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Impact of Climate Change on Farmers of Koronivia

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ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

TABLE OF CONTENTS

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

TABLE LIST

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

FIGURE LIST

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

ABSTRACT

- ***Purpose:***

This Paper aims to investigate the Impacts of Climate Change on Koronivia Vegetable Farmers' Cooperative and to develop adaptation strategies for farmers to mitigate the impact of climate change on their livelihoods.

- ***Methodology Approach:***

This research relied on intensive field investigation where farmers from Koronivia, were randomly selected for questionnaire surveys to collect data. All data collected through questionnaires were summarized accordingly to answers from the research questions. This field investigation were carried out during the Month of October, Year 2024.

- ***Findings:***

In this research paper, climate change is the independent variable and a common feature of the study. The impact of climate change on agricultural practices is becoming increasingly evident, particularly in areas like Koronivia, Fiji, which is heavily reliant on agriculture for its economy and food security. This study examines how changing climatic conditions such as rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events affect farmers' livelihoods in Koronivia. Through qualitative interviews and quantitative data analysis, the research highlights challenges faced by farmers, including crop yield variability, soil degradation and pest proliferation. Additionally, the study explores adaptive strategies employed by farmers such as crop diversification, water conservation techniques and the adoption of resilient agricultural practices. The findings underscore the urgent need for targeted policy interventions and support systems to enhance farmers' resilience to climate change, ensuring sustainable agricultural development in Koronivia and similar vulnerable regions.

- ***Practical Implications:***

The insights gained from this research aim to inform stakeholders about the critical intersections of climate policy and agricultural sustainability, ultimately contributing to a more resilient agricultural framework in the face of ongoing climatic challenges.

- ***Originality:***

There has not been many studies done before on the Impact of Climate Change on Farmers of Koronivia, therefore this paper draws the understanding of these impacts and its implications on the Farmers of Fijian society.

Keywords: *Climate Change, Agricultural Development, Mitigation Strategies.*

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CHAPTER ONE
INTRODUCTION

The Koronivia region of Fiji, with its vibrant agricultural landscape, has long been celebrated for its fertile soils and diverse crops. This region is home to a variety of farming practices that sustain local communities and drive the economy. However, as the world grapples with the realities of climate change, the farmers of Koronivia find themselves increasingly vulnerable to its impacts. Rising temperatures, unpredictable rainfall, and extreme weather events are not merely abstract concepts; they represent immediate threats to the livelihoods of those who depend on agriculture. Understanding the specific effects of climate change on these farmers is essential for developing effective adaptation strategies that can help them navigate this uncertain future.

The manifestations of climate change in Koronivia are evident and multifaceted. One of the most significant changes has been the increase in average temperatures. Over recent years, the region has experienced prolonged periods of heat, leading to heat stress in crops and altering the growing seasons for various plants. Farmers are increasingly finding that traditional planting and harvesting schedules are no longer viable, requiring them to adapt to a new and challenging reality. In addition to temperature rises, altered rainfall patterns have emerged, with some areas experiencing drought while others face flooding. This unpredictability complicates water management for farmers who rely on consistent rainfall to sustain their crops. As a result, many are left grappling with the dual challenges of insufficient water during dry spells and excessive water during heavy rains.

The impact of climate change extends beyond mere shifts in weather patterns; it also exacerbates the prevalence of pests and diseases that threaten crop yields. Warmer temperatures create a more conducive environment for pests, which can rapidly multiply and wreak havoc on crops. Farmers, already facing the stress of unpredictable weather, must now contend with an increased incidence of pests that may require new, potentially costly, management strategies. This situation creates a cascading effect, leading to further economic strain as farmers must invest more in pest control measures or risk losing their harvests.

The socio-economic implications of climate change for farmers in Koronivia are profound. Agriculture is not just a source of food; it is the backbone of the local economy. The ripple effects of reduced agricultural productivity can lead to food insecurity, which poses a significant risk for vulnerable populations that rely on subsistence farming. As crop yields decline, families may face hunger and malnutrition, further exacerbating existing inequalities within the community. Economic stability is closely tied to agricultural success; when farmers struggle to produce enough food, local markets suffer, and the entire community can feel the repercussions. In extreme cases, the economic strain may lead to the abandonment of traditional farming practices, eroding cultural ties and community cohesion.

Sustainable agricultural practices must also be prioritized to improve resilience. Techniques such as organic farming, agroforestry, and conservation tillage can enhance soil health and reduce dependency on chemical inputs, which may become less effective under climate stress. Implementing improved water management practices, such as rainwater harvesting and efficient irrigation systems, is essential for helping farmers adapt to altered rainfall patterns. These methods can ensure that crops receive adequate water during dry spells while minimizing the risk of flooding during heavy rains.

Access to information and resources is another critical factor in enabling farmers to adapt to climate change. Providing farmers with up-to-date information on climate trends, pest management, and sustainable practices is essential for empowering them to make informed decisions. Initiatives such as workshops, extension services, and partnerships with research institutions can facilitate knowledge transfer and support farmers in implementing adaptive strategies. Engaging local communities in these efforts fosters a sense of ownership and commitment to climate adaptation.

The role of government and non-governmental organizations (NGOs) is also vital in supporting farmers through this transition. Collaborative efforts can provide the necessary funding, training, and infrastructure development to enhance resilience. Policies that promote sustainable agriculture and provide financial assistance to vulnerable farmers can help mitigate the impacts of climate change. Creating networks among farmers can also facilitate the sharing of knowledge and resources, strengthening community resilience.

As the effects of climate change continue to unfold, it is imperative to recognize the unique challenges faced by farmers in Koronivia. Addressing these challenges requires a concerted effort from all stakeholders, including farmers, government agencies, NGOs, and the broader community. By fostering resilience through education, resource access, and sustainable practices, we can help ensure that the farmers of Koronivia not only survive but thrive in the face of climate change. Ultimately, this effort is not just about preserving agriculture; it is about protecting livelihoods, cultural heritage, and the future of the community.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

In conclusion, the impact of climate change on farmers in Koronivia is a pressing issue that demands urgent attention and action. As climate variability threatens agricultural productivity, understanding the local context and engaging with farmers is essential for developing effective adaptation strategies. By prioritizing sustainable practices, improving access to resources, and fostering community engagement, we can empower the farmers of Koronivia to navigate the complexities of a changing climate. The resilience of these farmers is not just critical for their survival; it is essential for the future food security and economic stability of the entire region. Through collaborative efforts and innovative solutions, we can help build a more sustainable and resilient agricultural landscape in Koronivia, ensuring that it continues to thrive in the face of climate change.

A. Problem Statement

Farmers in Koronivia, Fiji, are facing significant challenges due to the adverse effects of climate change, which threaten their livelihoods and the sustainability of local agriculture. The region is experiencing rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events, such as droughts and floods. These changes disrupt traditional farming practices, leading to decreased crop yields, increased pest and disease outbreaks, and compromised soil health.

The socio-economic implications of these environmental shifts are profound. Many farmers operate on small plots of land with limited access to resources, technology, and financial support, making them particularly vulnerable to climate impacts. Food security is jeopardized as agricultural productivity declines, affecting not only the farmers but also the broader community that relies on their produce.

Additionally, the pressures of climate change may force some farmers to abandon their lands, leading to rural-to-urban migration and further straining urban resources. This situation exacerbates existing inequalities, particularly for marginalized groups, such as smallholder farmers and women, who have less access to information and adaptation resources.

In summary, the problem lies in the intersection of climate change and agricultural vulnerability in Koronivia, necessitating urgent and targeted interventions to support farmers in adapting to the changing climate while ensuring food security and economic stability for the region.

The impact of climate change on farmers in Koronivia is of critical relevance due to the region's heavy reliance on agriculture for economic stability and food security. As many families depend on farming for their livelihoods, understanding how climate change affects crop yields and farming practices is essential for assessing the community's economic resilience. The threat to agricultural productivity directly influences food availability, which is vital for the health and well-being of the local population. Moreover, the farming traditions in Koronivia are deeply rooted in the cultural identity of the community, and disruptions to these practices due to climate change threaten cultural continuity and cohesion. Studying these impacts is significant not only for informing local and national policy development aimed at enhancing agricultural resilience but also for empowering the community to engage in sustainable practices. Insights gained from this research can contribute to the broader discourse on climate change adaptation, offering valuable lessons for similar rural contexts globally. Ultimately, addressing the challenges posed by climate change is crucial for achieving sustainable development goals, ensuring that Koronivia's farmers can thrive in an increasingly uncertain climate while preserving their cultural heritage and environmental integrity.

