ENVIS Newsletter

Vol.-5 Issue-I April-June 09

"Climate Change"

"Climate Change"

YOU CONTROL CLIMATE CHANGE.

TURN DOWN. SWITCH OFF. RECYCLE WALK . CHANGE

जहाँ है हरियाली।
वहाँ है खुशहाली।।

Editorial & Technical Support

Dr. Ajay Gairola
Member Secretary,
UEPPCB

Amarjeet Singh, EO
Project Coordinator,
ENVIS Centre, UEPPCB

Niharika Dimri
DEO
ENVIS Centre, UEPPCB

ENVIS CENTRE, UEPPCB,Dehradun.
E-mail: info@envis-ueppcb Website: www.envis-ueppcb.org

Climate Change

Imagine going for a picnic during your summer holidays. You break into a sweat just thinking about it! And to think that your parents would have loved nothing better during their childhood days! Yes, the change in climate over the last few decades has been truly amazing.

Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Climate change is any long-term change in the patterns of average weather of a specific region or the Earth as a whole. Climate change reflects abnormal variations to the Earth's climate and subsequent effects on other parts of the Earth, such as in the ice caps over durations ranging from decades to millions of years.

Climate experts think that climate change will bring increasingly frequent and severe heat waves and extreme weather events, as well as a rise in sea levels. These changes have the potential to affect human health in direct and indirect ways.

The warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level. The Earth's average surface temperature has risen by 0.76° C since 1850. Most of the warming that has occurred over the last 50 years is very likely to have been caused by human activities.

Factors that influence the Earth's climate.

- Variations in the Earth's orbital characteristics.
- Atmospheric carbon dioxide variations.
- Volcanic eruptions
- Variations in solar output.

Cause of Climate Change

The earth's climate is dynamic and always changing through a natural cycle. What the world is more worried about is that the changes that are occurring today have been speeded up because of man's activities. These changes are being studied by scientists all over the world who are finding evidence from tree rings, pollen samples, ice cores, and sea sediments. The causes of climate change can be divided into two categories -

1. **Natural causes**
   - Continental drift
   - Volcanoes
   - The earth's tilt
   - Ocean currents
2. **Man-made causes.**

Natural causes

There are a number of natural factors responsible for climate change. Some of the more prominent ones are continental drift, volcanoes, ocean currents, the earth's tilt, and comets and meteorites.

Continental drift

The continents that we are familiar with today were formed when the landmass began gradually drifting apart, millions of years back. This drift also had an impact on the climate because it changed the physical features of the landmass, their position and the position of water bodies. The separation of the landmasses changed the flow of ocean currents and winds, which affected the climate. This drift of the continents continues even today; the Himalayan range is rising by about 1 mm (millimeter) every year because the Indian land mass is moving towards the Asian land mass, slowly but steadily.

Volcanoes

When a volcano erupts it throws out large volumes of sulphur dioxide (SO_2), water vapour, dust, and ash into the atmosphere. Although the volcanic activity may last only a few days, yet the large volumes of gases and ash can influence climatic patterns for years. Millions of tonnes of sulphur dioxide gas can reach the upper levels of the atmosphere (called the stratosphere) from a major eruption. The gases and dust particles partially block the incoming rays of the sun, leading to cooling. Sulphur dioxide combines with water to form tiny droplets of sulphuric acid. These droplets are so small that many of them can stay aloft for several years. They are efficient reflectors of sunlight, and screen the ground from

some of the energy that it would ordinarily receive from the sun. Winds in the upper levels of the atmopshere, called the stratosphere, carry the aerosols rapidly around the globe in either an easterly or westerly direction. Movement of aerosols north and south is always much slower. This should give you some idea of the ways by which cooling can be brought about for a few years after a major volcanic eruption.

Explosive volcanic eruptions have been shown to have a short-term cooling effect on the atmosphere if they eject large quantities of sulfur dioxide into the stratosphere. This image shows the eruption of Mount St. Helens on May 18, 1980 which had a local effect on climate because of ash reducing the reception of solar radiation on the Earth's surface. Mount St. Helens had very minimal global effect on the climate because the eruption occurred at an oblique angle putting little sulfur dioxide into the stratosphere. (Source: U.S. Geological Survey, photograph by Austin Post).

Mount Pinatoba, in the Philippine islands erupted in April 1991 emitting thousands of tonnes of gases into the atmosphere. Volcanic eruptions of this magnitude can reduce the amount of solar radiation reaching the Earth's surface, lowering temperatures in the lower levels of the atmosphere (called the troposphere), and changing atmospheric circulation patterns. The extent to which this occurs is an ongoing debate. Ash column generated by the eruption of Mount Pinatubo on June 12, 1991. The strongest eruption of Mount Pinatubo occurred three days later on June 15, 1991. (Source: US Geological Survey).

