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PAMUN XVI RESEARCH REPORT— GLOBAL WARMING: GOING BEYOND PARIS (COP21) AND MARRAKECH (COP22)

Introduction of Topic

Global warming has become increasingly pertinent as more and more scientists and governments understand the impact of climate change. The scientific evidence suggests that there are worldwide changes occurring due to human interference, even if these changes may be regionally specific. While climate change may not be perceptible on a day-to-day basis, it has begun to have lasting effects on the environment, which will progressively worsen if it is not controlled.

Definition of Key Terms

Global Warming

An increase in the average temperature of the Earth's atmosphere, especially a sustained increase great enough to cause changes in the global climate. Many scientists believe that the Earth has been in a period of global warming for the past century or more, due in part to the increased production of greenhouse gases related to human activity.

Greenhouse Effect

A phenomenon in which the atmosphere traps radiation emitted by its sun, caused by gases such as carbon dioxide, water vapor, and methane that allow incoming sunlight to pass through but retain heat radiated back from the planet's surface.

Carbon Dioxide Emissions

Carbon dioxide (CO₂) accounts for the majority of greenhouse gases. CO₂ occurs naturally in the atmosphere, and is circulated through plants, soil, animals, and even water. However, due to the burning of fossil fuels such as oil, coal, and natural gas, CO₂ emissions have skyrocketed, and Earth's resources are unable to compete against the growing gas levels.

Carbon Tax

Carbon tax is the fee imposed on various fuels, based on the carbon content of each fuel. The objective of implementing a carbon tax is to reduce emissions through a monetary disincentive, with the eventual goal of having users switch to renewable energy.

Background Information

Global warming has garnered more attention in the recent decades, as mounting scientific evidence suggests human activity to be the primary source of climate change. According to a report by the Intergovernmental Panel on Climate Change (IPCC), it is more than 95% likely that human activities have greatly contributed to the increase in global temperatures over the last 50 years. While the sun's energy output does effect the climate – a decrease in output is believed to have triggered Ice Ages – it does not account for the current rise in temperatures. Indeed, if there was an increase in solar activity, all layers of Earth's atmosphere would be expected to warm. However, scientists are observing rising temperatures only at the surface and in the lower layers of the atmosphere, with a cooling in the upper atmosphere, directly related to the greenhouse gases trapping in heat.

While Earth has always depended on the greenhouse effect, recent human activity has begun to radically change its functioning: the burning of fossil fuels is estimated to account for 60% of greenhouse gas emissions, while agriculture and deforestation are each responsible for about 18% (UN Food and Agriculture Organization, World Resources Institute). The planet's ever-diminishing resources are no longer able to compete with the growing greenhouse gases, which are subsequently blocking heat from escaping the atmosphere and warming up the planet. According to data gathered by NASA, the average global temperature has increased by 0.99°C (1.7°F) since 1880, and has since continued to rise progressively faster each year: 2016 was recorded as the hottest out of the 136 years documented on file. The rising temperature has very real consequences on the environment, impacting both natural and human systems across the world.

Environmental Impact

Ice

Ice plays a vital role in the environment. While the amount of ice fluctuates during the winter and summer months, about 15% of the oceans are covered by ice year-round. The ice's white surface helps reflect sunlight back into the atmosphere, keeping global temperatures cooler, as well as the temperature of the oceans. In recent decades, the Arctic, Antarctica and Greenland are all seeing ice mass loss, which has accelerated since 2009. The loss of ice means less sunlight is diverted back, and the polar regions become more vulnerable to the increasing climate change, leading to extinction of species and ecosystem damage.

Oceans

The ocean levels have risen by 84.8mm since 1993, with a projected increase of 3.4mm a year according to NASA's calculations. There are two causes for rising water levels: the melting

glaciers draining into the sea and the expansion of water as it warms. The aquatic ecosystem is in peril: the warm water inhibits certain fish from breeding and algae from photosynthesizing, which in turn alters the natural food chain and human agriculture. While the ocean normally absorbs a large amount of CO₂, it is not equipped to support the recent increased levels. The water has gradually become more acidic, leading to more damage of aquatic life.

Extreme Weather

It is no coincidence that the recent surge of extreme weather coincides with the increase of global temperature. Ranging from hotter heat waves to stronger hurricanes, from more intense droughts to heavier rainfall, the weather is projected to get worse as temperature continues to rise. While climate change may not be responsible for a specific instance of extreme weather, it does seem to exacerbate the current weather conditions.

Social impact

All of the environmental impacts directly affect the human population. Rising sea levels will eradicate small islands and flood low-lying cities and states, forcing many to flee and relocated. The damaged ecosystem of the oceans will impact the fishing industry, and the extreme weather will destroy much of the agriculture. Already, there are plant and animal species that are being driven to extinction. Furthermore, the air quality is already declining, leading to the increase of allergies, asthma, and other respiratory issues. Infectious diseases are more likely to spread in polluted areas, as the conditions become more and more favourable to pathogens, especially those transmitted by insects.