B. Knowledge Gap

The farmers of Koronivia are increasingly feeling the impacts of climate change, which poses significant challenges to their agricultural practices and livelihoods. Rising temperatures, altered rainfall patterns, and more frequent extreme weather events, such as floods and droughts, directly affect crop yields and soil health. These changes can lead to reduced productivity, making it difficult for farmers to sustain their livelihoods and meet local food demands. Additionally, shifting pest and disease patterns further threaten their crops, necessitating adaptations in farming techniques. As these farmers grapple with these challenges, the urgency for innovative solutions and support becomes critical to ensure their resilience and food security in the face of a changing climate.

C. Purpose of the Study

The purpose of this study is to investigate the impact of climate change on vegetable farmers in Koronivia, with a focus on understanding how changing climatic conditions affect agricultural practices, crop yields, and overall livelihoods. By examining specific factors such as temperature fluctuations, altered precipitation patterns, and increased incidences of pests and diseases, the study aims to identify the challenges faced by these farmers. Furthermore, it seeks to explore adaptive strategies currently employed by farmers and evaluate their effectiveness. Ultimately, the study intends to provide insights that can inform policy recommendations, support mechanisms, and sustainable agricultural practices that enhance resilience to climate change within the community.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

D. Research Objectives

- *Research Question (RQ)*
  The Two Driving Questions for this Research Paper are:

- **RQ1** – What Impact does climate change have on Koronivia Vegetables Farmers' Cooperative?
- **RQ2** –How can Ministry of Agriculture provide support to KVFC to mitigate the impact of climate change?

- *Research Objectives (RO)*
  The Aim of this Study is to:

- **RO1** – The aim of this study is to investigate the impact of climate change on Koronivia Vegetable Farmers' Cooperative.
- **RO2** – To develop adaptation strategies for farmers of Koronivia to mitigate the impact of climate change on their livelihoods.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

CHAPTER TWO
LITERATURE REVIEW

The impact of climate change on farmers in Koronivia, Fiji, is multifaceted, affecting agricultural productivity, economic stability, and social well-being. Changes in weather patterns, such as increased rainfall variability and rising temperatures, have led to reduced yields of staple crops like taro and cassava, threatening food security for local communities (Naidu et al., 2020). Soil degradation, exacerbated by intensified rainfall, results in nutrient loss and decreased fertility, making it challenging for farmers to maintain sustainable production (Singh & Reddy, 2021). Economically, farmers face income instability due to unpredictable climate effects, often forcing them to diversify their livelihoods or seek alternative employment (Kumar et al., 2019). Additionally, the transition to adaptive practices incurs financial costs, further straining resources (Bishop & Fong, 2023). Socially, the pressures of climate change contribute to community displacement and mental health issues, as farmers grapple with anxiety over uncertain futures (Lal et al., 2023). Overall, addressing these challenges requires a comprehensive approach that includes government support, community engagement, and access to adaptive technologies to enhance resilience among farmers in Koronivia.

A. Causes of Climate Change

➢ *Greenhouse Gas Emissions*

- **Carbon Dioxide (CO2)**: Primarily released from burning fossil fuels (coal, oil, and natural gas) for energy, transportation, and industrial processes.
- **Methane (CH4)**: Emitted during the production and transport of coal, oil, and natural gas, as well as from livestock and other agricultural practices.
- **Nitrous Oxide (N2O)**: Released from agricultural activities, particularly from fertilizers and livestock manure.

➢ *Deforestation*

- The clearing of forests for agriculture, logging, and urban development reduces the number of trees that can absorb CO2, contributing to higher atmospheric concentrations of greenhouse gases.

➢ *Industrial Activities*

- Manufacturing processes release various pollutants, including greenhouse gases. Industries such as cement, steel, and chemicals are significant contributors.

➢ *Agriculture*

- Agricultural practices, including livestock production and rice cultivation, contribute to methane and nitrous oxide emissions. Land-use changes for agriculture also affect carbon storage.

➢ *Land Use Changes*

- Urbanization and changes in land use disrupt natural carbon sinks, reducing the land's ability to sequester carbon and affecting local climates.

➢ *Waste Management*

- Landfills produce methane as organic waste decomposes. Poor waste management practices can exacerbate greenhouse gas emissions.

➢ *Natural Factors*

- While human activities are the primary drivers of recent climate change, natural factors such as volcanic eruptions and solar radiation variations can also influence climate patterns.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

➢ *Feedback Loops*

- As the climate warms, processes such as permafrost melting and increased water vapor in the atmosphere can amplify warming, creating feedback loops that further accelerate climate change.

Addressing these causes requires a concerted global effort to reduce emissions, enhance carbon sinks, and transition to more sustainable practices across various sectors.

B. Impacts of Climate Change on Farmers

Climate change significantly impacts farmers, affecting their livelihoods, crop yields, and overall agricultural sustainability. Here are some key impacts:

➢ *Crop Yields*

- Decreased Productivity: Changes in temperature and precipitation patterns can lead to reduced yields of staple crops, making it harder for farmers to meet food demands.
- Pest and Disease Proliferation: Warmer temperatures can increase the prevalence of pests and diseases, threatening crop health and requiring more intensive pest management.

➢ *Water Availability*

- Droughts: Increased frequency and severity of droughts can limit water supply for irrigation, reducing crop viability and increasing competition for water resources.
- Flooding: Conversely, extreme weather events like heavy rainfall can lead to flooding, damaging crops and eroding soil.

➢ *Soil Health*

- Soil Degradation: Increased rainfall and extreme weather can contribute to soil erosion and nutrient loss, diminishing soil fertility and productivity over time.
- Salinization: Rising sea levels and increased irrigation can lead to salinity in coastal areas, affecting crop growth and soil health.

➢ *Economic Impacts*

- Income Instability: Fluctuating crop yields due to climate variability can lead to unstable incomes for farmers, making it difficult to plan for the future or invest in sustainable practices.
- Increased Costs: Farmers may face higher costs for water, fertilizers, and pest control, as well as investments in adaptive technologies and practices.

➢ *Food Security*

- Threats to Local Food Systems: Decreased agricultural productivity can threaten local food security, increasing reliance on imports and making communities more vulnerable to price fluctuations.

➢ *Social and Mental Health Effects*

- Migration Pressures: Farmers facing declining land productivity may be compelled to migrate to urban areas, leading to social disruption and loss of community cohesion.
- Mental Health Challenges: The stress and uncertainty associated with climate change impacts can lead to increased anxiety and mental health issues among farming communities.

➢ *Adaptation Challenges*

- Knowledge and Resource Gaps: Many farmers lack access to the information and resources needed to adopt sustainable practices, making it difficult to adapt to changing conditions.
- Financial Constraints: Limited access to credit and financial services can hinder farmers' ability to invest in adaptive technologies and practices.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

Addressing these impacts requires targeted policies, support systems, and resources to help farmers adapt to the changing climate and maintain sustainable agricultural practices.

C. Control Strategies to Reduce the Impact of Climate Change on Farmers of Koronivia

To reduce the impact of climate change on farmers in Koronivia, several control strategies can be implemented. These strategies focus on enhancing resilience, improving agricultural practices, and fostering community engagement. Here are key approaches:

➢ *Sustainable Agricultural Practices*

- Diversification of Crops: Encouraging farmers to plant a variety of crops can reduce dependence on single crops, enhance biodiversity, and improve resilience to climate variability.
- Agroforestry: Integrating trees into farming systems can improve soil health, enhance carbon sequestration, and provide additional income sources through fruit, timber, or shade.

➢ *Improved Water Management*

- Irrigation Systems: Implementing efficient irrigation techniques, such as drip or sprinkler systems, can optimize water use and reduce reliance on rainfall.
- Rainwater Harvesting: Encouraging the collection and storage of rainwater can provide a supplemental water source during dry periods.

➢ *Soil Conservation Techniques*

- Cover Cropping: Planting cover crops can improve soil health, reduce erosion, and enhance moisture retention.
- Conservation Tillage: Minimizing soil disturbance through reduced tillage practices can improve soil structure and reduce erosion.

