

Climate Change and Global Warming: A Critical Analysis

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Abstract

Global warming which is also denoted as climate change, is the observed rise in the average temperature of the Earth's climate system the global surface temperature is likely to go up a further 0.3 to 1.7°C in the lowest emissions scenario, and 2.6 to 4.8°C in the highest emissions scenario. These readings have been taken into account by the "national science academies of the major industrialized nations". Future climate change and its effects will differ from region to region. Expected effects include rise in global temperatures, rising sea levels, changing precipitation, and expansion of deserts. In its very inception of the research paper, the authors have dealt with the concept of Global Warming and Climate Change and the difference between the two. Further, the authors have delved deep into understanding the natural causes of Global Warming. In the subsequent chapter the Human influences on Global Warming and Climate Change is unearthed. The fourth part deals with the harmful effects of Global Warming. The paper has been concluded with thought-provoking suggestions on overcoming the problem of Global Warming and Climate Change by providing reasonable solutions.

Keywords: Global warming, climate change, temperature, Human influences, industrialized nations

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GLOBAL WARMING VERSUS CLIMATE CHANGE

"Climate change is no longer some far-off problem; it is happening here, it is happening now" [1].

—Barack Obama

Global warming is a long-term phenomenon of an increase in the temperature of the planet. The term Global Warming and Climate Change has been used interchangeably. During research, back in the late 1980s about how humans seemed to be doing things that result in heating up the planet, the term they usually used was global warming. This was mainly because the main effect was of greenhouse gases like carbon dioxide, methane, nitrous oxide, etc. which is the main contributor of this phenomenon of global warming. They trap more and more of the Sun's energy and drive the average temperature of the planet higher. Global warming has many facets, effect of greenhouse gases being one of them.

Climate change refers to a broad range of global phenomena created predominantly by

burning fossil fuels, which add heat-trapping gases to Earth's atmosphere. These phenomena include the increased temperature trends described by global warming [2]. The Average temperature rise is global, but climate is local and involves not just the average temperature, but also other criteria that vary, such as humidity, cloudiness, rain (or snow), and precipitation. Ocean currents make a difference in the coastal areas. For instance, England has much milder winters than Canada though it is farther north; this is mainly because the Gulf Stream carries warm water across the Atlantic to keep it relatively balmy.

Scientists have researched that rise in the Earth's temperature is very likely because of these factors. Climate patterns change as the planet warms up which causes extreme and unpredictable weather conditions. These changes bring far reaching effects on the planet [3]. Therefore, while global warming is the upfront root cause, what most people witness is a climate change.

The bottom line is that while global warming is not detrimental and climate change more

specifically describes the actual movement. This is a major reason why many people have settled on the latter term.

NATURAL CAUSES OF GLOBAL WARMING

Volcanic Eruptions

Volcanic eruptions gush out carbon dioxide which is a greenhouse gas and, but they also spew aerosols, such as volcanic ash or dust, and sulphur dioxide. Aerosols are liquids and solids that float around in the environment which involve soot, dust, salt crystals, bacteria, and viruses. Aerosols scatter incoming solar radiation and causes slight cooling consequence because they block a percentage of sunlight. These aerosols combine with water vapour present in the atmosphere and combines to become sulphuric acid, together forming sulphurous aerosols which get transported around the planet in easterly or westerly directions thereby warming the planet [4]. Thus, there lies a dichotomy as volcanic eruption leads to global warming as well as global cooling effects.

Variation in Solar Radiation

The dynamic change in solar radiation is related to the number of sunspots. Sunspots are darker blocks on the sun's surface. A sunspot is formulated where an intense magnetic field weakens the flow of gases that transport heat energy from the sun's interior. Sunspots appear dark because their temperature is lower than the surrounding environment. Sunspots are suppressing heat which flows to surrounding areas causing these regions to be brighter than normal, radiating more heat [5].

Movement of Crustal Plates

Due to the movement of the crustal plates the landmasses shift to different positions and latitudes which affect the pattern of global circulation of ocean water, air and climate of the continents. This movement cause change in the ocean currents and thus generates more heat which gets trapped in the atmosphere by the greenhouse gases thereby raising the temperature of the planet. However, the rate at which global warming takes place by this process remains slow [6].

HUMAN INFLUENCES ON GLOBAL WARMING AND CLIMATE CHANGE

Various natural and human factors influence the climate. In other words, these factors are also known as drivers. Emissions from vehicles, power plants and an increase in the amount of solar radiation are illustrations of "forcing" that drive temperature increment. Even the increased energy gets converted in the form of heat and contributes in the Global Warming [7].

A recent research found that "almost two-thirds of the impacts related to atmospheric and ocean temperature can be significantly attributed to anthropogenic forcing" (meaning human caused drivers) [8]. Natural climate drivers include the energy from the sun; aerosols from periodic volcanic events, dust, and salt spray; etc. which affects the climatic temperature.

Atmospheric concentrations of carbon dioxide (CO₂), methane and nitrous oxide began to rise around 198 years ago, after changing little since the end of the last ice age thousands of years earlier. The concentration of Carbon dioxide has increased from 280 parts per million before 1800, [9] to 396 parts per million in 2013.

For several decades, until around 200 years ago, this 'carbon cycle' was approximately in balance and steady. Since the 19th century, human-induced Carbon dioxide spews from fossil fuel combustion, cement manufacture and deforestation have interrupted the balance, adding Carbon dioxide to the atmosphere faster than it can be absorbed by the land biosphere and the oceans. On an average over the last 50 years, about 25% of total Carbon dioxide emissions were absorbed by the ocean making sea water more acidic and 30% was taken up on land, largely by increased plant growth stimulated by rising atmospheric Carbon dioxide, increased nutrient availability, and responses to global warming and rainfall changes. These changes to the carbon cycle are recorded from measurements in the atmosphere, on land and in the ocean, and from modelling studies.

