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Climate Change causes and effects

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Abstract

The earth is warming over time, and many people believe that rising temperatures are the main effect of climate change. However, the story does not begin with the temperature increase. The earth is a system, and because everything is interconnected, changes in one place can impact changes everywhere else. De facto, climate change's effects pose significant challenges for humanity. Worldwide marine and terrestrial ecosystems are at risk of significant modification due to climate change because ecosystems and biodiversity support cannot adapt or migrate at the same rate as climate change. Global warming threatens to destroy large portions of biodiversity. This article sheds light on the effects of climate change on the environment, transportation system, and human health, all of which are critical to sustainable development. It also explores the various causes and laws of climate change with potential solutions to combat challenges.

Keywords

Climate change, causes, effects, and International legal framework.

1. Introduction

One of the leading global concerns is climate change. Long-term changes in temperature and weather patterns are referred to as climate change. These shifts may be natural or artificial. Since the 1800s, human activities such as burning fossil fuels like coal, oil, and gas have been the primary cause of climate change. Burning fossil fuels produces greenhouse gas emissions that serve as a blanket around the planet, trapping heat from the sun and increasing temperatures.[1]The

[1]Turral, H., Burke, J., & Faurès, J. M. (2011). *Climate change, water and food security* (No. 36). Food and agriculture organization of the United Nations (FAO).

level of greenhouse gas concentrations is the highest it has been in two million years. The finding is that the earth has warmed by around 1.1°C since the late 1800s. Moreover, the most recent ten years, from 2011–2020, were the warmest ever.[2]According to Article 1 of the United Nations Framework Convention on Climate Change (UNFCCC)1992, 'climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods.' It clarifies that climate change is artificial. A typical human activity distressing the climate is the greenhouse gas emission into the atmosphere. Consequently, the final goal of the climate change legal framework is to achieve 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'[3] According to some research, approximately 30% of plant and animal species could become extinct if global temperatures keep rising.[4] Every nation is in danger due to the disastrously rapid rate of change. Additionally, Bangladesh faces significant natural disasters almost every year. Land and sea ecosystems are under threat in Bangladesh due to climate change brought on by global warming. This article explores various causes and laws related to climate change. It also sheds light on the effects of climate change on the environment, transportation system, and human health, all of which are critical to sustainable development. This paper argued that improved global climate governance and coherence within the current framework should take the lead to meet the climate challenges.

[2] Causes and Effects of Climate Change, https://www.un.org/en/climatechange/science/causes-effects-climate-change (Accessed on 10/10/2022)
[3] Article 2, The United Nations Framework Convention on Climate Change (UNFCCC)1992.
[4] "Climate Impacts on Ecosystems." EPA, 19january2017snapshot.epa.gov/climate-impacts/climate-impacts-ecosystems_.html. (Accessed on 15/10/2022)

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2. Causes of Climate Change

There are a few leading causes of climate change:

2.1 Deforestation

Every year, almost 10 million hectares of forest are destroyed worldwide. We lose about five million hectares of forest annually, though about half of it is balanced by new growth in the forests.[5] We are removing trees to build structures or for other reasons. Deforestation and climate change can coexist. Forests absorb carbon dioxide, so cutting them down decreases nature's ability to keep emissions out of the atmosphere. Rapid deforestation due to wildfires and other extreme weather contributes to global warming. Deforestation is the second largest source of greenhouse gases in the world. [6]However, as CO2 production has increased gradually, the capacity of the earth's natural systems to absorb Co2 decreased as well. It is occurring in numerous ways as resources on earth are disappearing, like deforestation. Some researchers claim that plants and soil will absorb less CO2 as the planet warms, intensifying climate change. To stop deforestation, a lot of people and organizations are voicing out. It is a crucial problem that needs to be solved to slow down climate change.[7]

2.2 Human Activity

Human activities are traced to the raising of greenhouse gases in the environment over the last 150 years.[8]In 2020, roughly 35.96 billion metric tons of carbon dioxide emissions were worldwide. Of this total, the power sector was the major contributor to CO2 emissions that year, contributing around 37%. In 2020, combustion for industrial manufacture and fuel generation

