

A Case study on the Impact of Climatic Changes in Banana Planters

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Abstract

This case study tries to investigate detrimental effects of climatic changes on banana planters due to shifted growing season, increase pest and disease pressure, water scarcity, extreme temperature, yield and quality, soil degradation, and market challenges. This study aims to highlights the vulnerability of banana cultivation to climate- related disruptions. Furthermore, this study tries to underscore the socio-economic problems like joblessness, shifts in agricultural practices and sustainability of banana cultivation. This study highlights the vulnerability of banana cultivation and to contribute the development of adaptive strategies for sustainable farming practices in the phase of changing climate and to highlight the vulnerability of banana cultivation.

Keywords: *Climatic changes, Banana planters, Pest and disease, Adaptive strategies, Sustainability, Socio economic problems.*

1. Introduction

Global systems for farming are vulnerable to serious climate change and variability, as well as extreme weather events like hailstorms, droughts, and floods. The importance of climate change and its effects on human welfare are becoming more and more apparent to humanity in the times we live in. Recent estimations indicate that there will be an increase in global population from 7 billion to over 9 billion

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people. It is shown that in order to feed the growing worldwide population by 2050, agricultural production will need to increase globally. The current projected effects of climate change make it more difficult to increase productivity quickly. One of the most reasonable, most healthy, and easily accessible fruits is the banana. Plantains and bananas are staple foods for millions of people worldwide, providing a more balanced diet than any other fruit or vegetable. The Robusta, Red Banana, Poovan, Rasthali, Nendran, Virupakshi, Monthan, Karpuravalli, Sakkai, Peyan, Matti, and Dwarf Cavendish are some of the varieties that come in different shapes, sizes, and colours.

Banana farming may experience high temperatures, soil moisture stress, flooding, and water logging as a result of climate change's rising air temperature and shifting rainfall patterns. Fruit grows more quickly when its temperature is right, so warming the fruit with bunch covers has increased its growth. Higher temperatures generally hasten the maturation of banana plants and reduce the bunch's growth period. When bananas are flooded for more than 48 hours, their growth is greatly reduced. Mature shoots often pass away after 72 to 96 hours of rain. Bananas require two thousand millimetre of annual rainfall and mean annual temperatures between 260 and 300 degrees Celsius to grow on commercial plantations. The main effects of climate change are thought to be high transportation costs for bananas to markets, low prices during the season, and high demand for the fruit during the dry season. Since 1961, 27 countries have seen an increase in annual yields due to climate change; these countries produce 86% of the world's dessert bananas. However, due to declining yields in the top producers and exporters, global yield gains could be mitigated or eliminated under the climate scenarios, falling

to, respectively. Thiruvananthapuram district's multiple linear approach was used to measure the effects of climate change on banana production. The dependent variable was the number of bananas produced, and the independent variables were the log values of the quarterly data on meteorological variables such as temperature, rainfall and relative humidity.

2. Review of Literature

(Varma and Bebbber, 2019) "Climatic change impacts on banana yields around the world", states that the effects of climatic changes have been studied on main food crops and not on any other crops that had played main role in helping developing world. Bananas are one of these crops. It is a staple food and a major commodity of many nations. This study analysed the 27 countries, analysing their changing climate since 1961. This study shows the countries at risk from climatic changes and those that are able to mitigate its effects or capitalize on its benefits.

(Adhikari et al., 2015; Adhikari, 2015) Climatic changes and eastern Africa: a review of impact on major crop, indicates that global warming is one of the major challenges in maintaining global food security. This study focuses on the fourteen strategic crops for eight sub-Saharan African countries. The impact of climatic change on the area seems to be largely negative. Wheat is the vulnerable crop among the crops, but for maize, rice and soybean have 45% yield reductions. Millet and sorghum are more resilient to climatic change. Root crops are projected to be less affected than grain crops. The development of small-scale irrigation systems and water harvesting structures seems promising moreover affordability of such measures remains a key issue in order to mitigate the long-term impacts of climatic changes

(Wood and Mendelsohn 2015) “The impact of climatic changes on agricultural net revenue: a case study in Fouta Djallon, West Africa”, states that the climatic conditions are associated with lower agricultural net revenue in sub-Saharan Africa. The economic effect of some particular areas of sub-Saharan Africa due to climatic changes on agricultural revenue is largely unknown. To understand this an area of Western Africa that has high climatic variation in a small geographic area and found out that high temperature and precipitation lower the agricultural revenues and cool and dry seasons have increased revenues.

