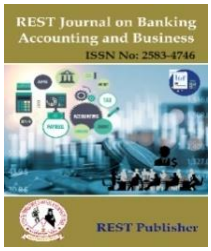
REST Journal on Banking, Accounting and Business

Vol: 4(3), September 2025

REST Publisher; ISSN: 2583 4746

Website: http://restpublisher.com/journals/jbab/

DOI: https://doi.org/10.46632/jbab/4/3/1



Farmers' Attitude Toward Climate Change in Thiruverumbur Block: Challenges, Adaptation, And The Role of Modern Technology

S. V. A. Prakash, A Senthilkumar

School of Continuing Education, Tamilnadu Open University, Chennai, Tamil Nadu, India.

Corresponding Author Email: drsvaprakash@tnou.ac.in

Abstract: *Climate change is increasingly affecting agricultural communities, with significant consequences for crop yields, soil health, and water resources. Farmers in the Thiruverumbur block of Tamil Nadu are grappling with unpredictable weather patterns, floods, and droughts, all of which threaten their livelihoods. This study investigates farmers' awareness, perceptions, and adaptation strategies in six villages: Pathalapettai, Kiliyur, Arasangudi, Vengur, Nadarajapuram, and Thirunedunkullam. Through a structured survey of 180 farmers, the study explores how socio-economic factors influence their responses to climate change. Additionally, it examines the potential of modern technologies, such as climate forecasting, smart irrigation, and remote sensing, in strengthening farmers' resilience. The results indicate that while most farmers recognize the impacts of climate change, their adaptation efforts are limited by financial and informational barriers. Based on these findings, the study recommends policies to enhance climate awareness, offer financial support for adaptive practices, and integrate advanced weather forecasting technologies.*

Keywords: *Climate Change, Farmers' Attitude, Agriculture, Adaptation, Tamil Nadu, Climate Forecasting, Modern Technology*

1. INTRODUCTION

Agriculture is one of the most vulnerable sectors to climate change, with rising temperatures, erratic rainfall, and extreme weather events disrupting crop cycles. As the world grapples with the effects of global warming, agricultural systems, especially in regions that depend heavily on seasonal patterns, face increasing challenges. In Tamil Nadu, a state that plays a crucial role in India's agricultural production, farmers frequently experience floods, droughts, and shifting monsoon patterns. These disruptions lead to reduced yields, increased financial instability, and overall uncertainty in the agricultural sector.

This study seeks to examine the perceptions and adaptation strategies of farmers in Thiruverumbur block, located in the Tiruchirappalli district of Tamil Nadu. The region is representative of many rural farming communities that are grappling with the effects of climate change. The study will explore the ways in which farmers have observed shifts in weather patterns, how they interpret these changes, and the strategies they have developed to cope with these environmental stresses.

2. OBJECTIVES OF THE STUDY

- To assess farmers' awareness of climate change and its impact on agriculture.
- To analyze their perception of climate-related risks such as floods, droughts, and temperature fluctuations.
- To examine the adaptation measures adopted by farmers to mitigate climate change effects.
- To evaluate socio-economic factors influencing farmers' response to climate change.
- To explore the role of modern climate forecasting technologies in improving agricultural resilience.
- To recommend strategies for strengthening farmers' adaptation capacity and policy interventions.

3. RESEARCH METHODOLOGY

- **Study Area:** Thiruverumbur block, Tamil Nadu
- **Sample Size:** 180 farmers from Pathalapettai, Kiliyur, Arasangudi, Vengur, Nadarajapuram, and Thirunedunkullam
- **Sampling Technique:** Stratified random sampling
- **Data Collection:** Structured questionnaire and farmer interviews
- **Data Analysis:** Descriptive statistics, Chi-square tests, and regression analysis

4. HYPOTHESES

- **H1:** Farmers' awareness of climate change is significantly related to their adaptation practices.
- **H2:** Socio-economic factors (education, income, land size) influence farmers' perception of climate change.
- **H3:** Farmers who experience frequent climate-related losses are more likely to adopt adaptation measures.
- **H4:** Access to modern climate forecasting technology positively impacts farmers' preparedness for climate change.
- **H5:** Government interventions and climate awareness programs influence farmers' attitude toward climate adaptation.