➢ *Pest and Disease Management*

- Integrated Pest Management (IPM): Adopting IPM strategies can reduce reliance on chemical pesticides, promoting the use of biological controls and crop rotation to manage pests sustainably.
- Crop Resistance: Researching and promoting the use of climate-resilient crop varieties can help farmers withstand pests and diseases more effectively.

➢ *Education and Capacity Building*

- Training Programs: Providing farmers with training on sustainable practices, climate adaptation strategies, and resource management can enhance their ability to cope with climate challenges.
- Access to Information: Establishing local information networks can help farmers stay informed about weather patterns, pest outbreaks, and best practices.

➢ *Financial Support and Resources*

- Access to Credit: Improving access to credit and financial services can enable farmers to invest in adaptive technologies and practices.
- Insurance Programs: Developing crop insurance schemes can help mitigate the financial risks associated with climate-induced losses.

➢ *Community Engagement and Collaboration*

- Farmer Cooperatives: Encouraging the formation of cooperatives can facilitate resource sharing, collective purchasing, and improved access to markets.
- Community-Led Initiatives: Involving farmers in decision-making processes regarding local climate adaptation strategies fosters ownership and effectiveness.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

➢ *Policy Support*

- Government Incentives: Implementing policies that promote sustainable agricultural practices and provide financial incentives can encourage farmers to adopt climate-resilient strategies.
- Research and Development: Supporting research into climate-smart agriculture can lead to the development of new technologies and practices tailored to local conditions.
- By implementing these control strategies, farmers in Koronivia can enhance their resilience to climate change, improve food security, and ensure the sustainability of their agricultural practices.

D. Gaps in Current Literature on the Impacts of Climate Change on Farmers of Koronivia

Identifying gaps in the current literature on the impacts of climate change on farmers in Koronivia is crucial for directing future research and developing effective strategies. Here are some notable gaps:

➢ *Localized Studies*

- Lack of Specific Research: Much of the existing research on climate change impacts is broad and may not address the unique socio-economic and environmental conditions of Koronivia. More localized studies are needed to understand specific challenges and adaptations relevant to this community.

➢ *Longitudinal Data*

- Insufficient Long-Term Studies: There is a scarcity of long-term data tracking the impacts of climate change on agricultural practices and productivity over time. Longitudinal studies could provide insights into trends and changes in farming practices and crop yields.

➢ *Adaptation Strategies*

- Limited Focus on Effective Practices: While some literature discusses adaptation, there is a lack of comprehensive assessments of which specific strategies are most effective in the Koronivia context. Research on successful local adaptations could inform future practices.

➢ *Economic Analysis*

- Inadequate Economic Impact Assessments: More detailed economic analyses are needed to quantify the financial impacts of climate change on farmers, including costs related to crop losses, adaptation measures, and changes in market dynamics.

➢ *Social and Psychological Dimensions*

- Neglect of Mental Health and Social Cohesion: The social and psychological effects of climate change on farming communities are often overlooked. Understanding mental health challenges and community dynamics in response to climate stressors is crucial for holistic support.

➢ *Policy Evaluation*

- Limited Evaluation of Existing Policies: There is a need for research evaluating the effectiveness of current agricultural and climate policies in Koronivia. Assessing what works and what doesn't can guide future policy development.

➢ *Indigenous Knowledge*

- Underrepresentation of Local Knowledge: Research often does not adequately incorporate indigenous and local knowledge systems that may offer valuable insights into sustainable agricultural practices and climate resilience.

➢ *Gender Perspectives*

- Insufficient Gender Analysis: The differential impacts of climate change on men and women in agriculture are not well-explored. Understanding these dynamics can help tailor interventions to meet the needs of all community members.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

➢ *Interdisciplinary Approaches*

- Need for Integrated Studies: Most research tends to focus on singular aspects of climate change impacts. There is a gap in interdisciplinary studies that consider environmental, economic, social, and psychological factors together.

➢ *Community Engagement*

- Lack of Community-Based Research: There is a need for more participatory research that actively involves farmers and community members in the research process, ensuring that their voices and experiences are central to understanding climate impacts.
- Addressing these gaps through targeted research can help develop more effective strategies for mitigating the impacts of climate change on farmers in Koronivia, fostering resilience and sustainable agricultural practices in the region.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

CHAPTER THREE
RESEARCH APPROACH & METHODOLOGY

A. Research Approach

The impact of climate change on agriculture is a pressing global issue, particularly in regions like Koronivia, where agriculture serves as a primary livelihood for many families. To comprehensively assess this impact, a mixed-methods research approach will be adopted, integrating both quantitative and qualitative methodologies. This approach allows for a nuanced understanding of the complex interactions between climate variables and agricultural practices, as well as the socio-economic implications for farmers in the region.

B. Research Design

- *Quantitative Methods:*

The quantitative aspect of this research will primarily involve structured surveys distributed to a representative sample of farmers in Koronivia. The survey will be designed to gather data on several key indicators, including crop yields, changes in planting and harvesting schedules, variations in crop types, and economic impacts such as income fluctuations and cost changes due to climate change. Questions will also address the frequency and severity of climate-related events, such as droughts and floods, and their direct consequences on agricultural productivity.

To ensure a comprehensive dataset, the sample will include farmers from various demographic backgrounds, including different age groups, gender, and levels of experience in farming. This stratification will help capture the diverse experiences and challenges faced by farmers in the region. Additionally, secondary data will be collected from local agricultural offices and meteorological services to obtain historical climate data, including temperature trends, rainfall patterns, and extreme weather events over the past few decades. This combination of primary and secondary data will facilitate robust statistical analyses, such as regression analysis, to identify correlations between climate variables and agricultural outputs.

- *Qualitative Methods:*

The qualitative component will be essential for understanding the lived experiences of farmers and their adaptive strategies in response to climate change. In-depth interviews will be conducted with a subset of farmers to develop deeper into their personal experiences and perceptions of climate change. These interviews will focus on how climate change has affected their farming practices, their decision-making processes, and their overall livelihood.

Additionally, focus group discussions will be organized to foster dialogue among farmers about their collective experiences and the challenges they face. These discussions will provide a platform for sharing ideas, potential solutions, and best practices, enhancing the community's resilience to climate change. Case studies of specific farms or farmers who have successfully adapted to changing conditions will also be explored, highlighting innovative practices and strategies that could be disseminated to others in the region.

- *Data Analysis*

The analysis of quantitative data will involve the use of excel which will allow for detailed examination of relationships between variables. Techniques such as descriptive statistics, correlation analysis, and regression modeling will be utilized to quantify the impacts of climate change on agricultural productivity and economic outcomes. This statistical analysis will provide valuable insights into the magnitude and significance of climate-related challenges faced by farmers.

For qualitative data, thematic analysis will be employed to identify recurring themes and patterns from interviews and focus group discussions. This analysis will help to contextualize the quantitative findings, providing a deeper understanding of the social and cultural factors influencing farmers' responses to climate change. By triangulating quantitative and qualitative data, the research will present a holistic view of the impacts of climate change on farmers in Koronivia.

- *Ethical Considerations*

Ethical considerations are paramount in conducting research with human subjects. All participants will be informed about the purpose of the research, and informed consent will be obtained prior to their participation. Anonymity and confidentiality will be maintained throughout the research process to protect the identities of the farmers involved. It is essential to be sensitive to the cultural context of Koronivia, ensuring that the research process respects local norms and practices. Researchers will also be prepared to address any potential biases and ensure that the voices of marginalized groups, such as women and younger farmers, are adequately represented in the study.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

- *Expected Outcomes*

This mixed-methods research is expected to yield comprehensive insights into the impact of climate change on the agricultural sector in Koronivia. Quantitative findings will provide evidence of specific trends and correlations, while qualitative insights will enrich our understanding of the adaptive strategies employed by farmers. The research aims to identify key challenges faced by the farming community, as well as successful adaptation strategies that could be scaled or replicated.

Furthermore, the study will seek to provide actionable recommendations for policymakers and agricultural support organizations. By identifying the specific needs and vulnerabilities of farmers in Koronivia, the research can inform targeted interventions, such as training programs on sustainable farming practices, access to climate-resilient crops, and financial support mechanisms to help farmers mitigate the economic impacts of climate change.