(Datta, 2013) “Impact of climate change in Indian horticulture-a review”, the greatest concern of mankind in 21st century is global warming and climate change. Due to unpredicted manner of aberration of climate, the established varieties of fruits, vegetables and flowers show poor yield. The increase in temperature, air pollution, melting of ice cap in Himalayan regions etc lead to this poor function. The most effective way to adopt agriculture is through renewable energy, conservation of forests and water bodies etc. To overcome the effects of climatic changes is by adopting hi-tech horticulture and judicious management of natural resources.

(Ghini et al., 2011) “Diseases in tropical and plantation crops as affected by climatic changes current knowledge and perspectives”, states about the tropical and plantation crops that include important crops for food security and energy resources. The diseases due to climatic change on crops life coffee, sugarcane, eucalyptus, cassava, citrus, banana, pineapple, cashew, coconut and papaya has been studies. By reviewing the existing methods and information about the impact of climatic changes on diseases of tropical and plantation crops, the trends for some diseases and its

management, identify the gaps in knowledge and experimental and analytical approaches to advance knowledge. This study explains about the effects of the changing climate on both chemical and biological controls and the changing global outlook on the demands of environment for the future.

3. Research Methodology

The study is descriptive in nature and the respondents were farmers of the age group 50 – 65 of Varandarappilly grama panchayath of Thrissur district of Kerala. The data is collected through Convenience Sampling of Non-Probability Sampling. The farmers choose for the study were cultivating for more than five years. The researchers used self-structured questionnaire for data collection. Case study was used for the study.

4. Ethical Consideration

The personal details of the respondents will be kept confidential and information given to the questions will be used for the purpose of this study. No personal details of informants are shared in the study.

5. Objectives

- To understand socio demographic profile of the respondents.
- To assess the social consequences due to climate change of the banana planters.
- To analyse the economic consequences of the banana planters.

6. Case 1

“Looking on to the last year’s yield and profit I have planted around 150 banana saplings. But due to the unexpected climate it had made a huge loss to our lives. We do seasonal farming and other cultivation includes pumpkin, peas, bitter gourd etc. The changing climate has made loss to these cultivations also.”

When looking into the first case, he does his cultivation in 30 cents of land that have been taken for lease. They have been to farming to more than 6 years in this field. They do seasonal farming for their livelihood. Farming is one of the means of their lives. Like last year, they have planted 150 saplings as they were having huge profit in the last years. But the unexpected climate has pushed them to huge debt as they don’t receive any profit. The improper growth of plants, unfavourable climate, increase of pest, the increasing number of fertilizers and pesticides have made their lives miserable. Due to the change in climate the yield has decreased. Each plant has its own climate to grow and to produce yield.

They still follow the same traditional practices that they have been following in the past years. Due to the lack of yield, they were not able provide necessary orders that they have received from their clients. This had made the loss of client and pushed to debt. Even their yield is not receiving proper amount for their bananas because it has a few damages or may not be grown well. They haven’t received any help from government or any other authorities resulting in poverty. They are struggling to find means for their livelihood as they don’t have any other jobs to survive. In their family only one earns money through farming and rest of his family depends upon him.

There has been drastic change in demand for the banana because of the lack of availability of the breed of banana and banana saplings. The import of banana from other states of India, like Tamil Nadu for lesser rate, has made the farmers life in Kerala miserable. The banana exported from Tamil Nadu is of less quality and this increased the demand for quality bananas. They are trying to matchup with the present situation of climate and its consequences.