❖ **The earth's tilt**

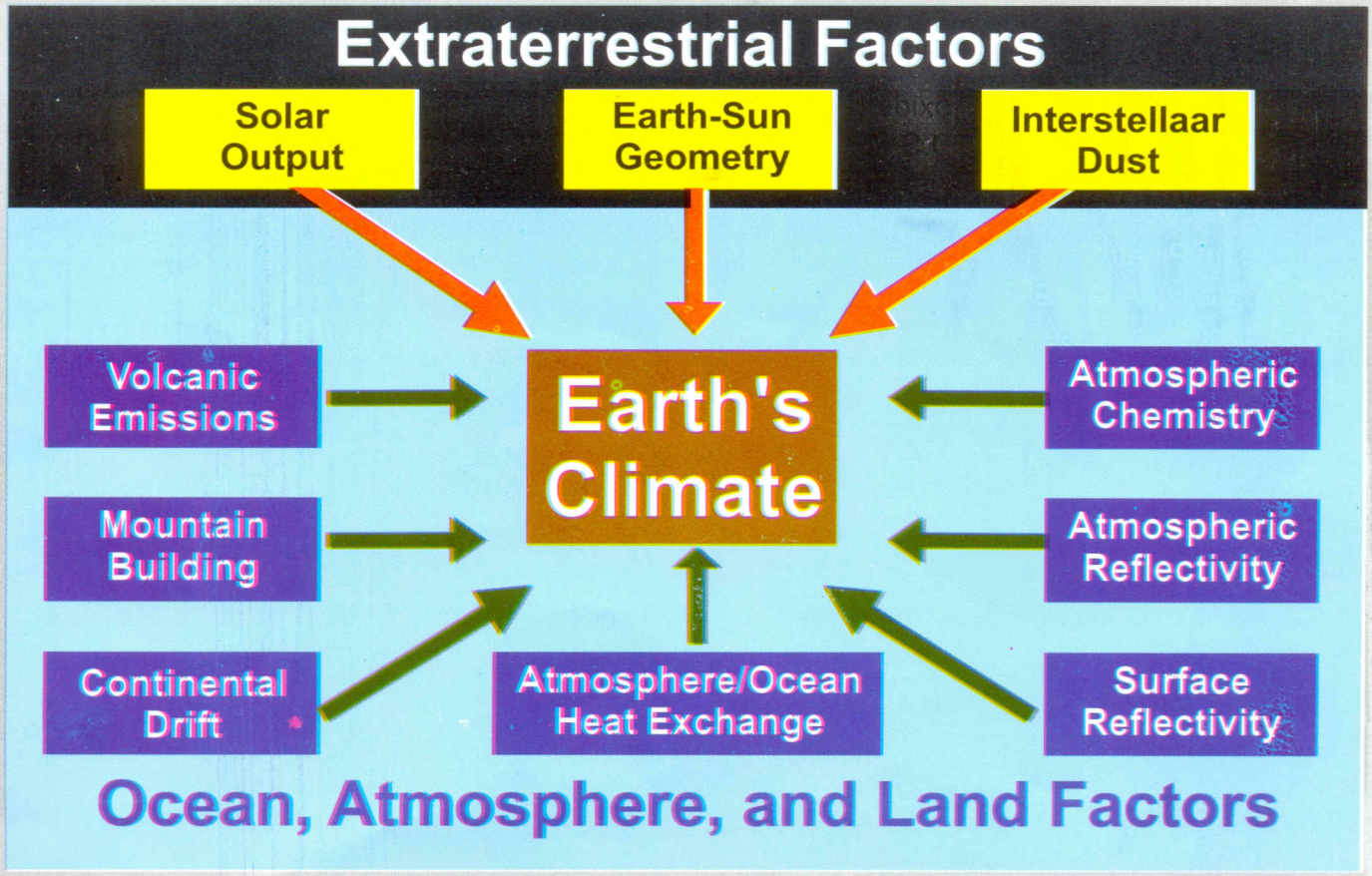
The earth makes one full orbit around the sun each year. It is tilted at an angle of 23.5° to the perpendicular plane of its orbital path. Changes in the tilt of the earth can affect the severity of the seasons - more tilt means warmer summers and colder winters; less tilt means cooler summers and milder winters.The gradual change in the direction of the earth's axis, called precession is responsible for changes in the climate.

❖ **Ocean currents**

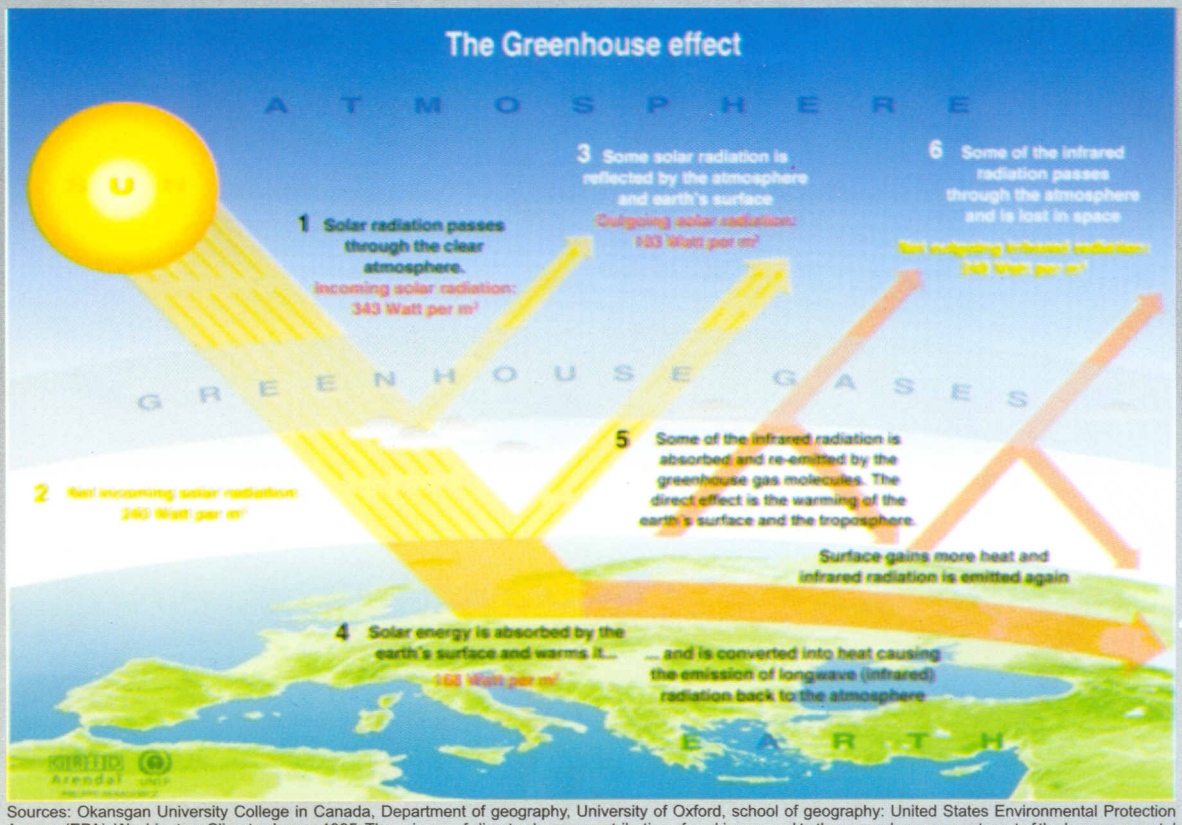
The oceans are a major component of the climate system. They cover about 71% of the Earth and absorb about twice as much of the sun's radiation as the atmosphere or the land surface. Ocean currents move vast amounts of heat across the planet - roughly the same amount as the atmosphere does. But the oceans are surrounded by land masses, so heat transport through the water is through channels.

