

IFFCO FOUNDATION
IFFCO House, 34 Nehru Place,
New Delhi 110019

Climate Change and Agricultural Cooperatives

G.C. Shrotriya and Daman Prakash*

IFFCO Foundation, New Delhi

Introduction

Entire world today is concerned about the impact of climate change. Nobel Peace Prize-2007 was awarded to Inter-governmental Panel on Climatic Change (IPCC) for their efforts to build up and disseminate greater knowledge about man-made climate change and consequent natural disasters. Natural disasters do not recognize any national, political, or regional boundaries, nor do they distinguish between developed and developing countries.

Climate change normally indicates "Change in behaviour of weather elements over an area during a time span". As per the United Nations Framework Convention of Climate Change (UNFCCC) "it is any change in climate that is attributable directly and indirectly to human activity that alter the atmospheric composition". IPCC defined it as "any change of climate over time whether due to natural cause or as a result of human activity".

Frequent occurrences of earthquakes, floods, cyclones, typhoons, tsunami and drought are also result of climate change. Such events, while affecting the human and cattle population, leave a disastrous affect on land, water and vegetation of the area. Agriculture is most vulnerable to the climate change.

India is primarily an agriculture-dependent nation, where majority of its 1.1 billion population depends on crop cultivation, fishery, forestry, dairy etc. for their livelihood. Besides this, India has vast coast-line which suffers from occasional cyclones. Many of these areas are also threatened because of rising sea level, due to global warming. There is already a tremendous loss of cultivable land in the coastal areas especially in the State of Orissa.

Climate change is a serious emerging threat to food and rural livelihood security. The IPCC estimated that man-made greenhouse gases (GHG) emissions have risen by 70% over the past three decades and will increase notwithstanding current climate change mitigation policies and related sustainable development practices. The Food and Agriculture Organization of United Nations (FAO) estimates that as a consequence of climate change "India could lose 125 million tons of its rain-fed cereal production, which is almost 18% of the total production of the world".

**Dr GC Shrotriya and Dr Daman Prakash, both work as Consultants with IFFCO Foundation, New Delhi, a public trust established by the Indian Farmers Fertiliser Cooperative Limited, IFFCO.*

Emission of Green House Gases

Agriculture is considered both culprit and victim of climate change. GHG emissions from the food and agriculture sector account for over one-third of the current annual total emissions; the livestock sector accounts for an estimated 18% of global greenhouse gas emission; and deforestation accounts for 18% carbon dioxide emissions, the world's 130 million ha of rice paddies are estimated to produce 50 to 100 million metric tones of methane annually. High emissions are largely from the Industrialized Countries as is evident from the per capita emission of greenhouse gases of different regions in the world (Fig 1).

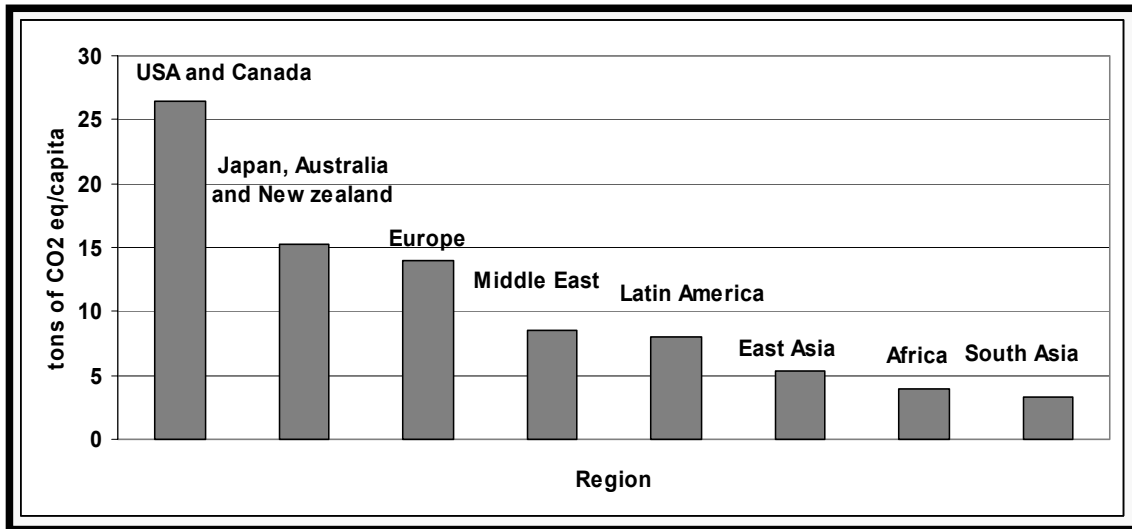


Fig. 1 – Per capita emission of green house gases from different regions of world

In India, highest emission of GHG is from energy sector (61%) followed by agriculture (28%). GHG emission from industrial process is 8% (Fig.2).