Table 1. Case 1 - Framework Analysis

Social Consequences	Economic Consequences
Migration and Displacement: farmers facing economic hardship due to climate change may be compelled to migrate in search of better opportunities, leading to social disruptions in rural areas.	Reduced Crop Yields: Changes in climate can leads to variations in temperature and precipitation, effecting crop growth. Reduced yields can result in lower income for farmers.
Food Insecurity: Reduced crop yields and disruptions in agricultural production can contribute to food security, affecting not only farmers but also the broader population reliant on agriculture for substances.	Increased Input Costs: climate change may necessitate adjustment in farming practices, requiring additional inputs such as new seeds, irrigation systems, or pest control measures. This can escalate production costs.
Health Challenges: changes in climate can impact the prevalence of vector borne diseases and affect <u>farmers</u> health. Increased exposure to extreme temperatures may also leads to heat related health issues.	Loss of Livestock: Extreme weather events, like heat waves or floods can threaten lives stock health and productivity. Farmers may losses economic losses due to reduced livestock output.

7. Case 2

“Along with my partner I have invested on banana cultivation as I have done like former years. But due to unexpected wind had made a huge loss for us leading to debt. As we are cultivating in our own land has made the loss a little bearable as we don’t need to pay the lease of the land. But if the climatic changes continue it can lead to the reduction of farmers in our place.”

When moving on to the next case, they have been into farming for more than 10 years in their own field. They have their own land for cultivation and they also do seasonal farming. They also have cultivation of peas, ladies' finger, spinach, bitter gourd, snake gourd etc. They have planted around 500 saplings. They plant so because they had huge profit from cultivation in past years. But when looking into the present years profit, they have loss and not even able to meet the amount they have invested.

The unexpected heavy wind that had blown in the months of November and December had led to the loss. The banana pith, its stem has been hugely affected by the wind and it led to the damage of the plant. When comparing to last year's profit, this year was of huge loss. They were not able to receive the amount that they have given to the workers. They had never experience climatic change and due to that they were not able to cultivate according to it. But if the climate keeps on changing it can lead to less production of food crops.

The increase in the amount for the fertilizers and pesticides with no subsidy have caused many financial issues for the farmers. They both started for business needs but now they are not able to meet their basic business needs. They still follow traditional methods and practices for their farming. Among them one of them have a job other than farming while the other one doesn't have a job for having a stable financial life.

They don't receive any financial support from government and other agencies during this time. No benefits for farmers are received even though there are policies. The import of crops from other states have led to the decreased demand of the quality crops. The rate for banana that the farmers is receive comparatively low even though the rate of banana is

high in market. Scarcity of water is seen more due to lack of rain and increasing temperature.

Table 2. Case 2 - Framework Analysis

Social Consequences	Economic Consequences
Loss of Livelihoods: Economic challenges in agricultural can result in job losses for those dependent on the sector. This can lead to the erosion of traditional livelihoods and need for alternative employment opportunity.	Shifts in Crop Sustainability: changing climatic conditions may render certain crops sustainable for regions, leading to the need for farmers to switch to more resilient or sustainable crops incurring transition costs.
Social Stress and Mental Health Issues: The uncertainties associated with climate change, including unpredictable weather patterns and economic stability, can contribute to stress and mental challenges among farmers.	Water Scarcity Issues: Dwindling water resources can impact irrigation systems, affecting crop growth. Farmers might need to need invest in more efficient irrigation methods or face reduced yields.
Community Resilience: Communities reliant on agricultural may struggle to adapt to changing climatic conditions. Building resilience at the community level becomes crucial for coping with the challenges posed by climatic change.	Market Volatility: fluctuations in crop production due to climate change can contribute to market volatility. Farmers may experience unpredictable price changes, impacting their income stability.

8. Case 3

“The lack of support and financial assistance of the side of government is seem to less when comparing to other states of India. The increase in the debt and loans are pushing us to the depths of poverty and suicide.”

