Climate Change and Sustainable Development

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Effect of Global Warming in Present Scenario

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Introduction

Over the past century, the world has warmed, ranging from 0.3 to 0.6 C. It does not sound like much of a change until one realises that over the past 10,000 years, the average global temperature has never been more than about 1R"C warmer or cooler than its today. This warming is attributed to the increased industrial and other human activities. Climatologists have warned that if these activities are unchecked, they will cause rise in global temperature from 1.5 to 4R"C over the next half century and endanger the existence of living things on the Earth. Of all the planets in our solar system, the Earth is remarkably unique in possessing so comfortable and hospitable average temperature of 5R"C – a level of comfort unmatched anywhere in our solar system. On the other hand, our neighbouring planets Venus, Jupiter, Mercury are too while Mars, Saturn, Uranus, Neptune and Pluto are freezing cold. The Earth has had this stable climate for the past 12,000 to 14,000 years. The temperature and its accompanying climate have been eminently suitable for growth of all living things. Thus in solar system, the Earth alone is habitable owing its uniqueness to the beneficent atmosphere.

Reasons of Global Warming

The most important aspect of balancing between the solar radiation absorbed and radiation reflected from the Earth's surface and atmosphere is that the green house gases keep the earth comfortably cool by sending out into the space is blocked, i.e the

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infrared windows are closed, excess of heat is stored in the atmosphere and the earth would get warmer. If the concentration of the greenhouse gases increases, number of molecules that absorb infrared radiations will also increase. These extra molecules absorb the heat, which otherwise would have escaped into the space, and cause global warming. Of the few results on the green house effect that seem straight forward and undisputedly accepted by greenhouse scientists are:

1) The world has warmed ranging from o.3 to 0.6 R" over the past century and

2) The levels of naturally occurring atmospheric trace gases such as carbon dioxide, methane, nitrous oxide and ozone (in troposphere) have risen sharply over pre industrial levels while chlorofluorocarbons and other halocarbons released by the industrial society have become a new class of radioactively important trace gases.

Let us now look into the sources and sinks of these individual gases and how imbalance is created due to human activities during post – industrial era.

Greenhouse Gases

The greenhouse gases of greatest concern are carbon dioxide, water vapor, methane, chlorofluorocarbons, nitrogen oxides and troposphere ozone.

Sources and Sinks

Carbon dioxide: When fossil fuels such as coal, oil and peat are burnt, the major product of this combustion is carbon dioxide. This combustion may be considered as respiration, the reverse process of photosynthesis and proceeds this way Part of the carbon dioxide produced in this way was partly responsible for warming the surface of the Earth and excess of the carbon dioxide from burning oil and coal to fuel engines of the society have been produced and it is this bulk of extra carbon dioxide that has been added to the atmosphere.

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Methane (CH4):

Methane gas, presence of which was made known only sixty years ago, it is also an Infrared absorber and hence it can be reasonable expected to have an impact or climate. From analytical measurement, it has been found rising steadily. Data indicate that methane levels have increased by more than double since seventeenth century. Currently it has been found to be increasing at about 1.1 percent annually. It' s long atmospheric life and high absorption property make it to account for about one sixth of the net atmospheric greenhouse effect.

Nitrous Oxide (N20):

Nitrous oxide is present in the Earth's atmosphere at a very low concentration. Even in its very low concentration it is becoming increasingly important in the overall global warming picture. The reason being that each molecule of nitrous oxide has an average life of 15 years and it absorbs long wave infrared radiation 7.8 to 17 NM regions. Global concentration of N2O though not increasing as fast as methane, is showing upward trend steadily from 280 pp. At the turn of the 20th century to 310 pp. at present. This results from the emission of 5 million tons of N2O could increase the average surface temperature by as much as 0.3 to 0.4R"C.

Chlorofluorocarbons (CFC'S) :

Chlorofluorocarbons are the most useful chemicals synthesised by man in response to a need t find a household refrigerant better than ammonia, sulphur dioxide or propane and are less corrosive, non explosive, nontoxic and chemically more stable. They revolutionised household and commercial refrigeration and made possible automobile air conditioning. The public gobbled up many CFC containing products, especially aerosol spray cans in which CFC's were the propellant solvents. When CFC's are bubbled into liquid plastic, a foam is produced that can be readily mould into lightweight materials for coffee, soup, ice tea cups. Their fire extinguishing capabilities and their use in cushions and pillows is well known.

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Effect of Global Warming

In order to calculate changes in global temperature, pattern of precipitation, relative humidity, winds and their directions, climatologists use three dimensional models called the global climate models. Earth's surface is divided into 800 to 1100 rectangles or grid points. The atmosphere is divided into 5 to 15 layers over each grid point . One such combined unit is called a cell. Data obtained from each of these cells are fed to supercomputers in order to find overall likely changes in the atmosphere. Based on the results obtained from the supercomputers, climatologist predict that if the present trend of letting out greenhouse gasses into the atmosphere continues, to cause a temperature rise of 1.5 to 4.5R" C over the next half century. Sea level rise is potentially one of the severe outcomes of global warming. Modellers project that the sea level is most likely to rise 0.5 to 1.5 meters in the next fifty to hundred years. The rise will come from thermal expansion of ocean water and from the melting of the mountain glaciers. Higher the sea level, greater is the increase in frequency and severity of flooding and damage to coastal structures. Further it destroys the wet lands, and caused salt water intrusion into rivers and water supplies near the ocean.

One third of the world's population lives in the low laying coastal areas. Several countries will be at risk if sea level rises substantially. For instance half the population of Bangladesh is already experiencing major flooding. It is calculated that if the percent trends continue, Bangladesh will lose up to 19% of its agricultural land. Other areas at great risk include Netherlands, Maldives and Pacific Islands. Among larger cities in danger are New York, New Orleans, Miami, Venice, Bangkok and Taipei.

Is Global Warming A Myth?

The International Panel on Climate Change, a United Nations Committee or 300 Earth scientists, has accepted the prediction of the 3D models and increase in the greenhouse gases, global temperature and gave effects of global warming. These questions that arises is how to escape from this danger? The easy answer is

to reduce the curtail emission of greenhouse gases into the atmosphere. It implies the reduction by the use of petroleum, coal and other fossil; fuels and CFCs. At this stage some scientists have raised a number of issues that call to question some aspects of the science of global warming. Forest evidenced that the greenhouses alone are responsible for global warming. Secondly how perfect are the global climate models and how reliable are the predictions made by these models?

The questions are not baseless. Scientists have studied the changes in the global temperature and concentration of carbon dioxide, right from 1,60,000 years ago to this day. Results of such studies showed that there are swings in global temperature a number of times in much earlier times. The current trend is natural, a continuation of the recovery from the "little ice age" that started five hundred years ago. When the global temperature has been swinging when there was no human activity, then how to account that greenhouse gases produced due to human activity are responsible for swing in global temperature now.

Conclusion

Amongst all the planets in the solar system, the earth alone is unique in possessing an average temperature of 15R"C and comfortable and hospitable climate. Temperature and the climate have been eminently suitable for the growth of all living things, and have been reliably stable for the past 10,000 years. But over the past one century the earth has warmed by from 0.3to 0.6C. This warming is attributed to the excess emission of greenhouse gases:CO2,CH4,NO2,O3 and CFCs. Stability in temperature during the past 10,000 years has been due to the balance between the solar radiation reflected from the Earth's surface and atmosphere.

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