



## Review Paper

# Effect of Global Warming on Mankind - A Review

Kumar S., Himanshu S.K. and Gupta K.K.

Department of Civil Engineering, Graphic Era University, Dehradun, Uttarakhand, INDIA

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## Abstract

*The concentration of several greenhouse gases has increased over time. Human activity increases the greenhouse gases effect primarily through release of carbon dioxide, but human influences on other greenhouse gases is also important. The ongoing accumulation of greenhouse gases causes increasing global warming. The recent IPCC (Intergovernmental Panel on Climate Change) 2007 shows that global average air temperature near Earth's surface rose  $0.74 \pm 0.18^\circ\text{C}$  in the last century and report concluded "most of the observed increase in globally averaged temperatures since mid – 20<sup>th</sup> century is very likely due to the observed increase in the concentration of anthropogenic greenhouse gases. Global warming affects many different facets of life on Earth. Global warming effects will include changes in agricultural yields, the continued melting of glaciers and species extinctions. New items were gradually added to the list, ranging from the degradation of ecosystems to threats to human health. Experts in fields from forestry to economics, even national security experts, pitched in to assess the range of possible consequences. The unfortunate reality is that predicting the impact of global warming is notoriously hard. It brings a whole range of scientific disciplines together, such as oceanography, meteorology, and geology, while no one can agree on the exact impacts for specific regions of the world. All scientists agree global warming will have numerous negative effects on our planet and our way of life. The effect of global warming will have adverse effect on the climatic conditions and water resources.*

**Key words:** Global warming, Climate change, water resources, temperature, IPCC.

## Introduction

Global warming is the increase in the average temperature of Earth's near-surface air and oceans since the mid-20th century. According to the 2007 Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC), global surface temperature has been increased  $0.74 \pm 0.18^\circ\text{C}$  ( $1.33 \pm 0.32^\circ\text{F}$ ) during the 20<sup>th</sup> century<sup>1</sup>. Temperature increase from the middle of the 20th century has been caused by increasing concentrations of greenhouse gases, which result from human activity such as the burning of fossil fuel and deforestation. Projections in the latest IPCC report indicate that the global surface temperature is likely to rise a further 1.1 to  $6.4^\circ\text{C}$  ( $2.0$  to  $11.5^\circ\text{F}$ ) during the 21st century. Increase in global temperature will cause sea levels to rise and will change the amount and pattern of precipitation.

Warming is expected to be strongest in the Arctic and would be associated with continuing retreat of glaciers, permafrost and sea ice. The Kyoto Protocol is aimed at stabilizing greenhouse gas concentration to prevent a "dangerous anthropogenic interference". As of November 2009, 187 states had signed and ratified the protocol<sup>2</sup>.

The average facade temperature of the globe has augmented more than 1 degree Fahrenheit since 1900 and the speed of warming has been almost three folds the century long average

since 1970. This increase in earth's average temperature is called Global warming. More or less all specialists studying the climate record of the earth have the same opinion now that human actions, mainly the discharge of green house gases from smokestacks, vehicles and burning forests are perhaps the leading power driving the fashion.

## Material and Methods

**Temperature Variations:** Warming of the climate system includes observed increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. NASA's Goddard Institute for Space Studies (GISS) and the National Climatic Data Centre show that 2005 was the warmest year since reliable, widespread instrumental measurements became available in the late 19th century, exceeding the previous record set in 1998 by a few hundredths of a degree<sup>3</sup>. The effect of changes in solar forcing in recent decades is uncertain, but small, with some studies showing a slight cooling effect, while others studies suggest a slight warming effect<sup>4</sup>. Greenhouse gases and solar forcing affect temperatures in different ways. While both increased solar activity and increased greenhouse gases are expected to warm the troposphere, an increase in solar activity should warm the stratosphere while an increase in greenhouse gases should cool the stratosphere. Observations show that temperatures in the stratosphere have been cooling since 1979,

when satellite measurements became available. Weather balloon data from the pre-satellite era show cooling since 1958, though there is greater uncertainty in the early radiosonde record<sup>5</sup>. The annual greenhouse gas emission by various sectors is shown in figure-1.