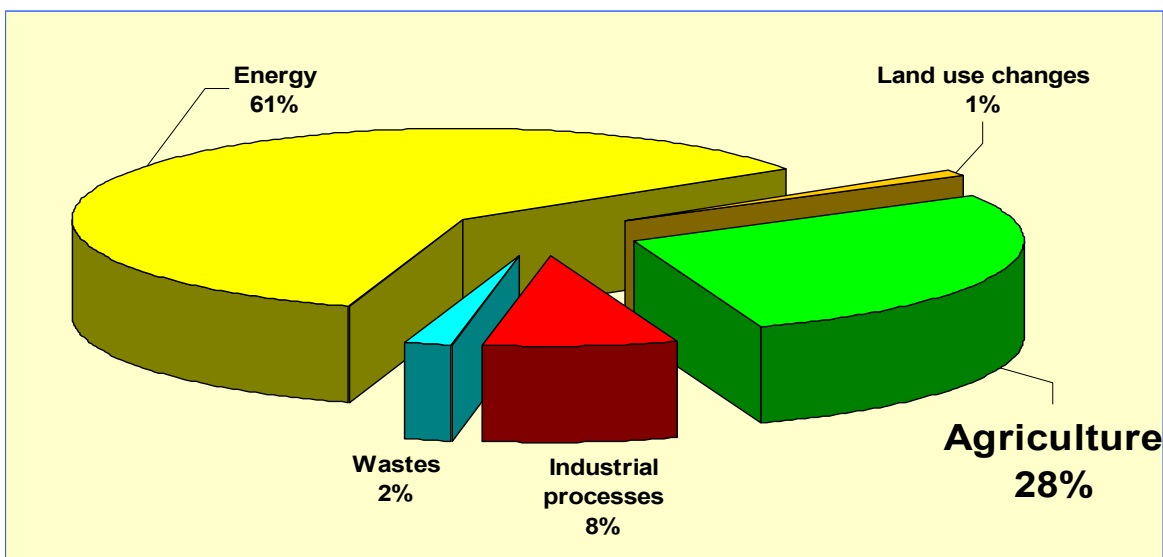


Fig.2-Green house gas emissions in India

Greenhouse gases mostly consist of carbon dioxide (CO₂), methane (CH₄), nitrus oxide (NO₂), chlorofluorocarbon (CFC) hydroflurocarbon (HFC) and sulphurhexafluride (SF). Major source of these gases are fossil fuel, all other burnings, refrigerators and AC machines, emission from automobiles and industries, agricultural activities etc. Global warming potential (GWP) of these gases is as under:

Carbon dioxide	1
Methane	21
Nitrus oxide	310
Hydroflurocarbon	140-11700
Per fluorocarbons	6500-9200
Sulphur hexachloride	23900

Global Warming

When the solar radiation comes to the surface of the earth, a majority of its intensity is absorbed by earth and some of it is reflected back. Infra-red radiation passes to the atmosphere and some part is reflected back to the earth. Due to the formation of a thick layer of greenhouse gases most of the infra-red radiation gets reflected back to the earth, resulting in warming of earth surface. The global warming is attributed to the enhancement of Greenhouse effect.

The earth's climate has been reported to be warming up at the rate of 0.1.C per decade over the last 50 years. IPCC has projected warming of about 0.2.C per decade for the next two decades. Although there is considerable uncertainty about future, all climate models indicate a rising trend in temperature. By 2100 a rise of 1.8 to 4.0.C is expected (Fig.3). Higher values cannot be ruled out.

