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Theme No. 184 : GLOBAL WARMING AND CARBON FINANCE – PART I

The average temperature of the earth has increased significantly since the beginning of industrialisation. The rate of increase in the temperature in the past few decades is alarmingly high.

What is global warming?

Global warming and climate change are often used interchangeably. Gases such as Carbon dioxide, Methane, Nitrous oxide and refrigerants create green house effect by trapping heat in the lower atmosphere. This makes the earth warmer because the sun's rays are allowed into the lower atmosphere but the heat from these rays is not able to escape.

What is the main cause for global warming?

Scientists across the globe have identified that emission of greenhouse gases (GHGs) due to anthropogenic (man-made) activities, particularly industrial activities, is the main cause for the global warming. The major GHGs are carbon dioxide (CO_2), methane (CH_4) nitrous oxide (N_2O), hydroflourocarbons (HFCs), perflourocarbons (PFCs) and sulphur hexafluoride (SF_6).

The atmospheric concentration of CO_2 and CH_4 have increased by 31 percent and 149 percent respectively above pre-industrial levels since 1750. Coal-burning power plants are the largest source of carbon dioxide pollution. Automobiles are its second largest source. The rest of the anthropogenic emissions are predominantly due to land use change especially deforestation.

What are its effects?

The global warming has many adverse effects such as rise in sea levels,

melting of glaciers, extinction of species, and increase in the ranges of disease vectors etc. For India the impact of climate change on the hydrological cycle is perhaps the greatest concern.

- Himalayan glaciers, which hold back water and release it gradually, are already retreating because of warming. This will increase the high flow in spring and reduce the dry season flow to a level that could be just 30-40% of present levels in the Ganga system. Drought and flood intensity would increase and the over-all run-off would decline.
- Another area of great concern for our country is the impact in the Ganga-Bhramhaputra delta, which is listed by UN as one of the regions most vulnerable area to climate change because of high exposure to sea-level rise, storm surge and river flooding.
- A further concern relates to health. With higher temperature more areas will become malaria-prone and the incidence of some other vector borne diseases will increase. Higher temperature will also affect pest infestation in agriculture.

How global warming can increase Ozone depletion?

It is a great concern that continued global warming will accelerate Ozone destruction and increase Ozone depletion. Ozone depletion gets worse when the stratosphere (where the ozone layer is), becomes colder. Because global warming traps heat in the troposphere, less heat reaches the stratosphere which will make it colder. Greenhouse gases act like a blanket for the troposphere and make the stratosphere colder. In other words, global warming can make ozone depletion much worse right when it is supposed to begin its recovery during the next century.

What is Ozone depletion and its harmful effects?

The layer closest to the surface is called the troposphere which extends from the earth's surface upto about 10 km. The Ozone layer is located above the troposphere in the stratosphere (10 km to about 50 km high). This layer is the Earth's natural protection for all life forms, shielding our planet from harmful Ultraviolet radiations.

As already stated earlier global warming makes the stratosphere more colder since the green house gases present in the troposphere will not allow the heat to escape to the stratosphere. The result is highly damaging. One effect is the rise in temperature of the earth's surface resulting in melting of ice and thereby the water level increases year by year. The other effect is the cooling of the stratosphere which make ozone depletion faster, resulting in the penetration of Ultraviolet rays into earth's surface and thereby causing cancer and a variety of skin diseases.

In the stratosphere the ozone is always in a chain reaction. Ozone contains 3 oxygen atoms. It absorbs the Ultraviolet light of certain frequencies and splits into O_2 and an oxygen atom. The oxygen atom then join with O_2 to regenerate Ozone. This is a continuing process which terminates when an oxygen atom combines with an ozone molecule to make 2 O_2. This depletion is caused by hydroxyl radical (OH), nitric oxide radical (NO), atomic chlorine (CI) and Bromine (Br). These elements are found in certain stable organic compounds especially Chlorofluoro carbons (CFCs). It is noted that a single chlorine atom would keep on destroying Ozone for upto two years (the time scale for transport back down to troposphere). The devastating effect of Bromine is much more than Chlorine.

Could global warming trigger a sudden catastrophe?

Recently, researchers—and even the U.S. Defence Department – have investigated the possibility of abrupt climate change, in which gradual global warming triggers a sudden shift in the earth's climate, causing parts of the world to dramatically heat up or cool down in the span of a few years.

In February 2004, consultants to the Pentagon released a report laying out the possible impacts of abrupt climate change on national security. In a worst-case scenario, the study concluded global warming could make large areas of the world uninhabitable and cause massive food and water shortages, sparking widespread migrations and war.

While this prospect remains highly speculative, many of global warming's

effects are already being observed—and felt. And the idea that such extreme change is possible underscores the urgent need to start cutting global warming pollution.

What are the major initiatives to minimise global warming?

Though emissions are more in industrialized countries the impact of global warming is felt uniformly across all parts of the world. Therefore, unless otherwise the entire world comes together to control emissions, global warming cannot be controlled. The first major global initiative to minimise global warming was the Earth Summit held in RiodeGeneiro in 1992. Since then the issue had been seriously debated and finally an accord was reached at the Kyoto Conference in December 1997. This protocol came into force in February 2005.

What are the important terms and conditions of Kyoto protocol?

Countries that have ratified Kyoto protocol have to reduce their emissions of GHGs. Industrialised countries listed in Annex 1 of Kyoto protocol (European Union countries and OECD countries) have to reduce their emissions. The emission reduction targets have been fixed for each of these countries under the protocol. Non-annex 1 countries are exempted from emission reductions because the emission of GHGs in these countries is very low. Therefore, emerging economies like India and China need not reduce their emission levels. Industrialised economies (Annex 1 Countries) and the individual industrial units in these countries are provided with flexible mechanism to meet their GHG emission reduction targets. They can either reduce the targets by improving the efficiency of operations or by fuel switching, etc. Two other alternatives are envisaged in the protocol:

1. Joint implementation and 2. Clean Development Mechanism.

Joint Implementation (JI): Industries in one Annex 1 country can take up emission reduction projects jointly with another industry in any of the other Annex 1 countries where the project cost is less.

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