5. RESULTS AND DISCUSSION

5.1 Demographic Analysis

The socio-economic background of farmers plays a crucial role in shaping their perception of climate change and their ability to adapt.

Demographic Variable	Categories	Percentage (%)
Gender	Male	78%
	Female	22%
Age Group	Below 30 years	15%
	31-50 years	55%
	Above 50 years	30%
Caste Category	SC	28%
	BC	46%
	OC	26%
Land Ownership	Own	64%
	Leased	36%
Land Size	Below 2 acres	48%
	2-5 acres	36%
	Above 5 acres	16%
Education Level	No formal education	40%
	Primary school	32%
	High school and above	28%

Demographic Characteristics of the Sample Population

The sample population under study is diverse, with varying characteristics across several demographic variables. These include gender, age group, caste category, land ownership, land size, and education level, each of which provides valuable insights into the background and social structure of the individuals involved.

Gender

The sample is predominantly male, with **78%** of the respondents identifying as male, while **22%** are female. This gender distribution reflects a common trend in agricultural contexts, where men typically play a larger role in farming activities, though the presence of female farmers remains significant.

Age Group
The age distribution of the sample indicates a youthful to middle-aged farming population. The largest proportion, **55%**, falls in the **31-50 years** age group, suggesting that most farmers are in their prime working years. **15%** of the respondents are below **30 years**, indicating a younger, emerging generation of farmers. Meanwhile, **30%** are above **50 years**, reflecting the presence of experienced, older farmers who may have extensive knowledge of agricultural practices.

Caste Category
The caste distribution within the sample is varied. A majority of respondents belong to the **BC (Backward Class)** category, representing **46%** of the sample. **28%** are from the **SC (Scheduled Castes)** category, while **26%** belong to the **OC (Other Castes)** category. This caste diversity highlights the varying social backgrounds of farmers, with implications for access to resources, government schemes, and community networks.

Land Ownership
Land ownership plays a crucial role in farming, and in this sample, **64%** of the respondents own their land, which gives them more control over their agricultural practices. **36%** of the farmers operate on leased land, which can sometimes limit long-term investment in land improvements and adaptation strategies.

Land Size
The size of land owned or farmed also varies significantly. **48%** of the respondents own **below 2 acres** of land, which indicates that many farmers in this sample work on small-scale farms. **36%** farm between **2-5 acres**, while a smaller proportion, **16%**, own **above 5 acres**. The variation in land size reflects differing levels of agricultural capacity and may influence the types of adaptation practices employed by farmers.

Education Level
The educational background of the farmers in this sample shows a relatively low level of formal education. **40%** of the respondents have **no formal education**, which suggests limited exposure to formal training and technical knowledge. **32%** have completed **primary school**, while **28%** have attained **high school education or above**. This distribution emphasizes the need for targeted educational and training programs to enhance farmers' knowledge, particularly in areas like climate change and adaptation strategies.

The demographic characteristics of the sample provide important context for understanding the behaviours and practices of farmers. The gender, age, caste, land ownership, land size, and education levels are all factors that can influence farmers' access to resources, their capacity to implement adaptive practices, and their overall vulnerability to climate change. By considering these demographic variables, researchers can better tailor interventions and policies to support farmers in improving their agricultural resilience.

