FORUM:	Environment Commission
ISSUE:	Measures to Address the Impacts of Severe Climate Change
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POSITION:	President of Environment Commission

Introduction

Severe climate change has emerged as one of the most urgent challenges of the 21st century, threatening ecosystems and human health. As the planet gets warmer, extreme weather events such as hurricanes and floods are increasing, causing significant damage to ecosystems and displacing people from their homes. The impacts of climate change are already being felt around the world, and without immediate and decisive action, the consequences could be catastrophic and irreversible.

Guiding international efforts to mitigate and adapt to climate change is crucial. To address these impacts, it is essential to identify the problems caused by severe climate change, review the global efforts to tackle these challenges, and propose effective solutions. A deeper understanding of this issue will lead to the creation of policies and resolutions that can guide the world toward a more sustainable future.

A collage of events related to climate and weather: loss of glacial ice, wildfires, hurricanes, floods, and drought

Background

Climate change primarily occurs because of the increase in greenhouse gases (GHGs) in the atmosphere, which are largely a result of human activities such as the burning of fossil fuels, deforestation, and industrial processes. Since the Industrial Revolution, the concentration of carbon dioxide (CO_2) in the atmosphere has risen dramatically, leading to an increase in global temperatures. According to the Intergovernmental Panel on Climate Change (IPCC), the Earth's average temperature has increased by approximately 1.2°C since the late 19th century, significantly affecting weather patterns, sea levels, and ecosystems.

Looking back, several important steps have been taken globally to address the issue. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was created as the first major

global agreement aimed at stabilizing GHG levels. This was followed by the 1997 Kyoto Protocol, which established legally binding targets for developed countries to reduce their emissions. Despite these efforts, global GHG emissions have continued to rise, primarily due to industrial growth in developing countries and weak enforcement of these agreements.

The Paris Agreement, adopted in 2015, was a major milestone in global climate policy. The agreement, endorsed by 196 countries, aims to limit global warming to well below 2°C above pre-industrial levels, with the goal of limiting the increase to 1.5°C. It emphasizes the need for all countries, regardless of their level of development, to cooperate on reducing emissions and adapting to the impacts of climate change.

Problems Raised

Environmental Degradation

One of the most severe consequences of climate change is the degradation of natural environments. Rising temperatures have led to the melting of polar ice caps and glaciers, resulting in rising sea levels. This increase in sea levels threatens coastal ecosystems and human settlements. Additionally, the oceans are absorbing excess CO_2, making them more acidic. This is particularly detrimental to marine life, especially coral reefs, which are crucial to marine biodiversity.

Deforestation in Amazon rainforest

Moreover, climate change is exacerbating desertification and deforestation, particularly in vulnerable regions such as Sub-Saharan Africa and the Amazon rainforest. As temperatures rise and rainfall patterns shift, these regions are experiencing more frequent and severe droughts. This leads to the loss of fertile land and forces communities that are dependent on agriculture to move. Another significant concern is the loss of biodiversity. As habitats are destroyed and the climate changes, many species struggle to survive and face the risk of extinction.

Human Displacement and Health Risks

Climate change is not only an environmental issue but also a profound humanitarian crisis. Extreme weather events such as hurricanes, floods, and wildfires are occurring more frequently and becoming more intense, displacing millions of people worldwide. According to the Internal Displacement Monitoring Centre, climate-related disasters displaced over 30 million people in 2020 alone. These

displaced populations, often referred to as climate refugees, face numerous challenges, including loss of livelihoods, food scarcity, and limited access to essential services such as healthcare and education.

