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# A STUDY ON CLIMATIC CHANGE ADAPTATION BY FARMERS IN RURAL AREAS OF INDIA

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## ABSTRACT

***Climate change has the potential to hurt everyone, but one particularly vulnerable group is farmers. Agriculture, especially in India, depends on favorable weather conditions; so, climate change-induced temperature rises can significantly hurt farm productivity. Consequently, a farmer's ability to adapt to temperature changes becomes crucial. So, in this paper we have discussed some of the problems facing by them and some recommendations for those problems.***

**KEYWORDS:** ***Adaptation, Climatic change, Mitigation, Urban disaster, floods, barriers.***

## INTRODUCTION

Climate change adaptation is a response to global warming that seeks to reduce the vulnerability of social and biological systems to relatively sudden change and thus offset the effects of global warming. Even if emissions are stabilized relatively soon, global warming and its effects should last many years, and adaptation would be necessary to the resulting changes in climate. Adaptation is especially important in developing countries since those countries are predicted to bear the brunt of the effects of global warming. That is, the capacity and potential for humans to adapt is unevenly distributed across different regions and populations, and developing countries generally have less capacity to adapt. Furthermore, the degree of adaptation correlates to the situational focus on environmental issues. Therefore, adaptation requires the situational assessment of sensitivity and vulnerability to environmental impacts.

## REVIEW OF LITERATURE

- **Pernille Gooch (2014)** study was conducted in South Sikkim, a mountain region located in the Indian Eastern Himalaya. He analyzed that the rural mountain communities have faced challenges from a range of social, economic, political and environmental factors and the threat from these factors has only intensified due to the current climate change.
- **Chandan Kumar Jha (2018)** explored link between climate/weather change and farmer migration in Bihar, India. The focus is the role of migration in access to climate and agricultural extension services.
- **Yutaka Ichikawa (2014)** determined that nearly one-sixth of India is defined as a Drought Prone Area, and as such recurring drought is one of the major challenges in the region. Drought impacts vary from region to region, but the overall issues are similar and Maharashtra State is indicative of the rest of the Drought Prone Area of the country.
- **Tek Narayan Maraseni (2012)** studied the impact of remote mountainous Jumla District of Nepal and explored how climate change is affecting the livelihood of local communities and the changing climate is an additional burden to the poor people in the mountains who are already living in poverty.
- **Hiroshi Ishidaira , Anthony S.Kiem (2014)** studied to understand the rural farming community's perception of drought impacts on socio-economic activities and environment, the adaptation at the household level and opinions on government drought mitigation measures.
- **Cecilia Tacoli (2009)** studies the impact of climate change that are likely to affect the population distribution and mobility. While alarmist predictions of massive flows of refugees are not supported by past experiences of responses to droughts and extreme weather events, predictions for future migration flows are tentative at best.
- **Lindsey Jones (2015)** explores the influence of social barriers to adaptation using insights drawn from field work in rural subsistence communities in western Nepal, and findings from a related ODI project in rural India. It explores the role of social institutions in determining how individuals adapt to climate stress and shock, and examines how restrictive cultural environments can limit successful adaptation.
- **Aromar Revi (2008)** considered the likely changes that climate change will bring in temperature, precipitation and extreme rainfall, drought, river and inland flooding, storms/storm surges/coastal flooding, sea-level rise and environmental health risks, and who within urban populations are most at risk. It notes the importance for urban areas of an effective rural adaptation agenda especially in maintaining the productivity and functioning of rural systems.

## MAJOR CHALLENGES

India is highly prone to climate related catastrophes like floods, droughts, heat waves and cyclones. India has a number of social welfare programs to counter the brunt and prevention & control of climate risks. The following are the major challenges faced due to climatic changes in rural areas of India.

- **Improve production efficiency, sustainability and resilience**: Enhancing productivity as well as the capacity of plants, animals and production systems to adapt to a rapidly changing environment and climate with increasingly scarce natural resources. The resulting innovations will help to move towards a resource-efficient agriculture and food and feed supply chains which consume fewer resources.
- **Deliver more public goods and ecosystem services**: Contributing to a better understanding of the complex interactions between primary production systems and ecosystems services. Supporting the provision of these public goods and services through the delivery of management solutions, decision-support tools and the assessment of their market and non-market value.
- **Empower rural people and develop better policies:** Strengthening rural communities' capacities for production and for delivery of ecosystems services. Fostering economic diversification, ensuring appropriate relations between rural and urban areas, as well as facilitating knowledge exchange, demonstration, innovation and dissemination. They will support policy makers in defining relevant strategies.
- **Create more sustainable forestry:** Promoting multi-functional forests which deliver a variety of ecological, economic, and social benefits. Focusing on the further development of sustainable forestry systems

which can address societal challenges and demands, including forest owners' needs, by putting in place multifunctional approaches taking into account climate change.

- **Build a sustainable and competitive agri-food industry:** Addressing the needs for the food and feed industry to cope with social, environmental, climate and economic change from local to global. Projects will consider all stages of the food and feed production chain, including food design, processing, packaging, process control, waste reduction, by-product valorization and the safe use or disposal of animal by-products.
- **Support market development for bio-based products and processes:** Opening new markets for biotechnology innovation, through in particular demand-side measures. Standardization and certification at Union and international levels are needed for, amongst others, determination of bio-based content, product functionalities and biodegradability. Methodologies and approaches to life-cycle analysis will be further developed.

