

Impacts of Climate Change on Rural Communities in Assam and Manipur

Social, Economic and Environmental Aspects

Prepared by
**Seven Sisters Development Assistance
(SeSTA)**

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Table of Contents

01

ACKNOWLEDGEMENT
PAGE.03

02

INTRODUCTION TO THE NODE
PAGE.04

03

INTRODUCTION
PAGE.05

04

SAMPLE METHODOLOGY
PAGE.06

05

LITERATURE REVIEW
PAGE.14

06

DISTRICT PROFILE
PAGE. 16

07

RESEARCH FINDINGS
PAGE. 19

08

CONCLUDING REMARKS
PAGE. 53

09

REFERENCES
PAGE. 57

10

LIST OF TABLES
PAGE. 58

11

ANNEXURE
PAGE. 59

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The study is fruit of collaborative effort, however, the faults, if any, solely belong to the author.

Introduction to NODE Research

About SeSTA

SeSTA (Seven Sisters' Development Assistance) was conceived with a mission to systematically drive socio-economic development across Northeast India by empowering marginalized communities. Through capacity building and institutional strengthening, SeSTA aims to lift these communities out of poverty and enable them to engage meaningfully in the global economy. Operating in some of the most remote and underdeveloped regions of the Northeast, SeSTA addresses the unique challenges posed by this geographically isolated and diverse area. Our teams are embedded across 34 Blocks in 19 Districts of Assam, 6 Blocks in 3 Districts of Meghalaya, and 4 Blocks in 2 Districts of Tripura. Additionally, in Arunachal Pradesh, Nagaland, Manipur, and Mizoram, SeSTA serves as the technical partner for the State Rural Livelihoods Missions (SRLMs). To date, SeSTA has positively impacted over 150,000 households by promoting organic farming, enhancing agricultural productivity, improving livestock management, and facilitating access to government schemes.

About NODE

NODE is an innovative initiative of SeSTA, supported by the Axis Bank Foundation, designed to catalyze and invigorate the development sector in Northeast India. This initiative focuses on sustainable livelihoods, climate resilience, grassroots governance, and gender justice, among other critical developmental themes. NODE seeks to harness the immense potential of collective community action. The initiative's core focus areas include organizational development, effective finance, accounts and compliance management, transformative governance training, human resource management, fundraising, stakeholder management, monitoring, evaluation and learning, as well as thematic knowledge and skills building. Currently, 13 Civil Society Organizations (CSOs) are part of this program.

About the Research

The research under NODE is a participatory and evidence-based study, ensuring the inclusion of diverse communities across Northeast India and engaging all relevant stakeholders. This research not only builds the capacity of participants but also fosters interdisciplinary and cross-sectoral partnerships. It explores and leverages new methodologies while upholding the highest standards of ethical research practices.

The study, titled "Impacts of Climate Change in Rural Communities of Assam and Manipur," specifically examines the social, economic, and environmental dimensions of climate change in three districts each from Assam and Manipur. These regions have been experiencing distinct climatic trends that significantly affect local communities and their livelihoods. The research is conducted in a participatory mode, with the active involvement of partners in the mentioned states, taking into account their interest, presence, and cooperation. This collaborative approach ensures that the findings are both relevant and actionable, providing a robust foundation for informed decision-making and sustainable development in the face of climate change.

Introduction

Climate change poses significant challenges to rural communities' worldwide, particularly in regions with limited resources and high dependence on natural ecosystems. In India, the northeastern states of Assam and Manipur are especially vulnerable due to their unique geographical, ecological, and socio-cultural contexts. These regions are predominantly rural, with a large portion of the population reliant on agriculture and natural resources for their livelihoods. As climate patterns shift, these communities face increasing risks related to agriculture, water resources, and overall socio-economic stability.

Climate change impacts have become highly visible affecting different aspects of human society and ecosystem across the globe. Rapid increase in earth's surface temperature and changing precipitation pattern has resulted in direct implication to multiple sectors and livelihood of communities. The intergovernmental Panel on Climate Change (IPCC) has predicted 3.7 to 4.8 degree C of warming if the works as usual continues (IPCC, 2014). The continuous increase in greenhouse gas emission due to anthropogenic pressure would further amplify the rate of increase in temperature and intensify the frequency of extreme weather events including floods, droughts, changing rainfall pattern, water resources depletion, and severe heat/cold waves. It has posed the global communities specially the poorest households more vulnerable to climate change.

