

Climate Changes and Its Impact on Environment of India

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Abstract

Growth of Exponential CO₂ and other Greenhouse Gasses in the atmosphere is causing climatic change. It affects agriculture, forestry, human health, biodiversity, snow cover and aquatic to mountain ecosystems. Changes in climatic factors like temperature, solar radiation and precipitation have potentials to influence crop production. Despite many efforts possible on combating impacts of climate change, there are still difficulties in agriculture. With an average of 0.06^o C/year, a rise in temperature from 1975 to 2006 by 1.8^o C has been recorded in the country. Problem of frequent drought, severe floods, landslides and mixed type of effects in agricultural crops have been experienced in India because of climate change. At the current level of emission, the rise in the temperature may go up by 4^o C by 2100 or even earlier. A rise in temperature by 2^o C may do well to agriculture in the northern latitudes, since this will help to extend the growing season and thereby increase the yield of the crops of those regions. In contrast, the average duration of crops will be reduced in the tropics and sub-tropics, thereby reducing yield. Some agriculture scientist observed the impact of a rise in temperature by 1^o C in wheat and rice; they observed that in North West India, which is the heartland of the green revolution, the duration of wheat and Rice will be reduced by a week. This in turn will reduce yield by 4 to 5 quintal per ha.

Key words: Crop Productivity, Climate Ecosystems, Biodiversity, Radiation, Precipitation, deforestation, urbanization and industrialization

Introduction

Climate encompasses the statistics of temperature, humidity, atmospheric pressure, wind, rainfall, atmospheric particle count and other meteorological elements in a given region over long periods of time. Climate can be contrasted to weather, which is the present condition of these same elements and their variations over periods up to two weeks. Especially as they affect animal or vegetative life.

It may be defined the condition of a place in relation to various phenomena of the atmosphere, as temperature, moisture, etc. Especially as they affect animal or vegetative life. There are ten (10) factors make the Earth's climate. They are solar output, Earth-Sun Geometry, Interstellar Dust, Volcanic Emissions, Mounting Building, Continental Drift Atmospheric Chemistry, and Surface Reflectivity Atmosphere/Ocean Heat Exchange.

Objectives of the study:

1. To be acquainted with the reasons of Climate change.
2. To know the major emitters at global level.
3. To know the impact of Climate change on our environment.
4. To know the effect of climatic change on agriculture.
5. To suggest Strategies for improving the agricultural productions.

Research Methodology

The data for this study have been collected

through secondary Sources such as Schroeder Institute for Research in Cycles of Solar Activity Nova Scotia, Canada, World Climate News, 2006, <http://en.wikipedia.org/wiki/Climate> Intergovernmental Panel on Climate and other websites are also used for this study.

Reasons for climatic change

The major factors which change the global climate include the natural factors and the human activities.

1. Natural Factors

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.

2. Human Activities

More than 50% Human activities causes changes in the climate. The Industrial Revolution in the 19th century saw the large-scale use of fossil fuels for industrial activities. These industries created jobs and over the years, people moved from rural areas to the cities. This trend is continuing even today. More and more land that was covered with vegetation has been cleared to make way for houses. Natural resources are being used extensively for construction, industries, transport, and consumption. Consumerism (our increasing want for material things) has increased by leaps and bounds, creating mountains of waste. Also,

our population has increased to an incredible extent. The major activities done by human are:

- Burning of fossil fuels and deforestation leading to higher carbon dioxide concentrations.
- Land use change (mainly deforestation in the tropics) account for up to one third of total anthropogenic CO₂ emissions.
- Livestock enteric fermentation and manure management, paddy rice farming, land use and wetland changes, pipeline losses, and covered vented landfill emissions leading to higher methane atmospheric concentrations.
- Many of the newer style fully vented septic systems that enhance and target the fermentation process also are sources of atmospheric methane.
- Use of chlorofluorocarbons (CFCs) in refrigeration systems, and use of CFCs and halogens in fire suppression systems and manufacturing processes.
- Agricultural activities, including the use of fertilizers that lead to higher nitrous oxide (N₂O) concentrations.

