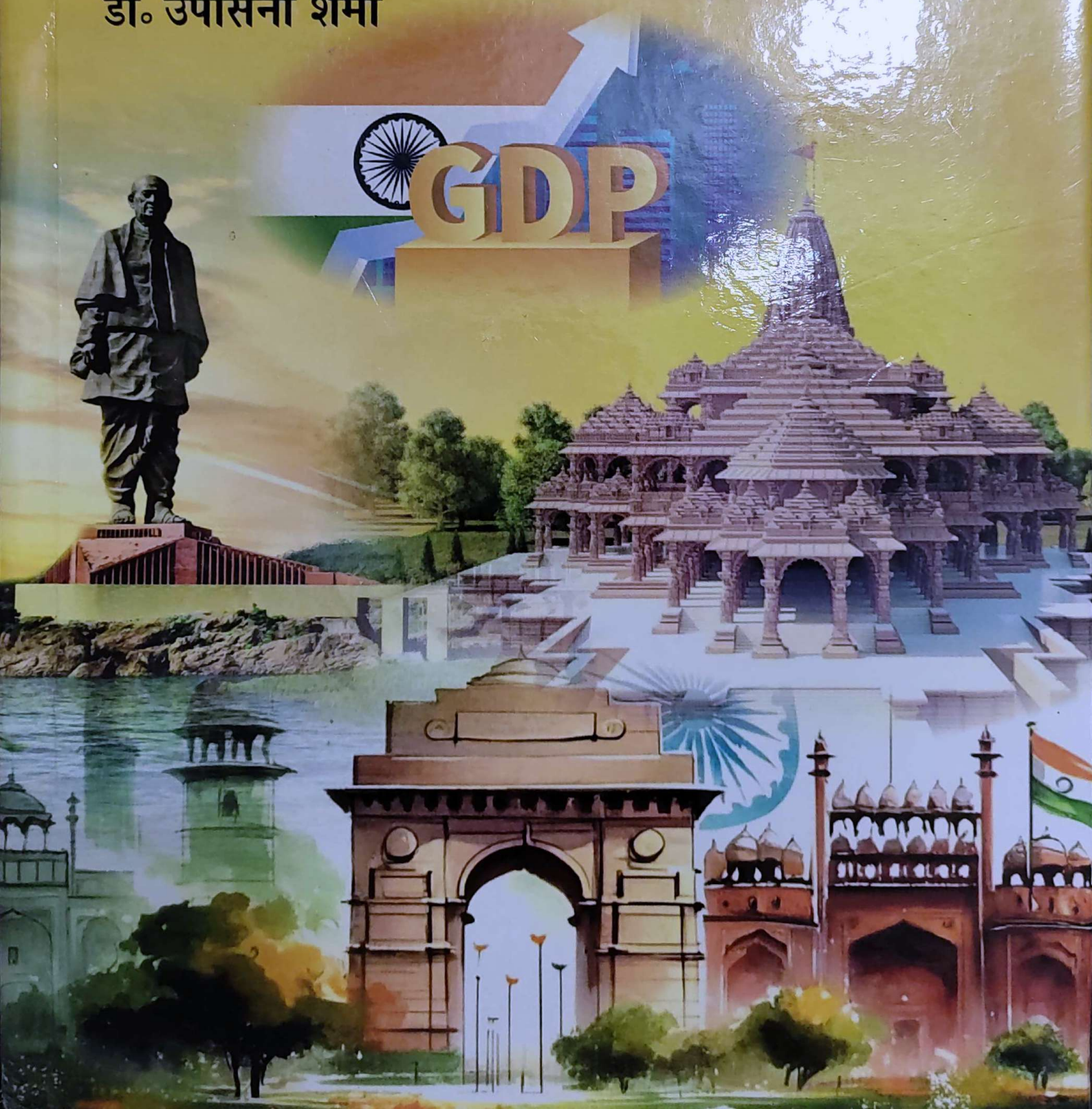




# इक्कीसवीं शताब्दी का भारत स्वप्न से यथार्थता की ओर

Twenty First Century of India  
From Dream into Reality

डॉ. उपासना शर्मा



इक्कीसवी शताब्दी का भारत :  
स्वप्न से यथार्थता की ओर  
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(FROM DREAM TO REALITY)

