

## GLOBAL WARMING: CAUSES, EFFECTS AND SOLUTIONS

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### Abstract

Earth has in the past been subjected to alterations in its climate. However, the current state of the climate change crisis is significantly worse than it was in the past. The increase in the average surface temperature of the earth that is attributed to increased concentrations of carbon dioxide and other gases in the atmosphere is referred to as global warming. Since we use fossil fuels like coal, oil, gasoline, and other fuels on a regular basis in our routines, these fuels are eventually burned, which results in harmful effects such as the "greenhouse effect."

### Keywords

Carbon dioxide, precipitation, emissions, methane, mitigation

### 1. INTRODUCTION

Climate and global warming are essential topics to cover in a science class because they are fascinating natural phenomena that are likely to have a significant impact on both the quality of our lives and the state of the environment. On the other hand, the research that has been done on climate change compels us to consider the means by which we acquire the information that we do.

The phenomenon known as "global warming," in which the average temperature of the Earth is climbing as a result of an increase in the amount of greenhouse gases that are being emitted into the atmosphere, can be explained as follows: The vast majority of the atmosphere does not absorb

infrared radiation because, as we already know, the atmosphere of Earth is made up of gases that form a layer. Therefore, they are not responsible for the warming of the earth. However, the molecules of greenhouse gases, primarily carbon dioxide and water vapour, are able to absorb infrared radiation from the sun. The temperature of Earth has fluctuated throughout its eons-long history, with periods of both warming and cooling. When the planet received more or less sunlight as a result of subtle shifts in its orbit, when the atmosphere or surface changed, or when the Sun's energy varied, there were corresponding shifts in the planet's climate. However, over the course of the last century, a new factor has begun to affect the climate of the Earth. The

temperature of Earth has fluctuated throughout its eons-long history, with periods of both warming and cooling. When the planet received more or less sunlight as a result of subtle shifts in its orbit, when the atmosphere or surface changed, or when there was a variation in the amount of energy coming from the Sun, climate changed. But over the course of the last century, a new factor has begun to have an impact on the climate of the Earth [1].

## 2. Causes of Global Warming

The majority of the factors that contribute to climate change are anthropogenic, which means that they are caused by actions taken by humans. Greenhouse gases are produced as a byproduct of human activities, which in turn contribute to the warming of the planet. It has a variety of negative effects on the environment and poses a threat to the very existence of life on earth. Therefore, in this article, we will talk about two different causes, namely natural causes and manmade causes. People are in danger of suffering from a lack of food and water, an increase in extreme heat, increased flooding, and economic loss due to climate change. The magnitude and gravity of rising surface temperatures, the impact of past and future warming on human life, and the imperative

to take action to slow the rate of future warming and mitigate the effects of climate change are all topics that will be covered [2]. Researchers in a variety of fields are continuing their investigations into global warming and the ways in which it will affect our lives which is depicted in Fig.1.

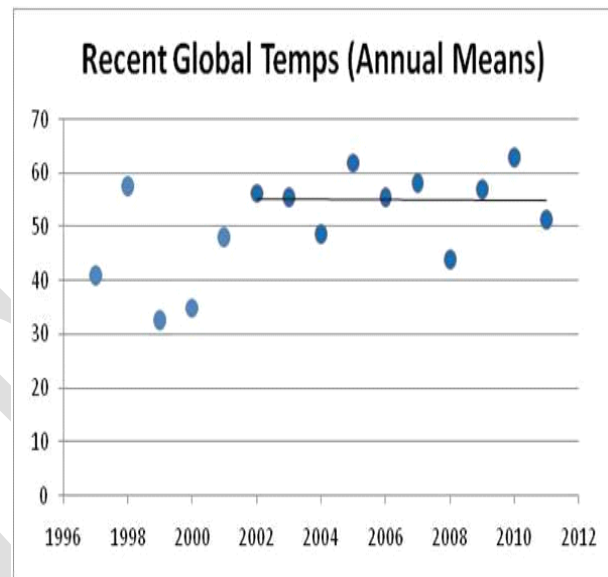


Fig. 1 Representation graph of recent global temperature from 1996 to 2012.

