

# AN IMPACT OF CLIMATE CHANGE IN INDIA

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## Abstract

Global warming is defined as the increase of the average temperature on Earth. As the Earth is getting hotter, disasters like hurricanes, droughts and floods are getting more frequent. Over the last 100 years, the average air temperature near the Earth's surface has risen by a little less than 1 degree Celsius or 1.3 degrees Fahrenheit. Deforestation increases the severity of global warming. The ocean is a huge carbon sink, holding about 50 times as much carbon as the atmosphere. The oceans are no longer able to store carbon as they have in the past. Burning fossil fuels such as natural gas, coal, oil and gasoline raises the level of carbon dioxide in the atmosphere, and carbon dioxide is a major contributor to the greenhouse effect and global warming. The climate change would increase the number of people suffering from death, disease and injury from heat waves, floods, storms and droughts. Floods are low-probability, high-impact events that can overwhelm physical infrastructure and human communities. Major storm and flood disasters have occurred in the last two decades. One can help to reduce the demand for fossil fuels, which in turn reduces global warming, by using energy more wisely. Global warming can occur from a variety of causes, both natural and human induced. The origin of the term global warming is traced back to 1975 scientific paper titled, "Are we on the brink of a pronounced global warming?" It was later made famous, and "stop global warming" became the slogan of the time, after the testimony of National Aeronautics and Space Administration climate Scientist James Hansen, in the US Senate in 1988. Global warming materializes when the major greenhouse gases like water vapour, carbon dioxide, methane, nitrous oxide and ozone, which trap the sun's rays of heat and light in the earth's atmosphere, which in turn intensifies temperature. This action is commonly referred to as the greenhouse effect.

**Key words:** Global warming, fossil fuels, greenhouse effect, climate change, etc.

## 1. Introduction

Mankind is in need of an equitable standard of living like adequate food, water, energy, safe shelter and a healthy environment for present as well as future generations. But casual acts of human race, such as emission of greenhouse gases by burning fossil fuels and deforestation has increased the earth's average surface temperature, which is defined as global warming. It is proved that the warming on the earth's surface over last 50 years is mostly due to the anthropogenic activities. Further, it is predicted that the global mean surface temperature will likely be in the range of 0.3-0.7°C for the period 2016-2035. This rise in temperature may cause various changes such as sea level rise, melting of snow sheets and change in rainfall pattern. Hence, global warming can be considered as the major affecting parameter in changing the earth's climate. Recent climate changes have shown its impact on natural as well as human systems. Climate change is the variation in

global or regional climates over time. It reflects changes in the variability or average state of the atmosphere over time scales ranging from decades to millions of years. These changes can be caused by processes internal to the Earth, external forces or more recently, human activities. In recent usage, especially in the context of environmental policy, the term climate change often refers only to changes in modern climate, including the rise in average surface temperature known as global warming. In some cases, the term is also used with a presumption of human causation, as in the United Nations Framework Convention on Climate Change.

## 2. Climate change and agriculture

Agriculture is the cultivation of animals, plants, fungi, and other life forms for food, fibre, bio fuel and other products used to sustain human life. Agriculture generally speaking refers to human activities, although it is also observed in certain species of ant and termite. The major agricultural products can be broadly grouped into foods, fibres, fuels, and raw materials. The environmental impact of agriculture is the effect that different farming practices have on the ecosystems around them, and how those effects can be traced back to those practices. The environmental impact of agriculture varies based on the wide variety of agricultural practices employed around the world. Ultimately, the environmental impact depends on the production practices of the system used by farmers. The connection between emissions into the environment and the farming system is indirect, as it also depends on other climate variables such as rainfall and temperature. There are many problems faced by modern agriculture: urbanization of farmland, water rights and usage, environmental concerns, and the procurement of government subsidies. Cycles of nutrients, energy, water and wastes have become more open, rather than closed as in a natural ecosystem. The climate sensitivity of agriculture is uncertain, as there is regional variation in rainfall, temperature, crops and cropping systems, soils and management practices. The inter-annual variations in temperature and precipitation were much higher than the predicted changes in temperature and precipitation. The crop losses may increase if the predicted climate change increases the climate variability.

## 3. Review of literature

Sinha (1982) assessed the impact of subsidies on agricultural productivity, income and employment. The study was related to select beneficiary farmers in Musahati block, Muzaffarpur in Bihar during 1979-80 and 1981-82. The cropping intensity on beneficiary farms increased from 154 to 160 per cent after used of subsidy also increase productivity of farms. They conclude that subsidy programme must be selective and discriminating. Proper identification of the beneficiaries must be given due to importance to check misuse of fund.

Abhiman Das (2009) observed that over the years there has been a significant increase in the access of rural cultivators to institutional credit and, simultaneously, the role of informal agencies, including money lenders, as a source of credit has declined. Among the striking features of the agricultural credit scene in India are the wide regional disparities in the disbursement of agricultural credit by scheduled commercial banks. At the same time the share of agricultural GDP is falling in total GDP. The direct agricultural credit amount has a positive impact on agricultural output and its effect is immediate.

Regina Birner (2011) stated that the agricultural has suffered adversity during the past decade despite high overall growth rates experienced by other sectors in the Indian economy. Increasing growth rates in the farm sector would require, among other things, a more equitable use of fertilizers. The trends in fertilizer use have been uneven across states and across farms of different sizes. Reform options for fertilizer policy should take into account these realities as well as India's continued need for food security.