Man made sources

- Electricity is the main source of power in urban areas. All our gadgets run on electricity generated mainly from thermal power plants. These thermal power plants are run on fossil fuels (mostly coal) and are responsible for the emission of huge amounts of greenhouse gases and other pollutants.
- Cars, buses, and trucks are the principal ways by which goods and people are transported in most of our cities. These are run mainly on petrol or diesel, both fossil fuels. "We generate large quantities of waste in the form of plastics that remain in the environment for many years and cause damage.
- We use a huge quantity of paper in our work at schools and in offices. Have we ever thought about the number of trees that we use in a day? " Timber is used in large quantities for construction of houses, which means that large areas of forest have to be cut down.
- A growing population has meant more and more mouths to feed. Because the land area available for agriculture is limited (and in fact, is actually shrinking as a result of ecological degradation!), high-yielding varieties of crop are being grown to increase the agricultural output from a given area of land. However, such high-yielding varieties of crops require large quantities of fertilizers; and more fertilizer means more emissions of nitrous oxide, both from the field into which it is put and the fertilizer industry that makes it. Pollution also results from the run-off of fertilizer into water bodies.
- Industrial errission and green house effect.



Greenhouse effect

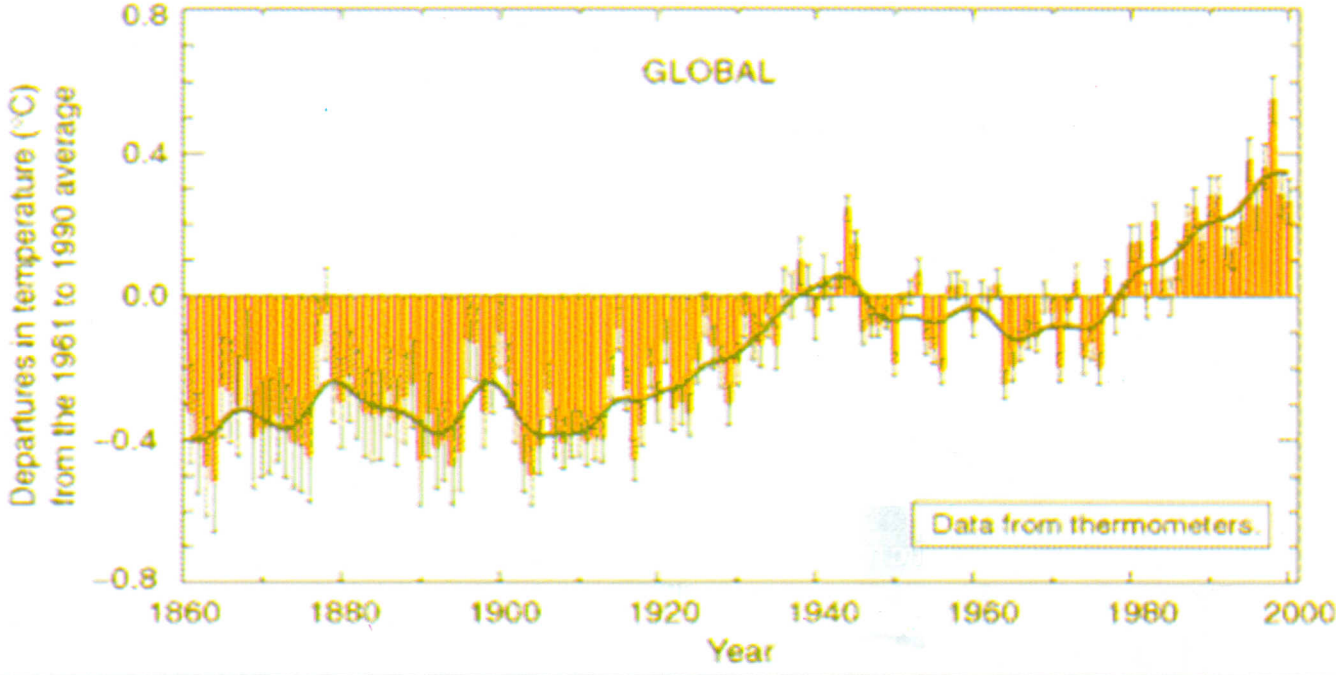


Sources: Okansgan University College in Canada, Department of geography, University of Oxford, school of geography: United States Environmental Protection Agency (EPA), Washington: Climate change 1995. The science of climate change, contribution of working group I to the second assessment reort of the Inergovernental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

