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| <b>Forum:</b> | United Nations Environment Programme (UNEP)                           |
| <b>Issue:</b> | Examining the Necessity for a Global Policy Addressing Climate Change |
| <b>Chair:</b> | Heather Park, Head Chair & Alex Huang, Deputy Chair                   |

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## Introduction

Our world has been encapsulated with various natural disasters in the 21st century, including violent forest fires, harsher storms, and the melting of glaciers. Scientists have derived that this phenomenon is termed “climate change.” According to the Intergovernmental Panel on Climate Change (IPCC), researchers believe that the global temperature will rise between 2.5 to 10 degrees Fahrenheit in the next century. With the current stage of environmental effects, there will be an increase in global temperature, growing seasons, droughts, and strengths of hurricanes. Additionally, by 2100, the sea level may rise between 1 to 4 feet from melting ice caps. These drastic changes not only affect ecosystems but will change the lives of human society. The costs in order to repair damages and accommodate groups of people will use money and time.



*Caption #1: Photograph of melting Jakobshavn Glacier iceberg*

According to the IPCC 5th assessment report, 100% of the observed effects of climate change are due to human activity. These human-caused changes may be due to fossil fuel usage and aerosols, which conceal heat on the Earth from the ozone layer. The clearing and development of land for human use can also be seen as a cause for climate change as well. However, it can be debated on who is the central group responsible for the changes: the consumers purchasing the products, the government, or

big industrial companies. Thus, countries have formed documents and treaties, including the Paris Agreements and the Kyoto Protocol, in order to collaborate against the changing environment. Many countries are responsible for these changes, and it is through cooperation with other countries that the world may be able to revive itself from climate change.

## Definition of Key Terms

### Weather

Different from climate, the weather is the daily or yearly changes in weather patterns.

### Climate

Climate is the weather patterns that have been observed over a long period. These observations include seasonal temperatures, wind patterns, and rainfall averages.

### Climate Change

Climate change is the alteration of the average weather pattern on Earth, which can lead to long-term shifts in the regional and global weather patterns.

### Fossil Fuel

Fossil Fuels are hydrocarbon-contained materials, such as oil, gasoline, natural gas, and coal, that can be used as a source of energy. Consumption of fossil fuel has dramatically increased following the Industrial Revolution, and now supply 80% of the energy consumed on Earth by modern-day developed countries.

### Greenhouse Gas (GHGs)

Greenhouse Gases are any gases that are able to absorb infrared radiation heat energy from the Earth's surface. Some of the most common emitted GHGs are Carbon Dioxide, Methane, Nitrous Oxide, Ozone, and Fluorinated Gas.

### Greenhouse Emission

Greenhouse Emission is the process of GHGs being emitted into the Earth's atmosphere. Due to the discovery of fossil fuel energy in the Industrial Revolution, the increasing consumption rate of fossil fuel had led to an increase in Greenhouse Emission, leading to the Greenhouse effect

### Ozone Layer

The ozone layer, also known as ozonosphere, is a region located at the upper atmosphere of Earth that contains a high concentration of ozone molecules. The ozone layer helps block out harmful radiation, such as UV rays, from harming living creatures on Earth's surface.

### **Ozone Depletion**

Ozone depletion is the phenomenon of the gradual thinning of Earth's Ozone layer, caused by the release of chemical compounds through human activities and industrialization.

### **Fracking**

Fracking, also known as hydrofracking, is a process of injecting fluid at high pressure into the underground and allow trapped gas or crude oil to be collected. Although fracking provides a source of natural gas and crude oil, fracking requires a large amount of freshwater and most bodies of water become highly polluted by the end of the fracking process. The recollection of these highly polluted fracking fluids can also lead to contamination of water sources in neighborhoods.

### **Mitigation**

Mitigation is the effort and attempts to reduce greenhouse gas emissions as much as possible through the utilization of different technologies and renewable energy in order to prevent as many emissions from entering the atmosphere.