Deshmukh (2014) stated that subsidies make some positive and negative impact on agricultural sector of India. In last few year percentage of agricultural sector in GDP is decrease but at same time production of agricultural sector is also increases with investment. The increase in population and inflation is the factor for low contribution of agricultural sector in India GDP. But agricultural subsidies play vital role in growth of agricultural sector in India. Without help of subsidies development of agricultural sector is very difficult.

#### **4. Objectives of the study**

1. To explain the effects of climate change on Indian agricultural across crops, seasons, and regions
2. To analyse the effects of climate change on irrigated and non-irrigated agriculture.
3. To assess the vulnerability of the Indian agricultural sector to climate change and its impact on livelihood and poverty.

#### **5. Environmental problems of agriculture**

Among the environmental problems of agriculture, water-related problems occupy an important place. It can be said that water is the blood of an eco system. Water not only influences the plant's growth per set but serves as an important medium of transfer for nutrients, etc. in soils. It influences the soils physical properties, both directly and indirectly due to biochemical processes. Environmental problems in agriculture have proven difficult to address due to the spatial heterogeneity and temporal variability intrinsic to agriculture. Agriculture is largely a struggle against nature; both its sustainability and the prospects for environmental performance and farm

income simultaneously are thus inherently limited. Agriculture's high degree of variability makes direct regulation inefficient. Subsidies for improving environmental performance can have negative consequences and have proven ineffective in practice, due largely to bureaucratic culture. The world's need to increase agricultural production leads to various impacts on the environment, some of them closely related to water processes. Water serves as a medium for transporting matter both inside and outside the given agro ecosystem. The water-related environmental problems of agriculture are connected with mechanical treatment of soil and use of fertilizers, pesticides, and other chemicals, and are naturally closely related to irrigation. The components of the environment most damaged by agricultural practices are soil and waters pollution. The water related environmental problems of agriculture at a field level will be studied by means of simulation models. Major agricultural problems are due to: increasing population growth, water logging and land erosion and salinity converting the arable land into non-agricultural uses.

## **6. Environmental challenges in the agriculture sector**

Agriculture increasingly faces the challenge of balancing its multiple functions in a sustainable way. However, concepts to address the wide range of issues and functions typical for agriculture are still scarce. Environmental and agricultural modelling presents the understanding current of integrated and working tools to assess and compute alternative agricultural and environmental policy options, allowing: Analysis of the environmental, economic and social contributions of agricultural systems towards sustainable rural development and rural viability; analysis of a broad range of issues and agents of change, such as: climate change, environmental policies, rural development options, effects of an enlarging global, international competition, and effects on developing countries. Agro biodiversity used in food production underpins humanity's life-support system. Agricultural intensification and expansion have destroyed biodiversity and habitats, driven wild species to extinction, accelerated the loss of production services and eroded agricultural genetic resources essential for food security in the future. Climate change is expected to cause modifications to biodiversity at all levels, including eco systems, species and genes. In turn, the increasing frequency of storms, drought and flooding caused by climate change threaten the viability of agro-ecosystems. Agriculture practices currently account for about 25 per cent of greenhouse gas emissions. Changes in farming seasons, and shorter cycles for all organisms, will lead to new pests and diseases, while a general increase in risk patterns and variability will affect economic returns and food security.

## 7. National action plan of climate change

The action plan outlines a number of steps to simultaneously advance India's development and climate change-related objectives. The Prime Minister's Advisory Council on Climate Change has outlined a National Action Plan on Climate Change was released by the Prime Minister in June 2008 and encompasses a range of measures. It focuses on the following eight missions:

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Ecosystem
6. Green India Mission
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change.

National Mission for Sustainable Agriculture is one the eight missions in the NAPCC aims to support climate adaptation in agriculture through the development of climate resilient crops, expansion of weather insurance mechanisms and agricultural practices. The mission focuses on four areas that are relevant for the endeavours of India's agricultural sector to adapt to climate change: Dry land agriculture, risk management, access to information, and use of technology. The National Agriculture Policy, 2000 aims to attain over the next two decades a growth rate in excess of 4 per cent per annum in the agriculture sector. The policy explicitly recognizes that agricultural growth should cater to domestic markets and maximize benefits from exports of agricultural products in the face of the challenges arising from economic liberalization and globalization.

## 8. Conclusion

All India crop yield index shows a strong relationship with all-India summer monsoon rainfall. Crops grown in both the monsoon (Kharif) and the post-monsoon (Rabi) seasons respond significantly to the summer monsoon. Kharif is the main crop growing season over India. Food grain yield during Kharif season is directly affected by day-to-day variations of summer monsoon precipitation. An increase or decrease in food grain yield is generally associated with an increase or decrease in rainfall. The present study has clearly brought out the role of day-to-day variation in Indian summer monsoon precipitation on Kharif food grain yield and also Rabi food grain yield over India for the period 1966–2010. Duration of wet or dry spells during the monsoon season plays

a critical role in determining the deficient/drought condition, which may lead to low yields; flood conditions may also lead to low yields. Therefore, prolonged active/break episodes can potentially change water availability and soil moisture availability with in a season to impact crop yield.

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