

ENVIRONMENTAL PROBLEM: GLOBAL WARMING.

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PAPER NAME: - ENVIRONMENTAL GEOGRAPHY

SUBJECT: - GEOGRAPHY

SEMESTER: - M.A. –IV

PAPER CODE: - (GEOG. 403)

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GLOBAL WARMING

Climate is an average weather condition for a long period. A minimum of 25 years have to be considered for reliable statistical determination of the characteristics of a climate. Climate is never static; it is subject to fluctuations. The term, 'climatic change' is defined as the climatic variations in historical time over the span of a few thousand years. The study of climate changes assumes importance in the context of the fact that all living beings have to adapt themselves to changes in climate.

The overwhelming majority of scientists agree that our globe is undergoing major climatic change. They also observe that the level of carbon dioxide is rising significantly. We can see from satellite images and researches, that the ice caps are melting faster, our sea level are rising, and weather pattern is changing. We are experiencing more water shortages, an upsurge in the amount of extreme weather events, such as wild fires, heat waves. We will see hurricanes, typhoons and cyclones increasing in ferocity and frequently. The deserts will expand and the world will ultimately have face difficulties growing enough food.

The main reason behind the climate change is the rise in global temperature popularly known as Global Warming caused by an excessive emission of carbon dioxide which becomes a major problem for mankind.

GLOBAL WARMING - The Global Warming hypothesis originated in 1896 when Svante Arrhenius, a Swedish chemist who subsequently received a Nobel Prize for developed the theory that carbon dioxide emissions from the burning of fossil fuels would cause global temperatures to rise by trapping excess heat in the earth's atmosphere. In the atmosphere carbon dioxide is a natural constituent. It has a concentration of over 0.032% by volume having a ratio of one each to 450 with oxygen. In spite of its relatively small proportion, carbon dioxide plays a very important role in the biosphere.

Arrhenius understood that the earth's climate is hated by a process known as the greenhouse effect. Now a day's all the scientists agreed that Global Warming is closely linked to the enhanced greenhouse effect which is an increase in the

concentration of greenhouse gases in the atmosphere leading to an increase in the amount of infrared or thermal radiation near the surface.

CONCEPT OF GREEN HOUSE AND GREEN HOUSE EFFECT –

A green house is a structure with a glass or plastic roof and frequently glass or plastic walls; heats up because solar radiation from the sun is absorbed by plants, soil, and other things inside the building. Glass is transparent to this radiation. The warmed structures and plants inside the greenhouse re-radiated this energy in the form of infrared, to which glass is opaque, and that energy is trapped inside the glass house. Although there is some heat loss due to conduction, there is a net increase in energy and therefore, temperature inside the green house. The same thing is happened in case of earth. The earth receives energy from the sun in the form of visible light. This light is absorbed at the earth's surface, and re-radiated as thermal or outgoing terrestrial radiation. Some of this thermal radiation is absorbed by the atmospheric green house gases like carbon dioxide, methane, water vapor, nitrous oxide etc. and re-radiated downward. The radiated downward energy is again absorbed by earth's surface and its atmosphere. Thus the earth surface receiving more radiation and it thus warmer than it would be, resulting global warming. This process of warming of the globe is known as green house effect. For this entire process the main culprit are the Green house gases.

The green house gases defined by the IPCC as “gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the earth's surface, the atmosphere itself, and by clouds.”

Green house gases, such as carbon dioxide, water vapor, methane and nitrous oxide trap the heat from the infrared radiation of the sun and heat up the earth's atmosphere. This has caused a rise in mean temperature of the earth's atmosphere, causing global warming. Even though burning of fossil fuels in thermal power plants is the main source of producing green house gases, air pollution caused due to scot diesel exhaust from road vehicles and industries is a greater contributor to global warming.

CAUSES OF GLOBAL WARMING –

The IPCC which was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to provide a comprehensive and objective assessment of scientific, technical and socio-economic information that could lead to a better understanding of anthropogenic (human induced) climatic change which is in fact refer as a prime cause of global warming or climatic change. On February 2, 2007, the IPCC published a summary report from Working Group I, which confirms that global warming is now “unequivocal” and states with more than 90 percent certainty that human activity “very likely” has been the primary cause of rising temperatures worldwide since 1950.

One of the first things scientists learned is that there are several greenhouse gases responsible for warming, and humans emit them in a variety of ways. Most come from the combustion of fossil fuels in cars, factories and electricity production. The gas responsible for the most warming is carbon dioxide and the major source of it is the power plants. These power plants emit large amounts of carbon dioxide produced from burning of fossil fuels for the purpose of electric generation. About twenty percent of carbon dioxide emitted in the atmosphere comes from burning of gasoline in the engines of the vehicles. Other contributors include methane released from landfills and agriculture (especially from the digestive systems of grazing animals), nitrous oxide from fertilizers, gases used for refrigeration and industrial processes, and the loss of forests that would otherwise store carbon dioxide.