### **Coral Reef Bleaching**

Coral reef bleaching is the process where high sea temperature forces algae to leave the coral tissues they live in, leaving the coral reef with a white skeleton

## **Background Information**

### **Causes of Climate Change**

In order to understand the causes of climate change, we first need to understand global warming, as it is the primary cause of climate change. Global warming is the long-term increase in global temperature, leading to the heating of the Earth's climate. Global warming is a direct cause of the increasing melting of glaciers and icecaps, which leads to warmer ocean water and extreme weather, increasing the pace of climate change. In short, the current climate changes that we are experiencing is undeniably a result of human activities, due to the developments of the Industrial Revolution, exploitation of fossil fuel energy, and the Greenhouse Effect.

## ***Industrial Revolution***

The start of climate change and global warming can largely be rooted in the Industrial Revolution. The Industrial Revolution was a period of mass industrialization led by the creation of new manufacturing processes through the invention of new machines, technologies, and the discovery of new energy between the 1760s to 1900s. The First Industrial Revolution (1760-1850) saw the development of the textile and iron industry, leading to the creation of new manufacturing machines powered by coal energy. The Second Industrial Revolution (1850-1900s) that followed saw the discovery of new energy sources, such as gasoline and natural gas. In general, the Industrial Revolution led to the creation of machines that powers and heavily rely on fossil fuel energy, which led to an increase in the consumption of fossil fuel and the release of GHGs.

### ***Exploitation of fossil fuel energy***

As demands for fossil fuel increases due to industrialization, exploitation of fossil fuel energy skyrocketed. In the First Industrial Revolution, coal became the most exploited energy as coal was required to power steam engines developed for the textile industry. This led to the establishment of coal mines and coal-preparation plants, which caused huge environmental damage due to waste products from the process. When fuel and natural gas became the main source of energy during the Second Industrial Revolution, demand for fuel and exploitation of crude oil also increased. The exploitation of crude oil is mostly through drills set up on land and water, extracting crude oil from the bedrock below. As demand for oil and natural gases continues to increase, new techniques such as fracking have been developed to exploit natural gases and crude oil from underground, especially in regions that lack fossil fuel deposits. Additionally, the increased exploitation of fossil fuel continues to support the rising demand for fossil fuel consumption, which leads to ever more GHGs being emitted into the atmosphere.

### ***Greenhouse effect***

The process of burning fossil fuels leads to increased emissions of carbon dioxide into the Earth's atmosphere. On regular occasions, the Earth's surface reflects on some of the energy and heat absorbed from the sun naturally, in order to prevent overheating of the Earth's climate system. However, the over-accumulation of GHGs in the Earth's atmosphere absorbs and releases heat and infrared energy that is supposed to be reflected by Earth's surface back into the Earth's atmosphere. This process is known as the greenhouse effect and is harmful because the over-accumulation of GHGs in the Earth's atmosphere leads to the warming of global temperatures and the changing of Earth's climate.

## Effects of Climate Change

Despite climate change occurring naturally and happening through steady paces, human activity has resulted in a faster pace of climate change in recent centuries. Climate change these days not only increases global land and water temperature but can also lead to unpredictable weather patterns that affect farming and crop harvesting and damaging weather events.

### *Rising sea levels*

One of the most prominent effects of climate change is rising sea levels and the warming of oceans. As global warming increases the average global temperature, there will be an increase in the melting of glaciers and ice sheets and thermal expansion of the oceans. As a result, sea levels will continue to rise. Currently, sea levels are rising 1.8mm per year. The rise of sea levels not only increases the chances of coastal flooding worldwide but also leads to coastal erosion and an increase in the severity of storm surges.

### *Ozone Depletion*

One of the effects of global warming and GHGs emissions is ozone depletion, and it partially contributes to climate change. Ozone depletion not only increases the number of ultraviolet rays reaching Earth's surface but also intensifies atmospheric circulation in the Southern Hemisphere, leading to a shift in weather patterns in the Southern Hemisphere. However, it is a misconception that ozone depletion is a major cause of global warming and climate change as its effects are relatively small compared to the greenhouse effect.

### *Extreme Weather*

Extreme weather is one of the predominant effects of climate change as the shift in weather patterns caused by climate change leads to the formation of extreme weather. Climate change leads to unpredictable weather patterns, causing abnormal rainfall failure. Similarly, climate change and global warming also lead to higher atmospheric temperature, increasing the rate of evaporation. These situations combined with hotter summers and drier soils lead to the increased occurrence of droughts globally. Besides droughts, heat waves are also examples of extreme weather caused by climate change, and analysis has shown that climate change and global warming has resulted in the increasing probability of long term heat waves around the world. Furthermore, climate change also intensifies heavy downpour, as climate change and global warming lead to warmer oceans and more evaporation, leading to heavy downpours that could lead to severe flooding.