Greenhouse effect. A schematic representation of the exchanges of energy between outer space, the Earth's atmosphere, and the Earth's surface. The ability of the atmosphere to capture and recycle energy emitted by the Earth surface is the defining characteristic of the greenhouse effect. The greenhouse effect is the heating of the surface of a planet or moon due to the presence of an atmosphere containing gases that absorb and emit infrared radiation. Greenhouse gases, which include water vapor, carbon dioxide and methane, are almost transparent to solar radiation but strongly absorb and emit infrared radiation. Thus, greenhouse gases trap heat within the surface-troposphere system. This mechanism is fundamentally different from that of an actual greenhouse, which works by isolating warm air inside the structure so that heat is not lost by convection. The greenhouse effect was discovered by Joseph Fourier in 1824, first reliably experimented on by John Tyndall in 1858, and first reported quantitatively by Svante Arrhenius in 1896. In the absence of the greenhouse effect and an atmosphere, the Earth's average surface temperature of 14 °C (57 °F) could be as low as ?18 °C (?0.4 °F), the black body temperature of the Earth. Anthropogenic global warming (AGW), a recent warming of the Earth's lower atmosphere as evidenced by the global mean temperature anomaly trend, is believed to be the result of an "enhanced greenhouse effect" mainly due to human-produced increased concentrations of greenhouse gases in the atmosphere. The major non-gas contributor to the Earth's greenhouse effect, clouds, also absorb and emit infrared radiation and thus have an effect on radiative

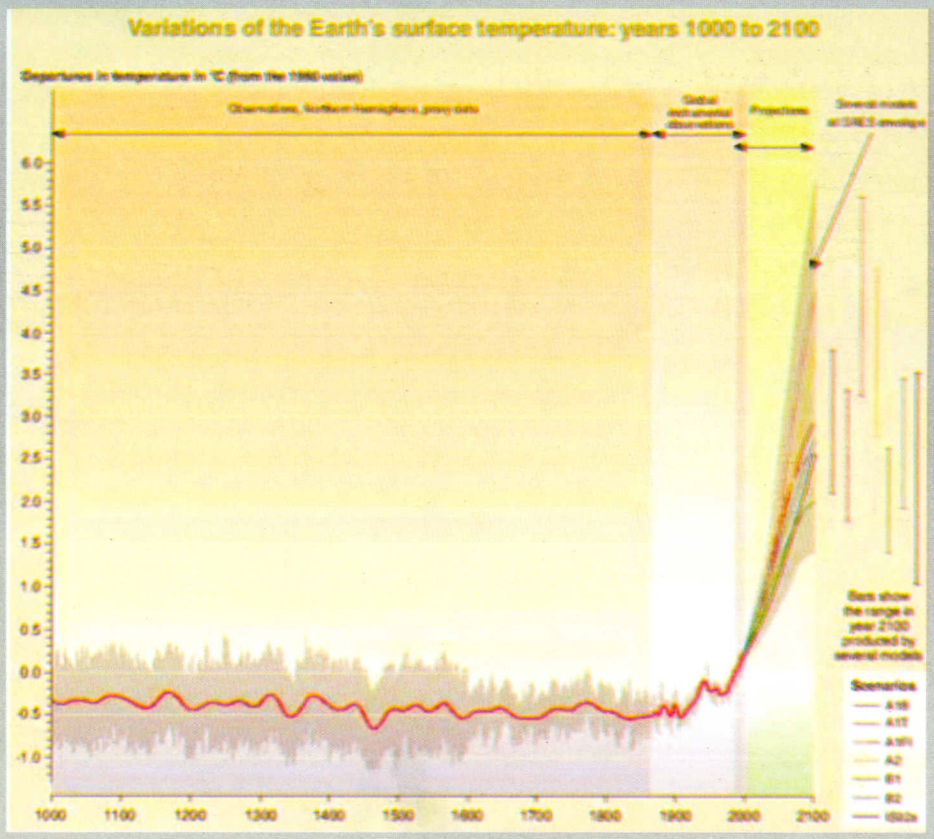
properties of the greenhouse gases. Human activities are causing greenhouse gas levels in the atmosphere to increase. This graphic explains how solar energy is absorbed by the earth's surface, causing the earth to warm and to emit infrared radiation. The greenhouse gases then trap the infrared radiation, thus warming the atmosphere

Variations of the Earth's surface temperature for the past 140 years



The Earth's surface temperature is shown year by year (red bars) and approximately decade by decade (black line, a filtered annual curve suppressing fluctuations below near decadal time-scales). There are uncertainties in the annual data (thin black whisker bars represent the 95% confidence range) due to data gaps, random instrumental errors and uncertainties, uncertainties in bias corrections in the ocean surface temperature data and also in adjustments for urbanisation over the land. Over both the last 140 years and 100 years, the best estimate is that the global average surface temperature has increased by 0.6 ± 0.2 °C.