Some of the major human influences on Global Warming and Climate Change are as follows:

Burning of Fossil Fuels

Over the past years, the world's industrialized nations have changed the balance of carbon content in the atmosphere by burning huge amounts of fossil fuels which contains concentrated carbon such as coal, oil, and gas. This is one of the biggest sources of emission of carbon dioxide that allows radiative forcing and contributes to global warming.

Deforestation

Plants and trees store a large amount of carbon dioxide within it as it takes carbon dioxide from the environment and releases oxygen. When vegetation is cut down or crops are burnt, they release this stored carbon dioxide in the atmosphere thereby contributing in global warming. "Up to one-fifth of global greenhouse gas pollution comes from deforestation and forest degradation" [10].

Farming

The livestock in the farm like sheep, cattle produce a large amount of methane when they are grazed at a large scale contributes to the global warming.

Industrial Revolution

Industrial Revolution kick started global warming much earlier than we realised. The Southern Hemisphere began warming much later because the Northern Hemisphere had largest share of earth's landmass. With the advent of Industrial revolution, climate change took a vibrant form through changing agricultural and industrial practices. The population growth during this period turned out to be a disaster as massive deforestation, urbanization and changing of the environment was around the corner [11]. Thus, Industrial Revolution remained a major cause of global warming and climate change.

HARMFUL EFFECTS OF GLOBAL WARMING

The effects of global warming and climate change are the environmental and social changes caused by man-made emissions of greenhouse gases. Future effects of climate change will differ depending on climate change policies [12] and social development [13]. The two significant policies to address climate change are reducing human

greenhouse gas emissions and adapting to the impacts of climate change which will adhere to climatic environment.

Physical Impacts of Global Warming

A wide range of evidence shows that the climate system has warmed [14]. Evidence of warming is also visible in living (biological) systems.

Regional Effects

Regional effects of global warming differ in nature. Some are as a consequence of a generalised global change, such as increasing temperature, resulting in local effects, such as melting ice. In other situations, a change may be related to a change in a particular ocean current or weather system. In such situations, the regional effect may be disproportionate and will not essentially follow the global trend.

Aggregate Impacts

Aggregating impacts add up the total impact of climate change across different sectors and regions [15]. Illustrations of aggregate measures include economic cost (e.g., changes in gross domestic product (GDP) and the social cost of carbon), changes in ecosystems (e.g., changes over land area from one type of vegetation to another), human health impacts, and the number of people suffering due to climate change. Aggregate measures such as economic cost need the researchers to make value judgements over the significance of impacts occurring in different regions and at different times.

OVERCOMING THE PROBLEM OF GLOBAL WARMING AND CLIMATE CHANGE

Global Warming is one of the biggest challenges that the world is facing today. Though the challenge is a big one, there are certain solutions for it. The biggest need of the hour is the initiatives at the grass root level. The reduction in the emission of the carbon dioxide is the giant goal which has to be fulfilled. Following are some of the ways which masses can adopt at the grass root level to save the environment by reducing the carbon emission:

Spreading the Word

Cognizance is the best key. Voicing the concerns on the social platform and among the

hoi-polloi raises the concern. It is ultimately important for the masses to get aware about the current scenario so that they can take initiatives at their individual level and contribute collectively for a cause. "Talk to your friends and family, and make sure your representatives are making good decisions," Aliya Haq, deputy director of NRDC's Clean Power Plan initiative, says. [16].

Powering Homes with Green Energy

Covering up the houses with the source of green energy will reduce the emission of carbon dioxide. All such appliances which generates power from solar or wind energy shall be used. Renewable resources are the dire need of the hour.

Investing in Energy Efficient Appliances

LED light bulbs consume up to 80 percent less energy than conventional incandescent. They are also cheaper in the long run. According to a research, a 10-watt LED that replaces the traditional 60-watt bulb will save around \$125 over the light bulb's life. If considered individually the amount might appear meagre but at the aggregate, it will save economic cost and ultimately the environment.

Fuel Efficient Vehicles

2025's clean car standard is the immediate goal which has to be followed. Electric Cars and the cars running on Compressed Natural Gas (CNG) are required. Foregoing the unrenewable resources like petrol and diesel to reduce the carbon emission is the need. This will save the environment as well as money and would thus invest in the sustainable development.

Legal Approach

India has agreed to many international commitments like Paris Agreement, United Nations Framework on Climate Change (UNFCC), etc. and there are several domestic legislations which have been enacted to take care of the environment. Some of them are: The Environment Protection Act, 1986; The Forest (Conservation) Act, 1980; The Wildlife Protection Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981 and Indian Forest Act, 1927.

CONCLUSION AND SUGGESTION

Global Warming and Climate Change remains a fiercely debated topic of the 20th century. Even now it is the one of the most important concern to be addressed at. Further climate change is inevitable if greenhouse gases continue unabated, future changes will substantially exceed those that have occurred so far.

A small initiative by each and every individual can contribute to save the world from carbon emissions and global warming. Various initiatives taken by the world leaders like Earth Summit and global conferences on climate change can only be successful when people at grass root level understand the serious concerns of climate change through raising awareness among them and then taking initiative at their individual level to curb this menace.

It is suggested that the polluter pays principle and new laws that would emit carbon emission should be adopted in view with the 2-degree Celsius limit of the Earth warming as adopted by the world leaders. This is how we the children of mother earth would be able to protect our mother from the one of its biggest threat of global warming and climate change.

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