การเปลี่ยนแปลงสภาพภูมิอากาศและเกษตรกรรม: มุมมองจากผู้มีส่วนได้ส่วนเสีย

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บทคัดย่อ

ปัญหาด้านการเปลี่ยนแปลงสภาพภูมิอากาศกำลังทวีความรุนแรงขึ้นอย่างรวดเร็ว ส่งผลให้เกิดภัยพิบัติที่เกี่ยวข้องกับสภาพอากาศเพิ่มขึ้นทั่วโลก ภาคเกษตรกรรมของประเทศไทยซึ่งเป็นรากฐานสำคัญของเศรษฐกิจและความมั่นคงทางอาหาร กำลังเผชิญกับความเปราะบางอย่างยิ่งต่อผลกระทบจากการเปลี่ยนแปลงสภาพภูมิอากาศ การศึกษาครั้งนี้มุ่งเน้นไปที่การสร้างความเข้าใจถึงความท้าทายที่เกิดขึ้นกับกลุ่มผู้มีส่วนได้ส่วนเสียในภาคเกษตรกรรมของไทยอันเนื่องมาจากการเปลี่ยนแปลงสภาพอากาศต่อวิถีชีวิตและการประกอบกิจการทางเกษตรกรรมของพวกเขา โดยผู้วิจัยเก็บข้อมูลผ่านการสัมภาษณ์กลุ่มเชิงลึกและการวิเคราะห์เชิงประเด็น (thematic analysis) งานวิจัยนี้ได้สำรวจประสบการณ์และมุมมองของผู้มีส่วนเกี่ยวข้องหลักในชุมชนเกษตรกรรม ผลการวิจัยพบว่า ผลกระทบเชิงลบจากการเปลี่ยนแปลงของสภาพภูมิอากาศเกิดขึ้นกับ (๑) ความสามารถในการพัฒนาผลผลิตทางการเกษตร (๒) ความมั่นคงทางเศรษฐกิจ (๓) การขาดแคลนอาหาร และ (๔) การศึกษาและวิถีชีวิต ผลการศึกษายังพบว่าเราจำเป็นต้องส่งเสริมเกษตรกรในประเด็นความรู้เรื่องความมั่นคงทางอาหาร และความจำเป็นเร่งด่วนในการนำแนวทางเกษตรกรรมที่มีความยืดหยุ่นมาปรับใช้ เพื่อลดผลกระทบจากการเปลี่ยนแปลงสภาพภูมิอากาศ จำเป็นต้องบูรณาการความรู้เรื่องการเปลี่ยนแปลงสภาพภูมิอากาศเข้าสู่ระบบการศึกษาไทย เพื่อเตรียมความพร้อมให้กับเกษตรกรรุ่นใหม่ในการปรับตัวต่อสภาพภูมิอากาศที่เปลี่ยนแปลง และสามารถนำกลยุทธ์ทางการเกษตรที่ยั่งยืนมาปรับใช้ได้อย่างมีประสิทธิภาพ

คำสำคัญ: การเปลี่ยนแปลงสภาพภูมิอากาศ / การเกษตร / ความมั่นคงทางอาหาร

Climate Change and Agriculture: Perspectives from Stakeholders

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Abstract

The problem of climate change is rapidly intensifying, leading to a growing number of climate-related disasters around the world. Thailand's agricultural sector, foundation of the country's economy and food security, is becoming increasingly vulnerable to the adverse effects of climate change. This study focuses on understanding the challenges faced by stakeholders in Thailand's agricultural sector due to climate change and how these challenges affect their livelihoods and agricultural practices. Data were collected through in-depth group interviews with stakeholders from Nakhon Sawan province. The research explored the experiences and perspectives of key stakeholders within agricultural communities. The findings reveal that climate change has had negative impacts on: (1) the capacity to improve agricultural productivity, (2) economic stability, (3) food shortages, and (4) education attainment and livelihoods. The study also highlights the urgent need to support farmers by enhancing their knowledge of food security and promoting the adoption of resilient agricultural practices to mitigate the impacts of climate change. Furthermore, it is essential to integrate climate change education into Thailand's education system to prepare future generations of farmers to adapt to changing climatic conditions and to implement sustainable agricultural strategies effectively.