However, the mixed-methods approach proposed for this research on the impact of climate change on farmers in Koronivia will provide a comprehensive and nuanced understanding of the issue. By combining quantitative surveys with qualitative interviews and focus groups, the study will capture the multifaceted challenges faced by farmers while also highlighting their resilience and adaptive strategies. The findings will not only contribute to the academic discourse on climate change and agriculture but will also serve as a valuable resource for policymakers and practitioners working to support sustainable agricultural practices in the face of an ever-changing climate. This research aims to empower farmers in Koronivia, equipping them with the knowledge and resources necessary to adapt to climate change and ensure their livelihoods for generations to come.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14908873

CHAPTER FOUR
RESULTS

The study was conducted in Koronivia, Nausori, with a total of 30 participants. As shown in the table below, 13 respondents were male (43.3%), 9 were female (30%), and 8 preferred not to disclose their gender (26%). In terms of age, 4 respondents were between 18-29 years (13.3%), 14 were between 30-39 years (46.67%), 12 were between 40-50 years (40%), and there were no participants over the age of 50.

The data also reveals that, of the 30 respondents, 16 (53.33%) are of ITaukei decent, 8 (26.67%) are of Indian ethnicity, and 6 (20%) chose not to disclose their ethnicity**.**

Table 1: Respondent Profile **N= 30**

			Ethnicity						Total	
Gender			ITaukei		Indian Descent		PNS		Count	%
			Count	%	Count	%	Count	%	Count	%
		18-29yrs	3	37.50%	0	0.00%	0	0.00%	3	23.10%
		30-39yrs	0	0.00%	2	66.70%	1	50.00%	3	23.10%
Male	Age	40-50yrs	5	62.50%	1	33.30%	1	50.00%	7	53.80%
		Above 50	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Total		8	100.00%	3	100.00%	2	100.00%	13	100.00%
		18-29yrs	0	0.00%	0	0.00%	1	33.30%	1	11.10%
		30-39yrs	3	75.00%	1	50.00%	1	33.30%	5	55.60%
Female	Age	40-50yrs	1	25.00%	1	50.00%	1	33.30%	3	33.30%
		Above 50	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Total		4	100.00%	2	100.00%	3	100.00%	9	100.00%
		18-29yrs	0	0.00%	0	0.00%	0	0.00%	0	0.00%
		30-39yrs	2	50.00%	3	100.00%	1	100.00%	6	75.00%
PNS	Age	40-50yrs	2	50.00%	0	0.00%	0	0.00%	2	25.00%
		Above 50	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Total		4	100.00%	3	100.00%	1	100.00%	8	100.00%
		18-29yrs	3	18.80%	0	0.00%	1	16.70%	4	13.30%
		30-39yrs	5	31.30%	6	75.00%	3	50.00%	14	46.70%
Total	Age	40-50yrs	8	50.00%	2	25.00%	2	33.30%	12	40.00%
		Above 50	0	0.00%	0	0.00%	0	0.00%	0	0.00%
	Total		16	100.00%	8	100.00%	6	100.00%	30	100.00%

- *Pie Chart*

The pie chart below shows the age distribution of male and female respondents in this study. It reveals that the largest proportion of male respondents are in the 40-50 years (23%), 18-29 years (10%), and 30-39 years (10%) age brackets. On the other hand, the majority of female respondents fall into the 30-39 years (17%) age group, followed by those in the 40-50 years (10%) and 18-29 years (3%) groups. Where by PNS Age 30-39 years is (20%) and (7%) is age between 40-50 years with no female respondents aged over 50.

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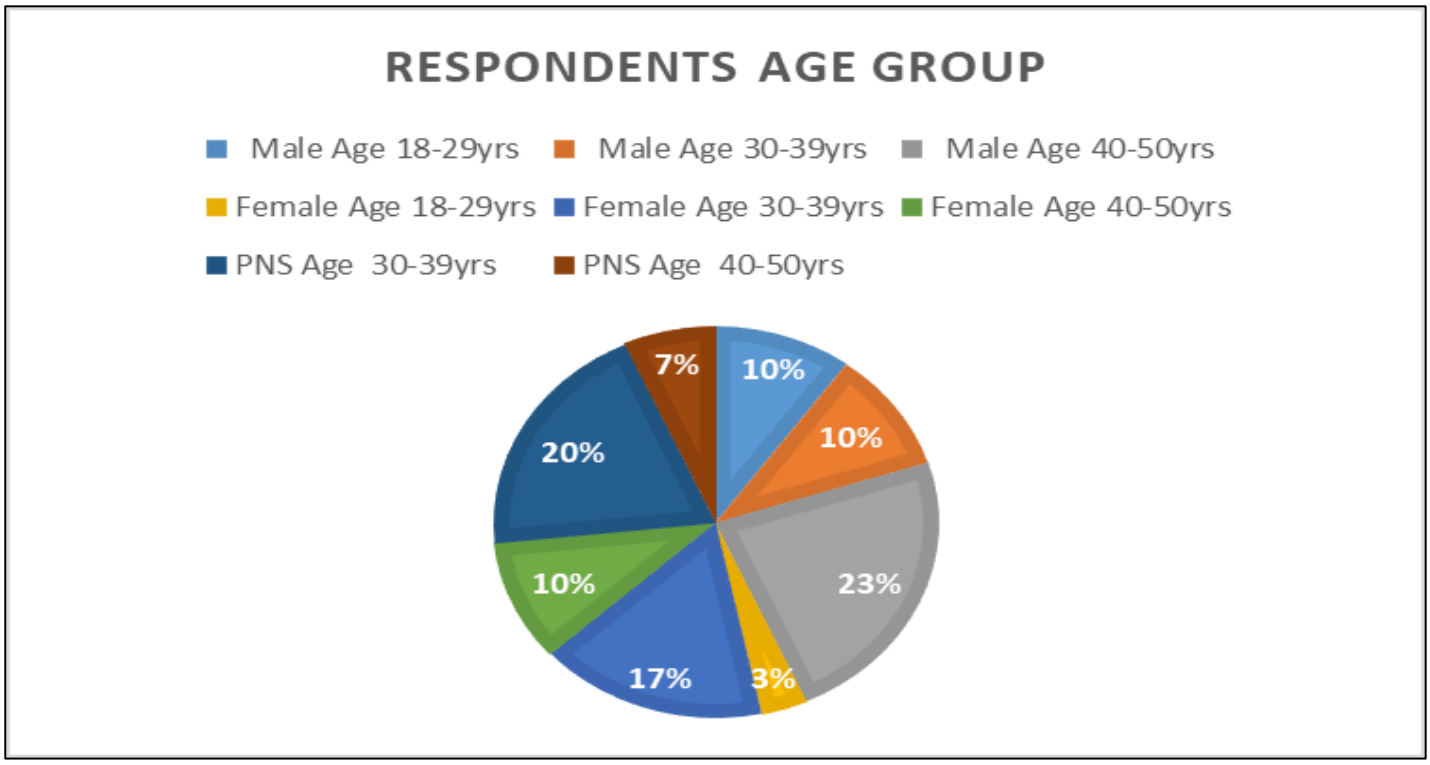

Fig 1: Respondents Age Group

Table 2: Do People Understand What Climate Change is and are they aware of how much it Specifically Impacts Farming Practices. Cross-Tabulation of Data showing the number of respondents who were knowledgeable about Climate Change.

Q2			Total	
			N	%
Yes	Q3	Very Much Aware	13	52.00%
		Somewhat Aware	6	24.00%
		No Idea at All	6	24.00%
	Total		25	100.00%
No	Q3	Somewhat Aware	5	100.00%
	Total		5	100.00%
Total	Q3	Very Much Aware	13	43.33%
		Somewhat Aware	11	36.67%
		No Idea at All	6	20.00%
	Total		30	100.00%

The data indicates that out of 30 respondents, 13 (43.33%) are very aware, 11 (36.67%) are somewhat aware, and 6 (20%) have no knowledge at all regarding climate change and its impacts on the farmers of Koronivia. Additionally, 25 respondents (83.33%) reported being unaware of climate change itself but had some understanding of its impacts on the farmers of Koronivia over the past two years.

Table 3: Ways is Which Climate Change Affected Farming Practices

Q4		Total	
		N	%
Q4	Change in Rainfall Patterns	12	40.00%
	Increase in Temperature	8	26.67%
	Pest and Disease Outbreak	7	23.33%
	Crop Failures	3	10.00%
	Others	0	0.00%
Total		30	100.00%

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The table above summarizes data on how climate change has impacted farming practices, broken down by different factors that affect farming. The most commonly reported impact of climate change is a change in rainfall patterns which is 40% of the respondents. In addition, increases in temperature and pest and disease outbreaks are also significant issues, affecting 26.67% and 23.33% of respondents respectively. Crop failures are less commonly reported, with only 10% of the respondents indicating that they have experienced this issue. However, no respondents identified "Others" impacts as relevant in this survey.