Source IPCC Third Assessment Report: Climate Change 2001
(The Scientific Basis, Summary for Policymakers)



From year 1000 to year 1860 variations in average surface temperature of the Northern Hemisphere are shown (corresponding data from the Southern Hemisphere not available) reconstructed from proxy data (tree rings, corals, ice cores, and historical records). The line shows the 50-year average, the grey region the 95% confidence limit in the annual data. From years 1860 to 2000 are shown variations in observations of globally and annually averaged surface temperature from the instrumental record; the line shows the decadal average. From years 2000 to 2100 projections of globally averaged surface temperature are shown for the six illustrative SRES scenarios and IS92a using a model with average climate sensitivity. The grey region marked "several models all SRES envelope" shows the range of results from the full range of 35 SRES scenarios in addition to those from a range of models with different climate sensitivities. The temperature scale is departure from the 1990 value.

Source IPCC Third Assessment Report: Climate Change 2001 (Synthesis Report)

Greenhouse gases and their sources

Carbon dioxide is undoubtedly, the most important greenhouse gas in the atmosphere. Changes in land use pattern, deforestation, land clearing, agriculture, and other activities have all led to a rise in the emission of carbon dioxide.

Methane is another important greenhouse gas in the atmosphere. About ¼ of all methane emissions are said to come from domesticated animals such as dairy cows, goats, pigs, buffaloes, camels, horses, and sheep. These animals produce methane during the cud-chewing process. Methane is also released from rice or paddy fields that are flooded during

the sowing and maturing periods. When soil is covered with water it becomes anaerobic or lacking in oxygen. Under such conditions, methane-producing bacteria and other organisms decompose organic matter in the soil to form methane. Nearly 90% of the paddy-growing area in the world is found in Asia, as rice is the staple food there. China and India, between them, have 80-90% of the world's rice-growing areas.

Methane is also emitted from landfills and other waste dumps. If the waste is put into an incinerator or burnt in the open, carbon dioxide is emitted. Methane is also emitted during the process of oil drilling, coal mining and also from leaking gas pipelines (due to accidents and poor maintenance of sites). A large amount of nitrous oxide emission has been attributed to fertilizer application. This in turn depends on the type of fertilizer that is used, how and when it is used and the methods of tilling that are followed. Contributions are also made by leguminous plants, such as beans and pulses that add nitrogen to the soil.

Runaway greenhouse effect

A runaway greenhouse effect occurs if positive feedbacks lead to the evaporation of all greenhouse gases into the atmosphere. A runaway greenhouse effect involving carbon dioxide and water vapor may have occurred on Venus. It is not possible that such an event will occur on Earth as a result of anthropogenic perturbations, but other potential runaway climate change effects involving Arctic methane release from permafrost have been suggested. Clathrates have also been proposed as a major potential methane source capable of inducing a 'runaway' effect.

- **Anthropogenic greenhouse effect**

Of the human-produced greenhouse gases, the one that contributes the bulk in terms of radiative forcing is carbon dioxide. CO2 production from increased industrial activity (fossil fuel burning) and other human activities such as cement production and tropical deforestation has increased the concentrations in the atmosphere. Measurements of CO2 from the Mauna Loa observatory show that concentrations have increased from about 313 ppm (mole fraction in dry air) in 1960 to about 375 ppm in 2005. The current observed amount of CO2 exceeds the geological record maxima (~300 ppm) from ice core data. The effect of combustion-produced carbon dioxide on the global climate, a special case of the greenhouse effect first demonstrated in the 1930s, may be called the Callendar effect.

Because it is a greenhouse gas, elevated CO2 levels will contribute to additional absorption and emission of thermal infrared in the atmosphere, which could contribute to net warming. In fact, according to Assessment Reports from the Intergovernmental Panel on Climate Change, "most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations".

Responses to anthropogenic global warming fall into three categories:

- **Adaptation -** dealing with the effects of global warming, such as by building flood defences
- **Mitigation -** reducing carbon emissions, such as by using renewable energy and energy efficiency measures.

- **Geoengineering** - directly intervening in the climate using techniques such as solar radiation management

What Are the Sources of Greenhouse Gases?

In the United States, greenhouse gas emissions come primarily from the combustion of fossil fuels in energy use. Energy use is largely driven by economic growth with short-term fluctuations in its growth rate created by weather patterns affecting heating and cooling needs, as well as changes in the fuel used in electricity generation. Energy-related carbon dioxide emissions, resulting from the combustion of petroleum, coal, and natural gas, represented 82 percent of total U.S. anthropogenic greenhouse gas emissions in 2006 (Figure 12). The connection between energy use and carbon dioxide emissions is explored in the box on the reverse side Values expressed as carbon dioxide equivalents (CO2e) are calculated based on their global warming potential (GWP). GWP is the ratio of the warming that would result from the emission of one kilogram of a greenhouse gas to that from the emission of one kilogram of carbon dioxide over a fixed period of time such as 100 years.

