

Research Article

The Economic Impact of Climate Change in India

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Abstract

Climate change is an increasing economic challenge for India, affecting agricultural productivity, labor markets, economic growth, and income inequality. This paper examines the economic consequences of rising temperatures, changing rainfall patterns, and climate related extreme events, with particular focus on agricultural output and farmers' incomes, labor productivity and employment, and their implications for economic growth. It also examines how these impacts vary across income groups, occupations, and regions. The analysis highlights that climate-sensitive sectors and outdoor workers face greater economic risks, while reduced agricultural productivity can lower rural incomes and increase food-price pressures. Extreme heat can further reduce working hours and labor efficiency, affecting overall productivity. These interconnected effects may constrain India's long-term economic growth and deepen existing inequalities. The paper therefore considers climate change not only an environmental concern but also a significant economic and developmental challenge for India.

Keywords: Climate Change, Indian Economy, Agricultural Productivity, Labor Productivity, Economic Growth, Income Inequality, Heat Stress, Climate Economics.

Introduction

Climate change is increasingly becoming an economic issue for India, not just an environmental concern. Rising temperatures, changing rainfall patterns, and frequent extreme weather events can reduce economic productivity and affect agriculture, employment, household incomes, and food prices. These effects are particularly significant because many livelihoods depend on climate-sensitive activities such as agriculture and outdoor labour. Although India's economy has continued to grow, climate-related risks can constrain long-term development by reducing productivity and incomes while increasing the vulnerability of households with limited capacity to adapt.

This paper examines the economic impact of climate change in India through four interconnected dimensions: agricultural productivity and farmers' income, labour productivity and employment, economic growth, and inequality. It argues that climate change can act as a persistent economic shock, with its costs disproportionately affecting climate-sensitive sectors and economically vulnerable populations.

Climate Change and Its Economic Significance in India

India's economy is strongly influenced by temperature and rainfall variations, particularly because agriculture, water availability, and rural incomes depend heavily on the monsoon. Climate change is disrupting these patterns through rising temperatures, altered rainfall, and more frequent heatwaves, droughts, and floods. These changes affect the economy through multiple channels: droughts can reduce agricultural output and farmers' incomes while increasing food prices, whereas heatwaves can reduce workers' productivity and working hours, with further effects on consumption and business costs.

The Reserve Bank of India has highlighted how uneven rainfall and extreme weather can damage crops and create supply shortages, contributing to food-price fluctuations. Thus, climate

change can generate both real economic losses through reduced production and price pressures through disruptions to food supply, making it an increasingly important economic concern for India.

Impact on Agricultural Productivity and Farmers' Income

Agriculture is one of the sectors most directly exposed to climate change. Changes in temperature, rainfall, and extreme weather events can affect crop yields, water availability, and agricultural activities. This is particularly important in India, where many households depend on farming and related rural employment. Higher temperatures can reduce crop productivity when conditions exceed optimal levels, while water stress can further intensify these effects, especially in rain-dependent regions.

The economic impact extends beyond farms, as lower production can reduce farmers' incomes and increase food prices, while reduced agricultural income can weaken demand for goods and services in rural economies. The effects are also unequal: farmers with access to irrigation, credit, crop insurance, technology, and diversified income sources may be better equipped to manage climate shocks, whereas smaller and resource-constrained farmers often have fewer options. Thus, the same climate event can produce significantly different economic outcomes across households.

Impact on Labour Productivity and Employment

A second major economic impact of climate change is its effect on labour productivity. High temperatures can cause physical and cognitive fatigue, forcing workers to take more breaks or reduce their working hours. This is particularly significant in agriculture, construction, and other outdoor occupations. The International Labour Organization estimates that India could lose approximately 5.8% of total working hours by 2030 due to heat stress, equivalent to around 34 million full-time jobs in terms of lost working capacity. This represents productivity loss rather than 34 million people becoming unemployed.

Recent research provides further evidence of this impact. A 2026 study of 1,560 outdoor workers across 11 districts in Tamil Nadu found significant productivity losses associated with heat exposure among workers in agriculture, construction, brick manufacturing, salt production, and quarrying. Similarly, the World Bank estimates that around 40% of India's GDP could remain dependent on heat-exposed work by 2030, making rising temperatures a significant risk to economic output.

These effects create a broader challenge for India's development. Economic growth depends not only on the size of the workforce but also on its productivity. If rising temperatures reduce the number of hours workers can safely and effectively work, climate change could offset some of the gains from India's growing labour force and place additional pressure on long-term economic growth.

Climate Change and Economic Growth

The effects of climate change on agriculture and labour ultimately influence India's broader economic growth. Economic growth depends on the productivity of labour, capital, and natural resources, all of which can be affected by climate-related shocks. Reduced agricultural productivity can lower economic output, while extreme heat can reduce labour productivity in agriculture, construction, manufacturing, and other outdoor activities. Climate disruptions can also interrupt supply chains and increase the cost of economic activity.

The World Bank has identified climate change as a long-term risk to India's development, particularly because of its effects on agriculture and other climate-sensitive sectors. Recent research estimated that extreme heat already causes annual economic losses of around US\$1.9 billion, or 2.3% of Chennai's GDP, with losses potentially increasing under higher-emission scenarios. These findings suggest that climate change should be viewed as a productivity issue, as repeated climate shocks can lead to not only temporary economic losses but also slower long-term growth and accumulation of productive capacity.

Climate Change and Economic Inequality

The economic costs of climate change are unlikely to be distributed equally across society. Higher-income households generally have better access to healthcare, insurance, safer housing, air conditioning, and financial savings, while poorer households often depend more on agriculture,

informal employment, and outdoor work, making them more vulnerable to climate shocks. This inequality is particularly evident in the labour market, where formal workers may have greater workplace protection, while informal workers may be unable to reduce working hours during extreme heat without losing income. Recent evidence from southern India has also found significant productivity losses among informal outdoor workers exposed to high heat stress.

Agricultural households face similar challenges, as climate shocks can reduce both crop production and income. Households with limited savings and resources may be forced to reduce consumption, sell assets, or borrow to cope with these losses, potentially creating long-term financial difficulties. Thus, climate change can not only reduce overall economic productivity but also deepen existing income inequalities.

Conclusion

Climate change represents a significant long-term economic challenge for India, affecting agricultural production, labor productivity, economic growth, and income distribution. Rising temperatures, changing rainfall patterns, and extreme weather events can reduce crop yields, working capacity, and household incomes, with the greatest effects often falling on climate-sensitive sectors and vulnerable populations. These interconnected impacts can weaken productivity and create persistent economic costs.

Therefore, climate change needs to be considered an important factor in India's longterm economic development. The future economic impact will depend not only on the overall level of climate change but also on how its costs are distributed across sectors, regions, and income groups. Understanding these differences is essential for assessing India's economic resilience and the sustainability of its future growth.

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