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# अनुक्रमणिका



प्राक्कथन (Preface)

आभार (Acknowledgement)

1. Transformation in Indian Agriculture: From Colonial Legacy to Contemporary Challenges  
**Dr Poonam Shah and Virender** 1-9
2. Challenges Approaches in Agricultural Development After Demonetisation  
**Dr. Anju Tripathi** 10-15
3. Digitalisation and Connectivity in Rural India  
**Parmanand Chauhan & Dr. Madhu Bala Juwanthy** 16-24
4. Election in India: Problems and Solutions  
**Dr. Bijaysing K. Bhabardode** 25-30
5. G-20 & India: Role and Importance  
**Dr. Sushma Saini & Dr. Abha Saini** 31-36
6. भारतीय संस्कृति के आयाम: गजेंद्र मोक्ष— दर्शन से दर्शन की ओर  
**डॉ वसुंधरा शर्मा** 37-40
7. आत्मनिर्भर भारत के समक्ष चुनौतियाँ एवं सम्भावित समाधान  
**डॉ उपासना शर्मा** 41-45
8. आर्थिक विकास में पर्यटन की भूमिका  
**डॉ नरेश कुमार व कु० रश्मि** 46-48
9. भारत में तकनीक चुनाव: समस्याएँ एवं समाधान  
**डॉ ज्ञानेश्वर एल० सोनवणे** 49-55
10. राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद (नैक) की प्रक्रिया तथा उसके विभिन्न सूचकों की भूमिका  
**डॉ मिथिलेश कुमार शुक्ल** 56-61



# Transformations In Indian Agriculture: From Colonial Legacy To Contemporary Challenges

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## **Abstract.**

This Chapter delves into the evolution of Indian agriculture from its pre-independence era marked by colonial influence to the complex challenges faced in the present day. The pre-independence period saw agriculture contributing significantly to India's income, with a majority engaged in subsistence farming. The British colonial rule introduced agrarian changes, altering land ownership, production patterns, and socioeconomic structures. These shifts led to exploitative practices, cash crop dominance, and inadequate infrastructure, stifling growth. Post-independence, challenges persisted, characterized by land disparities, low productivity, and food insecurity. Land reforms aimed to address inequality, yet their impact varied. The Green Revolution brought technological advancements, surging crop yields, and food self-sufficiency. However, it posed ecological and equity concerns. Economic reforms of the 1990s triggered diversification and globalization effects on Indian agriculture. Contract farming and multinational involvement raised complex dynamics. Recent trends encompass organic farming, digital technologies, and climate adaptation efforts. Agroecology emerges as a sustainable approach, addressing ecological balance and smallholder empowerment. Climate change remains a formidable threat, necessitating resilient strategies. The manuscript discusses policy directions emphasizing inclusive growth, rural infrastructure, and diversified income sources. Collaboration, agroecology, rural development, and climate adaptation are proposed pathways for India's agricultural future.

**Keywords.** Agricultural Transformation, Colonial Legacy, Green Revolution, Sustainability Challenges, Climate change

## **Understanding the Indian Agriculture**

**Prior to independence**, agriculture and allied activities comprised roughly 50% of India's national income, with around 85% of the population residing in villages and predominantly practicing subsistence agriculture. The distribution of land often displayed inequality, favoring large landowners and landless laborers. The British colonial era brought about significant changes to India's agrarian economy, impacting land ownership, production patterns, and socio-economic structures. The Zamindari

and Ryotwari systems, introduced by the British, disrupted traditional landholding practices, leading to exploitative rent extraction and direct revenue collection from cultivators, resulting in landlessness and indebtedness. Cash crops promoted for export displaced food crops, causing famines during poor harvests. Limited infrastructure investment and heavy taxation hindered market access and left farmers in poverty. The lack of emphasis on research, technological progress, and irrigation, along with overreliance on rainfall and exploitative systems, contributed to stagnant agricultural growth, poverty, and susceptibility to weather fluctuations.