## ***Coral Reef Bleaching***

Climate change in recent years has led to the increased occurrence of marine heatwaves and a rise in sea surface temperature, leading to mass destruction of coral reefs globally. According to collected data, coral reef bleaching has risen from 8% in 1983 to 31% in 2016. Additionally, researchers have found that coral reef bleaching has become 5 times more frequent since 1980. Although coral reefs only account for 0.1% of the world's ocean floors, it supports around 25% percent of the world's biodiversity, which shows that climate change imposes threats to the lives of many sea creatures that rely on coral reefs as their home and food source.

## **Worldwide Efforts on fighting Climate Change**

Effects of climate change have not been addressed or observed for more than a hundred years since the First Industrial Revolution until 1896 when Swedish scientist Svante Arrhenius estimated that mass coal-burning resulted from the Industrial Revolution could warm global temperatures and allow colder regions to become more quibble when growing crops. Although the idea that fossil fuel burning could lead to a warmer climate has been developed, the consequences have not been taken seriously until the past 60 years. In 1956, the New York Times released an article claiming that the accumulation of GHGs in the atmosphere could lead to long-lasting environmental changes. Climate change issues have not been fully addressed globally until the establishment of The Intergovernmental Panel on Climate Change (IPCC), which marks that for the first time in human history, countries globally are finally seeing climate change and global warming as an issue that can not be ignored. The issue of climate change has been further addressed through mitigation and the creation of the United Nations Framework of Convention on Climate Change, the Kyoto Protocol, and the most recent 2015 Paris Climate Agreement.

### ***Establishment of the Intergovernmental Panel on Climate Change (IPCC)***

The Intergovernmental Panel on Climate Change (IPCC) is a panel created by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP) in 1988 in order to provide scientific information to government nations on developing climate policies. The panel currently has 195 members with IPCC scientists volunteering their time and creating assessment reports that provide extensive summaries about the causes of climate change. IPCC is divided into 3 working groups. Group 1 focuses on the physical science of climate change, Group 2 focuses on climate change impacts, and Group 3 focuses on the mitigation of climate change. IPCC also includes a task force that focuses on improving data collection and writing reports on greenhouse gas emissions.

### ***United Nations Framework of Convention on Climate Change (UNFCCC)***

The United Nations Framework Convention on Climate Change is a binding treaty adopted at the 1992 Rio Earth Summit that stated Parties to the Convention. The 197 countries that ratified the Convention are required to lower their GHGs emissions. Targets for reduction of GHGs were established later in the amendment of the Kyoto Protocol and the 2015 Paris Climate Agreements.

### ***Kyoto Protocol***

The Kyoto Protocol is an international agreement signed in 1995 that legally binds developed countries to reduce 4.7% of GHGs emissions according to 1990 GHGs emission levels. The Kyoto Protocol started its First Commitment Period from 2008 to 2012. Following the Doha Amendment, a Second Commitment period has been set which is planned to last from 2013 to 2020. The Kyoto Protocol overall is considered relatively successful as parties of the agreement achieved a 12.5% reduction of GHGs emissions since the creation of the Protocol. However, some researchers have argued that success in the reduction of GHGs emissions is largely due to the collapse of the Soviet Union, leading to a decline in industrial manufacturing in Eastern Europe. Furthermore, despite the Kyoto Protocol being a legally binding treaty, many nations have not achieved their GHGs reduction goals. Above all, the Kyoto Protocol itself does not include major emission countries, such as the United States and China, and has faced the withdrawal of countries such as Canada, Japan, and Russia.