Table 4: Measures Farmers have Implemented to Adapt to Climate Change

Q5		**Total**	
		N	**%**
Q5	Crop Diversification	9	30.00%
	Water Conservation Techniques	7	23.34%
	Agroforestry	0	0.00%
	Soil Conservation Method and Crop Rotation	6	20.00%
	Using Drought-Resistant Crop	4	13.33%
	Irrigation Methods	4	13.33%
Total		**30**	**100.00%**

The table above outlines the various measures farmers have implemented to adapt to climate change as reported by the survey respondents. Crop diversification is the most widely adopted with 30% of the respondents. Water conservation techniques are closely followed by 23.34% of the respondents. Other strategies include soil conservation methods and crop rotation, which 20% of the farmers use, while 13.33% have adopted drought-resistant crops and 13.33% irrigation methods. However, agroforestry was not implemented by any respondents, as reflected in the 0% usage.

Table 5: Farmers have Changed the Types of Vegetables Grown in Response to Climate Change

Q6		**Total**	
		N	**%**
Q6	Yes	22	73.33%
	No	8	26.67%
Total		30	100.00%

The table presents data on whether farmers have changed the types of vegetables they grow in response to climate change. The majority of the respondents, 73.33% reported that they have indeed changed the types of vegetables they grow. In contrast, 26.67 % of respondents said they have not changed the types of vegetables they grow. This suggests that a significant portion of farmers have adapted their vegetable farming practices to address the impacts of climate change.

Table 6: Resources that Farmers have Access to for Climate Adaptation

Q7		**Total**	
		N	**%**
Q7	Financial	5	16.67%
	Technical	8	26.67%
	Material	17	56.66%
Total		30	100.00%

This table provides data on the resources that farmers have access to for climate adaptation. Material resources are the most commonly accessible with 56.66% of respondents reporting having access to them. This includes things like tools, seeds or other physical assets. Technical resources come next, with 26.67% of farmers having access to expert advice, knowledge or technology for adaptation. Only 16.67% of respondents reported having access to financial resources, such as funding or financial support for climate adaptation measures.

Table 7: Any Government or NGO Support Programs Available

Q8		**Total**	
		N	**%**
Q8	Yes	20	66.67%
	No	10	33.33%
Total		**30**	**100.00%**

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The table presents information about the availability of government or NGO support programs for farmers. A majority of respondents, 66.67% reported having access to such support programs. On the other hand, 33.33% of the respondents reported that no support programs are available to them. This suggests that while many farmers do have access to external support, a significant portion still lacks such resources.

Table 8: Ways in Which Climate Change has affected the Farmers' Cooperative

Q9		Total	
		N	%
Q9	Extreme Weather Events	12	40.00%
	Relocation	8	26.67%
	All of the Above	10	33.33%
	None of the Above	0	0.00%
Total		**30**	**100.00%**

The table above presents data on how climate change has affected farmers' cooperatives. Extreme weather events have impacted the cooperatives the most, with 40% of respondents indicating this effect, Relocation of the farm is another significant impact, reported by 26.67% of respondents. Additionally, 33.33% of respondents selected "All of the Above" indicating that both extreme weather events and relocation have affected the Farmers' Cooperative of Koronivia. Notably, no respondents reported that climate change had no effect on their cooperatives as reflected in the "None of the Above" category which has 0%.

Table 9: Collaborative Strategies which are in Place to Address Climate- Related Challenges

Q10		Total	
		N	%
Q10	Forming Alliance with Local and Global Organizations to Advocate for Stronger Climate Policies	9	30.00%
	Sharing Best Practices for Sustainability Among Cooperative Members to Reduce Collective Environment Impact	10	33.33%
	Collaborating with Research Institutions	3	10.00%
	All of the Above	8	26.67%
	None of the Above	0	0.00%
Total		**30**	**100.00%**

The table outlines the collaborative strategies that Farmers' Cooperative have put in place to address climate related challenges. Majority sharing best practices for sustainability among cooperative members to reduce the collective environmental impact, which is reported by 33.33% of respondents. Another key strategy is forming alliance with local and global organizations to advocate for stronger climate policies is a common strategy with 30% of respondents. Therefore, collaborating with research institutions is less common, with only 10% of respondents were engaged in this approach. However, 26.67% of respondents selected "All of the above", indicating that they employ multiple collaborative strategies, combining all the mentioned tactics. Thus, no respondents indicated the use of "None of the Above" suggesting that all surveyed farmers cooperatives are actively engaging in at least one of these collaborative strategies to address climate challenges. The total number of respondents is 30, and the table highlights the diversity of approaches cooperatives are taking to collectively tackle climate related issues.

Table 10: Foresee of the Future of Vegetable Farming in Koronivia given Climate Change

Q11		Total	
		N	%
Q11	Increased risk of crop failure due to extreme weather condition	11	36.66%
	Shift towards growing more resilient, drought-tolerant and heat-resistant vegetable varieties	9	30.00%
	Expanded use of sustainable farming practices like organic farming and agro ecology	5	16.67%
	Increased reliance on technology and precision farming to optimize resource use	2	6.67%
	All of the above	3	10.00%
Total		**30**	**100.00%**

The table presents the forecasts for the future of vegetable farming in Koronivia in light of climate change. Increased risk of crop failure due to extreme weather conditions is the most commonly anticipated outcome, with 36.66% of respondents. Another common expectation is a shift towards growing more resilient, drought- tolerant and heat-resistant vegetables varieties, 30% of respondents foresee. In terms, of adopting new farming practices, expanded use of sustainable farming practices alike organic farming and agro

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ecology is expected by 16.67% of respondent. However, 6.67% of respondents believe in increased reliance on technology and precision farming to optimize resource use. Lastly, 10% of respondents believe that all of these outcomes will collectively shape the future of vegetables farming in Koronivia. The table highlights a broad range of expectations for how climate change will affect vegetable farming in Koronivia.

Table 11: Additional Support or Resources which are Necessary for Effective Adaptation

Q12		Total	
		N	%
Q12	Financial support for Farmers to Invest in Climate-Resilient Infrastructure and Technology	10	33.33%
	Access to Climate Data, Forecasting Tools and Early-Warning Systems for Better Decision-Making	6	20.00%
	Training and Education on Sustainable Farming Practices and Climate Adaptation Strategies	11	36.67%
	Government Policies and Incentives that Promote Sustainable Farming and Climate Resilience	3	10.00%
	All of the Above	0	0.00%
Total		**30**	**100.00%**

The table highlights the additional support or resources that farmers believe are necessary for effective climate adaptation. Financial support for farmers to invest in climate-resilient infrastructure and technology is the most commonly cited need with 33.33% of respondents. Training and education on sustainable farming practices and climate adaptation strategies is another critical resources, with 36.67% of respondents. In addition, access to climate data, forecasting tools and early warning systems for better decision–making is seen as a requirement by 20% of respondents. Whereby government policies and incentives that promote sustainable farming and climate resilience are seen as necessary by 10% of respondents. However, no respondents identified “All of the above” as a necessary resources, suggesting that each of these resources was considered independently essential by respondents. Overall, the table shows that farmers emphasize the need for financial support education and improved access to information as the key components climate resilience in farming.

Table 12: Types of Training or Information would help you Better Adapt to Climate Change

Q13		Total	
		N	%
Q13	Training on Climate-Resilient Farming Techniques, such as Water Management and Crop Diversification	15	50.00%
	Access to Up-to-Date Climate Forecasts and Weather Prediction Tools For Planning Purposes	7	23.33%
	Information On Financial Resources, Subsidies or Insurance Programs For Climate Adaptation	5	16.67%
	Workshops on Sustainable Land Management and Soil Health to Improve Resilience to Extreme Weather	3	10.00%
	All of the Above	0	0.0%
Total		**30**	**100.00%**

The table outlines the types of training or information that farmers believe would help them better adapt climate change. Training on climate-resilient farming techniques, such as water management and crop diversification, is the most request form of support, with 50% of respondents highlighting its importance. Access to up to date climate forecasts and weather prediction tools is another area where farmers seek support with 23.33% of respondents. Similarly, information on financial resources, subsidies or insurance programs for climate adaptation is seen as helpful by 16.67% respondents. Workshops on sustainable land management and soil health to improve resilience to extreme weather events are also considered valuable by 10% of respondents showing interest in enhancing soil health to better withstand climate impacts. Lastly, no respondents indicated that “All of the above” would be helpful, suggesting that farmers see these resources and training types as distinct and individually necessary. Overall, the table reveals that farmers prioritize practical, climate-resilient farming techniques and access to information on climate forecasts and financial support to adapt to climate change.