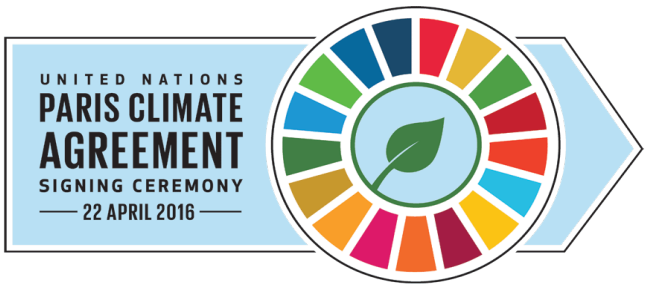
Beyond displacement, climate change also poses serious health risks. Rising temperatures are contributing to the spread of diseases such as malaria and dengue fever, as warmer climates enable disease-carrying insects to thrive in more places. Furthermore, heatwaves are becoming more frequent and intense, leading to increased mortality rates, especially among vulnerable populations such as the elderly and those with pre-existing health issues. The World Health Organization estimates that climate change will cause an additional 250,000 deaths per year between 2030 and 2050 due to malnutrition, malaria, diarrhea, and heat stress.

International Actions

The Paris Agreement

The Paris Agreement, adopted in 2015, represents the most important global effort to address climate change. It established a framework for all countries to take strong climate action, aiming to limit the global temperature rise to well below 2°C, and ideally to 1.5°C. Each country submits its own climate action plan, known as Nationally Determined Contributions (NDCs), which outlines how it will reduce greenhouse gas emissions and adapt to the effects of climate change.

The Paris Agreement also includes support for developing countries, which are often the most affected by climate change but have the least resources to deal with it. Financial aid, technology transfer, and capacity-building efforts are integral to the plan, with the Green Climate Fund, established under the UNFCCC, playing a key role. This fund helps developing countries transition to low-carbon economies and build resilience to climate impacts.



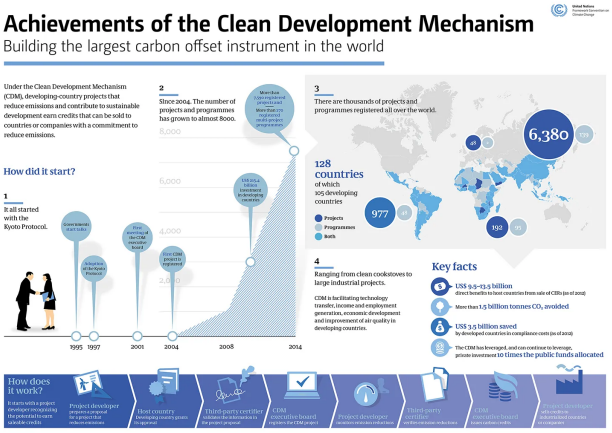
22 April 2016 High-Level Signature Ceremony for the Paris Agreement

Despite its achievements, the Paris Agreement faces several significant challenges. One major issue is the gap between the current NDCs and the emissions reductions needed to meet the 1.5°C target. Many countries' NDCs are not strong enough, and there is a lack of binding enforcement mechanisms to ensure that countries meet their commitments. Additionally, the temporal withdrawal of the United States from the Paris Agreement in 2020 — though later reversed — highlighted the vulnerability of the agreement to political changes.

The Kyoto Protocol

The Kyoto Protocol, adopted in 1997 and entered into force in 2005, was the first international treaty to set legally binding targets for reducing GHG emissions. It required developed countries, which are historically responsible for the majority of emissions, to reduce their emissions by an average of 5% below 1990 levels during a commitment period from 2008 to 2012.

The Kyoto Protocol introduced several innovative methods such as emissions trading, the Clean Development Mechanism (CDM), and Joint Implementation (JI). These allowed countries to meet their targets by investing in emissions reduction projects in other countries. These mechanisms were designed to provide flexibility and cost-effectiveness in achieving emissions reductions while promoting sustainable development in developing countries.



Achievements of the Clean Development Mechanism

However, the Kyoto Protocol had its drawbacks. One major criticism was that it only required developed countries to reduce emissions, excluding developing countries, including major emitters like China and India. Additionally, some countries, such as the United States, did not ratify the protocol, weakening its overall effectiveness. Despite these challenges, the Kyoto Protocol set the stage for future climate agreements and provided valuable lessons for shaping the Paris Agreement.