Assam and Manipur are already witnessing the adverse impacts of climate change, including erratic rainfall, rising temperatures, and increased frequency of extreme weather events. These changes have profound effects on agriculture—the backbone of rural economies—leading to reduced crop yields, loss of biodiversity, and heightened food insecurity. Moreover, the impacts extend beyond agriculture, influencing water availability, migration patterns, gender dynamics, and educational opportunities. The socio-economic consequences of these changes are particularly severe for marginalized groups, exacerbating existing inequalities and vulnerabilities.

Understanding the drivers of vulnerability and resilience within these communities is crucial for developing effective strategies to combat the effects of climate change. Socio-economic factors such as poverty, access to education, and health services, as well as cultural aspects like traditional knowledge systems and social cohesion, play a significant role in shaping how communities respond to environmental stressors. In addition to that governance mechanisms at local, state, and national levels influence the effectiveness of adaptation measures and the overall resilience of these populations.

This research seeks to assess the current and projected impacts of climate change on rural communities in Assam and Manipur, with a focus on agriculture, livelihoods, water resources, and socio-economic dynamics. By identifying key drivers of vulnerability and resilience, this study aims to provide insights into the effectiveness of existing adaptation measures and explore innovative strategies for enhancing climate resilience. The findings will contribute to the development of targeted interventions and policies on climate change in the rural community. This further would contribute to sustainable climate friendly livelihood approach for the communities.

Research Objectives

This research aims to:

1. Assess the current and projected impacts of climate change on rural communities in Assam and Manipur, focusing on agriculture, livelihoods, water resources, and socio-economic dynamics.
2. Identify the key drivers of vulnerability and resilience among rural populations in the face of climate change, considering socio-economic factors, cultural aspects, and governance mechanisms.
3. Investigate the effectiveness of existing adaptation measures and policies in mitigating the adverse effects of climate change on rural livelihoods and well-being.
4. Explore innovative strategies and practices for climate change adaptation and resilience building in rural Assam and Manipur.

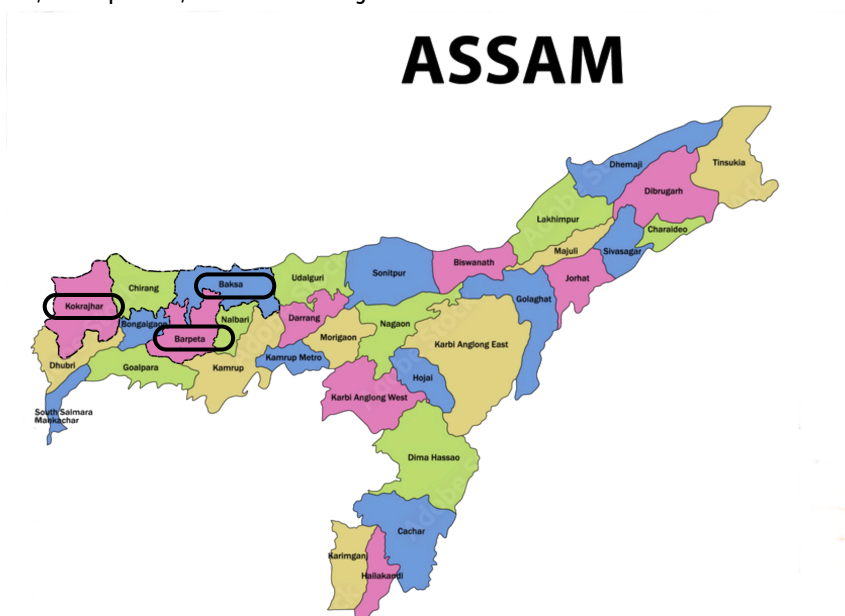
2. Sample Methodology

This chapter outlines the sampling methodology employed in the study. The study was conducted in the states of Assam and Manipur, focusing on specific districts and villages that are representative of the diverse socio-economic and environmental conditions in these regions.

