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Climate Change and Disaster Management

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The awareness of all stakeholders to climate issues is the key to enhancing preparedness and disaster proofing against the menace of global warming and climate change

IN THE recent years, we witnessed unprecedented floods in Mumbai and Rajasthan. New diseases like chickengunya, dengue, bird flu and now swine-flu etc are affecting both humans and livestock with alarming frequency. The question that arises in anybody's mind is why is it all happening?

One major reason attributed to this is the phenomenon of climate change which is occurring globally and, the world over, scientific community is concerned about it. The climate of a place is the average weather that it experiences over a period of time. The factors that determine the climate at a location are the rainfall, sunshine, wind, humidity, and temperature. Climate change refers to any long-term significant change in the expected patterns of average weather of a specific region or area or zone over an appropriately significant period of time. Such a change may be brought about by natural processes such as changes in the earth's orbit around the sun, the earth's tilt, change in ocean circulation, El Nino, La Nina etc., or due to human activities like burning fossil fuels, emission of greenhouse gases, deforestation, unscientific waste disposal etc.

The earth has always witnessed changes in its climate, with well-marked cold and hot periods, to which most life forms adapted naturally. Over the last 150-200 years this change in climate has speeded up due to human interference, leading to a disruption of natural balance. This rapid change in global climate is evident in rising global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea levels.

The reason for this widespread change is human activities which tend to upset the environmental and ecological balance. For example, our thermal power plants and ever increasing fleet of petrol and diesel powered vehicles emit huge amounts of greenhouse gases and other pollutants. The non-biodegradable plastic waste that we generate, causes further damage to

the environment. We complicate matters even more by cutting down trees to meet our demand for paper, construction and other timber based products. Further, our growing numbers means we need more food, hence the need to use fertilizers that not only emit nitrous oxide, but also pollute soil and groundwater. The

Fig -1

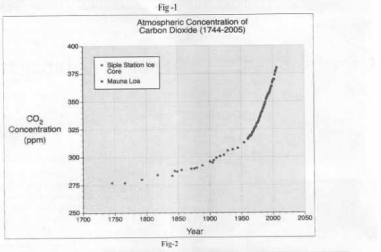
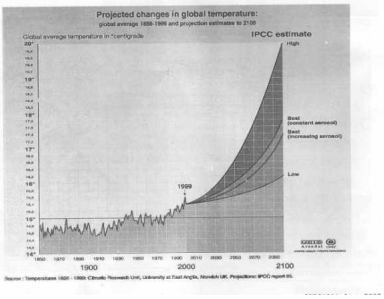


Fig-2



use of refrigerator, air-conditioner, electric appliances etc are all adding to global warming and the depletion of the ozone layer.

Greenhouse effect and Global warming

Greenhouse effect refers to the trapping of heat by a blanket of gases around the earth. This effect keeps the earth warm. Activities that generate greenhouse gases are called 'sources' and those that remove them are known as 'sinks'. A balance between 'sources' and 'sinks' maintains the levels of these greenhouse gases. When the concentration of greenhouse gases rises too much, it leads to global rise in temperatures, as we are witnessing today.

Global warming is an average increase in the temperature of the atmosphere near the earth's surface and in the troposphere and it can occur from a variety of causes, both natural and human induced. In common language, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities It has been observed that there is rise in CO_2 concentration in earth's atmosphere from 280ppm in the year 1850 to 379 ppm in the year 2005, as evident from figure 1. The rise in CO_2 is having analogous increase in temperature profile. (figure-2).

According to the IPCC (Intergovernmental Panel on Climate Change), an increase in carbon dioxide and other Green House Gases (GHGs), like methane, ozone, nitrous oxide, and chlorofluorocarbons, in the atmosphere is expected to increase the average global temperature between 1.5 °C to 4.5 °C by 2050. This in turn will lead to changes in rainfall and snowfall, more intense or frequent droughts, floods, and storms, as well as a rise in sea level. These climatic changes will have wide-ranging harmful effects including increase in heat-related mortality, dehydration, spread of infectious diseases, malnutrition, and damage to public health

Disastrous impacts of climate change

Climate change is a threat to both mankind and any life form existing on planet earth. Since the end of the 19th century, the earth's average surface temperature has increased by 0.3-0.6 °C. Over the last 40 years, the rise has been 0.2-0.3 °C. Recent years have been the warmest since 1860, the year when regular instrumental records became available.