### 2.1. Manmade Causes

The greenhouse effect and global warming are primarily caused by human activity, such as the destruction of forests, the burning of fossil fuels, and the raising of livestock for food. These activities are one of the primary reasons why the temperature of the earth is rising and how humans are increasingly influencing its climate. Some examples of manmade causes include producing electricity, raising cattle, engaging in consumerist behaviours, and the

burning of fossil fuels. The initiatives are industry-specific, and their recommendations for courses of action are, in many instances, exceedingly specific. The Energy Future Coalition, for instance, has been instrumental in the formation of a promising initiative that goes by the name "25 x 25." This initiative holds out the compelling vision that "Agriculture will provide 25 percent of the total energy consumed in the United States by 2025 while continuing to produce abundant, safe, and affordable food and fibre." The farmers, who raise crops, livestock, and trees, as well as horticulturists, energy experts, and policy experts, are the ones spearheading this initiative. Their primary objective is to expedite the scaling up of the production of biofuels such as ethanol and biodiesel from energy crops specifically designed for that purpose as well as waste residues from agricultural production [3]. However, the scope of their plan includes the production of electricity from wind and solar installations located on farms, in addition to energy derived from the methane gas emissions produced by agricultural operations.

### **2.1.1. Generating Power**

When fossil fuels, such as coal, oil, or gas, are burned to produce electricity and

heat, a significant amount of greenhouse gases are released into the atmosphere. Greenhouse gases, such as carbon dioxide and nitrous oxide, cover the planet and keep the heat of the sun trapped within it. Most of the blame for global warming falls on gases known as greenhouses. Almost every aspect of the electricity system has the potential to have some kind of impact on the surrounding ecosystem. These effects will vary according to the location of the electricity's point of generation and delivery. The generation of electricity is responsible for the second largest share of the world's emissions of greenhouse gases [4]. The amount of electricity that comes from renewable sources such as wind and solar is approximately 29 percent. This approach to generating electricity not only helps to restore natural resources but also reduces emissions of greenhouse gases and other pollutants into the atmosphere. Because the technologies that make up renewable energy have a low overall cost, renewable is currently the most cost-effective source of power.

### **2.1.2. The Consumption Mentality**

Consumers are gradually developing a greater awareness regarding the environment and the negative effects that their consumption behaviour have on it. It is the

ultimate driving force behind the industry's shakeup, affecting everything from changes in the production process to modifications in the laws protecting the environment. 60 percent of the world's greenhouse gas emissions were caused by the manufacturing and consumption of goods and services related to the household sector. According to the findings of the study, approximately four fifths of the negative impact that consumerism has on the environment is caused by direct human behaviour, such as driving cars or taking long showers, rather than by sources further down the supply chains of our products. Rich countries had much higher rates of consumerism than poor countries did, and those with the highest rates of consumerism had up to 5.5 times the environmental impact of the average country in the world.

### **2.1.3. Burning Fossil Fuel**

Initially the decomposition of long-dead carbon-based organisms that were buried and then buried again millions of years ago results in the formation of fossil fuels. They leave behind deposits that are rich in carbon, which are then extracted and burned to produce energy. It is estimated that they do not replenish themselves and that they currently supply approximately 80 percent of the energy needed by the world.

They are also utilized in the production of steel, plastic, and a vast assortment of other goods. Coal, oil, and gas are the three forms of fossil fuels that exist today. When fossil fuels are burned, a significant amount of carbon dioxide, which is a gas that contributes to global warming, is released into the atmosphere. The buildup of heat in our atmosphere due to the presence of greenhouse gases is the primary contributor to global warming. Already, there has been a rise of 1 degree Celsius in the average temperature across the globe. If temperatures rise by more than 1.5 degrees Celsius, there is a greater chance that sea levels will continue to rise, that there will be more extreme weather, that there will be a loss of biodiversity and that some species may become extinct [5]. There is also a greater chance that there will be a shortage of food, which will lead to worsening health.

### **2.2. Natural Causes**

The release of methane gas from arctic tundra is one of the natural causes of global warming, along with volcanic eruptions and other sources of greenhouse gas emissions.

The gas known as methane has a greenhouse effect, which means it has the ability to trap heat within the atmosphere of the earth.

The earth is currently in the midst of a climate change cycle that, on average, lasts for the past 40,000 years.