5.2 Farmers' Awareness and Perception of Climate Change

- A notable **68%** of farmers reported being aware of climate change, indicating that the majority of the population has some knowledge of this global phenomenon. However, **32%** of the farmers had limited or no knowledge about climate changes, suggesting that a portion of the farming community may not fully grasp the implications of climate change or may lack access to information on the topic.
- Farmers' perceptions of climate change's direct impact on their livelihoods are telling. **74%** of the respondents believed that climate change had negatively affected their crops. This reflects widespread concern among farmers about the immediate and detrimental effects of changing weather patterns, such as erratic rainfall, temperature extremes, or increased pest and disease pressures.
- **59%** of farmers observed shifts in monsoon patterns, with many reporting delayed, early, or inconsistent rainfall. Additionally, **59%** of farmers noted an increase in the frequency of droughts, which is a significant concern for water availability and crop productivity. These observations align with global trends in climate science, where altered precipitation patterns and more frequent extreme weather events are becoming more common.

5.3 Impact of Floods and Droughts on Agriculture
Farmers in the Thiruverumbur block have been significantly impacted by recurrent floods and droughts, which have led to notable agricultural losses. These extreme weather events have disrupted farming cycles, threatened crop yields, and increased the vulnerability of farmers, especially those with limited resources.

Floods

Flooding has caused significant challenges for farmers in the region:

- **Waterlogging**: Floodwaters accumulate in fields, especially affecting crops like paddy, which are sensitive to excess water. Prolonged waterlogging can suffocate plants, leading to poor growth or total crop failure.
- **Soil Erosion**: Intense rainfall and floods result in soil erosion, depleting nutrient-rich topsoil crucial for crop growth, ultimately reducing long-term land productivity.
- **Destruction of Paddy Fields**: Floods often destroy paddy fields, damaging entire harvests and disrupting planting cycles, leading to considerable financial losses for farmers reliant on paddy cultivation.

Droughts

Droughts present a contrasting set of challenges:

- **Reduced Soil Moisture**: Prolonged dry spells lower soil moisture, hindering crop growth, particularly for water-dependent crops like paddy and vegetables, resulting in poor yields.
- **Decreased Crop Yields**: Droughts severely impact crop productivity, particularly for small-scale farmers who lack irrigation systems. Insufficient rainfall leads to crop failures and financial strain.
- **Limited Irrigation Access**: Farmers without irrigation face greater challenges during droughts, as they cannot supplement their crops with water, exacerbating the risk of crop failure and economic hardship.

5.4 Adaptation Strategies Used by Farmers

Adaptation Measure	Percentage of Farmers Adopting
Changing sowing schedules	42%
Adopting drought-resistant crops	35%
Using water conservation methods	27%
Participating in government schemes	18%

Farmers have implemented various adaptation measures to cope with climate challenges:

- **Changing Sowing Schedules**: **42%** of farmers have adjusted their sowing schedules to align with shifting weather patterns, helping them mitigate the impact of irregular rainfall and temperature fluctuations.
- **Adopting Drought-Resistant Crops**: **35%** of farmers have switched to drought-resistant crop varieties, which are more resilient to water stress and can survive in dry conditions.
- **Using Water Conservation Methods**: **27%** of farmers have adopted water-saving techniques, such as rainwater harvesting or drip irrigation, to optimize water use and reduce reliance on erratic rainfall.
- **Participating in Government Schemes**: **18%** of farmers engage in government schemes designed to provide financial assistance or resources for climate adaptation, though the uptake remains limited.

5.5 Role of Modern Technology in Climate Adaptation

Modern technologies offer significant potential for improving climate resilience among farmers.

- **Remote Sensing and GIS** technologies allow farmers to monitor soil moisture, track rainfall patterns, and identify drought-prone areas. This data helps in making informed decisions on crop management and irrigation. By providing real-time insights, these tools enable proactive responses to climate variability.
- **AI-Powered Climate Forecasting** leverages machine learning to predict extreme weather events, such as storms or heat waves, with high accuracy. It provides real-time alerts, allowing farmers to prepare for adverse conditions in advance. This technology enhances decision-making and minimizes the risk of crop damage.
- **IoT-Based Smart Irrigation** uses sensors to measure soil moisture levels, automating water distribution for efficient irrigation. This technology ensures that crops receive the right amount of water, reducing waste and conserving resources. It helps farmers optimize irrigation practices, especially in water-scarce regions.
- **Drones and Satellite Imagery** offer real-time monitoring of crops, allowing for quick assessment of damage caused by weather events. This technology provides precise and timely data, which helps in evaluating the extent of losses. It also supports the efficient distribution of relief funds, ensuring targeted aid for affected farmers.