**Following India's independence in 1947**, the agricultural sector grappled with a series of challenges arising from its colonial past and the urgent need for rapid progress. Persisting disparities in land ownership prompted post-independence land reforms focused on rectifying inequalities and providing land to landless peasants. Traditional techniques, limited modern resources, and insufficient financial support contributed to enduring low productivity. The prevalence of cash crops worsened food insecurity, forcing the country to rely on imports during scarcities. Rural poverty endured due to a lack of employment opportunities, inadequate infrastructure, and limited access to education and healthcare. Inefficient agricultural practices and market entry were hindered by deficient modern infrastructure, including irrigation, storage, and transportation. The post-independence period marked significant land reforms that encompassed land ceilings, tenancy adjustments, and intermediary abolitions, all aimed at redistributing land, boosting productivity, and promoting social equity. The successful implementation of these reforms varied due to a range of factors. This era also witnessed the introduction of Five-Year Plans from the late 1940s to the 1960s, highlighting the pivotal role of agriculture in overall economic growth and poverty alleviation. These plans allocated resources to initiatives such as irrigation, rural electrification, agricultural research, and improved credit availability. Subsequent plans maintained a focus on enhancing infrastructure, productivity, and food security, while also fostering the dissemination of agricultural knowledge through research institutions and centers.

The **Green Revolution**, spanning from the 1960s onwards, marked a pivotal period in Indian agriculture characterized by the widespread adoption of high-yielding crop varieties, improved irrigation methods, and increased use of fertilizers and pesticides. Spearheaded by figures like Norman Borlaug and M.S. Swaminathan, this technological shift led to substantial gains in agricultural production, particularly for wheat and rice, primarily due to the introduction of responsive dwarf varieties that yielded more with fertilizer application. This shift not only addressed food scarcity but also transformed India from a food-deficient nation to one with a surplus, positively impacting rural livelihoods, poverty reduction, and overall economic growth. However, this phase was not without challenges. Despite successful land reforms, administrative complexities and political resistance resulted in uneven land distribution. The agricultural emphasis of the Five-Year Plans sometimes disregarded other sectors, contributing to regional disparities. While the Green Revolution boosted yields, it raised ecological concerns due to excessive chemical use, soil degradation, and



water resource depletion. Additionally, limited access to credit and resources prevented small farmers from fully adopting these new methods, perpetuating inequalities.

**During the 1970s and 1980s**, India witnessed a significant phase of agricultural development with the intensified implementation of Green Revolution practices, initiated in the 1960s. This movement aimed to enhance agricultural productivity through the introduction of high-yielding crop varieties, amplified utilization of fertilizers and irrigation, and the adoption of modern farming techniques. Notably focusing on wheat and rice production in regions like Punjab, Haryana, and parts of Uttar Pradesh, the integration of high-yielding crop varieties led to substantial yield increases due to their responsiveness to fertilizers and shorter growing cycles. By promoting chemical fertilizers and improved irrigation methods, the Green Revolution ensured nutrient availability throughout different seasons, resulting in heightened crop output, food self-sufficiency, and reduced reliance on food imports, thereby alleviating hunger and malnutrition to a certain extent.

During this period, agricultural research and institutions played a vital role, spearheaded by the Indian Council of Agricultural Research (ICAR), establishing research centers, universities, and extension services to bridge the gap between research findings and practical farming. Collaborations with international organizations facilitated technology transfer crucial for the revolution's success. Amidst this, a shift towards diversification and horticulture emerged in the 1970s and 1980s due to rising incomes and changing dietary preferences, offering export opportunities and benefits for smallholder farmers. However, this modernization raised sustainability, equity, and environmental concerns, with intensified chemical use causing degradation, unequal distribution of benefits favoring larger landowners, and monoculture practices endangering crop resilience and agrobiodiversity.