Direct impacts

It is anticipated that there will be an increase in the number of deaths due to greater frequency and severity of heat waves and other extreme weather events. An extreme rise in the temperature will affect people living in the urban areas more than those in the rural areas. This is due to the 'heat islands' that develop here owing to the presence of concrete constructions, paved and tarred roads. In the sea it would create dead zones with no fish.

Indirect impacts

Indirectly, changes in weather pattern, can lead to ecological imbalance, changes in food production levels, increase in the distribution vector-borne diseases. Higher temperature will cause the sea levels to rise that could lead to erosion and damage to important ecosystems such as wetlands and coral reefs. Temperature rise would indirectly result in geo-hydrological changes along the coastline such as saltwater intrusion into the groundwater and the wetlands, coral reef destruction, and damage to the drainage in the low-lying areas. Climate change would also increase air pollution levels.

Agriculture

Climate change will affect agricultural yield directly because of alterations in temperature and rainfall, and indirectly through changes in soil quality, pests, and diseases. In particular, the yield of cereals is expected to decline in India, Africa, and the Middle East. Extreme weather conditions such as high temperature, heavy rainfall, floods, droughts, etc. will also affect crop production.

Weather

A warmer climate will change rainfall and snowfall patterns, would lead to increased droughts and floods, melting of glaciers and polar ice sheets, and result in accelerated sea- level rise. An increase in the number of cyclones and hurricanes over the last few years has been attributed to changes in global temperature profile.

Sea level rise

Coastal areas and small islands are the most threatened areas because of rises in sea level due to global warming. The heating of oceans, and melting of glaciers and polar ice sheets, is predicted to raise the average sea level by about half a metre over the next century. Sea-level rise could have a number of physical impacts on coastal areas, including loss of land due to inundation and erosion, increased flooding, and salt-water intrusion. These will adversely affect coastal agriculture, tourism, freshwater resources, fisheries and aquaculture, human settlements, and health. Rising sea levels threaten the survival of many low-lying island nations, such as the Maldives, Marshall Islands and low-lying coastal areas.

Health

Global warming will directly affect human health by increasing cases of heat stress. It would cause new diseases both in humans and cattle and outbreaks of epidemics will increase.

Forests and Wildlife

Ecosystems sustain the earth's entire storehouse of species and genetic diversity. The ecosystems that are most likely to be affected by this change are the ones in the higher latitudes, the tundra forests. Polar regions will feel the impact of warming more than other regions and interiors of continents will experience more warming than the coastal regions. Climate change may establish entirely new set of forest species wiping out the existing ones. The recent report of WWF (The World Wide Fund for Nature) states that this invisible killer has entered the most cherished natural habitats of the world. The giant pandas of Wolong in China, the grizzly bears of America's Yellowstone National Park, and the Tigers in Kanha National Park in India are some of the animals at risk from global warming. If the rate of climate change continues at the same pace or accelerate , the extinction of some mountain plants and animals is a certainty.

Marine life

Due to climate change and increasing temperature the tropical forests of the oceans- the corals and coral reefs would sustain more damage. In Australia, large stretches of the Great Barrier Reef have been damaged by bleaching. Zooplanktons, small organisms that float on the sea surface are declining in numbers, thereby reducing the number of fish and sea birds that feed on these organisms disturbing the food web of aquatic ecosystem.

Global warming affecting India

A recent report by scientists has revealed that India has almost consistently experienced more than normal annual mean temperatures for the past 14 years. The data contained in the "Annual Climate Summary 2006", a report produced by the National Climate Centre Office of the Additional Director General of Meteorology (Research) Meteorological Department, Pune revealed warming at the rate of 0.48 degrees Celsius over 100 years. The year 2006 was the warmest year on record since 1901, according to the report and it was determined by annual mean temperature over the country as a whole being 0.59 degrees Celsius above the average calculated during 1961-1990.