Results and discussion

The major emitters at global level

Top countries emitting ghg at global level

In 2005, the world's top-20 emitters comprised 80% of total GHG emissions (PBL, 2010. See notes for the following table 1). Tabulated below is the top-5 emitters for the year 2005 (MNP, 2007). The second column is the country's or region's share of the global total of annual emissions. The third column is the country's or region's average annual per capita emissions, in tons of GHG per head of population

Table 1: Top-5 emitters for the year 2005

Country or region	% of global total annual emissions	Tones of GHG per capita
China	17 %	5.8
United States	16 %	24.1
European Union-27	11 %	10.6
Indonesia	6 %	12.9
India	5 %	2.1
Others	45%	-

Note: These values are for the GHG emissions from fossil fuel use and cement production. Calculations are for carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and gases containing fluorine (the F-gases HFCs, PFCs and SF₆).

Impact of climate change on our environment:

Changing climate effect coming in the form of decreasing yield of agriculture, forestry and ecosystem, increased risk of human health and decreasing water resources as revealed in table 2.

Effect of climate change on agriculture

Effect of climate change on crops

The effect of increased temperature and CO₂ levels on arable crops will be broadly neutral can be seen in the table 3:

- Horticultural crops are more susceptible to changing conditions than arable crops
- Field vegetables will be particularly affected by temperature changes
- Water deficits will directly affect fruit and vegetable production
- Poultry and pigs could be exposed to higher incidences of heat stress influencing productivity
- Increase in disease transmission by faster growth rates of pathogens in the environment

Strategies for improving the agricultural productions

- Promote seminar, workshops, training and general education to rural population dependent on agriculture.
- Identification of present issues of climate change related to agricultural sectors.
- Strengthen Agricultural Research Station and commodity program to run effective researches related to climate change.
- Interactive communication for transfer technologies to farmers about climate change and its impacts on agriculture
- Preservation of genetic materials to reduce extinction of biodiversity
- Crop insurances for social securities and food securities
- Change in national policies towards farmers incentives such as subsidy in agricultural inputs and agricultural investment

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Table 2: Impact of Climate Change On Our Environment.

Climate driven phenomena	Agriculture, Forestry and ecosystems	Water Resources	Human Health	Industry, settlements and society
Temperature change Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights	Increased yields in . colder environments Decreased yields in warmer environments	Effects on water r esources relying on snow meltEffects on some water supply	Reduced human mortality from decreased cold exposure	Reduced energy demand for heating and increased demand for coolingDeclining air qual ity in cities
Heat waves/ warm spellsFrequency increases over most land areas	Reduced yields in warmer regions due to heat stressWildfire danger increases	Increased water demand Water quality problems e.g. algal blooms	Increased risk of heat related mortality specially for the elderly, chronically sick, very young and socially isolated	Reduction in quality of life for people in warm areas with out appropriate housing.
DroughtAffected areas increases	Land DegradationCrop damage and failure. Increased livestock deaths	More widespread water stress	Increased risk of malnutrition Increased risk of water and food borne diseases	Water shortage for settlements, industry and societiesReduced hydropower generation
Cyclones and storm surgesFrequency increases	Damage to Crops Uprooting of trees Damage to coral reefs	Power outages cause disruption of public water supply	Increased risk of deaths, injuries, water and food borne diseases	Withdrawal of risk coverage y in vulnerable areas by private insurersPotential for popula tion migration and loss of propert
Sea level rise Increased incidence of extreme high sea-level (excluding tsunamis)	Salinization of irrigation water, estuaries and fresh water systems	Decreased fresh water availability due to salt water intrusion	Increased risk of deaths by drowning in floods	Potential for movement of population and infrastructure

Table 3: Predicted effects of Climate change on agriculture over the next 50 years.

Climatic element	Expected change by 2050	Confidence in prediction	Effect on agriculture
CO2	Increase From 360 PPM To	Very High	•Good For Crops •Increased Photosynthesis •Reduced Water Use
Sea level rise	Rise By 10-15 Cm	Very High	• Loss Of Land • Coastal Erosion • Flooding • Salinization Of Ground Water
Temperature	Rise by 1-2oc increased friequency of heat waves	High	•Faster, Shorter, Earlier Growing Seasons • Heat Stress Risk •Increased Evapo-transpiration
Precipitation	Seasonal Changes By +- 10%	Low	• Impacts On Drought • Risks Soil Workability • Water Logging
Storminess	Increased Wind Speeds, Especially In North. More Intense Rainfall Events	Very Low	• Lodging • Soil Erosion • Reduced Infiltration Of Rainfall

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