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Table 13: Suggestions on how to Improve the Availability of Climate Information for Farmers

Q14		Total	
		N	%
Q14	Develop More Localized and Accessible Climate Data Platforms, With User-Friendly Interfaces and Region – Specific Forecasts	9	30.00%
	Provide Mobile Apps or SMS – Based Services to Deliver Real-time Weather Updates and Climate Information Directly to Farmers	7	23.33%
	Increase Collaboration Between Meteorological Agencies, Agricultural Extension Services and Local Farmer Networks to Share Accurate and Timely Information	6	20.00%
	Offer Training Programs to Help Farmers Interpret and Apply Climate Data for Better Decision- Making	6	20.00%
	All of the Above	2	6.67%
Total		**30**	**100.00%**

The table presents suggestions for improving the availability of climate information for farmers. The most common suggestions is to develop more localized and accessible climate data platforms, which would provide user- friendly interfaces and region-specific forecasts. This option was selected by 30% of respondents, indicating a strong desire for tailored, easily accessible climate data. Another key suggestion is to provide mobile apps or SMS-based services to deliver real-time weather updates and climate information directly to farmers, with 23.33% of respondents supporting. Increasing collaboration between meteorological agencies, agricultural extension services, and local farmer's networks is also seen as important with 20% of respondents emphasizing the need for better information sharing networks. Furthermore, offering training programs to help farmers interpret and apply climate data for better decision-making is support by 20% of respondents. Lastly, "All of the above" was selected by 6.67% of respondents, indicating that some farmers see all these strategies as necessary. Overall, the table highlights a strong consensus among farmers on the need for accessible, real-time, and localized climate data, as well as better collaboration and training to help them interpret and act on this information.

Table 14: Data on Climate Change Factors Affecting Farmers of Koronivia – Koronivia Farmers' Cooperative

Months	**Flooding**		**Drought**		**Storms & Hurricanes**		**Pest & Disease Outbreak**	
Gender	Male	Female	Male	Female	Male	Female	Male	Female
Nov-23	55		0		0		26	
I-Taukei	11	10	0	0	0	0	5	4
Indians	25	7	0	0	0	0	8	9
Others	2	0	0	0	0	0	0	0
Dec-23	69		0		0		28	
I-Taukei	20	5	0	0	0	0	6	0
Indians	26	16	0	0	0	0	18	2
Others	2	0	0	0	0	0	2	0
Jan-24	72		0		0		35	
I-Taukei	20	6	0	0	0	0	6	1
Indians	25	18	0	0	0	0	25	3
Others	3	0	0	0	0	0	1	0
Feb-24	27		0		0		31	
I-Taukei	6	6	0	0	0	0	5	1
Indians	8	6	0	0	0	0	20	1
Others	1	0	0	0	0	0	4	0
Mar-24	28		0		0		30	
I-Taukei	6	5	0	0	0	0	5	0
Indians	8	4	0	0	0	0	20	4
Others	3	0	0	0	0	0	1	0
Apr-24	30		0		0		24	
I-Taukei	7	4	0	0	0	0	5	3
Indians	9	6	0	0	0	0	9	4
Others	3	1	0	0	0	0	2	1

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The table presents data on the impact of climate change factors affecting farmers in Koronivia, under the Koronivia Farmers' Cooperative, for the period from (November2023 to April 2024) during the flooding season. The data is categorized by climate change events (flooding, drought, storms and hurricanes and pest and disease outbreak) and by gender (male and female) and ethnic groups (I-Taukei, Indians and Others).

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CHAPTER FIVE
DISCUSSION

This study aimed to explore the impact of climate change on farmers of Koronivia, as well as its economic impacts on the livelihood of farmers and ways in which Ministry of Agriculture provide support to Koronivia Farmers. The findings have provided valuable insights into these questions, which will be discussed in this section.

A. Respondent Profile in Detail Discussion

A total of 30 respondents completed the survey providing a comprehensive demographic overview that highlights key details regarding gender, age and ethnicity. The ethnic groups represented are ITaukei, Indian Descent and PNS (Not to disclose Information) and the age ranges are 18-29 years, 30-39 years, 40-50 years and above 50 years. There are 30 respondents in total with 13 males (43.3%) and 9 females (30%) represented in the sample. Additionally, 9 respondents (26.7%) belong to the PNS group.

The majority of males (53.3%) are in the 40-50 years age group, with (62.5%) of ITaukei males and (50%) of PNS males in this category. ITaukei males (37.5%) are the largest ethnic group among male respondents, with 5 respondents in the 40-50years range. However, Indian Descent males are fewer (2 respondents), with (66.7%) in the 30-39 years range and (33.3%) in the 40-50 years range.

ITaukei females are the largest ethnic group in the female category, with (75%) of them in the 30-39 years group and (25%) in the 40-50 years group. Indian Descent females show a balanced distribution, (50%) in the 30-39 years group and (50%) in the 40-50 years group. Thus, PNS females are more likely to be in the 30-39 years range (75%) with (25%) in the 40-50 years age range.

However, for future surveys might aim for a broader age distribution, especially by targeting the 18-29 years and above 50 years age group, as these were under represented in this survey. Additional outreach could help ensure a more balanced gender distribution and could enhance the diversity of Indian descent and PNS participants, especially in younger age groups.

B. Understanding the Impact of Climate Change on Farming Practices and Adaptation Strategies

The survey data explores level of awareness and understanding among farmers regarding climate change and its specific impacts on farming practices. Tables 2 to 5 provide detailed knowledge of how climate-related events have affected the farmers in Koronivia.

First, there is a notable degree of awareness among respondents about the impacts of climate change on farmers in Koronivia. Out of 30 respondents 13(43.33%) said they are very much aware of the impacts of climate change whereas 11(36.67%) of the respondents were somewhat aware. However, 6(20%) of the respondents have no awareness of the specific impacts of climate change on the farming practices.

Secondly, climate change has affected farming practices, with a total of 30 responses. The most common impact reported was a change in rainfall patterns, affecting 40% of respondents. This was followed by an increase in temperature, which was noted by 26.67% of participants. Pest and disease outbreaks were also a significant concern, affecting 23.33% of farmers. Crop failures were reported by 10% of respondents. No participants mentioned other factors. These findings highlight the various climate-related challenges that farmers are facing, with rainfall patterns being the most prominent issue.

Moreover, the measures that farmers have implemented to adapt to climate change. The most commonly adopted strategy was crop diversification, with 30% of farmers employing this method to manage changing environmental conditions. This was closely followed by water conservation techniques, used by 23.34% of respondents, to address water scarcity. Soil conservation methods and crop rotation were implemented by 20% of farmers to maintain soil fertility and prevent erosion. Additionally, 13.33% of farmers adopted drought-resistant crops and irrigation methods to cope with the challenges posed by irregular rainfall and rising temperatures. Notably, agroforestry was not implemented by any of the respondents, suggesting limited uptake of this particular adaptation strategy. In total, 30 farmers participated in the survey, reflecting their varied approaches to adapting to the impacts of climate change.

Further, highlights the response of farmers regarding changes in the types of vegetables they grow in response to climate change. A significant majority, 73.33% of the respondents, reported that they have changed the types of vegetables they cultivate as a direct adaptation to the changing climate conditions. This indicates that farmers are modifying their agricultural practices to better suit new environmental realities, possibly selecting more climate-resilient or drought-tolerant crops. In contrast, 26.67% of farmers stated that they have not made any changes to the types of vegetables they grow. This could suggest that some farmers either feel their current crops are still well-suited to the climate or face barriers in adapting to new agricultural practices. In total, 30 farmers were surveyed, reflecting diverse experiences and responses to climate change.