They have been cultivating banana for past 8 years in their own and the land they have taken for lease. The cultivation is around 2acers of land. They have planted around 300 banana saplings along with other crops like pepper, turmeric, bitter gourd, snake gourd, coconut, nutmeg and more. The unexpected change in climate had made them to cultivate more crops other than banana.

They are now facing huge financial problems including debts, loans etc. Even though he follows modern methods

and practices for farming. But still due to the change in climate doesn't bring any financial help and profit. Water scarcity is seen in this area has been increasing due to lack of rain and raise in temperature.

If the temperature increases and the lack of rain goes on the cultivation of crops will become extinct. Even though he has a job, he is not able to fulfil his needs and that of his family. As an only bread winner of the family, he is totally in a state of anxiety about taking care of his family. The cost of basic elements is increasing day by day, but the income they receive through farming are decreasing day by day. If it continues the only thing that they can do is to leave farming and go in search of better jobs.

Table 3. Case 3 - Framework Analysis

Social Consequences	Economic Consequences
Conflict Over Resources: Scarce of resources, such as water and conflicts among farmers or communities, exacerbating existing social tensions.	Risk of Crop Failure: increased frequency of extreme weather events, such as hurricanes or droughts, raises the risk of complete group failure, leading to significant economic losses for farmers.
Social Stress And Mental Health Issues: The uncertainties associated with climate change, including unpredictable weather patterns and economic stability, can contribute to stress and mental challenges among farmers.	Water Scarcity Issues: Dwindling water resources can impact irrigation systems, affecting crop growth. Farmers might need to need invest in more efficient irrigation methods or face reduced yields.
Health Challenges: changes in climate can impact the prevalence of vector borne diseases and affect farmers health. Increased exposure to extreme temperatures may also leads to heat related health issue	Loss of Livestock: Extreme weather events, like heat waves or floods can threaten lives stock health and productivity. Farmers may losses economic losses due to reduced livestock output.

9. Discussions

Due to the unexpected change in climate change the farmers are facing great social and economic consequences. The social consequences include health challenges, community

resilience, social stress, migration and displacement and more and the economic consequences include risk of crop failure, water scarcity, shifts in crops sustainability etc. The lack of knowledge about the drastic climatic changes pushed the farmers into the depths of poverty and to suicide. The financial crisis faced by them is increasing day by day. These increases can lead to the end of farming in our states. The depths and loans of farmers are taken into account only when they commit suicide. This attitude of government and other higher authorities should change and should provide helping hand for them not only for the sake of their living but also for the economic betterment of the state.

10. Suggestions

1. The farmers should be provided with adequate knowledge and technology that can be used in the present scenario.
2. Higher authorities and government should take note of the policies and programmes for the farmers that is presently prevalent and should also take care about the benefits of such programmes to the farmers.
3. Social workers can help farmers by providing awareness and advocate for their rights. Social workers can also help them by identifying community resources (for e.g. water scarcity) and mobilising them for their welfare.

11. Conclusion

In conclusion, the adverse impact of climatic changes on banana planters is a multifaceted challenge that threatens not only the livelihoods of farmers but also the global supply chain of this crucial crop. Rising temperatures, unpredictable rainfall patterns, and the increased frequency

of extreme weather events have collectively contributed to a decline in banana yields and quality. Pests and diseases, once manageable, have become more rampant, further exacerbating the vulnerability of banana plantations. The economic repercussions of these climatic challenges are profound, affecting not only individual farmers but also the broader agricultural sector and the communities dependent on banana cultivation. Increased production costs, loss of income, and market instability pose significant threats to the sustainability of banana farming enterprises. An all-encompassing and cooperative strategy is needed to mitigate the negative effects of climate change on banana plantations. Important first measures include putting climate-resilient crop types into practice, investing in sustainable agriculture methods, and providing farmers with cutting-edge technology. Furthermore, the agricultural industry as a whole and banana plantations' long-term resilience depend on international efforts to mitigate climate change by cutting greenhouse gas emissions and encouraging sustainable development. We can only expect to lessen the negative effects of climate change on banana plantations and ensure a sustainable future for this essential crop by combining efforts at the local, national, and international levels.

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