



Enhanced Green House Effect and its Impact on Environment

KEYWORDS

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ABSTRACT

Today greenhouse gas levels are the highest they have been in the past 3 million years and have been increasing since the dawn of the Industrial Revolution. The enhanced greenhouse effect continues to grow by the addition of man-made greenhouse gas emissions to the Earth's atmosphere. Some of the effects of enhanced greenhouse effect are widespread melting of snow and ice around the world, rise in global sea levels, ocean acidification, coral bleaching as well as loss of biodiversity.

Introduction

The greenhouse effect is a natural process that is millions of years old. It plays a critical role in regulating the overall temperature of the Earth. The greenhouse effect was first discovered by Joseph Fourier in 1827, experimentally verified by John Tyndall in 1861, and quantified by Svante Arrhenius in 1896. Change in the composition of air due to several human activities has brought about green house effect. By 2040, CO₂ level in air is expected to reach a level of 450 ppm (0.04%). Increases in the amount of carbon dioxide and other greenhouse gases in the Earth's atmosphere have caused an enhanced greenhouse effect. With emissions being produced daily, a large imbalance is being created which is enhancing the greenhouse effect and making it stronger. The greenhouse effect is a central component to keeping our Earth warm. This process maintains the temperature of the Earth such that the planet is warm enough to develop and sustain life. The preceding is true as long as the components of the greenhouse effect, the amount of light and energy coming from the sun as well as the quantity of greenhouse gases that are in the atmosphere, remain in balance.

The Enhanced Greenhouse Effect

The enhanced greenhouse effect is being caused by human activities that are adding greenhouse gases to the Earth's atmosphere. As there are already greenhouse gas emissions from natural sources, additional amounts leads to more heat being trapped on the planet. This extra heat creates an impact by distorting weather patterns and causing climate change. Prior to the Industrial Revolution, the components of the greenhouse effect were in balance, particularly the gases that circulated in the atmosphere. Once it got underway, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and fluorinated gas levels have been increasing because of humans activities.

With an enhanced greenhouse effect, the Earth is unable to release enough heat to space which leads to global warming. Global weather patterns absorb some of this overall increase in temperature and adjust for this accumulation in energy. These two effects are now creating climate changes around the world. Scientist have recorded a 0.75°C increase in the planet's overall temperature during the course of the last 100 years. The enhanced greenhouse effect leads to other effects on our climate and has already caused:

- Greater strength of extreme weather events like: heatwaves, tropical cyclones, floods, and other major storms.
- Increasing number and size of forest fires.
- Rising sea levels (predicted to be as high as two feet by the end of the next century).
- Melting of glaciers and polar ice.
- Increasing acidity in the ocean, resulting in bleaching of coral reefs and damage to oceanic wildlife.

Increase in Air temperature

Increase in air temperature - popularly called as global warming - refers to mean temperature of entire globe averaged over all months and all places. Hence, the change in temperature at a place, in a particular month, may or may not match closely with change in temperature of globe. Warming is predicted to be greater in higher latitudes than in tropics and will be more pronounced during winter than in summer. An increase in air temperature of this magnitude is not substantial enough to result in any changes as per the microclimatic experience. Between places the variation of mean annual temperature or seasonal temperature vary. In this background most people may conclude that a change in air temperature is not significant. Unfortunately, this is not true. Because at global level, increase in mean temperature over places and over months indicate that in many places the rise in temperature is much higher (even upto 6-8oC) than normal. Variation of this order over normal is of great consequences. Deviation from normal is more significant than variation between months / places, as, such variations are part of normal temperatures. The biggest increase in air temperatures are recorded from 1980 onwards - which coincides with highest increase in CO₂ levels. The rise in winter temperature is mostly observed in India than rise in pre-monsoon temperatures.

Increase in Sea Level

Over the past 100 years, sea level has increases by 18 cm. Inter government a panel in climate change has suggested that sea level would rise upto 90cm by 2100. Large scale flooding of California in 1999 and parts of western coast in India in the last 5-8 years, are testimonies to effects of sea level rise. If the sea level rises by 80-90 cm, perhaps many of coastal cities of world will be washed away besides great changes in harbours and their facilities, in sea routes and in fishery industry. With increased sea levels these are the first casualties. If the increase is to the tune of 90 cm, the world is going to face a catastrophe. Till today, no attempt is successful for containing the effects of sea level rise. There is no method to save the inundating cities. Attempts to construct walls across the coast have met with little success. There are two schools of thoughts about the actual scientific reason behind rise in sea level. According to traditional school of thought, global warming has resulted in melting of polar ice sheet extending to 12 million square km as well as melting of ice on many mountainous regions of world. Extra water generated by these sources was thought to be the reason for rise in sea level.