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C. Access to Resources for Farmers and Government/NGO Support in Climate Adaptation

The survey findings from Tables 6 to 7 highlight a significant concern regarding the resources available to farmers for climate adaptation and the support provided by the government and NGOs. The availability of resources for farmers and the support from government and non-governmental organizations (NGOs) play a critical role in helping agricultural communities adapt to the challenges posed by climate change.

As climate conditions become more unpredictable, farmers need access to various resources such as financial assistance, technical guidance, and material support to implement effective adaptation strategies. Among the respondents, the most commonly available resource was material support, with 56.66% of farmers indicating they have access to materials that help them adapt to climate change. This may include things like seeds, tools, or equipment necessary for implementing adaptive farming practices. Technical support was reported by 26.67% of farmers, suggesting that a smaller but significant portion of farmers have access to expert guidance or training to help them adjust to new climatic conditions. Only 16.67% of farmers had access to financial resources, which are critical for investments in adaptation strategies such as purchasing new equipment, adopting climate-resilient crops, or implementing irrigation systems. This indicates that financial support may be a limiting factor for many farmers in fully adapting to climate change.

In many cases, government programs and NGO initiatives are essential in providing this support, helping farmers build resilience against extreme weather events, shifting rainfall patterns, and other climate-related challenges. Understanding the extent of this support and the resources available is key to ensuring that farmers can continue to thrive in an increasingly unstable environmental landscape. According to the data presents the availability of government or NGO support programs for farmers. A majority of respondents, 66.67%, reported that they have access to such programs, indicating that more than half of the farmers benefit from external assistance, which may include financial aid, technical support, or resources to help with climate adaptation. On the other hand, 33.33% of farmers stated that they do not have access to any government or NGO support programs. This suggests that a significant portion of farmers may face challenges in accessing external resources, which could limit their ability to implement effective climate adaptation strategies.

D. The Impact of Climate Change on Farmers' Cooperatives and Collaborative Strategies to Address Climate-Related Challenges.

The impact of climate change on farmers' cooperatives is increasingly significant, as shifting weather patterns and extreme events disrupt agricultural production and cooperative operations. These challenges are pushing cooperatives to adapt through various collaborative strategies. This survey findings from table 8 and 9 explores how climate change has affected farmers' cooperatives, focusing on key impacts such as extreme weather events and the need for relocation. It also examines the strategies cooperatives are employing to address these climate-related challenges, highlighting the importance of collective action and resource-sharing in building resilience within farming communities.

The survey highlights several key impacts, shedding light on the ways cooperatives are being disrupted by climate change. A significant 40% of respondents reported that extreme weather events, such as floods, droughts, and storms, have had the most considerable impact on their cooperatives. These unpredictable and severe weather patterns can cause damage to infrastructure, disrupt agricultural production, and affect the overall functioning of the cooperative. In addition, 26.67% of farmers noted that climate change has led to the need for relocation, suggesting that some cooperatives have been forced to move to areas less vulnerable to environmental stressors. Furthermore, 33.33% of respondents mentioned that both extreme weather events and relocation were factors affecting their cooperatives. This indicates that climate change is creating multifaceted challenges that cooperatives are struggling to manage. Notably, no respondents reported that climate change had no effect, emphasizing that the impacts are widespread. In total, 30 farmers participated in the survey, highlighting the diverse ways in which climate change is affecting cooperative operations.

However, the collaborative strategies employed by farmers' cooperatives to address climate-related challenges. These strategies reflect the cooperative's collective efforts to build resilience and adapt to the impacts of climate change. A significant 33.33% of respondents reported that cooperatives are actively sharing best practices for sustainability among their members to reduce the collective environmental impact. This strategy helps ensure that all members are equipped with effective, climate-smart agricultural practices. Additionally, 30% of farmers noted that cooperatives are forming alliances with local and global organizations to advocate for stronger climate policies, demonstrating a broader effort to influence policy and secure support for climate adaptation. Some cooperatives (26.67%) are adopting a combination of these strategies, working across multiple fronts to address climate challenges. Furthermore, 10% of respondents highlighted collaboration with research institutions, signaling a willingness to integrate scientific knowledge into their adaptive practices. Notably, no respondents indicated that their cooperatives were not engaged in any collaborative strategies, underscoring the widespread recognition of the need for joint efforts in tackling climate change..

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E. The Future of Vegetable Farming in Koronivia: Climate Change Challenges, Required Support, and Training for Successful Adaptation

The future of vegetable farming in Koronivia is increasingly shaped by the challenges posed by climate change. These environmental changes threaten agricultural productivity and require farmers to adopt new strategies to maintain their livelihood. The survey finding from tables 10 to 12 will be discussed in this section .The strategies and concerns that farmers in Koronivia anticipate in response to the growing challenges posed by climate change.

The results highlight various approaches farmers are considering to adapt to the changing climate. A significant 36.66% of farmers reported that the increased risk of crop failure due to extreme weather conditions is a major concern. This reflects the growing uncertainty around weather patterns, such as droughts and heavy rainfall, which directly impact crop yields. In response, 30% of farmers are shifting towards growing more resilient, drought-tolerant, and heat-resistant vegetable varieties, which can better withstand the changing climate. Additionally, 16.67% of farmers are expanding the use of sustainable farming practices like organic farming and agro ecology, which focus on enhancing environmental health and long-term productivity. A smaller portion, 6.67%, emphasized an increased reliance on technology and precision farming to optimize resource use, improving efficiency and reducing environmental impact. Finally, 10% of farmers are adopting a combination of these strategies. Overall, the responses reflect a broad recognition of the need for diverse and integrated approaches to address the challenges of climate change and ensure the future of farming in the Koronivia area.

Moreover, the additional support or resources farmers believe are necessary for effective adaptation to climate change. The results indicate the critical areas where farmers feel they need assistance to build resilience and ensure sustainable agricultural practices. A significant 36.67% of farmers identified the need for training and education on sustainable farming practices and climate adaptation strategies. This reflects the importance of equipping farmers with the knowledge and skills required to cope with climate-related challenges. Financial support for farmers to invest in climate-resilient infrastructure and technology was the second most commonly identified need, with 33.33% of farmers highlighting the importance of financial assistance for adapting their farming methods and infrastructure. Access to climate data, forecasting tools, and early-warning systems for better decision-making was noted by 20% of farmers, suggesting that timely and accurate information is crucial for adapting to unpredictable weather patterns. Finally, 10% of farmers emphasized the need for government policies and incentives that promote sustainable farming and climate resilience. Notably, no farmers identified a need for just one resource, showing that a combination of support is needed to effectively address climate adaptation. These results underscore the multifaceted approach required to help farmers adapt to the challenges posed by climate change.

Furthermore, the types of training or information that farmers believe would help them better adapt to climate change. The results reveal the key areas where farmers feel additional knowledge and skills are necessary to enhance their resilience to climate-related challenges. The most commonly identified need, with 50% of respondents, is training on climate-resilient farming techniques, such as water management and crop diversification. These practices are essential for coping with changing weather patterns and ensuring sustainable agricultural production. A further 23.33% of farmers highlighted the importance of access to up-to-date climate forecasts and weather prediction tools, which would assist them in planning and making informed decisions. Information on financial resources, subsidies, or insurance programs for climate adaptation was noted by 16.67% of respondents, indicating that support in securing funding or protection against climate risks is a critical need. Lastly, 10% of farmers identified workshops on sustainable land management and soil health as valuable for improving resilience to extreme weather. Notably, no respondents mentioned the need for just one type of training, suggesting that farmers recognize the importance of a comprehensive approach to climate adaptation. These findings highlight the diverse knowledge and resources needed to equip farmers with the tools to adapt successfully to the changing climate.

F. Suggestions for Improving Farmers' Access to Climate Information

The information gathered from research, table 12 suggests on how to improve the availability of climate information for farmers. These recommendations highlight the importance of accessible, real-time, and region-specific climate data to help farmers make informed decisions and adapt to changing environmental conditions.

The most common suggestion, with 30% of respondents, is the development of more localized and accessible climate data platforms, featuring user-friendly interfaces and region-specific forecasts. This would ensure that farmers receive accurate and relevant climate information tailored to their specific location. Additionally, 23.33% of farmers proposed providing mobile apps or SMS-based services to deliver real-time weather updates and climate information directly to farmers, making it easier for them to access crucial data on the go. Another 20% of farmers emphasized the need for increased collaboration between meteorological agencies, agricultural extension services, and local farmer networks to share accurate and timely information. This would improve communication and ensure farmers receive consistent, reliable updates. Another 20% suggested offering training programs to help farmers interpret and apply climate data effectively in their decision-making processes. Lastly, 6.67% of respondents advocated for a combination of all these strategies. These suggestions underscore the need for a multifaceted approach to enhance climate information accessibility for farmers, ensuring they have the tools and knowledge to adapt successfully to climate change.