[5]Deforestation and Forest Loss, https://ourworldindata.org/deforestation#:~:text=Globally%20we%20deforest%20around%20ten,deforestation%20occurs%20in%20the%20tropics. (Accessed on 11/10/2022)
[6] "Deforestation and Climate Change." Earth Day Network, www.earthday.org/campaigns/reforestation/deforestation-climate-change/.(Accessed on 12/10/2022)
[7] "REDD: Protecting Climate, Forests and Livelihoods." International Institute for Environment and Development, January 24 2018, www.iied.org/redd-protecting-climate-forests-livelihoods.
[8] Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K., ... & Miller, H. (2007). IPCC fourth assessment report (AR4). Climate change, 374.

accounted for 21% of all emissions worldwide.[9] In 2020, the worldwide transportation sector generated over 7.3 billion tons of CO2 emissions, making it one of the worst polluters. With 41% of all transportation-related emissions that year, passenger vehicles were the primary source of emissions.[10] Nearly one-fourth of all carbon dioxide emissions connected to energy come from transportation. The American Association for the Advancement of Science claims that there is "clear scientific evidence" that human activity is to blame for the current global climate change, which is becoming a more significant threat to society.[11]

2.3 Powering buildings

Globally, a significant source of greenhouse gas emissions contributor is the residential and commercial building sector. These emissions are caused partly by the direct burning of fossil fuels for energy in buildings and partly by the production of electricity. Burning coal, oil, or gas still supplies most of the world's electricity, producing carbon dioxide and nitrous oxide, two potent greenhouse gases that cover the planet and trap the sun's heat. Recently, energy-related carbon dioxide emissions have risen due to rising energy demand for heating and cooling, rising air conditioner ownership, and increased power use for lighting and different appliances. Data reveals that in 2018, building manufacturing materials alone accounted for 11% of international energy and process-related greenhouse gas emissions. [12] Gases are also released during mining and other industrial activities.

2.4 Agriculture

Agriculture has a significant impact on climate change in many ways. Consumers in the wealthiest countries are responsible for 14% of deforestation; imported meat, vegetable oils,

[9] Distribution of global carbon dioxide (CO2) emissions in 2020, by sector, https://www.statista.com/statistics/1129656/global-share-of-co2-emissions-from-fossil-fuel-and-cement/ (Accessed on 11/10/2022)
[10] Distribution of carbon dioxide emissions produced by the transportation sector worldwide in 2020, https://www.statista.com/statistics/1185535/transport-carbon-dioxide-emissions-breakdown/(Accessed on 11/10/2022)
[11] "AAAS Reaffirms Statements on Climate Change and Integrity." American Association for the Advancement of Science, www.aaas.org/news/aaas-reaffirms-statements-climate-change-and-integrity.
[12] International Energy Agency. 2019 global status report for buildings and construction: towards a zero-emission, efficient, resilient building and construction sector. (2019).

coffee, cocoa, and paper have all been grown on deforested land.[13] So, due to deforestation, agriculture is responsible for a sizeable share of the globe's greenhouse gas emissions. However, agriculture is another industry that is making significant steps toward sustainability. It can operate as a carbon sink, eventually absorbing almost as much CO2 as it releases.[14]

3. Effects of Climate Change

There are some effects of climate change:

3.1 Hotter temperatures

The earth's surface temperature rises with the increase in greenhouse gas concentrations. The period from 2011 to 2020 was the warmest on record. Since the year 1980, each decade has been warmer than the one before it.[15] There are more hot days and heat waves everywhere in the world. Wildfires can start more quickly and spread more swiftly in warm conditions. At least twice as swiftly as the rest of the world, the Arctic has warmed.

3.2 Increased drought and more storms

As our atmosphere gets warms, we are experiencing more droughts, severe storms, and floods. Scientists predict that if we do not cut back on our emissions, climate change might lead to the death of more than 250,000 people annually and push 100 million people into poverty by the year 2030.[16] Water supply is changing due to climate change. In many water-stressed locations, global warming makes water shortages worse. It is raising the possibility of ecological droughts making ecosystems more vulnerable and the risk of agricultural droughts affecting crops. Additionally, severe sand and dust storms that can transport billions of tons of sand across continents can be sparked by droughts.