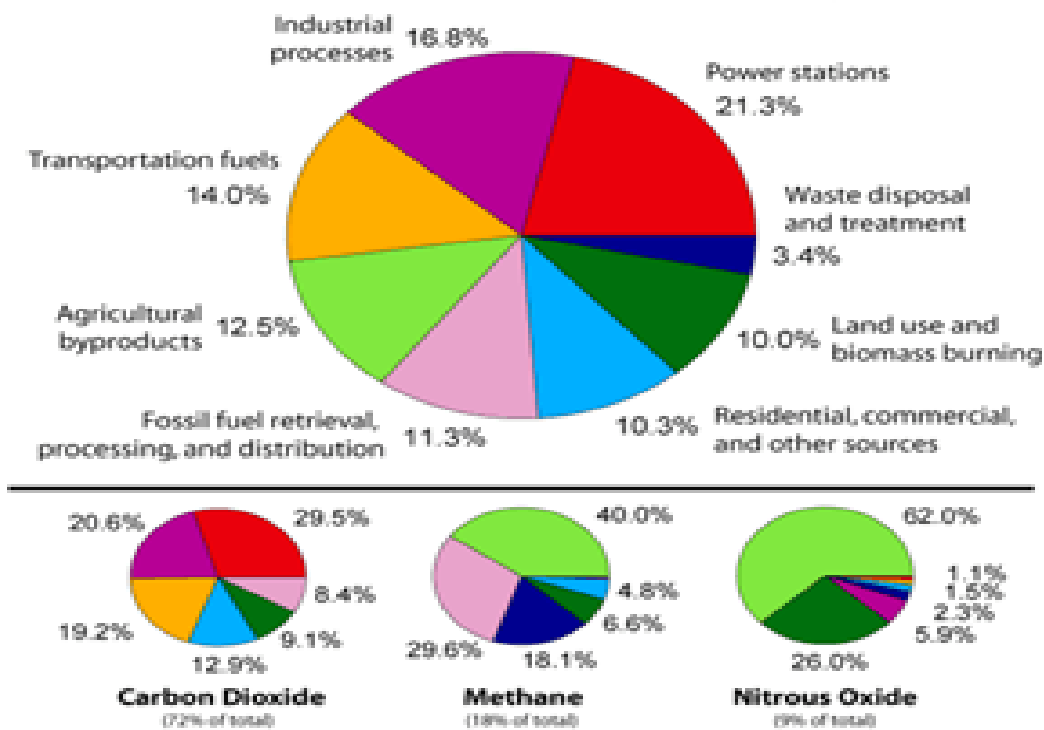
Different greenhouse gases have very different heat-trapping abilities. Some of them can even trap more heat than CO₂. A molecule of methane produces more than 20 times the warming of a molecule of CO₂. Nitrous oxide is 300 times more powerful than CO₂. Other gases, such as chlorofluorocarbons (which have been banned in much of the world because they also degrade the ozone layer), have heat-trapping potential thousands of times greater than. CO₂ But because their concentrations are much lower than, CO₂ none of these gases adds as much warmth to the atmosphere as CO₂ does.

Different Sectors are responsible for the emissions of greenhouse gases. In which the majors are the –

1. Industrial Sector
2. Transportation
3. Agricultural
4. Power Stations
5. Waste disposal and treatment
6. Land use and biomass burning
7. Residential, Commercial and other sources
8. Fossil fuel retrieval, processing and distribution.

The following figure shows the Annual Greenhouse Gas Emissions by Sector

Annual Greenhouse Gas Emissions by Sector



RESPONSIBLE COUNTRIES: -

Though all the developed and developing countries are responsible for the emission of green house gases and for global warming, but the countries highly responsible for it are United States of America, China, E. Europe and former

Soviet Union, West Europe, India, Japan, South Africa etc. Currently the United States, with less than 5 percent of the world's population, produces 28 percent of all anthropogenic CO₂. China with 1.3 billion people is second in total CO₂ emission. Following data shows the nation and their contribution in emission of Carbon Dioxide – (source: World Resource Institute, 2011)

COUNTRIES	PRODUCTION OF CO ₂ IN %
USA	28 %
CHINA	23 %
E. EUROPE AND FORMER SOVIET UNION	13 %
WESTERN EUROPE	12 %
INDIA	07 %
JAPAN	04 %
SOUTH AFRICA	04 %
ALL OTHERS	09 %

CONSEQUENCES OF GLOBAL WARMING:

The rises of greenhouse gases and consequent global warming phenomenon have a number of effects on earth climate, ecosystems and biospheric processes. The major events are described as follows:

