

Climate-smart agriculture

Ensuring a sustainable future for India

India is poised at a critical juncture as it confronts rapid climate change and its devastating impact on agriculture. Global warming is triggering a host of challenges such as extreme temperatures, erratic rainfall, floods, rising sea levels and dwindling water sources.

Farmers are bearing the brunt, with crop failures, mounting debt and distressing suicides becoming common. It is imperative to take urgent and decisive action to secure the future of Indian agriculture.

Embracing climate-smart agriculture offers hope, providing a sustainable path forward through innovative and adaptive practices. The choices made today will shape the destiny of India's agriculture, determining whether it thrives against the odds or succumbs to climate change.

Introduction

Driven primarily by increased greenhouse gas emissions, climate change is raising global temperatures, altering weather patterns and disrupting traditional farming practices. The resulting frequent temperature anomalies, droughts, floods and other extreme weather events are leading to crop failure, soil degradation and water scarcity. The impact on farmers is particularly severe, resulting in ever-shrinking productivity and livelihood opportunities.

Given India's diverse climatic regions and the criticality of agriculture to the economy, the country needs to address the implications of these changes.

For this purpose, it is essential to understand the threats from climate change and the subsequent measures to alleviate them.

- 1) The rising global temperatures threat:** Scientists warn that by 2100, the planet could warm up by a sizeable 3.5°C to more than 8°C, far exceeding the Paris Agreement's target to keep the rise below 2°C. This warming poses a significant challenge for the Indian agriculture sector. As temperatures rise, evaporation rates increase, resulting in changes in precipitation patterns and water availability. Some regions may experience more intense rainfall and flooding, others may suffer from prolonged droughts. These shifts can disrupt traditional agricultural practices and make it difficult for farmers to predict suitable planting and harvesting times, impacting crop yields and overall productivity.
- 2) Coastal vulnerability and inundation threats:** India's long coastline is home to extensive agricultural land, especially in the Sundarbans, Kerala and Tamil Nadu. Rising sea levels due to melting ice caps and thermal expansion of seawater put these coastal regions at risk of inundation. Saline ingress in farmlands can render them infertile and unsuitable for cultivation. Additionally, coastal areas are more susceptible to the impact of cyclones and storm surges, further endangering agricultural land and the communities that depend on them. Farmers in coastal areas face the imminent threat of losing their livelihood as their land is engulfed by the encroaching sea, exacerbating existing vulnerabilities.
- 3) Plight of the small and marginalized farmers:** Indian farmers, especially those depending on rain-fed agriculture, are especially vulnerable to the adverse effects of climate change. The loss of crops not only impacts farmer incomes but also amplifies their debt, perpetuating cycles of poverty and distress. As traditional farming practices become less reliable, farmers experience heightened uncertainty and risk aversion, leading to reduced investment in agriculture. The emotional toll of climate-induced challenges on farmers is immense, contributing to an alarming increase in farmer suicides.
- 4) Threat of declines in crop yields:** Climate change projections based on current trends and emission scenarios paint a concerning picture for the future of Indian agriculture. The yield of staple crops such as rice, wheat and maize is expected to reduce significantly. Droughts and floods can damage crops

and degrade soil, reducing the land's fertility and capacity to support crops. Additionally, changing climatic conditions may lead to shifts in the distribution of pests and diseases, further compromising productivity. These projected declines in yields have far-reaching implications for food security, nutrition and the overall wellbeing of the millions who depend on agriculture for their sustenance and livelihood.

Addressing the climate change challenge to agriculture

A comprehensive and multi-pronged approach is required to address the multifaceted challenges posed by climate change on Indian agriculture. Climate-smart agriculture offers a promising way ahead.

This involves adopting sustainable farming practices that are resilient to climate change such as.

- Adopting efficient water management techniques, such as rainwater harvesting and drip irrigation, to help mitigate the impact of water scarcity
- Embrace climate adaptation strategies, including crop diversification and the promotion of climate-resilient crop varieties to cope with changing climatic conditions.
- Curtail the indiscriminate use of fertilisers and agrochemicals to prevent soil and water degradation
- Adopt an integrated pest management approach by minimising the usage of synthetic pesticides and prioritising natural pest control methods
- Promote the use of organic and natural farming methods to enhance soil health and biodiversity, contributing to long-term sustainability
- Promote agroforestry by intentional integration of trees and shrubs within the agriculture landscape to act as windbreakers, reduce soil erosion, provide carbon sequestration and protect crops from harsh weather conditions. They also contribute leaf litter, which enriches the soil with organic matter and nutrients
- Protect and restore natural ecosystems, such as wetlands and forests, to enhance the resilience of agricultural landscapes

By embracing a holistic and collaborative approach, involving policymakers, farmers, scientists and communities, India can effectively address the challenges of climate change and ensure a resilient future for its agricultural sector.