[13] https://ourworldindata.org/grapher/imported-deforestation (Accessed on 12/10/2022)
[14] "Agriculture and Greenhouse Gas Emissions." American Farm Bureau Federation – The Voice of Agriculture, www.fb.org/market-intel/agriculture-and-greenhouse-gas-emissions.
[15] Causes and Effects of Climate Change (fn2)
[16] https://www.nrdc.org/stories/global-warming-101#effects (Accessed on 9/10/2022)

In many areas, destructive storms have increased in ferocity and frequency. As temperatures rise, more moisture evaporation occurs, intensifying hefty rains and flooding and causing more powerful storms. Warm ocean surface waters are also the sources of cyclones, hurricanes, and typhoons. According to the National Oceanic and Atmospheric Administration, 20 weather-related disasters in the United States in 2021 cost at least $1 billion in damages.

3.3 Sea levels rising and melting ice sheets

Global sea levels are rising more quickly. Rising ocean temperatures, melting glaciers, and ice sheets consistently contribute to rising sea levels. Since 1880, the average sea level has increased by 8 to 9 inches (21 to 24 centimetres). Global sea level reached a new peak in 2021 of 97 mm (3.8 inches) above 1993 levels. From 2006 to 2015, it increased by more than double, from 0.06 inches (1.4 millimetres) per year over the majority of the 20th century to 0.14 inches (3.6 millimetres) per year. [17] According to the United Nations Ocean Atlas, 8 of the world's ten largest cities are near coasts. Sea-level rise can have far-reaching impacts on coastal cities and habitats because it contributes to rising floods, global temperatures, and greenhouse gas emissions. Since 1979, the summertime melting of Greenland and Antarctica's ice sheets has increased by around 30% due to climate change. [18]

3.4 Loss of species

Climate change threatens the survival of species on land and in the sea. These risks increase with increasing temperatures. Many species are threatened with extinction in the coming decades. Wildfires, extreme weather conditions, invasive pests, and diseases are among the many threats associated with climate change. Some species can migrate and survive, but others will not. According to research, approximately one million different species live in the waters. The potential of mass species migration brought on by rising ocean temperatures could lead to the homogeneity of biodiversity worldwide. The rising ocean temperatures risk could lead to the mass migration of

[17] https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level/.(Accessed on 12/10/2022)
[18] "National Snow and Ice Data Center." Quick Facts on Ice Sheets | National Snow and Ice Data Center, nsidc.org/cryosphere/quickfacts/icesheets.html (Accessed on 11/10/2022)

species, causing the global homogenization of biodiversity.[19] It can cause a decline in species in the warmer water regions and a sharp increase in the colder regions around the poles. This type of transformation could seriously impact global fisheries and aquaculture.[20]

3.5 Food and water resources

Climate change can hurt food and water supplies. It can raise hunger and malnutrition around the world. Severe weather and rising temperatures may continue to limit crop productivity, reduce livestock productivity, and increase water demand. As food demand is expected to grow by nearly 70 per cent by 2050, the problem will only worsen.[21]

3.6 Different health risks

Climate changes are harming people's health through air pollution, extreme weather levels, forced displacement, diseases, mental health pressures, poor nutrition, and hunger problems in places where people cannot grow sufficient food.[22]Higher temperatures raise heat-related illnesses, and working outdoors will be more difficult. Changing weather patterns also increase death rates. Data reveals that environmental risks take the lives of approximately 13 million people each year.

3.7 Financial challenges

The enormous expenses of losing natural resources like clean water and air make it difficult to calculate a precise value of the costs of climate change. Additionally, many regions of the world are experiencing economic difficulties due to climate change.[23] The United States already spends

[19] Appeltans, W., Ahyong, S. T., Anderson, G., Angel, M. V., Artois, T., Bailly, N., ... & Costello, M. J. (2012). The magnitude of global marine species diversity. Current Biology, 22(23), 2189-2202.
[20] Faure, M. G., & Peeters, M. (2011). Climate Change Liability-Introduction. Climate Change Liability, Cheltenham: Edward Elgar.
[21] Kijne, J. W. (2013). Hugh Turral, Jacob Burke and Jean-Marc Faurès: climate change, water and food security. Irrigation Science, 31(3), 179-182.
[22] Costello, A., Abbas, M., Allen, A., Ball, S., Bell, S., Bellamy, R., ... & Patterson, C. (2009). We are managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. The Lancet, 373(9676), 1693-1733.
[23] Ruppel, O. C., Hattingh, J., Spier, J., Koch, H. J., Roschmann, C., & Pillay, A. G. (2013). Climate Change: International Law and Global Governance Volume I: Legal Responses and Global Responsibility. Perspective, 10, 349.