The 10 warmest years ever since the Meteorology Department started keeping a record of temperatures since 1901 are 2006 (0.595), 2002 (0.59), 1998 (0.50), 2004&2001 (0.47), 2003 (0.45), 1958 (0.43), 1941 (0.41), 2005(0.40), 1999 (0.39), 1953 & 2000 (0.36) and 1980 (0.34).

The Himalyan glacier is melting at the rate of 10-15mts/ year and Ganges would loose 2/3rd of July-September flow affecting 1/3 rd of India's irrigated land and causing water shortage for 500million people in South Asia. Possibilities of frequent droughts in Rajasthan, Karnatka, Tamilnadu, Orissa, Chattishgarh. Floods in Assam, West Bengal, Bihar, Orissa, UP. Cyclone and storms in AP, Tamilnadu & Orissa, submergence of low lying coastal regions. Traditionally dry areas like Saurashtra and Kutch and West Rajasthan, besides Gujarat, Madhya Maharashtra and Orissa, are receiving excess rainfall, whereas Himachal Pradesh, East and West U.P, Bihar, Jharkhand and Assam and Meghalaya are becoming rain deficient. Northern hilly regions, Uttrakhand, Himachal and parts of Jammu and Kashmir are becoming warmer and receiving less snowfall.

Disaster Preparedness Measures

Lesser use of fossil fuels and increased use of renewable sources of energy will undoubtedly decrease the emission of GHGs substantially and switching to cleaner fuels and energy-efficient technologies will reduce pollutants level in the environment.

Carbon Sequestration

The uptake and storage of carbon is called carbon sequestration. Carbon sequestration is the process through which agricultural and forestry practices remove carbon dioxide (CO_2) from the atmosphere. The term "sinks" is also used to describe agricultural and forestry lands that absorb dangerous CO_2. Measures that sequester carbon and/ reduce emissions of GHGs are Afforestation, Grazing land management, conservation tillage on croplands, conservation or riparian buffers- Grasses or trees planted along streams and croplands etc.

Kyoto Protocol

India accepted Kyoto Protocol in August 2002 with the objective to fulfill requirements of Clean Development Mechanisms (CDMs) It commits the developed countries, including economies in transition to reduce emissions of GHGs by an average of 5.2% below 1990 levels during 2008-2012. Under this initiative a National Clean Development Mechanism has been created in 2003 by the Cabinet. Till March 2006, CDM Authority has cleared 252 projects mainly in the field of Renewable energy, solid-waste, Hydro-flurocarbons, Energy efficiency etc.

Ozone Cell under Montreal Protocol

The Ministry of Environment and Forest (MoEF) is the nodal agency entrusted with the task of UN Framework Convention on Climate Change(UNFCCC) and environment related multilateral conventions and protocols. It has established an ozone cell to render necessary service to implement Montreal Protocol and its Ozone Depleting Substances (ODSs) phase out programme in India. India is also a signatory to UN Framework on Climate Change (UNFCC) whose primary objective is to reduce the emission of Green House Gases (GHGs)

Scientists feel that the world must restrict its carbon emission to 190 Giga Tons by 2050 if it is to have the chance of escaping the consequences of global warming. It is possible to reduce emission adopting disaster risk reduction approach. On the basis of deliberations at the World Conference on Disaster Reduction in Kobe, Japan , 168 countries adopted the Hygo Framework for Action (HFA) which seeks to achieve a substantial reduction of disaster losses in lives and in the social, economic and environmental assets under their five priorities of action between year 2005-15. What is required now is a holistic approach to mitigate climate change effects by all agencies and stakeholders through initiatives of awareness, training, capacity building and adopting more scientific approach towards development. The awareness of all stakeholders to climate issues is the key to enhancing preparedness and disaster proofing against the menace of global warming and climate change. ❑

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