**The 1990s** marked a pivotal juncture in India's economic trajectory, characterized by the initiation of comprehensive economic reforms encompassing liberalization, privatization, and globalization. These reforms were undertaken to integrate the Indian economy with global markets, stimulate private sector involvement, and foster overall economic advancement. In the context of agriculture, this paradigm shift had multifaceted implications. On one hand, it incentivized agricultural diversification as farmers responded to market demands. Conversely, it rendered smallholder farmers susceptible to unpredictable global market dynamics, thereby impacting their income stability. Simultaneously, the economic reforms precipitated reductions or eliminations of certain agricultural subsidies, alleviating governmental fiscal pressures but disproportionately affecting farmers reliant on subsidies for vital inputs such as fertilizers and irrigation. The resultant trade liberalization spurred heightened agricultural exports, fostering the cultivation of cash crops tailored for international markets; however, an inadvertent consequence was the potential negligence of staple food crops, consequently engendering concerns regarding food security. Moreover, the relaxation of trade barriers exposed domestic agricultural producers to heightened competition from economically efficient imported counterparts, exacerbating the challenges faced by small-scale farmers striving to contend with mechanized foreign producers on a larger scale.

Amidst the wave of **globalization**, contract farming emerged as a significant practice wherein agribusinesses and food corporations established agreements with farmers for specific crop production, promising market access and improved pricing. However, this development sparked concerns about the potential imbalance of bargaining power within such arrangements. Concurrently, the globalization process facilitated the entry of multinational agribusiness firms into India, introducing advanced agricultural technologies, enhanced seeds, and improved farming methods. Nevertheless, apprehensions arose regarding the degree of control exerted by these corporations over agricultural processes. Furthermore, the era witnessed the adoption of modern agricultural technologies, encompassing genetically modified crops, precision-oriented farming practices, and mechanization, all aimed at augmenting productivity and efficiency. Notably, while large-scale farmers and agribusinesses swiftly integrated these innovations, smallholders encountered impediments due to financial limitations, knowledge gaps, and restricted access to resources. Consequently, a discernible technology disparity surfaced, exacerbating prevailing inequalities within the agricultural sector.

**During the 2010s and subsequent years**, the Indian government introduced a series of initiatives to bolster rural development and augment agricultural growth. Among these, the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) stands out, concentrating on elevating water utilization efficiency by facilitating the adoption of contemporary irrigation methodologies. Concurrently, the National Mission for Sustainable Agriculture (NMSA) prioritizes the cultivation of climate-resilient techniques and the advancement of organic farming approaches. These multifaceted endeavors are orchestrated to not only elevate rural livelihoods and enhance agricultural productivity but also to ensure food security in light of the burgeoning population. Launched in 2015, the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) encompasses a spectrum of measures geared towards furnishing farmers with efficacious irrigation solutions and adept water management practices, thereby mitigating reliance on erratic monsoon precipitation. Its ambit encompasses endeavors to amplify on-farm water use efficiency, advocate micro-irrigation methodologies, and institute structures for rainwater harvesting. Additionally, the Soil Health Card Scheme, initiated in 2015, assumes a pivotal role by furnishing farmers with tailored recommendations for effective nutrient management, thereby ameliorating soil health and augmenting crop yield. The program incentivizes judicious fertilizer application and the cultivation of sustainable agricultural practices.