Major Countries and Organizations Involved

Intergovernmental Panel on Climate Change (IPCC)

Created in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP), the IPCC is an international organization dedicated to assessing the scientific evidence relating to climate change. The primary purpose of the IPCC is to analyze existing literature on the environment and report relevant findings to policymakers. They may also comment on possible scenarios based on projected changes in the climate, as well as provide strategies that may mitigate the impact of future changes. However, while the IPCC includes these various suggestions, it is not a definitive course of action – the final decision is ultimately up to the policymakers.

United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC became effective on March 21, 1994, and is currently ratified by 197 parties, which includes all of the UN member states, the EU, and Palestine. The primary goal of the UNFCCC is to stabilize the amount of greenhouse gases in the atmosphere, in order to prevent further human impact on

the climate. The convention does not set binding limits on greenhouse gas emissions that countries must follow, but it carries the framework for other protocols that may detail specific action that will further promote the UNFCCC's objective.

Conference of the Parties (COP)

The COP is an annual meeting between all the members of the UNFCCC, which assess the progress of each party, based on how they have implemented and upheld the treaty. The COP also negotiates further agreements, such as setting concrete, legally binding obligations for developed nations to reduce greenhouse gas emissions. COP is responsible for the Kyoto Protocol (1997), the first agreement that called for stricter and more specific commitments in reducing greenhouse gas emissions in developed nations. More recently, the 2015 COP21 agreement in Paris, France calls for a global initiative to limit further temperature increase.

United Kingdom

The UK was the first country to enact a national legislation to combat global warming, through the Climate Change Act of 2008. The act entails a sizable reduction of the net UK carbon by 2050, reducing emission by 80% of the 1990 levels. The act also requires legally-binding carbon budgets, which caps the gas emission over a five-year period. Since 2013, the UK has maintained a form of the carbon tax, which requires fossil fuel producers to pay a minimum price for the CO₂ emissions. With one of the highest carbon tax rates, the UK has since begun to see a decline in emissions and a steady rise in renewable energy sources. While the UK signed the Paris Agreement before withdrawing as a member of the EU, it will continue to uphold the same values by replacing the former EU policies with new UK specific ones.

United States of America

The United States has a turbulent history with climate change. The Environmental Protection Agency (EPA) was created in 1970 with the purpose to protect both humans and the environment through research and education. Since then, the EPA oversees various legislations, concerning a range from air, water, land, endangered species, to hazardous waste. While carbon reduction strategies were implemented, the US is one of the few nations that does not implement a carbon tax. Recently, the Trump administration questioned the existence of global warming, believing that the reduction of fossil fuels hurts the US economy and job industry. The EPA has subsequently faced massive budget cuts while coal and oil producers are enhanced. On an international level, the US is notorious for signing agreements, yet not ratifying them. The US signed the Kyoto Protocol, but because it never ratified, it was not bound to the demands. The Trump administration also announced plans to withdraw from the Paris agreement, and the US will join the only other non-signatory nations, Syria and Nicaragua.

China

Since 2006, China has been the world's largest greenhouse gas emitter, as the largest consumer of coal. While China ratified the Kyoto Protocol, it was not obligated to limit emissions. However, due to the strain Chinese industries place on the environment, the government has made significant changes to reduce carbon emissions. One of China's primary objectives is to increase renewable energy sources to 20% of its total energy by 2030. China signed the Paris agreement, pledging the carbon emissions to reach a peak in 2030. Currently, it is on track to reach the peak earlier than indicated, due to the strong influx of clean energy sources.

European Union

Since the 1990's, the EU has addressed the need to limit greenhouse gas emissions, which eventually resulted in the European Climate Change Programme (ECCP), created in 2000. The purpose of the ECCP is to develop and implement strategies which would enable the EU to meet the demands of the Kyoto Protocol. The ECCP created the EU Emissions Trading System (EU ETS), which is the largest greenhouse gas emissions trading scheme in the world. Essentially, the EU ETS works as a cap and trade, where each member has a maximum allowance for emissions. If a member does not reach this cap, it may auction or trade the remaining allowance to a member who has exceeded its cap and requires more allowance. The cap is gradually reduced, thus reducing total emissions.

Timeline of Events

Date	Event
March 21, 1994	Creation of the UNFCCC
11 December, 1997	Adoption of the Kyoto Protocol
June, 2000	Creation of the ECCP
8 December, 2012	Adoption of the "Doha Amendment to the Kyoto Protocol"
30 November – 11 December, 2015	COP21 in Paris, France
7 – 11 November, 2016	COP22 in Marrakech, Morocco
2016	Hottest recorded year out of 136 documented

Relevant UN Treaties and Events

- United Nations Framework Convention on Climate Change, 9 May 1992
- Kyoto Protocol to the United Nations Framework Convention on Climate Change, 11 December 1997
- Doha Amendment to the Kyoto Protocol, 8 December 2012
- Paris Agreement, 12 December 2015

Main Issues

Economic effects

There are several consequences that will arise if climate change is not addressed, which will affect both large corporations and individuals. Severe weather, such as flooding from rising sea levels and extreme hurricanes, will damage infrastructure and resources will be required to rebuild roads, homes, powerlines, and factories. This will lead to the lost productivity that comes from climate-related disruptions; increased rainfall may delay the transport of goods, health issues from air pollution may prevent an employee from working efficiently.