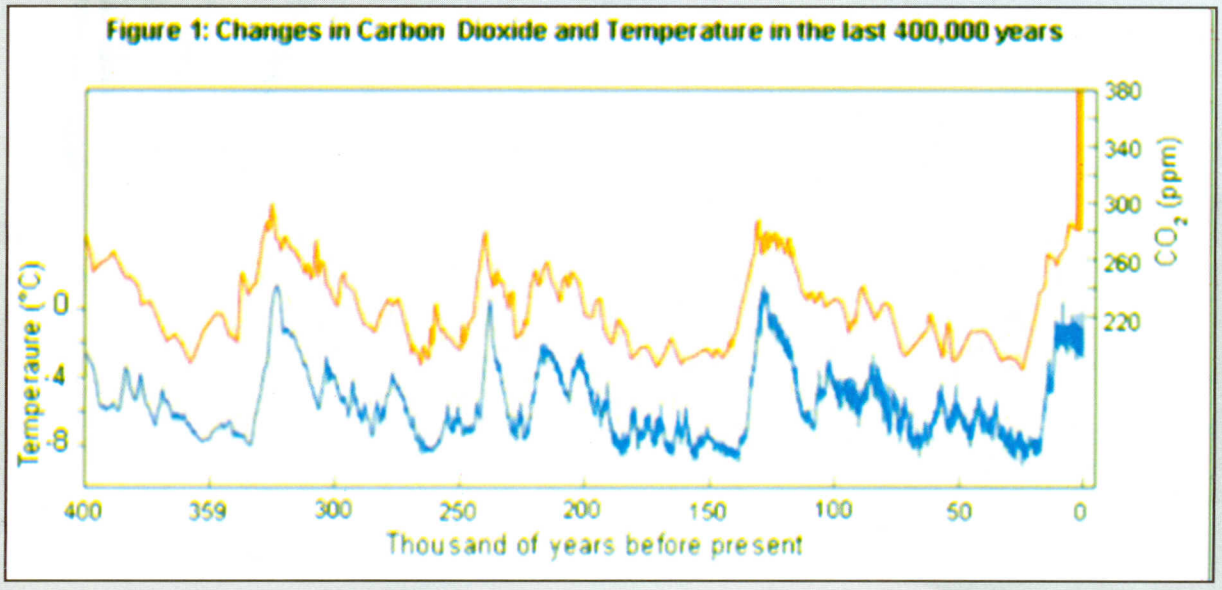
Why Are Atmospheric Levels Increasing?

Levels of several important greenhouse gases have increased by about 25 percent since large-scale industrialization began around 150 years ago . During the past 20 years, about three-quarters of anthropogenic (human-caused) emissions came from the burning of fossil fuels. Concentrations of carbon dioxide in the atmosphere are naturally regulated by numerous processes collectively known as the "carbon cycle"

What Effect Do Greenhouse Gases Have on Climate Change?

In computer-based models, rising concentrations of greenhouse gases produce an increase in the average surface temperature of the Earth over time. Rising temperatures may, in turn, produce changes in precipitation patterns, storm severity, and sea level commonly referred to as "climate change."

Figure 1: Changes in Carbon Dioxide and Temperature in the last 400,000 years



Carbon Dioxide - Endless Warming Carbon dioxide is the number-one reason for man-made climate change. But what is carbon dioxide, actually? Where does it come from? And why are governments and businesses now scrambling to reduce their carbon dioxide emissions?

Figure 2.Carbon Dioxide Emissions and Carbon Dioxide Concentrations (1751-2004)

The movement ("flux") of carbon between the atmosphere and the land and oceans is dominated by natural processes, such as plant photosynthesis. While these natural processes can absorb some of the net 6.2 billion metric tons (7.2 billion metric tons less 1 billion metric tons of sinks) of anthropogenic carbon dioxide emissions produced each year (measured in carbon equivalent terms), an estimated 4.1 billion metric tons are added to the atmosphere annually. This positive imbalance between greenhouse gas emissions and absorption results in the continuing increase in atmospheric concentrations of greenhouse gases. A molecule of carbon dioxide (CO2) consists of one carbon and two oxygen atoms. Colorless and odorless, it is hard to detect. The amount of carbon dioxide in the atmosphere has been in flux throughout the Earth's history, but the United Nations Intergovernmental Panel on Climate Change estimates that in pre-industrial times CO2 made up around 280 ppmv (parts per million volume) of the Earth's atmosphere.

While there are other greenhouse gases like methane and ozone that trap more heat per molecule, carbon dioxide is the second-most important greenhouse gas behind water vapor. Methane and ozone are more efficient, but have less effect on climate change due to their smaller atmospheric concentration.

Man-induced increase

Since the beginning of the industrial revolution, the average amount of carbon dioxide in the atmosphere has increased by nearly 40 percent from an estimated 280 to more than 380 ppmv percent. This increase in CO_2's share of the atmosphere is mostly due to anthropogenic (man-induced) factors, such as burning fossil fuels, deforestation and industrial production. In total, humans emit around 32 gigatons of carbon dioxide each year. Half of this stays in the atmosphere; the rest is absorbed by oceans and vegetation. With sharp increases in man-made CO_2 emissions, the natural CO_2 cycle gets thrown out of balance: vegetation can no longer transform the increased amount of CO_2 into oxygen, and oceans are steadily reaching saturation level. The result of the increasing amount of carbon dioxide in the atmosphere is an enhanced greenhouse effect and, subsequently, climate change. While CO_2 is only responsible for 20 percent of the natural greenhouse effect, it accounts for about 60 percent of the anthropogenic greenhouse effect that is causing the latest wave of global warming.

Sources

Carbon dioxide has always been with us. Scientists say Earth's earliest atmosphere was made up mostly of steam, carbon dioxide, and ammonia from volcanic eruptions. Today, carbon dioxide is mostly produced by the combustion of organic matter like coal, oil, and wood, the fermentation, and the respiration processes of living organisms.

Role and Uses

While CO_2 has gotten some bad press lately, it is one of the most important substances on Earth. Besides providing warmer temperatures, it is also the world's most important fertilizer. Plants, phytoplankton, and algae need the gas for their photosynthesis to

produce sugar and to grow. Doing so they absorb and bind carbon dioxide and produce oxygen. That is why forests are one of the world's most important CO_2-sinks.