Unexpected Change in the Seasons

The rainfall patterns in the world are governed by differential heating of air layers over different latitudes. Differential heating of air is the main reason for different convectional air current movement from one part of globe to other. Due to rise in air temperature, the pattern of convectional current and differential heating pattern have substantially changed. This has resulted in change in amount of rainfall and its distribution. The study of global rainfall pattern over last 100 years, as related to positive and negative anomalies in temperatures has indicated that in many places rainfall increased

and in many other places it has decreased substantially. In many places the rainfall is delayed, whereas in many other places it is preponed or untimely. Based on temperature and rainfall, each part of world has definite seasons in a year with many characteristic features about air temperature, hydrological changes, biological growth etc. Winters have extended in many places, while summer is more severe in other places. The degree of dependability has reduced and an element of uncertainty has increased. For e.g., in India pre-monsoon showers (summer rainfall) have reduced substantially, while cyclonic rainfall during November-December have become a regular feature.

Disease in Animals and Plants

Many diseases and pests of plants / animals follow a particular rhythm because of specific response of causal organism to a set of environmental conditions. Hence, disease / pest is more likely to attack a plant/animal if the environmental situations are favourable. These are called 'pre-disposing' factors. Due to change in environment, the disease/ pests may occur with greater virulence or may subside. Hence, the attack of pests and diseases in recent years has been undergoing unpredictable changes. Even in human beings, the attack of some diseases is pre-disposed by many environmental factors. For e.g., low temperature and high humidity favour asthma, coastal climate favouring elephantiasis, heavy rainfall favouring malaria.

Ocean Acidification

Increased greenhouse gas emissions: Increases in carbon dioxide levels have made the world's oceans 30% more acidic since the Industrial Revolution. Increases in carbon dioxide levels have made the world's oceans 30% more acidic since the Industrial Revolution. The ocean serves as a sink for this gas and absorbs about a quarter of human carbon dioxide emissions, which then goes on to react with seawater to form carbonic acid. So as the level of carbon dioxide in the atmosphere rises, the acidification of the oceans increases.

Changes to plant growth and nutrition levels

Higher levels of carbon dioxide makes carbon more available, but plants also need other nutrients (like nitrogen, phosphorus, etc.) to grow and survive. Without increases in those nutrients as well, the nutritional quality of many plants will decrease. Since plants need carbon dioxide to grow, if there are higher amounts in the air, plant growth can increase. Experiments where carbon dioxide concentrations were raised by around 50% increased crop growth by around 15%.⁸ Higher levels of carbon dioxide makes carbon more available, but plants also need other nutrients (like nitrogen, phosphorus, etc.) to grow and survive.

Smog and ozone pollution

Over the last century, global background ozone concentrations have become 2 times larger due mainly to increases in methane and nitrogen oxides caused by human emissions. Over the last century, global background ozone concentrations have become 2 times larger due mainly to increases in methane and nitrogen oxides caused by human emissions. At ground level, ozone is an air pollutant that is a major component of smog which is dangerous for both humans and plants. Long-term ozone exposure has also been shown to reduce life expectancy.

Ozone layer depletion

Increased greenhouse gas emissions: Nitrous oxide damages the ozone layer and is now the most important ozone depleting substance and the largest cause of ozone layer depletion. Nitrous oxide damages the ozone layer and is now the most important ozone depleting substance and the largest cause of ozone layer depletion. This is because CFCs and many other gases that are harmful for the ozone layer were banned by the Montreal Protocol (MP) which has reduced their atmospheric concentration. Nitrous oxide is not restricted by the MP, so while the levels of other ozone depleting substances are declining, nitrous oxide levels are continuing to grow.

Conclusion

The release of GHGs and their increasing concentration in the atmosphere are already having an impact on the environment, human health and the economy. These impacts are expected to become more severe, unless concerted efforts to reduce emissions are undertaken. Addressing climate change requires action from everyone across all nations. Governments, businesses and individuals need to take significant steps to reduce emissions by using resources more efficiently and adopting new and cleaner technologies. We can reduce our GHG emissions at home, at work and in our everyday activities. We can make a difference by changing our behaviour and making lifestyle decisions that reduce emissions.

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