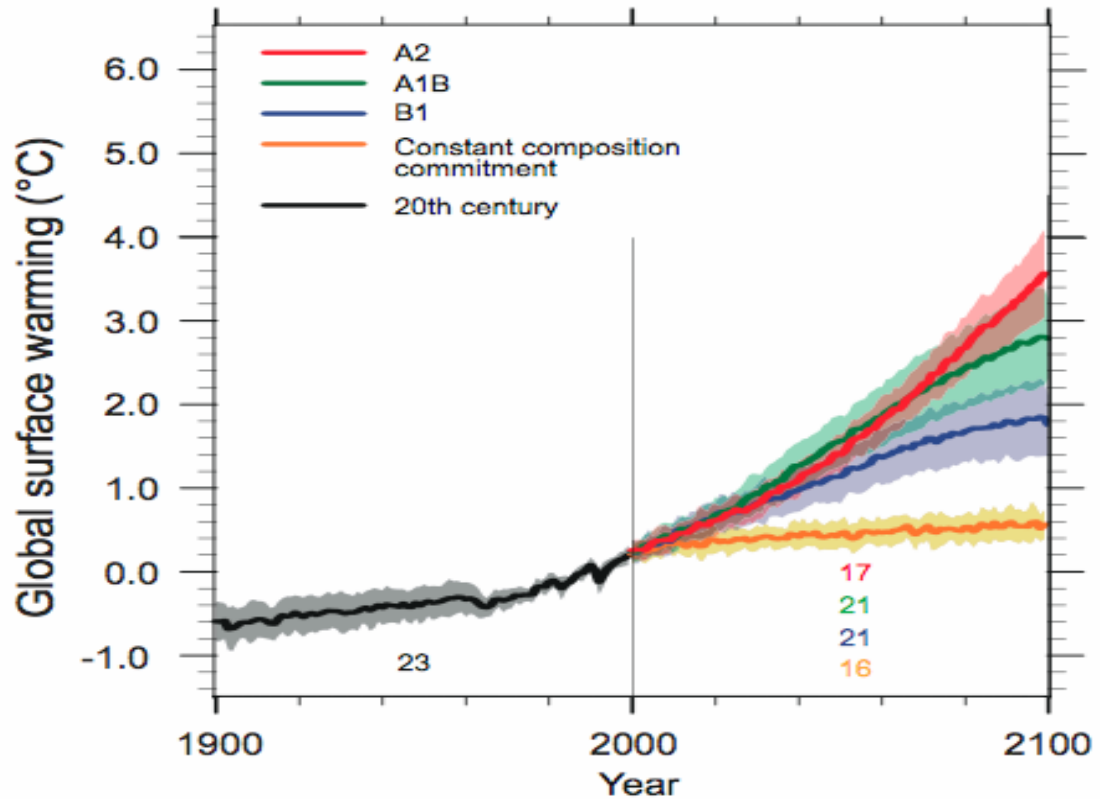


Fig. 3- Global warming –expected rise in temperature

Rise in Sea level

With the increase in temperature volume of water is going to expand. Similarly melting of glaciers and mountain snow will add to the volume of water in sea, resulting in rise in sea level. This phenomenon is becoming a threat to the coastal areas. Already some areas have completely submerged or partially submerged. Projected sea level rise is between 15 – 90 cm. Reports of area loss have been received from Sunderbans of West Bengal and also from Orissa.

Impact of Global Warming

Rise in atmospheric temperature leads to decrease in yield of crops; forest fires; floods due to higher precipitation; extreme weather leading to increase in the intensity of hurricane/cyclones; rise in sea levels due to the faster rate of melting of ice; glacier melting and disappearance; ocean acidification due to increased level of carbon dioxide; delay in winter and increase in summer span; and adverse impact on natural ecosystems, such as wetlands, mangroves and coral reefs, grasslands and mountain ecosystems; changes in monsoon pattern; and adversely affect agriculture and food security.