According to some estimates, volcanic eruptions produce a greater amount of carbon dioxide. In combination, the solar cycle and cosmic rays are responsible for more than 14% of the warming that has been observed.

### **2.2.1. Volcanic Eruption**

The release of carbon dioxide and other greenhouse gases caused by volcanic eruptions is a potential contributor to climate change, which is defined as "the rise in global temperatures due primarily to the increasing concentrations of greenhouse gases in the atmosphere." [Citation needed] if there is a sufficiently large amount of CO<sub>2</sub> being released into the atmosphere. It has the potential to influence climate change. The stratosphere receives massive amounts of volcanic gas, aerosol droplets, and ash when major explosive eruptions take place. The injected ash quickly falls from the stratosphere, and the majority of it is removed within a few days to a few weeks. This means that it has very little impact on the change in climate. Volcanic gases, such as sulphur dioxide, have the potential to result in a cooling of the planet's temperature, while volcanic carbon dioxide

and other greenhouse gases have the potential to result in an increase in the planet's temperature [6].

### **2.2.2. Methane Gas**

The presence of high levels of greenhouse gases in the atmosphere, such as CO<sub>2</sub> and methane, is responsible for the rise in average global temperature. The thawing of permafrost is one of the causes of Arctic methane release, which is the process by which methane is released from seas and soils in areas of the Arctic that are covered by permafrost. The process of decay can begin on previously frozen organic matter once it thaws. When organic matter breaks down, it releases carbon dioxide and methane into the atmosphere.

When methane enters the atmosphere, it possesses a warming potential that is more than 80 times greater than that of carbon dioxide. The effect that is brought on by methane is the following: The amount of oxygen that can be taken in through breathing can be diminished when methane concentrations are high [7]. This can result in changes in mood as well as slurred speech, problems with vision, loss of memory, nausea, vomiting, facial flushing, and headaches.

### 2.2.3. Greenhouse gases

To use the greenhouse as a straightforward example: "A positive climate forcing, also known as a warming effect," is produced whenever there is an increase in the atmospheric concentrations of greenhouse gases. Greenhouse gases are to blame for the greenhouse effect, which is caused by an increase in the temperature of the atmosphere and ultimately results in the warming of the entire planet. The sun's rays that strike the surface of the earth cause some of them to be reflected back into space, while the remainder are converted into heat. It is able to block the flow of heat away from the planet and into space, which has the effect of making the planet warmer. The heat from the Sun is absorbed by the Earth as it travels through its atmosphere on its way to the surface [8]. The surface's heating causes it to radiate heat, which is picked up by greenhouse gases like carbon dioxide. If it weren't for the earth's natural greenhouse effect, the average temperature here on planet Earth would be well below freezing. The current increases in greenhouse gases caused by humans cause greater amounts of heat to be trapped, which causes the Earth to gradually become warmer over time, which in turn causes global warming. A concerted effort made by

a large number of geochemists and their collaborators was successful in obtaining numbers for the "climate sensitivity" in earlier epochs. This refers to the response of temperature to an increase in the CO<sub>2</sub> level. Not only during the most recent ice ages, but also back over hundreds of millions of years under radically different conditions, a doubled level of the gas had always gone along with a temperature rise of three degrees, give or take a degree, in complete agreement with the computer calculations. This was the case not only during the most recent ice ages, but also back over the course of those hundreds of millions of years. The climate modellers had not overlooked anything crucial; the warming caused by greenhouse gases was undeniably a fundamental aspect of the behaviour of the planet.

### 3. The Repercussions of Climate Change

There are many factors that contribute to and are affected by global warming, and this warming poses a threat to the continued existence of life on earth. The most obvious contributors to climate change are human activities such as industrialization, deforestation, and technological advancement. These human activities have led to an increase in the emission of greenhouse gases, which in turn



has resulted in an increase in temperature and the melting of glaciers. The fig.2 represents the impacts of global warming.