### ***2015 Paris Climate Agreement***

By 2015, another climate agreement took place with more challenging reduction goals and more participation of nations globally, known as the 2015 Paris Climate Agreement. The 2015 Paris Climate Agreement was ratified by 186 countries to combat climate change and invest for a sustainable carbon future. Goals set for the strengthening of global efforts to combat climate change include keeping the rise of global temperature under 2 Degrees Celsius and limiting the increase of temperature to only 1.5 Degrees Celsius. Although the agreement seems successful, pledges for GHGs reduction are set by countries themselves, and some are less ambitious than others. Additionally, according to data from 2019, the world is currently still far off-track from the reduction goals set in the Paris Climate Agreement. Moreover, even if nations were able to achieve reduction goals set in the agreement, the world will still be on the pace of exceeding the rise of global temperature by 2 Degrees Celsius. Worse of all, nations such as the United States are considering withdrawal of the agreement as reduction goals are deemed to be impossible to be achieved.

## **Major Countries and Organizations Involved**



## United States of America

With 4833.1MT in carbon dioxide emissions in 2016, the United States is the 2nd largest emitter of carbon dioxide, totaling 16% of carbon dioxide gases in 2019. The Climate Science Special Report (CSSR) predicts an increase in the annual average global temperature to increase by 9 degrees Fahrenheit in comparison to the preindustrial ages. Between 1901 to 2016, there was a 1.8 degree Celsius increase in the United States' annual average temperature, and there are predictions of rising to 2.5 degrees Celsius by 2050. There are various incidents that may occur in the United States, including coastal flooding, which can target some of the country's largest cities, heat waves, increases of precipitation, and forest fires, as already seen by the Californian wildfires. The United States has not ratified the Kyoto Protocol and President Trump announced its withdrawal from the Paris Climate agreements in November 2019, decreasing the strength of the two important documents.

## China (PRC)

The People's Republic of China is one of the central countries that will determine if action will be taken against climate change. The populous country emits the greatest amount of carbon dioxide in the world, with 29% in 2019 and 9056.8MT in emissions in 2016. Due to the high amounts of smog in 2011, the country decided to make an effort to decrease its coal consumption to improve air equality. Despite efforts, there have been setbacks to these restrictions. During the second half of 2018, smog rose due to lenient restrictions on industries. Researchers found that around 75% of the GHG emissions are derived from supply chains, with 72% of emissions from overseas companies where products are being imported and exported. Brands located in China have used data from the Institute of Public and Environmental Affairs to monitor possible violations of emissions.

## India

India is responsible for 7% of the global carbon emissions since 2019, ranked 3rd in 2016 with 2076.8MT in emissions. The peninsula is extremely vulnerable to the effects of climate change from its long coastline and the large population susceptible to rising sea-levels. Heatwaves have already struck the country, and Intended Nationally Determined Contributions (INDCs) could amount to \$1 trillion. Some of the country's INDCs include achieving 40% of electric power from non-fossil fuel-based energy by 2030 and to create a carbon sink between 2.5 to 3 billion tons of CO<sub>2</sub> by 2030. Additional INDCs are efforts of mitigation and developing climate change technology to improve the state of the country. India has ratified the Kyoto Protocol, along with the Paris Agreement, marking that the country aims to improve its GHG situation.

## Canada



Canada has adopted its own emission reduction targets called the Pan Canadian Framework on Clean Growth and Climate Change in 2016. The document is the first climate change plan in Canadian history and has been set to help Canada to achieve its Paris Agreement GHGs reduction target of 30% reduction of 2005 levels while pledging over 2.65 billion over five years in Climate Finance. Despite Canada's efforts in setting GHGs emissions reduction goals, Canada's Paris Agreement GHGs reduction target only equals to 14% reduction of 1990 levels, the lowest pledge in all G7 nations. Although Canada's percentage of global emission has improved from 1.8% to 1.6%, Canada's GHGs emission has increased by 18% since 1990. Moreover, Canada has received global scrutiny for being the first country to withdraw from the Kyoto Protocol after admitting that its unable to achieve its emission reduction targets.

### European Union (EU)

The European Union has reduced its GHGs emissions by 21.7% since 1990 levels and has been a role model in setting up emission reduction targets in the international community. One of the targets set to be achieved on track by 2020 is the EU 2020 emission reduction goal, which includes a 20% cut in GHGs emissions since 1990, achieving 20% of all EU energy like renewable energy, and a 20% improvement in energy efficiency. Additionally, the EU also created the Emission Trading System (ETS), where a cap has been put on companies that sets emission reduction goals that will gradually decrease throughout the years. Companies that exceed their emission reduction goals need to buy emission space or else they will receive huge fines. Companies with an excess amount of emission space are able to sell it off to companies that have exceeded their emission reduction goals. Furthermore, the EU has also invested in the development of low carbon technologies through research programs and capital fundings.