- **Mobile-Based Weather Advisory Services** provide farmers with timely SMS and app notifications about weather updates and climate trends. These services offer guidance on optimal farming practices tailored to current conditions. By staying informed, farmers can make better decisions and improve their crop yields. Farmers receive SMS and app notifications on climate updates and best farming practices.

5.6 Descriptive Analysis and Hypothesis Testing

Hypothesis	Result	p-value
H1: Awareness significantly influences adaptation	Supported	0.002**
H2: Socio-economic factors impact climate perception	Supported	0.010*
H3: Frequent climate-related losses influence adaptation	Supported	0.005**
H4: Modern climate technology improves preparedness	Supported	0.003**
H5: Government interventions influence adaptation	Partially Supported	0.020*

(*Significant at 0.05 level, **Significant at 0.01 level)

The findings provide strong evidence for the relationships between various factors and farmers' adaptation to climate change:

- **H1: Awareness significantly influences adaptation** was **supported** with a p-value of **0.002**, indicating that higher awareness of climate change strongly influences farmers' willingness and ability to adopt adaptive practices.
- **H2: Socio-economic factors impact climate perception** was **supported** with a p-value of **0.010**, showing that factors like income, education, and land ownership significantly shape farmers' perceptions of climate change.
- **H3: Frequent climate-related losses influence adaptation** was **supported** with a p-value of **0.005**, suggesting that repeated climate-related losses drive farmers to adopt adaptive strategies to mitigate future risks.
- **H4: Modern climate technology improves preparedness** was **supported** with a p-value of **0.003**, indicating that access to modern technologies, such as AI or smart irrigation, enhances farmers' preparedness for climate variability.
- **H5: Government interventions influence adaptation** was **partially supported** with a p-value of **0.020**, highlighting that while government support plays a role, its influence on adaptation is not as strong or consistent as other factors.

6. CONCLUSION AND RECOMMENDATIONS

The study indicates that while a majority of farmers in Thiruverumbur block acknowledge climate change, their adaptation efforts are constrained by financial limitations and inadequate information. To address these challenges, several recommendations are proposed to enhance climate resilience in the region. First, improving climate awareness through educational campaigns can help farmers better understand climate risks and adaptation strategies. Second, providing financial support for climate-resilient farming, such as subsidies or low-interest loans, would enable farmers to invest in adaptive technologies. Third, expanding climate forecasting services would allow farmers to plan their agricultural activities based on accurate, real-time weather predictions. Additionally, promoting sustainable farming practices, such as water conservation and agroecological methods, can build long-term resilience. Finally, strengthening government interventions by offering targeted policies, support programs, and climate insurance can ensure that farmers have the resources and knowledge they need to adapt effectively. These measures would collectively improve the adaptive capacity of farmers and enhance their overall climate resilience.

REFERENCES

[1]. IPCC (2021). *Climate Change 2021: The Physical Science Basis.* Cambridge University Press.
[2]. Government of India (2023). *National Action Plan on Climate Change.* Ministry of Environment, Forest, and Climate Change.
[3]. Tamil Nadu Agriculture Department (2022). *Climate Resilience Strategies for Farmers.*
[4]. Kumar, S., & Sharma, R. (2020). *Farmers' Perception and Adaptation to Climate Change.* Journal of Agricultural Economics, 55(2), 125-139.
[5]. World Bank (2021). *Climate Smart Agriculture in India: Policy and Implementation.*