Keywords: Climate Change / Agriculture / Food Security

1. Introduction

In Thailand, where agriculture constitutes a vital pillar of the national economy and serves as a primary source of livelihood for millions, the impacts of climate change are especially pronounced. The sector is increasingly threatened by extreme weather events, shifting rainfall patterns, and rising temperatures. At the same time, farmers must navigate complex socio-economic and cultural landscapes that influence their ability to adapt.

The impacts of climate change extend well beyond environmental and economic concerns, posing significant threats to public health, quality of life, and social equity. These effects are especially acute for vulnerable populations, including adolescents, the elderly, individuals with chronic illnesses, and those living in poverty. As climate change intensifies, so too does its influence on human health—manifesting in a range of direct and indirect consequences that disproportionately burden those least equipped to cope.

Rising global temperatures have been closely associated with an increase in heat-related illnesses, such as heatstroke, dehydration, and cardiovascular complications [1] and usually the exposure to extreme heat exacerbates existing health conditions and increases mortality rates, particularly among elderly populations and urban poor who may lack access to adequate cooling systems. Furthermore, shifting climate patterns and altered ecosystems contribute to the expanded geographic range and seasonal activity of disease vectors, leading to the resurgence and spread of vector-borne diseases such as dengue fever, malaria, and Zika virus.

In addition to communicable diseases, climate change significantly affects food and water systems, leading to increased food insecurity and water scarcity [2]. Crop failures due to drought, flooding, and unpredictable weather patterns result in rising food prices and reduced access to nutritious food—conditions that exacerbate malnutrition, especially among children and pregnant women. Contaminated or insufficient water supplies, exacerbated by droughts and overwhelmed infrastructure, compromise hygiene and increase the risk of waterborne illnesses, placing already marginalized communities at greater risk. The long-term health consequences of climate change ripple through societies, undermining overall well-being and threatening economic resilience. Climate-related health issues reduce labor productivity and increase absenteeism, while surging healthcare costs strain public health systems—particularly in low- and middle-income countries with limited resources. The combined effects contribute to a vicious cycle of vulnerability, where social inequalities are deepened, and national development goals are pushed further out of reach.

Addressing these challenges demands coordinated and cross-sectoral responses that integrate health into national climate adaptation strategies. Investing in climate-resilient health systems, expanding early-warning mechanisms for climate-sensitive diseases, and promoting equitable access to healthcare and essential services are all critical steps toward safeguarding public health in the face of a warming planet.

The growing imbalance caused by climate change continues to perpetuate cycles of poverty and inequality, severely undermining efforts to achieve sustainable development and social justice. The depletion of natural resources further exacerbates these issues. Climate-induced events—such as prolonged droughts and diminishing freshwater availability—heighten competition for essential resources, leading to conflict, displacement, and instability.

Agricultural productivity is declining as land becomes increasingly less arable, while fisheries suffer from ocean warming and acidification. These environmental changes trigger cascading effects across food systems and global trade networks, threatening livelihoods and food security worldwide.

Robust policy interventions and comprehensive mitigation strategies are urgently needed to address these interconnected challenges. Enhanced planning, targeted investments in resilient infrastructure, and proactive readiness for health-related consequences must become priorities. Lessons learned from crises such as the COVID-19 pandemic can guide nations in anticipating and managing the multifaceted impacts of climate change. Effective adaptation requires a holistic, systems-based approach—one that integrates public health, social equity, and sustainable resource management into broader climate strategies. Such efforts are vital to safeguarding the well-being of both current and future generations.

The Situation in Thailand

Thailand is currently confronting severe and far-reaching challenges linked to climate change—challenges that demand immediate and sustained action from all sectors of society. As one of the nations' most vulnerable to climate-related impacts, Thailand faces rising temperatures, erratic rainfall, and increasing incidences of drought and flooding that threaten agriculture, public health, and economic stability.

This vulnerability highlights the need for a coordinated response involving government agencies, the private sector, academia, and civil society. By acknowledging the sector-specific risks and impacts of climate change, Thailand can formulate and implement targeted adaptation strategies that build resilience at both community and national levels. Understanding these interlinked vulnerabilities is essential for shaping inclusive, effective climate responses. With collective effort and a clear vision, Thailand can mitigate the worst impacts of climate change and transition toward a more resilient, equitable, and sustainable future.