Many industries rely on fossil fuels to function, as coal and oil were previously extremely cheap forms of energy. By minimizing cost of production, companies are able to maximize profit. The imposition of the carbon tax as a monetary disincentive has already shifted the industry, and renewable energy sources are slowly being introduced on a competitive scale. However, certain nations believe that a shift to clean energy will result in the loss of jobs and ultimately hurt the GDP, and thus are reluctant to implement these policies.

Environmental effects

By 2050, the world population is expected to exceed 9 billion. If this happens, there will be an extreme strain to secure enough resources to cover the entire population. Energy demands are projected to be 80% higher, which would increase greenhouse gas emissions by 50% and warm the planet by several degrees before the end of the century. The amount of gas in the atmosphere would contribute greatly to air pollution and pollution-related deaths. The growing amount of people would result in both land and water scarcity; the pressure to deforest the remaining land would result in a 10% in biodiversity, while the global water demand is projected to increase by 55%. These calculations are alarming, but it is possible to mitigate the future impact of global warming before reaching the “tipping point,” at which time, the damage to the planet will be irreversible.

Previous Attempts to solve the Issue

Kyoto Protocol

The first international solution to climate change was outlined in the Kyoto Protocol (1997), which called nations to commit to reducing greenhouse gas emissions, including CO₂, methane, nitrous oxide, and hydrofluorocarbons. The aim was to have a collective reduction of emissions by 5.2% below the 1990 levels by 2012. The Kyoto Protocol assigned nations different targets based on the status of developed or developing nation; the US was tasked with reducing emissions by 7%, while China, a developing country, was not required to reduce emissions, even though it has since surpassed the US as the primary greenhouse gas emitter. In 2012, an amendment was added to the protocol, known as the “Doha Amendment,” which established a second commitment period from 2013-2020. Of the 194 countries that signed the protocol, 192 have ratified. Canada withdrew, while the US never ratified. While a great initial agreement to combat climate change, it seems the Kyoto Protocol is not entirely successful, as carbon emissions are still rising and the global temperature is increasing.

Paris Agreement

The 21st Session of the Conference of the Parties to the U.N. Framework Convention on Climate Change took place in Paris, France in 2015. This convention marked another major milestone, as it united the entire world in a single agreement. While the Kyoto Protocol set targets for only a select number of developing countries, the Paris Agreement involves a global collaboration to curb climate change. The key goals of this agreement are to keep global temperatures no higher than 2°C (3.6°F) of pre-industrial times, by limiting the greenhouse gas emissions to a level such that the natural environment can absorb normally, a result expected between 2050 and 2100. Each nation will submit emissions reports to be reviewed every five years, so that they may be held accountable. Furthermore, developed nations will provide financial assistance to developing countries to help them switch to renewable energy.

COP22

The 22nd Session of the Conference of the Parties to the U.N. Framework Convention on Climate Change was held in Marrakech, Morocco, in 2016. The goal of this convention was to further develop the Paris Agreement, along with preliminary reports of international progress. There were several key outcomes in COP22, among them negotiations on increasing financial contributions of developed nations to developing countries. They also discussed the loss that would ensue from climate change, focusing not only on the immediate damage of the environment, but on the non-economic losses as well, which includes a loss of culture and identity due to migration.

There have been several large attempts to mitigate the effects of climate change. It is important to note the while this section outlines international agreements, many individual countries, states, and even cities have already made enormous effort to combat global warming.

Possible Solutions

While the Paris Agreement is a promising first step to reversing the damage on the climate, there is still a long way to go. Of course, reducing carbon emissions will be instrumental. One such way is through clean power plants, which are turning to sunlight to generate electricity. Individual uses for solar power are also positively contributing to the environment. While it may not be feasible for all factories to switch to solar energy, nuclear power produces significantly less CO₂ compared to coal. Furthermore, both hybrid and electric cars are proving to be environmentally friendly, which will surely make an impact as the number of vehicles approaches two billion, provided the electricity does not come from fossil fuels.

Agriculture is another sector which would benefit greatly from environmentally-conscious change. Current machines and farming products such as manure produce a large amount of greenhouse gas emissions; switching to cover crops would reduce soil erosion, and bio-digesters would reduce animal waste. Certain crops can also be turned into bio-fuels, which would replace the use of gasoline while being more sustainable.

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