around $240 billion per year on climate change that humans drive, and future expenditures are expected to be substantially greater.[24]

4. International framework for climate change

Many international legal frameworks have been taken for climate change issues in the past few decades. They reflect the evolution of ideas that guide the States and international organizations to adopt measures regarding climate change issues. Some regulatory developments have increased responsibility for the overwhelming outcomes of global warming. According to the study, some international frameworks are mentioned here.

4. 1 The UN Framework Convention on Climate Change (UNFCCC)

The UNFCC sets the fundamental legal guidelines and principles for global climate change cooperation. It aims to stabilize greenhouse gas concentrations in the atmosphere to prevent dangerous human interference with the climate system. The UNFCCC was signed on May 29 1992, and entered into force on March 21 1994. The 198 countries that ratified the Convention are called Parties to the Convention. The general procedural terms of the UNFCCC established a Conference of the Parties, which would meet regularly to negotiate concrete protocols to supplement the more general provisions of the UNFCCC. A secretariat was established to support this work.

4.2 The Kyoto Protocol

The Kyoto Protocol was adopted in December 1997 to increase the impact of the UNFCCC of 1992. It obligated industrialized nations and those undergoing a market economy transition to meet the defined emissions reduction objectives for a basket of six GHGs. The first commitment period of the Kyoto Protocol ran from 2008 to 2012. The second commitment term, from 2013 to 2020, was recognized by the Doha Amendment of 2012.

[24] "The Economic Case for Climate Action in the United States." FEUUS, feu-us.org/case-for-climate-action-us (Accessed on 8/10/2022)

4.3 The Paris Agreement

196 Parties adopted the Paris Agreement on December 12 2015, and it came into force on November 4 2016. Its goal is to limit global warming on the earth. Countries aspire to reach a global peak in greenhouse gas emissions to construct a climate-neutral globe by the middle of the century to achieve the long-term temperature target. It is a landmark agreement in the multilateral climate change process. Because for the first time, a legally binding agreement unites all nations together to fight against climate change and its effects. The Global Stocktake, which is conducted every five years, reviews the parties' cumulative progress on mitigation, adaptation, and means of implementation. The Paris Agreement is the high point of international law on climate change in 2020. It plans the worldwide response to climate change during the following decades. Countries promised to keep global warming below 2ºC —more likely 1.5ºC —above preindustrial levels. However, we will only achieve this temperature goal if we maintain the international climate commitments.

4.4 The 1987 Montreal Protocol

The historic multilateral environmental deal is the Montreal Protocol. It safeguards the stratospheric ozone layer by phasing out the production and consumption of ozone-depleting substances(ODS). These substances damage the stratospheric ozone layer, the shield that protects people and the environment from the sun's damaging UV radiation when they are released into the atmosphere. The Protocol was adopted on September 16 1987.

Other treaties focus on specific species or ecosystems covering climate change, but these are general and comprehensive conventions.

5. Conclusion and Recommendation

Climate change is accurate, and it has an impact on our life. The current effects are impacting people, communities, and species all across the earth. Even if the implications of climate change may appear dire, we can still prevent the worst outcomes by taking proper steps. There are some possible strategies to combat climate change to create a cleaner planet, such as:

- One of the primary energy consumers is heating and cooling systems in buildings. Approximately half of household energy use is spent on heating and cooling. People can increase the energy efficiency of their area by sealing cracks and ensuring it is well-insulated.
- Most vehicles on the world's roads burn either diesel or petrol. Driving less and using a bike or walking will reduce greenhouse gas emissions.
- Water waste should be decreased. Conserving water also lowers carbon emissions. This is because energy is required to pump, heat, and treat the water.
- State authorities should take the necessary steps to stop deforestation.
- Developed countries and international organizations must assist developing and developing countries to comply with their core obligations regarding climate change issues and meet their international minimum standard.
- In this regard, binding laws should be formed. In response to the changing climate and for the survival of humanity, significant changes should be made to the current legal framework.

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