Theoretically, rising CO_2 levels should be compensated by plants and algae. Up to a certain concentration, more CO_2 means more photosynthesis and more growth. Unfortunately, under hot and dry conditions many plants close their pores to prevent the loss of water and switch to a process called photorespiration during which they consume oxygen and produce carbon dioxide. So rising CO2 levels will only lead to higher growth in areas with enough precipitation and fertile soils.

Carbon dioxide (CO_2) is emitted in a number of ways. It is emitted naturally through the carbon cycle and through human activities like the burning of fossil fuels.

Natural sources of CO_2 occur within the carbon cycle where billions of tons of atmospheric CO_2 are removed from the atmosphere by oceans and growing plants, also known as 'sinks,' and are emitted back into the atmosphere annually through natural processes also known as 'sources.' When in balance, the total carbon dioxide emissions and removals from the entire carbon cycle are roughly equal.

Health impacts of climate change

Climate change is a major problem caused by the increase of human activities leading to several direct and indirect impacts on health. The combustion of fossil fuels, increasing number of industries, and large-scale deforestation are some of the causes for the accumulation of GHGs (greenhouse gases) in the atmosphere. According to the IPCC (Intergovernmental Panel on Climate Change), an increase in carbon dioxide and other GHGs, like methane, ozone, nitrous oxide, and chlorofluorocarbons, in the atmosphere is expected to increase the average global temperature by 1.5 ° C to 4.5 ° C. 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 infrastructure. Thus we should take appropriate measures to stop this climate change.

Direct impacts

The weather has a direct impact on our health. If the overall climate becomes warmer, there will be an increase in health problems. 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. The elderly, the very young and those suffering from respiratory and cardiovascular disorders will probably be affected by such weather extremes as they have lesser coping capacity. 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. Higher temperatures in the cities would lead to an increase in the ground-level concentration of ozone thereby increasing air pollution problems.

Indirect impacts

Indirectly, changes in weather pattern, can lead to ecological disturbances, changes in food production levels, increase in the distribution of malaria, and other vector-borne diseases. Fluctuation in the climate especially in the temperature, precipitation, and humidity can influence biological organisms and the processes linked to the spread of infectious 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. Direct impact of this rise would include deaths and injury caused by intense flooding. Temperature rise would indirectly result in geohydrological 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 could increase air pollution levels by accelerating the atmospheric chemical reactions that produce photochemical oxidants due to a rise in the temperature.

Diseases

The GHGs have been responsible for the depletion of stratospheric ozone, which protects the earth from the harmful direct rays of the sun. Depletion of stratospheric ozone results in higher exposure to ultra violet rays of the sun, leading to an increase in the incidents of skin cancer in light skinned people. It could also lead to an increase in the number of people suffering from eye diseases such as cataract. It is also thought to cause suppression of the immune system. Due to global warming there will be an increase in the areas of habitat of disease-spreading insects such as the mosquito, causing an increase in the transmission of infection through these carriers.

Potential effects on health due to sea level rise include:

- death and injury due to flooding;
- reduced availability of fresh water due to saltwater intrusion;
- contamination of water supply through pollutants from submerged waste dumps;
- change in the distribution of disease-spreading insects;
- effect on the nutrition due to a loss in agriculture land and changes in fish catch; and
- health impacts associated with population displacement.

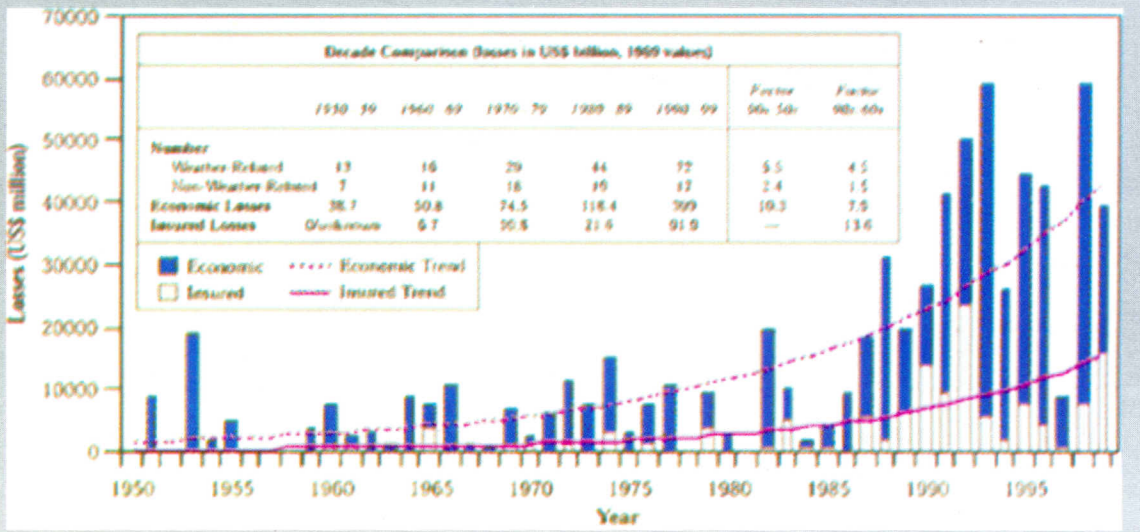
Vulnerability & Adaptation

Vulnerability is defined as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. Severe storms, floods and droughts since the eighties have served as reminders that climate change is a global problem. The most dramatic change has been in the temperature, with measurement records suggesting that warming by 0.3-0.6 °C has already taken place since the 1860s. The last two decades of the 20th century were the warmest in this period.

Over the next hundred years, the earth's surface temperature is projected to increase by 1.4 to 5.8 °C which will be greater than that experienced over the last 10 000 years.