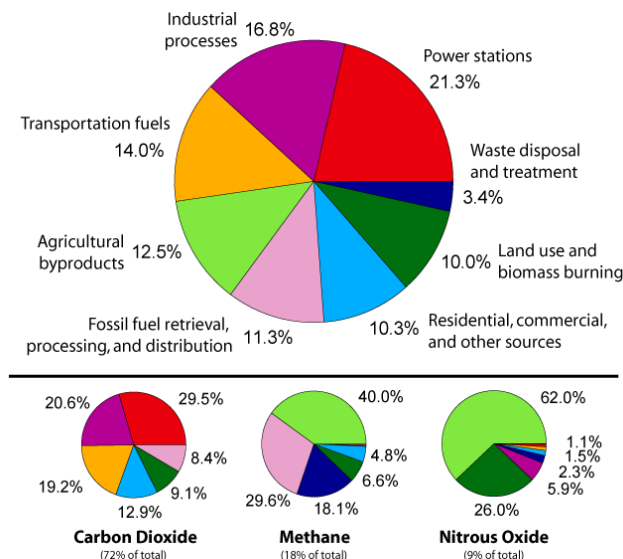


Figure-1

Annual greenhouse gas emission by various sectors

The greenhouse effect is the process by which absorption and emission of infrared radiation by gases in the atmosphere warm a planet's lower atmosphere and surface. It was proposed by Joseph Fourier in 1824 and was first investigated quantitatively by Svante Arrhenius in 1896. The question in terms of global warming is how the strength of the presumed greenhouse effect changes when human activity increases the concentrations of greenhouse gases in the atmosphere<sup>6</sup>.

The green house gases like carbon dioxide, methane, and nitrous oxide are playing hazards in the present times. These green house gases trap heat in earth's atmosphere and thus result in increasing the temperature of earth. The excessive emission of these gases is one of the major Causes of Global Warming. The major source of carbon dioxide is the power plants. These power plants emit large amounts of carbon dioxide produced from burning of fossil fuels for the purpose of electricity generation.

The impact of increased surface temperatures is significant in itself. But global warming will have additional, far-reaching effects on the planet. Warming modifies rainfall patterns, amplifies coastal erosion, lengthens the growing season in some regions, melts ice caps and glaciers, and alters the ranges of some infectious diseases. Some of these changes are already occurring.

**Climate Change:** For most places, global warming will result in more frequent hot days and fewer cool days, with the greatest

warming occurring over land. Longer, more intense heat waves will become more common. Storms, floods, and droughts will generally be more severe as precipitation patterns change. Hurricanes may increase in intensity due to warmer ocean surface temperatures. Figure-2 shows the global change in precipitation (in percentage).

