



# CLIMATE CHANGE AND ITS BRUNT ON INDIAN AGRICULTURE

Dr. M. Satheesh Pandian<sup>1</sup>, Dr.G.N.Ramakrishna<sup>2\*</sup>

<sup>1</sup>Assistant Professor, Department of Economics and Centre for Research in Economics, Arumugam Pillai Seethai Ammal College, Tiruppattur, Sivaganga (Dt), Tamil Nadu-630 211.

<sup>2\*</sup>Assistant Professor, Department of Economics, Acharya Institute of Graduate studies, Bengaluru, 560107

\*Corresponding Author

## ABSTRACT

*Rising temperature distress affects the agriculture sector in various forms and it results in increasing unwanted pests and diseases. Flood and excess rain over a dumpy duration of time leads to widespread harms to crops. Excessive weather conditions have caught the eye of agrarian professionals and scientists alike and that they are now concentrating on natural farming to detain the shocks of worldwide climate change. In India, as elsewhere within the world, climate change is now having major attention on the political and public agenda. Within the subcontinent, exacting attention is being given to the impact of climatic changes on farming sector since there might be solemn implications for food security. With this backdrop the present paper made an attempt to explain the impact of climate change on the agriculture both in national and international landscape, its effects, and methods need to follow and suggest some of the implications to implement for the policy making.*

**KEY WORDS:** *Climate Change; Agriculture; Temperature; Farming Sector*

## INTRODUCTION

Climate change contains a serious impact on the provision of varied resources on the planet especially water, which sustains life on this planet. Changes within the biosphere, biodiversity and natural resources are adversely affecting human health and quality of life. All through the 21st century, India is anticipated to face the warming issue above universal level. India also will begin to experience more seasonal variation in temperature with more warming within the winters than summers. Longevity of warmth waves across India has extended in recent years with warmer night temperatures and warmer days, and this trend is predicted to continue. The common natural action is predicted to be 2.33°C-4.78°C with a doubling in CO<sub>2</sub> concentrations. These heat waves will result in increased variability in summer monsoon precipitation, which can end in drastic effects on the agriculture sector in India. Climate models predict a gradual rise in carbonic acid gas (CO<sub>2</sub>) concentration and temperature across the world. These models, however, don't seem to be very precise in predicting future changes in local atmospheric condition. Local atmospheric condition like rain, temperature, sunshine and wind, together with locally adapted plant varieties, cropping systems, and soil conditions can maximize food production as long as plant diseases is controlled. Agriculture production is directly obsessed with temperature change and weather. Potential changes in hotness, rainfall and CO<sub>2</sub> concentration are anticipated to impact the crop growth significantly. The impact of global climate change on worldwide food production is taken into account to be low to moderate with successful adaptation and adequate irrigation. Global agricultural production might be increased because of the doubling of CO<sub>2</sub> fertilization effect. Agriculture will be impacted because of climate changes imposed on water resources. India will begin to experience more seasonal variation in temperature with more warming within the winters than summers. Global climate change is posing a good threat to agriculture and food security. Water is that the most crucial agricultural input in India, as 55% of the overall cultivated areas doesn't have irrigation facilities. At present country could able to attain the required food supplies under these changing circumstances. All climate models predict that there'll be more extreme climatic conditions, with more droughts, heavy rainfall and storms in agricultural production regions. Such extreme weather events will influence where and when diseases will occur, thereby imposing severe risks and potential



failure. In developing countries like India, global climate change is an extra burden since ecological and socio-economic systems already face pressures from rapid population, industrialization and economic development. India's climate could become warmer under conditions of increased atmospheric dioxide. Over the years, demand for water has increased thanks to urbanization, increasing population, rapid industrialization and other developmental initiatives. Additionally, changes in cropping and land-use patterns, over-exploitation of groundwater and changes in irrigation and drainage have modified the hydrologic cycle in many climate regions and river basins of India. Availability of water is that the most significant consider agricultural production. The quality and quantity of the water are severe limitations for agriculture in most parts of India. Agriculture must adapt to changing weather conditions by tapping water resources and developing improved water management approaches. Simultaneously, there's also must develop and implement technologies and policies which is able to help in reducing and mitigating greenhouse emission emissions. Therefore, assessment of the provision of water resources is future national requirement and expected impact of global climate change and its variability is critical for relevant national and regional long-term development strategies for sustainable development.