### **Recent Trends**

**Organic Farming:** The organic farming movement has gained momentum in India as a response to concerns about chemical inputs, soil degradation, and the long-term sustainability of conventional farming practices. The Paramparagat Krishi Vikas Yojana (PKVY) and the Rashtriya Krishi Vikas Yojana (RKVY) support the adoption of organic farming practices by providing financial incentives and capacity-building training to farmers. This shift towards organic and sustainable farming practices



aims to improve soil health, reduce chemical pollution, and promote environmentally friendly approaches to agriculture. Paramparagat Krishi Vikas Yojana (PKVY): This scheme promotes organic farming and supports the formation of organic farmer groups. It encourages the use of traditional farming practices, natural fertilizers, and bio-pesticides. The entire state of Sikkim in India became 100% organic in 2016, demonstrating the feasibility and benefits of transitioning to organic farming. This initiative led to improvements in soil health, reduced chemical usage, and increased market demand for organic produce.

**Digital Technologies:** Digital technologies have played a transformative role in Indian agriculture in recent years. The growth of mobile phone usage and internet connectivity has enabled farmers to access real-time information on weather forecasts, market prices, and best agricultural practices. The e-National Agriculture Market (e-NAM) platform facilitates online trading of agricultural produce, reducing intermediaries and ensuring better prices for farmers. Additionally, precision agriculture technologies, such as remote sensing and Geographic Information Systems (GIS), are being adopted to optimize resource use and increase productivity. mKisan Portal: Launched by the Government of India, this portal provides farmers with real-time agricultural information through SMS, including weather forecasts, market prices, and expert advice. Farmers in Punjab are using remote sensing and GIS technologies to optimize fertilizer and irrigation practices. This has led to increased crop yields, reduced input costs, and improved resource efficiency.

**Food deficit to food surplus:** Since independence, India has made remarkable strides in increasing food production and achieving self-sufficiency in staple crops. The Green Revolution of the 1960s played a pivotal role in this achievement, introducing high-yield varieties, modern irrigation systems, and agrochemicals. As a result, India transitioned from being a food-deficit nation to one that produces enough to meet its domestic consumption needs. This achievement has not only ensured food security for a growing population but has also enabled the country to buffer against global food price fluctuations.

**Poverty Alleviation and Rural Livelihood Improvement** Agricultural development has been a cornerstone of poverty alleviation and rural livelihood improvement in India. The expansion of agriculture has provided direct employment to a significant portion of the population, particularly in rural areas where non-farm opportunities have been limited. Government interventions such as the National Rural Employment Guarantee Act (NREGA) have further supported rural livelihoods by providing employment and income opportunities during lean agricultural seasons. This has contributed to a reduction in poverty rates and improved living standards in rural communities.

## Challenges

**Monocropping:** Heavy reliance on a single crop (e.g., wheat or rice) can lead to ecological imbalances, soil nutrient depletion, and vulnerability to pests and diseases. A significant issue in Haryana and Punjab is monoculture, wherein a prominent challenge emerges due to the exclusive cultivation of rice during the kharif season and wheat during the rabi season. The state of Andhra Pradesh has promoted zero-budget natural farming, which emphasizes crop diversification, minimal external inputs, and soil health management. This approach aims to reduce farmers' expenses and enhance overall sustainability.

**Climate Change** The intricate relationship between India's diverse climate and its agriculture presents a significant challenge for the country's food security. The varying temperature and precipitation patterns, coupled with unpredictable monsoons and extreme weather events, have a direct impact on crop yields and water availability. The depletion of glaciers and changing precipitation patterns also affect water resources, leading to challenges in irrigation and water management. Rising temperatures contribute to the proliferation of pests and diseases, further threatening agricultural productivity. Adapting to these climate-induced challenges requires the adoption of resilient crop varieties, improved water management practices, and sustainable farming approaches.

**Persistence of Land Inequality and Smallholder Struggles** While agricultural development has led to significant progress, land inequality remains a persistent challenge in India. Large tracts of land are often owned by a small percentage of the population, while the majority of farmers are smallholders with limited land holdings. This inequality in land distribution contributes to disparities in access to resources, credit, and technology. Additionally, smallholder farmers face challenges in accessing markets and negotiating fair prices, often leading to economic vulnerability.