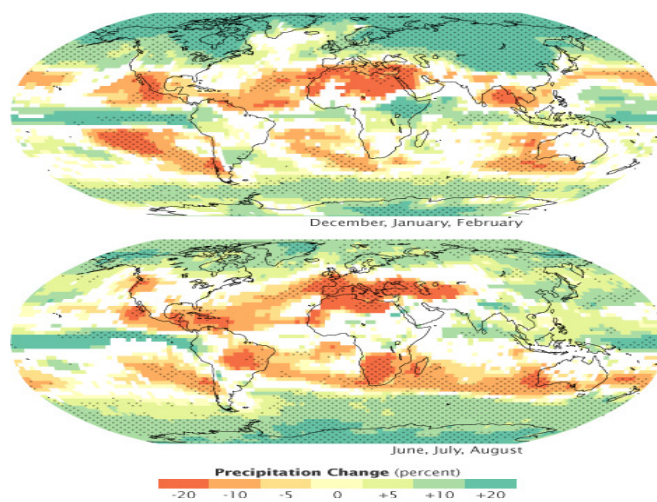


Figure-2

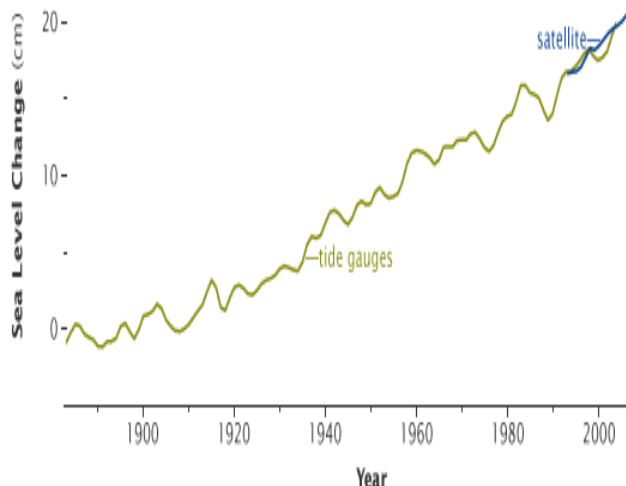
Global change in precipitation (percentage)

Apart from driving temperatures up, global warming is likely to cause bigger, more destructive storms, leading to an overall increase in precipitation. With some exceptions, the tropics will likely receive less rain (orange) as the planet warms, while the polar regions will receive more precipitation (green)<sup>7</sup>. White areas indicate that less than two-thirds of the climate models agreed on how precipitation will change.

**Rising Sea Levels:** The weather isn't the only thing global warming will impact; rising sea levels will erode coasts and cause more frequent coastal flooding. Some island nations will disappear. The problem is serious because up to 10 percent of the world's population lives in vulnerable areas which are less than 10 meters (about 30 feet) above sea level. Between 1870 and 2000, the sea level increased by 1.7 millimeters per year on average, for a total sea level rise of 221 millimeters (0.7 feet or 8.7 inches). And the rate of sea level rise is accelerating. Since 1993, NASA satellites have shown that sea levels are rising more quickly, about 3 millimeters per year, for a total sea level rise of 48 millimeters (0.16 feet or 1.89 inches) between 1993 and 2009<sup>8</sup>.

It is impossible to pin any single unusual weather event on global warming, but emerging evidence suggests that global warming is already influencing the weather. Heat waves, droughts, and intense rain events have increased in frequency during the last 50 years, and human-induced global warming more likely than not contributed to the trend. Sea levels crept up about 20 centimeters (7.9 inches) during the twentieth century<sup>9</sup>. Sea levels are predicted to go up between 18 and 59 cm (7.1 and

23 inches) over the next century, though the increase could be greater if ice sheets in Greenland and Antarctica melt more quickly than predicted. Higher sea levels will erode coastlines and cause more frequent flooding. The year wise change of sea level is shown in figure- 3.



**Figure- 3**  
**Year wise change of sea level**

**Flooding Bangladesh:** One of the poorest nations in the world is projected to lose 17.5% of its land if sea level rises about 40 inches (1 m). Tens of thousands of people are likely to be displaced, and the country's agricultural system will be adversely affected. Coastal flooding will threaten animals, plants, and fresh water supplies. The current danger posed by storm surges when cyclones hit Bangladesh is likely to increase.

**Disappearing Islands:** The Majuro Atoll in the Pacific Marshall Islands is projected to lose 80% of its land with a 20-inch (0.5m) rise in sea level. Many of the islands will simply disappear under the rising seas. A similar fate awaits other islands throughout the South Pacific and Indian Oceans, including many in the Maldives and French Polynesia. Coral reefs, which protect many of these islands, will be submerged, subjecting the local peoples to heightened storm surges and disrupted coastal ecosystems. Tourism and local agriculture will be severely challenged.

**Disappearing Ice Packs:** Wildlife in the arctic regions will be seriously affected as warmer temperatures affect the ocean ice cover. Polar bears rely on sea ice to hunt seals, which use the ice for rearing their young. The native peoples also rely on the ice to hunt these species and walrus. Observations of walrus in 1996-99 showed them to be thin and in poor condition, partly due to receding sea ice.

**Health and Disease:** Cold winter weather reduces the spread of infectious diseases by killing infectious organisms and carrier species, such as mosquitoes. Warmer, wetter weather could increase the spread of malaria, dengue fever, and yellow fever.