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CHAPTER SIX
SYNTHESIS OF THE FINDINGS

The research on the impact of climate change on vegetable farmers in Koronivia reveals significant challenges and adaptive responses within the farming community. The findings demonstrate that farmers are acutely aware of the climate change impacts they face, which include shifting rainfall patterns, rising temperatures, and the increased frequency of extreme weather events. These changes have contributed to issues such as crop failures, pest outbreaks, and the need for relocation, which have affected both individual farmers and cooperative operations.

Farmers have implemented various adaptive measures to cope with these challenges. These include crop diversification, the use of drought-resistant varieties, and water conservation techniques. Despite these efforts, the research highlights that many farmers still face barriers in fully adapting, particularly due to limited access to financial resources, technical support, and climate-specific information.

The survey also points to the role of government and NGO support programs, with a significant proportion of farmers having access to such initiatives. However, the nature and extent of this support vary, indicating that there is still a need for more targeted and accessible assistance. Collaborative strategies, such as forming alliances with local and global organizations, sharing best practices, and collaborating with research institutions, are being used to enhance collective resilience among farmers' cooperatives.

Moreover, the research emphasizes the importance of improving access to climate information. Key suggestions include the development of localized climate data platforms, mobile apps for real-time weather updates, and greater collaboration between meteorological agencies and farmer networks. Training on sustainable farming techniques, climate data interpretation, and the application of modern technology are also essential to enhance farmers' adaptive capacity.

Overall, while farmers in Koronivia are taking steps to mitigate and adapt to climate change, the findings underscore the need for more comprehensive support in terms of resources, training, and access to accurate, localized climate information to ensure the long-term sustainability of vegetable farming in the region.

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CHAPTER SEVEN
CONCLUSION

In conclusion, the research highlights the significant and growing impact of climate change on vegetable farmers in Koronivia. Farmers are increasingly facing challenges such as erratic rainfall, rising temperatures, and extreme weather events that threaten crop productivity, disrupt farming practices, and negatively affect farmers' livelihoods. The study underscores the vulnerability of the agricultural sector to climate variability and the urgent need for effective adaptation strategies.

While farmers have implemented various measures to cope with these challenges, such as crop diversification, drought-resistant varieties, and water conservation techniques, there are still notable gaps in their ability to fully adapt. Key barriers include limited access to financial resources, technical support, and timely climate information. The findings also show that although government and NGO support programs are available, they are often insufficient or not tailored to the specific needs of the farmers in the region.

The research further emphasizes the critical need for improved access to localized climate data and forecasting tools, as well as better training on sustainable farming practices. Collaborative efforts between government agencies, NGOs, and the farming community are crucial to enhancing resilience and ensuring the long-term sustainability of vegetable farming in Koronivia.

Ultimately, addressing the impacts of climate change on vegetable farmers requires a multifaceted approach, combining financial support, technology, education, and stronger policy frameworks. By enhancing the capacity of farmers to adapt to the changing climate, Koronivia’s vegetable farming sector can better navigate the challenges posed by climate change and continue to thrive in the face of an uncertain future.

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RECOMMENDATION

To effectively address the impact of climate change on vegetable farmers in Koronivia, several key recommendations can be made. First, there is a critical need for increased financial support for farmers to help them invest in climate-resilient infrastructure, technologies, and farming practices. Government and NGO policies should focus on providing targeted financial assistance, such as grants, subsidies, and low-interest loans, as well as expanding crop insurance programs to protect farmers from extreme weather events. Second, enhancing access to reliable and localized climate information is vital. The development of user-friendly climate data platforms, mobile applications, and SMS-based services can help deliver real-time weather updates and forecasts, enabling farmers to make better-informed decisions regarding planting and harvesting.

Additionally, strengthening collaboration between meteorological agencies, agricultural extension services, local farmer networks, and NGOs is crucial for ensuring that accurate and timely climate information reaches farmers. Partnerships with research institutions can also drive the development of climate-resilient farming techniques and crop varieties. Furthermore, providing targeted training programs on sustainable farming practices, climate-smart agriculture, and effective water and soil management would help farmers better adapt to the changing climate. Promoting the adoption of climate-smart agricultural practices, such as agro ecology and crop diversification, is essential for ensuring long-term environmental sustainability.

Lastly, strengthening government policies that support sustainable farming and climate resilience will create a more conducive environment for adaptation. These policies should promote both environmental protection and food security. By implementing these recommendations, the vegetable farming sector in Koronivia can enhance its resilience to climate change, securing the livelihoods of farmers and ensuring the future sustainability of the industry.

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APPENDIX

Questionnaire

A. Research Topic: Impact of Climate Change on Farmers of Koronivia

➢ *Demographic Information*

Name: ……..

Age: ☐ Between 18-29yrs ☐ 30-39yrs ☐ 40-50yrs ☐ Above 50

Gender: ☐ Male ☐ Female

Religion: ☐ Itaukei ☐ Indofijian

➢ *Do you know what climate change is?*

☐ Yes ☐ No

➢ *Are you aware of specific climate changes affecting your farming?*

☐ Very much aware ☐ Somewhat aware ☐ No idea at all

➢ *How has Climate Change affected your farming practices? (Select all that apply)*

☐ Change in rainfall patterns ☐ Increase in temperature ☐ Pests and diseases outbreak
☐ Crop failures ☐ Others

➢ *What measures have you implemented to adapt to climate change? (Select all that apply)*

☐ Crop diversification ☐ Water conservation techniques
☐ Agroforestry ☐ Soil conservation method and crop rotation
☐ Using drought-resistant crop ☐ Irrigation Methods

➢ *Have you changed the types of vegetables you grow in response to climate change?*

○ Yes ○ No

➢ *What resources (financial, technical, or material) do you have access to for climate adaptation?*

☐ Financial ☐ Technical ☐ Material

➢ *Are there government or NGO support programs available to you?*

○ Yes ○ No

➢ *How has climate change affected the cooperative as a whole?*

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- Extreme Weather events (eg: floods, droughts, storms)
- Some cooperative members may be forced to relocate due to climate-related events such as Flooding
- All of the above
- None of the above

➢ *What collaborative strategies are in place to address climate-related challenges?*

- Forming alliance with local and global organizations to advocate for stronger climate policies
- Sharing best practices for sustainability among cooperative members to reduce collective environmental impact
- Collaborating with research institutions allows cooperatives to stay informed about emerging climate-related technologies and methods, which can enhance their resilience and sustainability efforts
- All of the above
- None of the above

➢ *How do you foresee the future of vegetable farming in your area given climate change?*

- Increased risk of crop failure due to extreme weather events such as droughts and floods
- Shift towards growing more resilient, drought-tolerant and heat-resistant vegetable varieties
- Expanded use of sustainable farming practices like organic farming and agro ecology
- Increased reliance on technology and precision farming to optimize resource use
- All of the above

➢ *What additional support or resources do you believe are necessary for effective adaptation?*

- Financial support for farmers to invest in climate-resilient infrastructure and technology
- Access to climate data, forecasting tools, and early-warning systems for better decision- making
- Training and education on sustainable farming practices and climate adaptation strategies
- Government policies and incentives that promote sustainable farming and climate resilience
- All of the above

➢ *What kind of training or information would help you better adapt to climate change?*

- Training on climate-resilient farming techniques, such as water management and crop diversification
- Access to up-to-date climate forecasts and weather prediction tools for planning purposes
- Information on financial resources, subsidies, or insurance programs for climate adaptation
- Workshops on sustainable land management and soil health to improve resilience to extreme weather
- All of the above

➢ *Do you have any suggestions on how to improve the availability of climate information for farmers?*

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- Develop more localized and accessible climate data platforms, with user-friendly interfaces and region–specific forecasts
- Provide mobile apps or SMS–based services to deliver real-time weather updates and climate information directly to farmers
- Increase collaboration between meteorological agencies, agricultural extension services, and local farmer networks to share accurate and timely information
- Offer training programs to help farmers interpret and apply climate data for better decision-making
- All of the above