### Timeline of Events

| Date         | Description of event  |
|--------------|---|
| 1712         | Thomas Newcomen invents the first commonly used steam engine                                    |
| 1760 - 1850s | 1st Industrial Revolution - the introduction of machinery and modern industrialization          |
| 1850 - 1900s | 2nd Industrial Revolution - the introduction of new energy and transportation                   |
| 1896         | Svante Arrhenius reasons that the effects of burning coal will lead to the warming of the Earth |
| 1927         | CO <sub>2</sub> emissions resulting from fossil fuels reach one billion tons per year           |
| 1988         | Creation of the Intergovernmental Panel on Climate Change (IPCC)                                |

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| 3-4 June 1992    | Rio Earth Summit adopts the UNFCCC  |
| 11 December 1997 | The Kyoto Protocol is adopted in Kyoto, Japan   |
| 2008 - 2012      | Kyoto Protocol First Commitment Period starts   |
| 8 December 2012  | Doha Amendment is added to the Kyoto Protocol, creating a Second Commitment Period that starts in 2013 and ends in 2020 |
| 12 December 2015 | The Paris Agreement is adopted  |
| 4 November 2016  | The Paris Agreement enters into force   |

## Relevant UN Resolutions and Treaties

- The Kyoto Protocol, 11 December 1997
- The Copenhagen Accord, 18 December 2009
- The Paris Agreement, 22 April 2016
- Supporting the Paris Agreement, 3 August 2016, (UNEP/EA.2/Res.6)

## Possible Solutions

The overall complexity and scale of climate change make it extremely hard for people to address and fix compared to the issues of ozone depletion or air pollution. However, the best way that humans can fix and address climate change is to lower the effects of global warming on climate change through the reduction of GHGs emissions.

**The adoption of a new agreement or revised agreement based on climate change and its effects is vital.** Two important climate change agreements that have already been ratified in countries are the Kyoto Protocol and the Paris Agreement. However, countries that have ratified these agreements struggle to make ends meet on combating climate change. For the Paris Agreement, it is predicted that a majority of the carbon emission reduction pledges by 2030 will not be successful in keeping their pledges, with the top emitters having the possibility to increase their emissions as well. Some major carbon emitters have not been willing to join the Paris Agreement. One example is the United States of America, with President Donald Trump announcing his exit from the agreement in November 2019 since it may “undermine [the] economy” and will put the United States “at a permanent disadvantage.” Other countries, such as Iran and Turkey, are not a part of these agreements as well. Thus, revisions to ensure economies will be sustained as well as incentives, which may include financial or trade-related, may be utilized to encourage these countries to join new or previous agreements.

**Emphasizing the current effects of climate change on the environment and human society is necessary.** According to "The Truth Behind the Paris Agreement Climate Pledges" published by several renowned scientists, failures to reach goals on limiting carbon emissions could lead to a minimum of \$2 billion per day from the effects of climate change on health, water, food, and the environment. Thus, it is vital for governments, NGOs, and any other groups to highlight events that have been sourced from climate change to the public and officials to stress the importance of global policies. The main factor for change is the opinion of the public. If the public is not willing enough to convince the government to enact change, greater dangers of climate change will be inevitable.

**The development of new green energy and resources is important in order to replace fossil fuel energy.** The burning of fossil fuels is the main cause of GHGs emissions; therefore, the replacement of fossil fuel with greener energy is key for solving the roots of this issue. The creation of new green energy has already been seen through the implementation of solar panels, hydro-powered dams, and nuclear power plants. However, not all of the green energies are sustainable or safe, so it is important for us to continue to search for greener energy to replace the burning of fossil fuel. This search of greener energy will be achieved by requiring nations, NGOs, and UN bodies to invest money into research programs for the development of greener energy. An example of this would be the creation of hydrogen-powered cars, which uses hydrogen gas to power the combustion engine instead of fuel. Despite it might seem easy, the replacement of fossil fuel energy not only will impact countries' economy that's reliant on the exploitation of fossil fuel, research for new energy also require years of research and a large sum of investment in order to achieve progress.

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