The possible increase in flooding and damage to water and sewage infrastructure can further encourage the spread of disease.

**Increased Air Pollution:** Three out of four of the world's highest-density cities are in rapidly developing countries, where vehicle pollution is high. In Central Europe alone 21,000 deaths are tied to air pollution each year. The concentration of photochemical pollutants, such as ozone, tends to increase with warmer temperatures. Ozone damages lung tissue and is especially harmful to people with asthma and other lung conditions.

**Impacting Ecosystems:** More importantly, perhaps, global warming is already putting pressure on ecosystems, the plants and animals that co-exist in a particular climate zone, both on land and in the ocean. Warmer temperatures have already shifted the growing season in many parts of the globe. The growing season in parts of the Northern Hemisphere became two weeks longer in the second half of the 20th century. Spring is coming earlier in both hemispheres. This change in the growing season affects the broader ecosystem. Migrating animals have to start seeking food sources earlier. The shift in seasons may already be causing the lifecycles of pollinators, like bees, to be out of synch with flowering plants and trees<sup>10</sup>. This mismatch can limit the ability of both pollinators and plants to survive and reproduce, which would reduce food availability throughout the food chain. Warmer temperatures also extend the growing season. This means that plants need more water to keep growing throughout the season or they will dry out, increasing the risk of failed crops and wildfires. Once the growing season ends, shorter and milder winters fail to kill dormant insects, increasing the risk of large and damaging infestations in subsequent seasons<sup>11</sup>.

**Impacting People:** The changes to weather and ecosystems will also affect people more directly. Hardest hit will be those living in low-lying coastal areas and residents of poorer countries who do not have the resources to adapt to changes in temperature extremes and water resources. As tropical temperature zones expand, the reach of some infectious diseases, such as malaria, will change. More intense rains and hurricanes and rising sea levels will lead to more severe flooding and potential loss of property and life.

**Effects of Global Warming on Water Resources:** Both the environment and the human lives are being adversely affected by the phenomenon of global warming. The effects of global warming is myriad and numerous. Several researches were conducted by different organizations and all of them revealed that global warming is increasing at an alarming rate

**Water Resources impact:** Effects of global warming are vast and cover every sphere of one's life. Both the nature and the living beings are suffering from the effects of global warming. If we do not take note of the alarming rate of growing global warming then our earth might cease to exist someday. The water resources have been heavily affected by the global warming phenomenon. Sea levels have risen, glaciers retreats are taking place often and the most harmful affect is the shrinking of the Arctic Circle. This

phenomenon has caused concerns among all the sectors and geo-engineering is considered to be a way of mitigation.

If we put it simply then the water bodies would be affected during the long and scorching summers since the rate of evaporation would increase with hotter summers. Water cycle is important for any kind of human activity and global warming would adversely affect this cycle in the human activities as well as the climatic changes. Global warming might also lead to floods. The water levels in many regions would lower due to excessive evaporation and this would cause in torrential downpours increasing the chance of deluge<sup>12</sup>.

The acceleration in the phenomenon of global warming has caused the ice sheets in the West Antarctic Circle and Greenland to shrink. Carbon sediments have been released in the air and due to the increase of carbon emission the reduction in the ice sheets has taken place. This reduction might cause a huge flood around the world. By the end of twenty first century the water in the sea is expected to rise by 7.1- 23.2 inches. Due to the augmentation of global warming effects the Thermohaline circulation might as well get disrupted. The fresh water from the Polar Regions would interrupt the Gulf Stream causing this distress. The implication of a change of course of the Gulf Stream would have worldwide effect that would drastically accelerate climate change and extremes.

## Conclusion

The impact of global warming is already being seen around the world. Despite efforts on behalf of some countries to reduce greenhouse gas emissions, such as the Kyoto treaty, the world as a whole is pumping out more and more carbon dioxide every year. Countries like Norway and Holland are meeting their goals to reduce emissions, but this is small fry when countries such as China and India are pumping out more and more every year. Reducing our carbon and greenhouse gas emissions will make our personal living space more sustainable. We humankind have the ability to destroy the planet, we can also help protect and sustain it.

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