### **EFFECTS OF CLIMATE ON INDIAN AGRICULTURE**

Climate change is perceptible through an increase all told India mean temperature and increased frequency of maximum rainfall events within the last three decades. This causes fluctuation in production of major crops in several years. Impact of temperature change on Indian agriculture was studied under National Innovations in Climate Resilient Agriculture (NICRA). Rainfed rice yields in India are projected to cut back marginally (<2.7%) in 2050 and 2080 and irrigated rice yields by 8% in 2050 and 12% in 2080 scenarios. Further, wheat yield projected to scale back by 7-29% in 2100 and maize yields by 19-25%. Future climates are likely to profit chickpea with increase in productivity (25-55%). Indian Council of Agricultural Research (ICAR) has initiated a network project NICRA during 2011 to handle the impact of global climate change on Indian agriculture. NICRA project is being reviewed by a High Level Monitoring Committee (HLMC) under the Chairmanship of Secretary, DARE & DG, and ICAR with invited members representing different Ministries, Government of India. This committee recommends measures to be taken through NICRA for creating Indian agriculture more resilient to changing climate. Besides an expert committee periodically review the project and advise on various aspects. Vulnerability assessment of Indian Agriculture to temperature change is undertaken by Indian Council of Agricultural Research (ICAR). Such an assessment was for 573 rural districts of India (excluding the Union Territories of Andaman and Nicobar Islands, Lakshadweep). Supported the vulnerability analysis, 109 districts out of 573 rural districts (19% of total districts) are 'very high-risk' districts, while 201 districts are risk districts. the main points are available at Integrated simulation modelling studies indicated that under Representative Concentration Pathway 4.5, maximum temperature is predicted to extend by 1 to 1.5oC in 256 districts, by 1.3 to 1.6 oC in 157 districts (2020-2049). The rise ranged from <1.3 oC in 199 districts to >1.6 oC in 89 districts. Cultivation of wheat in these districts is probably going to be suffering from heat stress. Under NICRA project, wheat germplasm comprising of advanced breeding lines and land races are screened for heat/drought tolerance. ICAR-Indian Agricultural Research Institute (IARI) has released the high yielding varieties like HD 2967 and HD 3086 which are being grown in large areas of North-west and North India. Zero till planting of wheat has advanced the wheat sowing in Punjab and Haryana.

### **STEPS NEED TO TAKE TO MITIGATE THE IMPACTS OF THE CLIMATE CHANGE ON AGRICULTURE**

The "Global Risks Report 2020" published by World Economic Forum lists global warming or climate change trends because the top global threat over the subsequent decade while the world Climate Risk Index places India at the fifth position among the countries most liable to the climate change crises. The past few years have seen a rise in awareness of the impacts of global climate change on the Indian agricultural ecosystem both among policymakers still because the general population. The augmented importance on sustainable livelihood is an illustration of this move. Unfolding Crisis However, as data indicates, despite continued efforts at sustainable living and life choices, India's agricultural productivity is within the danger of getting severely impacted. Issues like greenhouse emission emissions, increased frequency of maximum weather outcomes, average annual temperatures taking a northward shift and rising sea levels are just some of the factors that would adversely impact India's agricultural sector. Central to the food security of the state, any ripple during this sector is guaranteed to cause a result within the whole economy. Consistent with the Economic Survey, agriculture, at the present employs around 49 percent of the Indian workforce while 16 percent of our GDP comes from agricultural and its allied activities. In absence of any adaptation and mitigation measures, the yield of Rabi and Kharif crops are expected to travel down by 12 and 15 percent respectively thus impacting self-sufficiency in food production and demolition the income of the farmers and therefore the rural population of India. In addition, the COVID-19 pandemic's brunt on the farming sector of India has also been overwhelming.



The shortage of availability of labour and transportation facilities and overall shutdown of markets are a number of the ways during which the Indian farmers are affected. Shortage of migrant workers has also led to a pointy hike in daily wages for crop-harvesting. This, not to mention the closing of interstate movement has reportedly led to large losses for the farmers of Indian agriculture remains largely obsessed with monsoon with around 52 percent of the agricultural land non-irrigated. This has left it uninsured alongside the changes of weather. The pattern of the Indian monsoons is predicted to change within the next decade both spatially and temporally with a change in arrival and departure dates, increased intensity of rainfall further as larger breaks between bursts of monsoon. This is often guaranteed to change the sowing and harvesting cycles that Indian farmers should be prepared before. An economic survey points out that non-irrigated regions will face a larger consequence of climate change and its associated impacts. Higher temperatures led to by temperature change will encourage weed and pest proliferation, impacting the nutritional status of crops.