Thailand faces a wide range of climate-related challenges that affect its environment, economy, and society. The agricultural sector, central to the nation's socio-economic development and food security, is especially vulnerable to shifting rainfall patterns, temperature increases, and extreme weather events such as floods and droughts [3]. These disruptions have serious implications for crop yields, rural livelihoods, and national food security.

Studies consistently highlight Thailand's heightened exposure to climate-related risks, including rising temperatures, shifting precipitation patterns, frequent flooding, and prolonged droughts [4] [2]. Observational data over recent decades confirm a significant warming trend, which has contributed to increasingly frequent and severe weather extremes [5]. Future projections indicate that these climate hazards will escalate, posing growing threats to agriculture, infrastructure, water resources, and vulnerable populations [6].

In response, Thailand has launched adaptation initiatives across several key sectors, including agriculture, urban planning, and energy [1]. However, further integration of climate adaptation into national policy frameworks and development plans remains essential. Transitioning toward a low-carbon economy and strengthening institutional capacity and governance are also critical to effectively managing these interconnected risks and ensuring long-term resilience [7].

Given these vulnerabilities, it is imperative that Thailand prioritizes comprehensive adaptation strategies. These should include sustainable land and water management, coastal protection and ecosystem

restoration, climate-resilient urban design, and the promotion of adaptive agricultural practices. Successful implementation will depend on cross-sector collaboration involving government agencies, local communities, civil society, and the private sector. This study seeks to explore the following research questions:

- How do changing weather patterns and extreme climate events affect agricultural productivity, food security, and rural livelihoods in Thailand?
- What are the specific impacts of climate change on Thailand's agricultural business sector, and how are stakeholders responding?

2. Method

This study employs a phenomenological approach to explore the lived experiences and perceptions of key stakeholders within Thailand's agricultural sector regarding the impacts of climate change. This qualitative research design allows for an in-depth understanding of the subjective experiences and interpretations of participants

3. Data Collection

3.1 Selection of Key Informants

The selection of key informants for this study was guided by a purposive sampling strategy, aimed at capturing diverse perspectives on the impacts of climate change within the agricultural sector in Thailand. The key informants included:

Farmers (n=5): These participants were selected based on their direct experience with climate variability, shifts in agricultural productivity, and adaptive practices. Their insights are critical in understanding how climate change affects crop yields, soil health, and water availability at the grassroots level. The farmers represented different regions of Thailand to reflect geographical variability in climate impacts.

Agricultural Policymakers (n=3): Policymakers were chosen for their role in shaping climate adaptation strategies and agricultural policies. Their perspectives provided insights into governmental responses, policy gaps, and strategic planning aimed at enhancing climate resilience in the sector.

Industry Experts (n=3): This group included experts from agribusiness companies and agricultural research institutions. Their input helped to contextualize climate challenges within market dynamics, technological adaptation, and supply chain management, which are crucial for sustainable agricultural practices.

Representatives from Government Agencies and NGOs (n=2): These informants were selected to provide a macro-level view of climate change governance and support mechanisms available to farmers and agricultural communities. Their experiences reflected on the effectiveness of policy implementation, international cooperation, and community-based initiatives in mitigating climate risks**.**

Reflection on Climate Change Problems in Agriculture

Although it is not the aim of this study to generalize the concept of climate change impact on agriculture in Thailand, we selected the views from these selected groups to be instrumental in illustrating the multifaceted nature of climate change problems in Thailand's agricultural sector. Farmers' experiences highlight the immediate impacts of extreme weather events, shifting rainfall patterns, and soil degradation.

Policymakers contribute to understanding regulatory and institutional responses to these challenges, identifying both successes and barriers in adaptation policies [4] Industry experts provide a market-oriented perspective, identifying technological innovations and private sector initiatives that could enhance climate resilience. Finally, insights from government and NGO representatives underscore the role of community engagement, international partnerships, and sustainable development policies in supporting local farmers. Together, these perspectives create a holistic view of climate-related challenges and adaptive strategies in Thai agriculture, offering a robust foundation for policy recommendations and sustainable practice improvements.