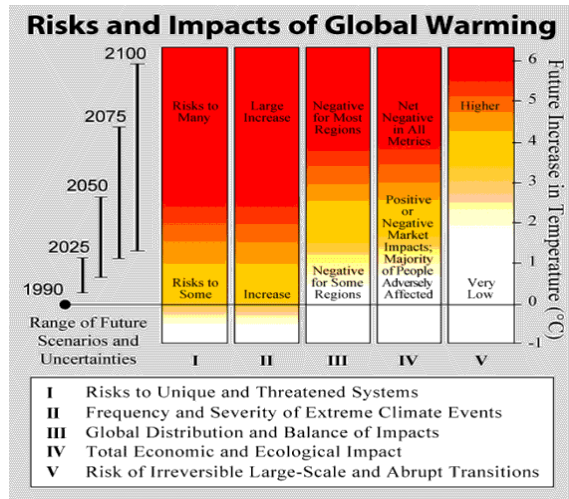


Fig. 2. Impact of Global Warming

### 3.1. Ecosystem Collapse

The term "ecosystem collapse" describes what happens when an ecosystem is subjected to multiple pressures, such as a decrease in its carrying capacity for all organisms and significant alterations to the size or extent of the ecosystem or the species that make up that ecosystem.

The degree of toxicity of the new component and the degree to which the existing ecosystem is resilient are the two primary factors that determine whether an ecosystem will completely collapse or experience a gradual recovery. The tipping points that lead to ecological collapse can be predicted by scientists. R50 is a dependable measurement model for the robustness of

food webs, and it is the name of a recently developed model that is being utilised extensively for determining whether or not a food web has collapsed.

### 3.2. The Depletion of Biodiversity

The diversity of all living organisms on our planet, which currently exist, has been decreasing at the signal of extinction or an alarming rate in recent years. This decline is primarily the result of human activities, such as changes in land use, pollution, and climate change. In recent years, the rate of this decline has reached the signal of extinction. It involves the disappearance of a variety of species all over the world.

The five primary causes or drivers of biodiversity loss are described as follows: habitat loss, invasive species, overexploitation (extreme hunting and fishing pressure), pollution, and climate change associated with global warming [9].

### 3.3. Sea Level Rise

According to the records, the average level of the sea around the world has risen about 8–9 inches. Since the year 1880, with approximately a third of that total occurring only in the most recent twenty-five and a half years. The majority of the increase in water level can be attributed to the melting of snow and ice on glaciers and ice sheets, in addition to the thermal expansion of

seawater caused by climate change. The annual mean sea level was 91.3 millimetres (3.6 inches) higher than the 1993 average in the year 2020, making it the highest annual average since satellite measurements began in 1979. (1993-present).

#### **4. A remedy for the problem of global warming**

A viable response to the problem of global warming is the establishment of additional plantation programs and the suppression of deforestation. Everyone needs to reduce their use of electricity as much as possible while simultaneously looking into alternative and renewable sources of energy. Everyone ought to make an effort to shop for and buy products that are ethical, carbon neutral, and environmentally friendly. We need to conduct an investigation into whether or not the factories are releasing any hazardous gases. Some solutions to the problem of global warming include reducing the amount of food that is wasted, installing solar panels on rooftops, switching to electric vehicles, concentrating on sources of renewable energy, and planting trees [10].

##### **4.1. Lessening the amount of wasted food**

Food waste is responsible for producing approximately 8 percent of all anthropogenic emissions. Therefore, we

need to make a plan ahead of time and only purchase the items that we require. If we want to avoid wasting food, we should try to avoid wasting food and instead get creative with the leftovers. Food waste prevention is the most efficient method for reducing the negative effects that food waste has on the environment. We can save the land, water, and energy that would have been used to produce food that we don't consume if we refrain from producing it in the first place [11].

##### **4.2. Solar Panels atop the roof**

Solar energy can be harvested pretty much anywhere there is sunlight and space to do so. When compared to other methods of producing electricity, such as burning fossil fuels like coal and natural gas, solar panels do not result in the emission of greenhouse gases. The majority of our energy comes from the combustion of fossil fuels, which is a process that releases carbon dioxide into the atmosphere [12]. Therefore, installing solar panels on the roof will stop the production of greenhouse gases.

#### **CONCLUSION**

We should all be aware of the fact that our planet is not in good health. It requires treatment, and we can assist in the healing process. The current generation has a moral obligation to shoulder the burden of



reversing the effects of global warming in order to spare subsequent generations the associated anguish. After all, at the moment, the only planet in the universe to support life is earth. Because there is nowhere else for us to go, even the smallest step, regardless of how insignificant it may seem, carries a lot of weight and is quite significant in the fight against global warming.

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