## IMPLICATIONS FOR THE POLICY MAKING

One way the farmers may be helped to return out of this crisis is by creating an internet transaction system that would help them buy, sell or exchange their crops and related material like seeds and fertilizers with the nearby villages so on earn and generate a flow within the market. Enlarge the realm under irrigation with the utilization of efficient irrigation techniques like drip and sprinkler irrigation. Seeing this situation of COVID-19, sensors can even be accustomed water the sector in order that there's no physical contact with anyone. We can grow border crops like moringa which needs one-time investment and provides recurring income throughout as its fruit, flower and leaves will be used for multiple purposes. It also shelters the crops, having no preservation cost. Farmers might be encouraged to adopt more sustainable modes of agricultural production like intercropping, mixed-cropping, husbandry and crop rotation. Traditional farming systems like organic farming, zero-budget natural farming, etc. use only minimum inputs and are less addicted to external factors like irrigation, fertilisers, pesticides, etc. These must be encouraged through appropriate awareness programmes and subsidies for farmers who adopt these techniques. It is imperative to provide fund for the research on energy and eco-friendly water utilization methods and policies, smart agriculture methods, and use of AI etc., in monitoring plant health. The functioning of agricultural-extension schemes to bring more farmers into its ambit should even be emphasised on. Design suitable crop insurance models with appropriate crop cutting experiments to insure farmers against the loss caused thanks to global climate change. More farmers have to be brought within the realm of economic inclusion and security benefits. More credit must be extended to the farmers from institutional sources because the cost of agriculture is simply visiting increase once when measures are taken to shield the arena against global climate change.

## CONCLUSION

Climate change is one of the mounting threats to the agriculture, and it is not only affecting the affecting agriculture, but also sustainable development. The expected effects of global climate change could seriously compromise the power of the agriculture sectors to feed the globe, and severely undermine progress toward eradicating hunger, malnutrition and poverty. Action is urgently needed to organize the agricultural sectors for the prospect of rapidly changing environmental conditions. Because the agriculture sectors are partly liable for the build-up of gas within the atmosphere that are responsible global climate change, it's also important to cut back agricultural emissions. Even without temperature change, world agriculture and food security are face daunting challenges. Increment and rising incomes in much of the developing world have pushed the demand for food and other agricultural products to unprecedented levels. Without heightened efforts to scale back poverty and improve agricultural productivity, many low-income countries, especially those in Sub-Saharan Africa and South Asia, will find it difficult to confirm access to adequate quantities of food for all. Agriculture production systems and food systems must undergo significant transformations to fulfil the interlinked challenges of achieving sustainability, ensuring food security and addressing global climate change. Increasing resource efficiency is crucial to extend and safeguard food security within the long run and making major contribution temperature change mitigation. With the increased risks from the impacts of temperature change, efficiency and resilience must be considered together at every scale and from environmental, economic and social perspectives. Climate-smart agriculture could be a dynamic approach that guides the needed changes towards addressing the challenges of temperature change. It's not a brand new agricultural system, nor a group of practices. It articulates globally applicable principles for managing agriculture for food security under changing weather conditions, which may function the idea for policy support and suggestions by multilateral organizations. Climate-smart agriculture provides a framework for setting up place comprehensive policies, adequate institutions and proper governance to implement sustainable, climate-sensitive development strategies. The framework may be used for channelling new financing to handle the investment needs for research organizations and enable farmers to beat the barriers, including up-front costs and temporarily foregone income,



to the adoption of climate-smart agriculture practices. The climate-smart agriculture approach is especially important for agricultural producers in developing countries who are in danger of food insecurity as results of temperature change and who have limited means, little policy support and few institutions which will help them deal with change. Climate justice demands action to help these producers who are most tormented by global climate change but have contributed least to it; and supply opportunities to developing countries to boost their food security and speed their economic process. Actions taken to boost food security and help producers adapt to vary can often have significant mitigation co-benefits. They may, however, have higher upfront costs. Finding appropriate ways to produce incentives for the uptake of climate smart alternatives may be a key priority. In various countries, agricultural policy is connected with economic policies, to help the rural economies. There are rising number of promise for low-income nations to familiarize the production along pathways that are both more sustainable and highly dynamic. Research and development associates have a significant role to play in recognizing and encouraging climate-smart exercises that make stronger rural communities, develop smallholders' living and employment, and avoid depressing social and cultural brunts, like loss of legal right and made migration. In many developing countries, the planning and implementation of agricultural support policies may be radically improved. The objectives of climate-smart agriculture goals have to be integrated into this broad policy context.

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