## RECOMMENDATIONS

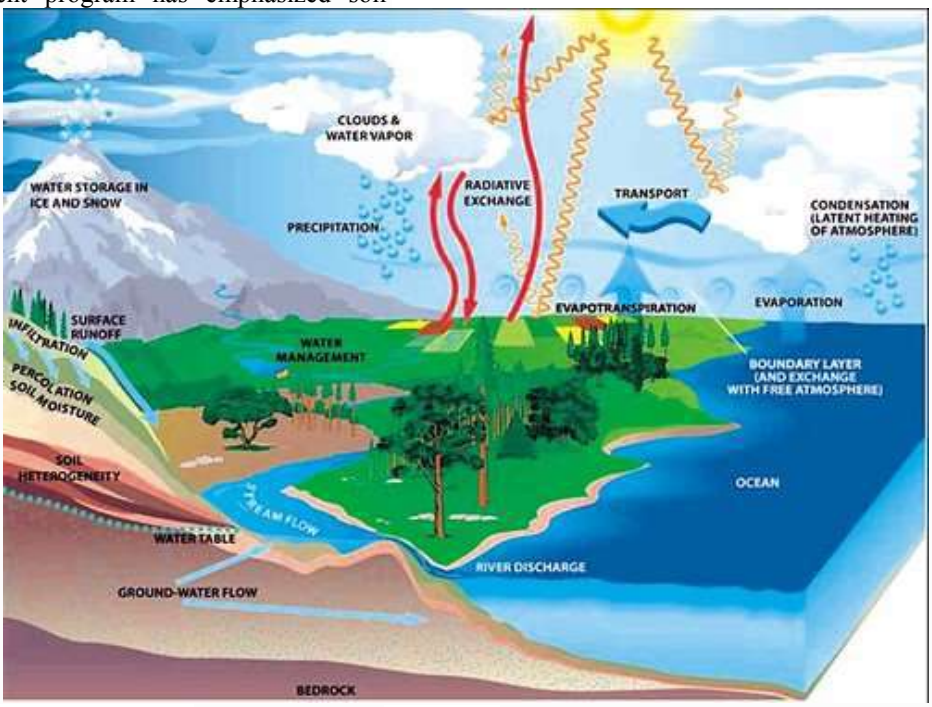
Climate change is already taking place. Rural areas will be particularly affected as it impacts water resources, agriculture, overall biodiversity and ecosystems like forests and coastal zones, as well as human health. There is a great need for a pathway to development that is sustainable and resilient to climate change. The following are the recommendations for the climatic changes.

- **Impact on agriculture:** Climate change will have a major impact on biophysical and socio-economic conditions. Agriculture will be one of the sectors that will be hardest hit by adverse climate conditions, since agricultural production is extremely vulnerable to underlying climate risks such as drought, intense and erratic rainfall, and temperature shifts, which are a result of the intensification of the water cycle. Yet, the intensity of the impacts will differ from community to community, region to region and continent to continent.

1. **Biophysical impact:** Physiological effects on cultivated crops, pasture, forests, fish, rangeland and livestock, changes in the quantity and quality of land, soil and water resources, increased weed and pest challenges, alien invasive species.
2. **Socio-economic impact:** Changes in yields and production, reduced gross domestic product (GDP) from agriculture in the long term, greater fluctuations in world market prices, migration and civil unrest.

- **Watershed Development Program:** This program has been in operation for nearly 40 years. It has emphasized the importance of soil and water conservation, and people's participation through Watershed Associations in planning and management. As the Natcom notes, “Overall national objectives of reducing the adverse impact of droughts, improving/stabilizing the production of important rainfed crops like pulses and

oilseeds, and controlling siltation of reservoirs, have not been achieved to a satisfactory level.". The watershed development program has emphasized soil and water conservation efforts/methods, but not on productivity linked best agronomic practices (Natcom,2004).




- **Impact on coastal areas:** The coastal areas of the country, in the states of Orissa, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Maharashtra, Goa and Gujarat, face grave risks due to climate change. There is the risk of cyclones and tsunamis, the intensity of which is predicted to rise. Rising sea levels, which could flood land (including agricultural land) and cause damage to coastal infrastructure and other property, pose another threat. Poor countries face a host of development challenges apart from climate variability and climate change, such as the threat of HIV/AIDS, environmental degradation, declining export prices, demographic changes and so on. Climate change is an additional challenge that though significant, has often been overlooked in addressing poverty reduction and sustainable development.
- **Command Area Development Program (CAD):** This program has had a positive impact on irrigation water utilization, irrigation intensity, agricultural productivity and soil and water environment. It has been felt that the main emphasis of CAD has so far been on hard resilience or physical works, such as construction of field channels and on farm development work.
- **Crop diversification**: Crop diversification methods such as crop rotation, mixed cropping and double cropping, reduce the vulnerability of crop yields. Crop diversification has also been found to result in reduced erosion, improved soil fertility, improved crop yield, reduced risk of crop failure and enhanced water savings.
- **Flood control and flood management:** Flooding is a major problem in the Himalayan rivers. About 40 Mha, which is close to one-eighth of the geographical area of the country, is vulnerable to floods. Flood protection works in the form of flood embankments and reservoirs have not proved very useful. It has been felt that it may not be possible to provide complete protection against floods. What is needed is a greater emphasis on the efficient management of flood plains, flood proofing, including disaster preparedness and response planning, flood forecasting and warning, and many other non-structural measures.

## CONCLUSION

Human-induced climate change has contributed to changing patterns of extreme weather across the

globe, from longer and hotter heat waves to heavier rains. From a broad perspective, all weather events are now connected to climate change. While natural variability continues to play a key role in extreme weather, climate change has shifted the odds and changed the natural limits, making certain types of extreme weather more frequent and more intense.

While our understanding of how climate change affects extreme weather is still developing, evidence suggests that extreme weather may be affected even more than anticipated. Extreme weather is on the rise, and the indications are that it will continue to increase, in both predictable and unpredictable ways.

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