3.2 Data Analysis

Thematic analysis was employed to identify recurring patterns, themes, and insights within the interview data. All interviews were transcribed and coded through an iterative process that allowed themes to emerge naturally from the data. This approach facilitated a deeper understanding of the complexities and nuances surrounding climate change impacts on Thailand's agricultural business sector. To enhance the credibility and rigor of the study, several strategies were implemented, including member checking, peer debriefing, and researcher reflexivity. Member checking involved sharing key findings with participants to validate interpretations and ensure accuracy. Peer debriefing provided opportunities to discuss emerging themes and interpretations with colleagues, while reflexivity helped the researcher critically examine their own positionality and potential biases throughout the research process.

4. Results

Theme 1: Climate Change and Agricultural Production

All participants agreed that climate change presents significant challenges to agriculture in Thailand. Rising temperatures and shifting rainfall patterns are directly impacting crop yields and overall agricultural productivity, threatening the livelihoods of farmers and their communities [2][8]. As one farmer noted,

"*We feel its impact throughout our farm and other production*."

The sector's sensitivity to extreme weather—such as droughts, floods, and temperature fluctuations—has led to increased crop failures and difficulties in planting cycles. Irregular rainfall was highlighted by nearly all participants as a primary concern, often alternating between prolonged droughts and sudden, intense downpours that result in flooding. These disruptions significantly undermine food production and rural economic stability.

"*Everything seems connected—heat, drought, flood, no rain, and poor yields*," said one respondent, capturing the compounding nature of these effects.

Rising temperatures also pose long-term threats to specific crops that struggle to adapt to new climatic conditions, reducing both yields and income. Studies suggest climate change may cause a 17% decline in crop yields across various types, with serious implications for food security and rural poverty [9]. One participant emphasized,

"*Unpredictable weather is disrupting everything—from planting schedules to harvests. Every farmer is feeling the strain*."

The intersection of climate change and agriculture in Thailand presents a pressing challenge, particularly due to the sector's high vulnerability to shifting climate patterns. Participants consistently reported declines in crop yields, attributing them to rising temperatures, irregular rainfall, and extreme weather events. These disruptions have already affected planting schedules, caused crop failures, and threatened farmers' livelihoods.

Unpredictable rainfall—marked by alternating periods of drought and heavy rain—was cited as a major concern, leading to flooding and further reducing productivity. Some crops are struggling to adapt to changing conditions, resulting in lower yields and income, especially for smallholder farmers. This contributes to deepening food insecurity and rural poverty.

"*Farmers can't do this alone. We need government policies—whether it's funding for new technologies or training programs to help us adapt*," one participant noted.

These findings underscore the need for targeted policies and sustainable agricultural strategies that enhance resilience and support farmers' adaptive capacity. Indeed, this theme underlines the action for adaptive agricultural strategies to protect livelihoods and ensure food security amid a changing climate.

Theme 2 Climate Change, Food Security, and Economic Stability

Climate change poses a significant threat to food security and local economic stability, particularly in regions dependent on subsistence and rainfed agriculture. Participants from the agricultural sector expressed concern over increasingly erratic weather patterns—such as altered rainfall and temperature fluctuations—that are reducing crop yields and undermining food supply. This vulnerability is especially acute in rural communities, where livelihoods depend heavily on consistent agricultural output.

"If we don't address these issues now, it's not just farmers who will suffer. Everyone will feel it—when food prices rise or supply runs short."

To address these challenges, participants emphasized the need for drought-resistant crop varieties and improved water management systems. Such strategies are essential to strengthen resilience and maintain agricultural productivity in a changing climate [10]. In addition, sustainable land use practices—including agroforestry—can help restore soil health, support biodiversity, and buffer against climate-related disruptions.

"We need practical solutions—drought-tolerant crops, better irrigation. Without them, surviving another season feels impossible."

Access to timely climate information, financing, and training in climate-smart agriculture is also vital for empowering farmers to adapt. For instance, projected declines in sugarcane production—a key economic crop in Thailand—highlight how local agricultural challenges can ripple into global food markets, reinforcing the urgency of proactive and inclusive adaptation measures [11].