POLAR ICE CAPS MELTING: The ice caps melting is a four pronged danger-

1. It will raise sea level. There are 5,773,000 Cubic Miles of water in ice caps, glaciers, and permanent snow. According to the National Snow and Ice Data Center, if all glaciers melted today the seas would raise about 2300 feet. Luckily, that's not going to happen, all in one. But there is a chance for 10-15% of the arable land and economic productivity of coastal areas could be lost. The effects of global warming on the Indian Sub Continent vary from the submergence of low lying islands and coastal lands to the melting of glaciers in the Indian Himalayas, threatening the volumetric flow rate of many of the most important rivers of India and south Asia. In India such effects are projected to impact millions of lives. Ongoing climatic change and sea level rises have submerged several low lying islands in Sundarbans, displacing thousands of people. Temperature rises on the Tibetan Plateau, which are causing Himalayan glaciers to retreat. Glacier's like Montana Glacier National Park now has only 27 glaciers, versus 150 in 1910.

2. Melting ice caps will throw the global eco-systems out of balance. The ice caps are fresh water and when they melt they will desalinate the ocean, or in the other word make it less salty.
3. Temperature rises and changing landscapes in the Arctic Circle will endanger several species of animals, only the most adaptable will survive.
4. Ecological disasters, such as a 1998 coral bleaching event that killed off more than 70% of corals in the reef ecosystems of Lakshadweep and Andamans are also projected to become increasingly.

The following table shows the estimates of impact of 1 meter rise in sea level (source- IPCC, WGII, 1996)

COUNTRY/ SOURCE	PEOPLE AFFECTED		LAND AFFECTED	
	People million	in % of total	KM ²	% Of total
CHINA	72	07	35,000	---
BANGLADESH	71	60	25,000	17.5
JAPAN	15	15	2,300	0.6
NETHERLANDS	10	67	2,165	5.9
INDIA	7.1	01	5,800	0.4
EGYPT	4.7	09	5,800	1.0

WATER BALANCE: - Although changes in sea-level have received much publicity, problems of water availability are likely to be more serious and perhaps more expensive to solve. In future, warmer word will have water crisis in some part while in other region it will be wetter than today.

INCREASE PROBABILITY AND INTENSITY OF DROUGHTS AND HEAT WAVE: -

Although some areas of earth will become wetter due to global warming, other areas will suffer serious drought and heat waves. Africa will receive the worst of it, with more severe drought also expected in Europe. Water is already a dangerously rare commodity in Africa, and according to Intergovernmental Panel of Climatic Change, global warming will exacerbate the condition and could lead to conflicts and war.

WARMER WATER AND MORE HURRICANES: - As the temperature of ocean rises, there is probability of more frequent and stronger hurricanes.

MIGRATION: - It would cause large scale migration of people living in the coastal areas due to inundation of coastal areas.

CHANGES OF HABITAT: - Widespread shifts might occur in the natural habitats of animals and plants. Many species would have difficulty surviving in the regions they now inhabit. For example, many flowering plants will not bloom without a sufficient period of winter cold.

THREATS TO HUMAN HEALTH: - Tropical diseases, such as malaria and dengue, might spread to larger region. Longer-lasting and more intense heat waves could cause more deaths and illnesses. Floods and droughts could increase hunger and malnutrition.

HOW TO TACKLE THE CHALLENGE: -

Climatologists are studying ways to limit global warming. Two key methods would be-

1. Limiting CO₂ emissions: - Two effective techniques for limiting CO₂ emissions would be (i) to replace fossil fuels with energy sources that do not emit CO₂ (ii) to use fossil fuel more efficiently. Alternative energy sources that do not emit CO₂ include wind, sunlight, nuclear energy and underground steam.
2. Carbon sequestration: - It could take two forms (i) underground or underwater storage and (ii) storage in living plants. Underground or underwater storage would involve injecting industrial emissions into underground geologic formations or the ocean.

AGREEMENT ON GLOBAL WARMING: - Delegates from more than 160 countries met Kyoto, Japan, in 1997 to draft the agreement that became known as the Kyoto Protocol. That agreement calls for decreases in the emissions of greenhouse gases. All the 160 nations agreed to roll back CO₂, methane and nitrous oxide emissions about 5 percent below 1990 levels by 2012. Three other greenhouse gases, hydro fluorocarbons, per fluorocarbons and sulfur hexafluoride, would also be reduced, although from what level was not decided.

Despite the fact that industrialization, agricultural practice, transport and communication have been instrumental for the development of the nation, the country need to control the emission of green house gases which will definitely protect or save the country from the threat of emerging global warming and save our earth to becoming too hot and thus safety of the earth from the intense heat can be ensure.

Global warming occurs when carbon dioxide (CO₂) and other air pollutants and greenhouse gases collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface. Normally, this radiation would escape into space—but these pollutants, which can last for years to centuries in the atmosphere, trap the heat and cause the planet to get hotter.