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EFFECTS OF CLIMATE CHANGE ON AGRICULTURAL LIVELIHOODS: CHALLENGES FOR FARMERS IN ODISHA'S COASTAL AND INTERIOR AREAS

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ABSTRACT----------
Odisha, a crucial agricultural state in India, faces increasing obstacles due to the impacts of climate change. This study explores how these climatic shifts are affecting farmers across Odisha, with a special emphasis on both coastal and interior regions. It discusses changes in weather patterns, the socioeconomic impacts on farming communities, and explores potential sustainable solutions. This analysis draws from a variety of sources, including academic research, economic analyses, and personal accounts, aiming to provide a detailed understanding of the challenges facing Odisha's farmers and potential adaptation strategies.----------

INTRODUCTION

The economy of Odisha is heavily reliant on agriculture, which employs a significant portion of the state's population and contributes greatly to its GDP. The state's geography, ranging from a long coastline to fertile plains and hills, supports a variety of agricultural practices. However, the sector is increasingly at risk due to climate change, which manifests in rising temperatures, erratic rainfall, and an increase in extreme weather events. These changes have a severe impact on crop yields and farmers' livelihoods.

This paper delves into the specific effects of climate change on Odisha's agricultural sector, focusing particularly on coastal and interior regions. It also considers the broader socioeconomic implications for farming communities, including migration, food security, and changes in traditional practices. The discussion concludes with an examination of sustainable practices and strategies for enhancing the resilience of Odisha's agricultural sector.

IMPACT OF CLIMATE CHANGE ON ODISHA'S AGRICULTURE

Coastal Areas

Odisha's coastal areas are particularly susceptible to climate change effects such as cyclones, rising sea levels, and salinity intrusion, which pose serious threats to agriculture. The increasing frequency and severity of cyclones, like Cyclone Fani in 2019, cause extensive damage to crops and infrastructure, disrupting agricultural cycles (Chakraborty et al., 2020).

Cyclones can devastate crops, erode topsoil, and increase soil salinity, making land less fertile. The resulting waterlogging from these events can stunt crop growth and promote pests and diseases (Mohanty et al., 2019). Additionally, rising sea levels are gradually increasing the salinity of both soil and water resources, adversely affecting paddy fields that are particularly sensitive to salinity.

Changes in fish populations and migration patterns, influenced by altered sea temperatures and coastal erosion, also impact the livelihoods of coastal communities. Many farmers rely on fishing as a supplementary source of income, and these changes can reduce fish stocks, affecting both income and food security (Dash et al., 2018).

Interior Areas

In the interior regions of Odisha, which include a mix of hilly terrains and fertile plains, irregular rainfall patterns have become increasingly problematic, leading to droughts and water scarcity. These conditions severely impact the cultivation of key crops such as rice, pulses, and oilseeds, which depend heavily on consistent monsoon rains (Mishra & Sahu, 2014).

Irregular rainfall affects planting and harvesting schedules and disrupts groundwater replenishment, which many farmers rely on for irrigation. The depletion of groundwater, combined with insufficient irrigation infrastructure,

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leaves farmers vulnerable to droughts, leading to reduced crop yields, economic hardship, and food insecurity (Rao et al., 2016).

Rising temperatures in the interior regions affect crop development and increase the prevalence of pests and diseases, resulting in lower yields and quality. The lack of irrigation facilities exacerbates these issues, making rain-fed agriculture highly vulnerable to climate variability (Rao et al., 2016).

Socioeconomic Implications

The climatic impacts on agriculture in Odisha lead to significant socioeconomic challenges. Crop failures and reduced productivity cause financial instability among farmers, many of whom take out loans to cover their losses. This debt burden often becomes unmanageable, leading to a cycle of poverty and financial stress (Behera & Mishra, 2021).

Migration is a major consequence, with many rural residents moving to urban areas or other states in search of better opportunities. This migration disrupts community structures and leads to labor shortages in rural areas, further diminishing agricultural productivity. The decline in agricultural labor also contributes to the abandonment of traditional farming practices, which are often more sustainable and adapted to local conditions (Jena & Misra, 2019).

The cultural impact of migration includes the loss of traditional agricultural knowledge and practices as younger generations leave rural areas. This loss threatens the continuation of culturally significant farming methods and affects the preservation of agrobiodiversity. Traditional crop varieties, often more resilient to local conditions, are being replaced by higher-yielding but less adaptable modern varieties (Munda & Patnaik, 2020).

Additionally, the psychological stress from ongoing crop failures and financial difficulties is significant. Farmers often face anxiety and depression, which is compounded by financial pressures. This mental health issue is frequently underreported and insufficiently addressed, yet it is a critical component of the overall wellbeing of farming communities (Nanda & Nayak, 2020).

Sustainable Solutions and Adaptation Strategies

To address these challenges, adopting sustainable agricultural practices and adaptation strategies is essential. Promoting climate-resilient crops and advanced farming techniques is one effective measure. For example, the development and use of salt-tolerant rice varieties and drought-resistant crops can help mitigate the adverse effects of climate variability (Rath & Panigrahi, 2020).

Improving water management practices is also crucial. Building water conservation structures such as check dams and rainwater harvesting systems can increase water availability and reduce reliance on erratic rainfall. Expanding irrigation infrastructure can further support consistent agricultural production (Pradhan et al., 2018).

Community-based adaptation strategies are key to building resilience. These strategies include combining traditional knowledge with modern agricultural practices, promoting community-based natural resource management, and encouraging agroforestry. These approaches not only help communities adapt to changing climatic conditions but also support biodiversity conservation and enhance ecosystem services (Samal et al., 2015).

The roles of government and non-governmental organizations (NGOs) are critical in facilitating these adaptations. Government initiatives, such as subsidies for micro-irrigation systems and incentives for organic farming, can provide necessary support to farmers. NGOs can play a role in offering training and resources for sustainable practices, helping bridge the gap between scientific research and practical application (Pattnaik & Mohanty, 2017).

Moreover, improving market access and implementing fair trade practices can enhance the economic stability of farmers. By connecting them to better markets and ensuring fair prices for their produce, the economic resilience of agricultural communities can be strengthened. This can also include developing value-added products from traditional crops, opening up new markets and providing additional income sources (Sahoo & Tripathy, 2018).

Infrastructure investment is another critical area. Developing better transportation networks, storage facilities, and processing units can reduce post-harvest losses and improve the overall efficiency of the agricultural supply chain. Access to reliable electricity and digital technologies can support the adoption of modern farming practices,

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providing farmers with timely information on weather forecasts, market conditions, and best practices (Dash et al., 2020).

CONCLUSION

The challenges faced by farmers in Odisha, exacerbated by climate change, are urgent and require immediate action. The distinct issues faced by the coastal and interior regions call for region-specific adaptation strategies. Despite the significant impacts of climate change on agriculture, there is potential for mitigation through sustainable practices and innovative solutions. Support from research, education, and policy initiatives is crucial to ensuring the resilience and sustainability of Odisha's agricultural sector.

Focusing on climate-resilient crops, improving water management, and supporting community-based adaptation strategies can help Odisha move towards a more resilient agricultural future. Collaboration among government bodies, NGOs, and the private sector will be vital in implementing these solutions and supporting farming communities through this transition. Preserving traditional agricultural knowledge and practices will also be essential, ensuring the cultural heritage of Odisha's farming communities is maintained.

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