Climate-smart agriculture (CSA) emerges as a promising approach to enhance food productivity, build resilience in agricultural systems, and reduce greenhouse gas emissions in response to climate change impacts [13]. CSA encompasses a range of practices and technologies that aim to improve agricultural productivity while simultaneously addressing climate change challenges. However, the adoption of these practices can be hindered by various barriers, including limited access to resources and insufficient knowledge among farmers [12]. Technological advancements play a crucial role in facilitating adaptation; however, the pace of these advancements must align with the rapid changes brought about by climate change to be effective [11]

The complex impacts of climate change on food security call for urgent and effective adaptation strategies. These must focus on protecting the agricultural sector and sustaining food systems amid rising temperatures, shifting rainfall, and extreme weather events [8]. Integrating traditional knowledge with innovative practices can strengthen farmers' adaptive capacity and help maintain both food production and livelihoods [2].

A coordinated effort among policymakers, agricultural experts, and local communities is essential to address these challenges and ensure long-term food security in Thailand's changing climate.

Theme 3: Education and Livelihood

Climate change remains poorly integrated into Thailand's education system, particularly in rural areas where agricultural education is most needed. Many teachers lack the training and resources to effectively convey the subject, resulting in a disconnect between theoretical instruction and practical knowledge for students. This gap leaves farmers ill-equipped to understand and respond to the realities of a changing climate.

Limited research funding and weak collaboration on climate change education—especially related to agricultural adaptation—further hinder preparedness. A widespread perception that climate and environmental issues are irrelevant contributes to apathy within the education sector, particularly regarding curriculum development and teacher capacity. As a result, Thai farmers often adopt reactive rather than proactive responses, lacking awareness of long-term preventative strategies.

Climate change is deeply affecting the lives of farmers in Thailand, disrupting traditional practices and increasing uncertainty. Irregular rainfall, rising temperatures, and more frequent pest and disease outbreaks have made crop cultivation more difficult, reducing yields and farmer incomes. The economic and emotional toll on farming communities is growing steadily.

"*We need more research on how to farm sustainably in this new reality. It's not just about growing crops—it's about protecting the land and the people who depend on it***,"** one participant emphasized.

All participants agree that, to address these challenges, the Thai government must prioritize comprehensive support for the agricultural sector. This includes providing climate-resilient seeds, modern farming technologies, and targeted training in sustainable agricultural practices. Additionally, financial assistance and insurance programs are critical to cushion farmers against the economic impacts of climate-related losses, helping ensure their livelihoods and long-term well-being.

All farmers in this study emphasizes the need to foster knowledge exchange and collaboration among themselves, research institutions, and agricultural experts in the area regarding climate change. It is essential for promoting climate-resilient agriculture and update the farmers with practical knowledge. Sharing best practices and innovative strategies can empower farmers with the tools and insights needed to adapt effectively to changing conditions. By creating an enabling environment that supports farmers with appropriate resources, training, and technologies, Thailand can enhance the resilience of its agricultural sector.

This holistic approach not only addresses the immediate challenges of climate change but also lays the foundation for long-term sustainability and prosperity. Prioritizing the well-being of farmers and the

strength of the agricultural system will enable Thailand to build a more secure and resilient future for its rural communities and national food systems.

5. Conclusions

This study highlights the complex and far-reaching impacts of climate change on Thailand's agricultural sector. Four key themes emerged from participants' insights, reflecting the deep interconnection between climate variability and rural livelihoods, food security, education, and farmer well-being.

First, irregular rainfall and rising temperatures were identified as major disruptions to crop productivity and economic stability. Droughts and floods were particularly damaging, contributing to reduced yields and increased food insecurity.

Second, food security emerged as a critical concern, especially in rural areas dependent on subsistence farming. Participants stressed the need for climate-resilient agricultural practices and support systems to protect local economies and food supplies.

The third theme revealed a gap in climate change education. Inadequate teacher preparation and the limited integration of climate topics into agricultural education leave farmers unprepared to respond to changing environmental conditions. Enhancing climate literacy is essential to bridge this gap.

Lastly, the impact on farmers' livelihoods was evident. Increased uncertainty, disrupted practices, and financial vulnerability underscore the urgent need for support—such as access to resilient seeds, sustainable technologies, financial aid, and platforms for knowledge exchange.

Addressing these challenges requires a holistic, multi-stakeholder approach that combines scientific research, policy reform, and community engagement. By investing in agricultural resilience and farmer well-being, Thailand can secure a more sustainable and climate-resilient future for its farming communities.

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