**Water Management and Resource Sustainability** Sustainable water management is a critical concern in Indian agriculture. The Green Revolution's focus on high-yield crops led to increased water demand, resulting in over-extraction of groundwater in many regions. This has led to issues of water scarcity, declining water tables, and ecological imbalances. The challenge lies in implementing efficient irrigation techniques, promoting rainwater harvesting, and adopting drought-resistant crop varieties to ensure long-term water resource sustainability.

**Balancing Modernization with Traditional Wisdom** The tension between modernization and traditional agricultural practices is a central challenge. While technological advancements have significantly boosted productivity, they have also raised concerns about environmental degradation, loss of traditional knowledge, and over-dependence on chemical inputs. Striking a balance between modern agricultural practices and traditional wisdom, such as agroecology and organic farming, is crucial to ensure sustainable agriculture that respects local ecosystems and preserves indigenous knowledge.

## Way Ahead

**Embracing Agroecology and Holistic Farming Approaches** Agroecology represents a paradigm shift in agricultural practices, emphasizing the integration of ecological principles into farming systems. This approach encourages the use of locally adapted crops, reduced reliance on external inputs, and the enhancement of biodiversity. By prioritizing the regeneration of soil health and natural ecosystems, agroecology offers several benefits such as increased resilience to pests and climate change, improved water management, and reduced environmental degradation. Policy measures should focus on providing training, research support, and incentives for farmers to adopt agroecological techniques. This entails a shift away from chemical-intensive agriculture towards more sustainable and self-sufficient farming practices.

**Strengthening Rural Infrastructure and Market Linkages** Robust rural infrastructure is essential for enhancing agricultural productivity and connecting farmers to markets. Investment in transportation, storage facilities, and cold chains can significantly reduce post-harvest losses and ensure that farmers receive fair prices for their produce. Additionally, the development of efficient market linkages, both at local and national levels, can help farmers access broader consumer bases, leading to increased income. Policy interventions should include public-private partnerships for infrastructure development, the establishment of farmer producer organizations, and the creation of market information systems to enable informed decision-making.

**Addressing Farmer Income Disparities and Social Security** Income disparities among farmers remain a pressing concern in India's agricultural landscape. Policy measures should focus on enhancing the bargaining power of small and marginalized farmers through collective action and access to credit. Strengthening social safety nets, such as crop insurance, health care, and pension schemes, can provide a safety net against unpredictable events and improve overall well-being. Additionally, efforts to diversify income sources, such as through non-farm employment opportunities and value-added products, can contribute to reducing income volatility.

**Climate-Resilient and Sustainable Agricultural Practices** With the increasing challenges posed by climate change, it's imperative to promote climate-resilient agricultural practices. This involves the adoption of drought-tolerant crops, water-efficient irrigation systems, and soil conservation techniques. Policies should encourage the development and dissemination of climate-smart technologies, as well as provide incentives for the adoption of sustainable practices. Moreover, research and extension services should play a critical role in helping farmers adapt to changing climatic conditions.

**Adaptation and Mitigation of Climate Change** Mitigating the impact of climate change on Indian agriculture necessitates a comprehensive strategy involving the government, international collaborations, and innovative solutions. Supporting farmers with resources, technology, and information is crucial for their adaptation efforts. Climate-resilient practices and the incorporation of advanced meteorological forecasting can help buffer against the uncertainties posed by changing climate



patterns. In sum, addressing the intricate interplay between climate and agriculture in India demands collaborative efforts and proactive measures to ensure food security and sustainable rural livelihoods.

**Collaborative Efforts for Inclusive Agricultural Growth** Inclusive agricultural growth requires collaboration among various stakeholders, including government bodies, research institutions, NGOs, and farmers themselves. Multi-stakeholder partnerships can facilitate knowledge sharing, technology transfer, and the co-design of policies that cater to the diverse needs of farmers across regions and socio-economic strata. Emphasis should be placed on participatory approaches that engage local communities in decision-making processes. Moreover, policies should promote equitable distribution of resources, facilitate land tenure security, and prioritize the interests of smallholders and marginalized groups.

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