Key Players

United States

The United States, as one of the largest greenhouse gas emitters globally, has played a significant role in international climate negotiations. Under different administrations, the U.S.'s approach to climate change has varied considerably. During the Obama administration, the U.S. played a key role in negotiating and adopting the Paris Agreement, setting ambitious targets for reducing emissions. However, the subsequent withdrawal from the agreement under the Trump administration in 2020 marked a significant setback for global climate efforts. The Biden administration has since rejoined the Paris Agreement and committed to reaching net-zero emissions by 2050 through a transition to clean energy and increased investment in climate resilience.

European Union

The European Union (EU) has been a leader in global climate action, consistently advocating for stronger international commitments and setting ambitious targets for reducing its own emissions. In 2019,

the EU introduced the Green Deal, a plan to make Europe the first climate-neutral continent by 2050. This comprehensive plan includes measures to reduce GHG emissions, promote renewable energy, improve energy efficiency, and protect biodiversity. The EU has also been a strong advocate for climate finance for developing countries, contributing significantly to the Green Climate Fund and other international initiatives.

Possible Solutions

Renewable Energy Transition

One of the most effective solutions to address severe climate change is the transition from fossil fuels to renewable energy sources. Solar, wind, and hydropower are not only abundant and sustainable but also increasingly affordable compared to traditional energy sources. To facilitate this shift, governments and the private sectors should invest in renewable energy infrastructure, provide subsidies and incentives for clean energy projects, and gradually eliminate fossil fuel subsidies that encourage the continued use of carbon-intensive energy sources. This transition will reduce GHG emissions, decrease air pollution, and create new jobs in the green economy.

The Global Energy Transition

Climate Adaptation and Resilience Building

In addition to mitigation efforts, it is crucial to focus on adaptation strategies to protect vulnerable communities from the impacts of climate change. This includes investing in infrastructure that can withstand extreme weather events, such as flood defenses and climate-resilient buildings. Developing countries, in particular, need support to build resilience, including access to climate finance, technology transfer, and capacity-building programs. Strengthening early warning systems, promoting sustainable agriculture, and restoring degraded ecosystems are also essential parts of a robust and effective adaptation strategy.

Glossary

Greenhouse Gases (GHGs)

Gases that trap heat in the atmosphere, contributing to global warming, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)

Adaptation

Adjustments in systems, practices, or structures to reduce harm or take advantage of opportunities posed by climate change

Biodiversity

The variety of life in a particular habitat or ecosystem, crucial for maintaining ecological balance

Climate Finance

Funding provided by developed countries to developing nations to help them mitigate and adapt to climate change

Climate Neutral

Achieving a balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks, leading to no net carbon emissions

Climate Resilience

The ability of communities, economies, and environments to cope with the impacts of climate change and recover from climate-related disasters

Emissions Trading

A market-based approach to controlling pollution by providing economic incentives for reducing the emissions of pollutants

Fossil Fuels

Natural fuels such as coal, oil, and natural gas, formed from the remains of ancient plants and animals, and major sources of greenhouse gas emissions

Nationally Determined Contributions (NDCs)

Climate action plans submitted by each country under the Paris Agreement, outlining their commitments to reduce emissions and adapt to climate change

Net-Zero Emissions

A state where the amount of greenhouse gases emitted is balanced by the amount removed from the atmosphere, resulting in no net increase in atmospheric greenhouse gases

Paris Agreement

An international treaty adopted in 2015, aiming to limit global warming to well below 2°C, with efforts to keep the increase to 1.5°C

Renewable Energy

Energy from sources that are naturally replenishing, such as solar, wind, and hydropower, and do not produce greenhouse gas emissions when generated

Sustainable Development

Economic development that is conducted without depletion of natural resources, ensuring that future generations can meet their needs

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