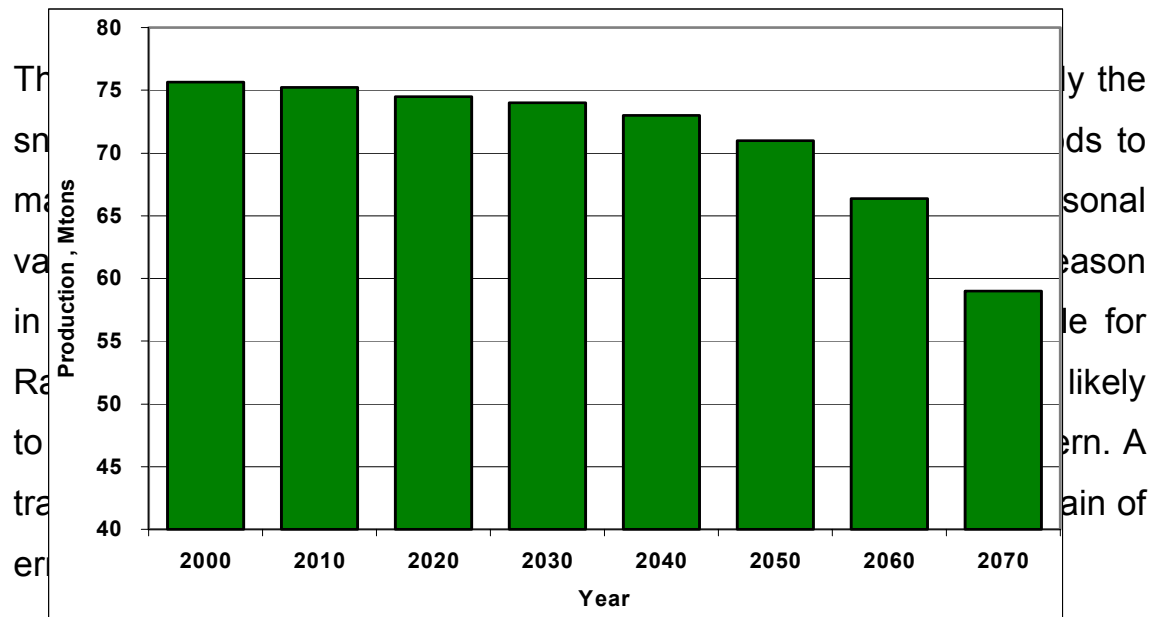


Fig. 4 - Potential Impact of Climate Change on Wheat Production in India

Mitigating Climate Change - Role of Cooperatives

There are 550,000 cooperatives in India with a total membership of nearly 300 million individual members. Around 65% of the cooperatives are agriculture-related. Each and every village in the country is linked to cooperatives. A majority of the farmers obtain credit, input supply and marketing services from their cooperatives. Cooperatives in India are broad based and thus can influence agriculture production system.

Most of the climate changes are considered man-made. Excessive deforestation by any nation can change the rainfall pattern of the area. Therefore, individual efforts with collaborative strategy have to be adopted for minimizing these effects. Climate change and natural disasters are a reality and communities have to prepare in advance to save themselves, agriculture and natural resources.

Some initiatives have been taken nationally to mitigate or reduce the impact of climate change. Though at government level there are initiatives but at the community level they are not visible. Cooperatives are the community-based and member-oriented organizations. In the Principles of Cooperation "Concern for Community" has been highlighted. Therefore, the cooperatives also have a responsibility towards helping the community in preparing for climate change risk management. There is a strong need to be pro-active to take adequate measures. It has to be about creating awareness or developing certain action plans. For initiating any such activities, "Will to serve" the community is required.

Cooperatives can play the following roles:

-Carry out awareness programmes about ill-effect of climate change on agriculture and prepare for change in cropping pattern to be practiced and introduction of tolerant varieties;

-Adopt Risk Mitigation tool e.g., crop insurance, weather insurance, alternative options for livelihood. It is necessary to provide services to member-farmers in agriculture cooperatives so that they are benefited by these risk management tools.

- Take up natural resource conservation activities like afforestation, water harvesting and conservation.

- Initiate activities which will reduce contribution to greenhouse gases like best management practices in crop cultivation.

-Develop linkages with the related agencies so that the farmers could be informed in advance about the incoming disasters.

-Identification of natural warning system, its documentation and dissemination.

- Create a cooperative hub for networking with already established national and international systems and disseminate information to grassroots level cooperatives.

Summing -up

Climate change, as has been projected by experts, is not a one-time phenomenon. With the continuing emission of greenhouse gases, reduction in cultivable areas, deforestation, population growth and the lukewarm attitudes of some of the polluting sectors, the effect on the earth and mankind is going to be harsher. There will be strong adverse effect on agriculture and means of livelihood.

Agriculture is one sector which would suffer the most. It is, therefore, pertinent that all individuals, farmers or non-farmers must contribute to enable the earth to reenergize itself. The greenhouse effect can be reduced only with the cooperation of everyone. Agricultural cooperatives have, therefore, a tremendous responsibility to help the earth and the mankind living on it.

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