Climate changes have occurred in the past, but always gradually, over thousands of years, giving ecosystems time to adapt. The rapid change that is currently taking place will leave ecosystems vulnerable. The large quantities of water locked in the polar ice caps and glaciers will be released as a consequence of warming. This, together with an increase in the thermal expansion of the oceans, will make the global mean sea level rise by 9 cm to 88 cm.

The effects of global warming are difficult to quantify because of the complicated relationships between air temperature, precipitation quantity and pattern, vegetative cover and soil moisture. However, it is likely that the frequency, intensity and duration of storms and other extreme weather events could increase.



The costs of catastrophic weather events have exhibited a rapid upward trend in recent decades. Yearly economic losses from large events increased 10.3-fold from US$4 billion yr-1 in the 1950s to US$40 billion yr-1 in the 1990s (all in 1999 US$). The insured portion of these losses rose from a negligible level to US$9.2 billion annually during the same period, and the ratio of premiums to catastrophe losses fell by two-thirds. Notably, costs are larger by a factor of 2 when losses from ordinary, noncatastrophic weather-related events are included. The numbers generally include "captive" self-insurers but not the less-formal types of self-insurance.

Source IPCC Third Assessment Report: Climate Change 2001 (Impacts, Adaptation & Vulnerability, Chapter 8, Insurance and Other Financial Services

A rise in sea level could inundate and erode coastal areas, increase flooding and salt-water intrusion; this will affect coastal agriculture, fisheries and aquaculture, freshwater resources, human settlements and tourism. The incidence of water-borne diseases, heat stress and vector-borne diseases such as malaria is expected to increase.

All developing countries facing the problems of population and economic growth will be put under even greater stress as a result of these impacts.

In India, climate change could represent additional pressure on ecological and socio-economic systems that are already under stress due to rapid urbanization, industrialization, and economic development. With its huge and growing population, a 7500-km long densely-populated and low-lying coastline, and an economy that is closely tied to its natural resource base, India is considerably vulnerable to the impacts of climate change

Preventive measures

- Reduction in the use of non-renewable sources of energy and increased use of renewable sources will undoubtedly decrease the emission of GHGs substantially. This decrease in the GHGs will have a positive affect on the health and well being of the people.
- Furthermore, switching to cleaner fuels and energy-efficient technologies will reduce local pollutants and therefore, have an added beneficial impact on health.

Together, we can make a difference

Use the green power

- Move to renewable sources of energy. Buy devices that are more energy efficient. It will be easier on your pocket in the long run and you will recover the initial slightly higher cost in no time. Move to CFLs from incandescent bulbs can make a great difference in energy consumption.
- When leaving rooms, make sure you switch off the fan, lights and other appliances. Unplug your mobile phone charger as soon as its done charging.It helps to switch off TV and music systems even though they have a sytandby function. Some countries have made it mandatory for all new appliances to do away with the standby button.
- Be automobile-wise
- Keep your cars well tuned. Do not idle your car for long periods.
- Cycle or walk to your school if its walking distance. Do the same for your neighbourhood market. Remember walking is a good exercise.
- Use public transport and carpool wherever possible.
- Get your car emission level checked at regular intervals for efficient performance.
  Remove extra weights from your vehicle to reduce the fuel consumption. Make sure that you carry drinking water before setting off so that you are not dehydrated on the way. While buying bottled water is convenient, it has a big carbon footprint.
- Though it takes more time, train journeys are kinder to the planet's health than swooping around in aircrafts.

Improve your surroundings

- Plant trees. Our green friends are the best ways to trap and fix carbon to the ground and prevent it from damaging the atmosphere. These activities will not only transform you in to an eco-warrior, they will also be light on our pockets.
- Do your weekly grocery shopping while going out on an errand or while returning from work rather than making special trips.

- Make sure that the garbage is segregated into biodegradable and non-biodegradable, collected regularly and disposed in the correct manner.
- Generate as little waste as possible- especially paper.
- Buy products with the least possible packaging to reduce waste.

Other practices

A considerable portion of greenhouse emissions relates to the production of food, its packaging, and its transport to market. Choices of food depend on factors like- health, costs, cultural and religious considerations, ethical concerns, and little understood personal cravings and temptations. Greenhouse and energy related concerns are normally considered secondary when it comes to personal food choices. Vegetarian or quasi-vegetarian diet is less consumptive of energy. Hence, its important to

- Eat wisely. Choose foods that are local, organic and low on the food chain whenever possible.
- While exotic fruits and vegetables from different countries are enticing, their transportation leaves a carbon trail. Eat local food.
- Compost organic waste.
- Recycle paper and other recyclable items.
- Spread the message across and make a strong network of green crusaders to bring a change at our levels.

Feedback Form

Dear Information seeker,

ENVIS Centre, UEPPCB, Dehradun furnishes you with the services to collect and disseminate information related to environment of Uttarakhand. To share information with us you are requested to fill up the form given below:

Your feed back is valuable to us and will be highly appreciated.

Name:
Designation:
Department:
Address:
City:
State:
Country: Pin:

ENVIS CENTRE TEAM

Sh. Amarjeet Singh, EO
Project Co-ordinator
Email: asoberoi@yahoo.com

Mrs. Niharika Dimri
Data Entry Operator
email: niharika.dimri@rediffmail.com

From:

ENVIS-CENTRE
Uttarakhand Environment Protection & Pollution Control Board
E-115 Nehru Colony Dehradun
Phone Tel-0135-2762257, web: www.envis-ueppcb.org
E-mail: info@envis-ueppcb.com, envis.ueppcb@gmail.com