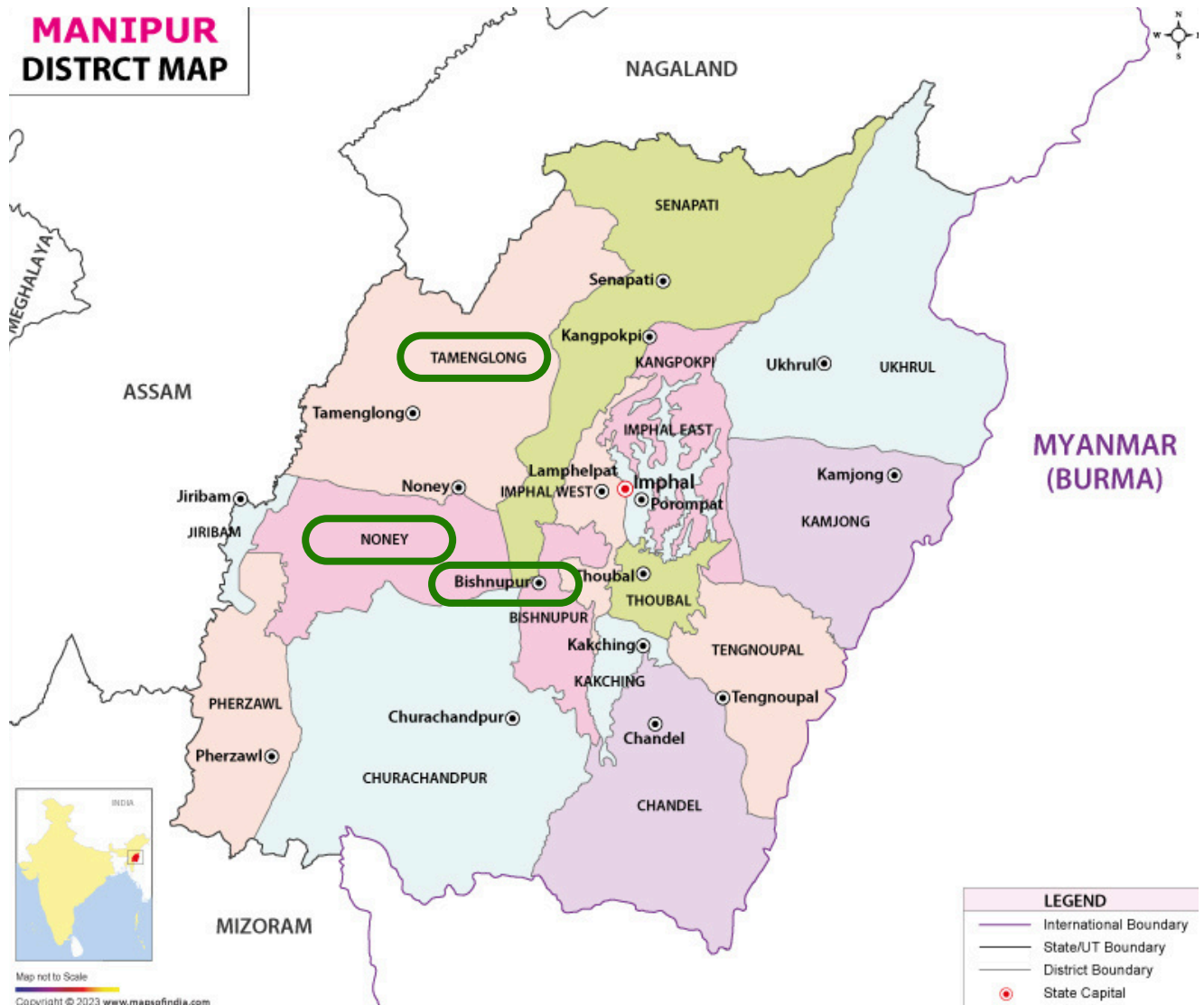
2.1 Survey Framework:

1. Study Area: The study was conducted in two northeastern states of India - Assam and Manipur. Three districts from each state were selected to represent diverse geographical, socio-economic, and environmental conditions. The Map of each locations are provided below:

Assam: Baksa, Barpeta, and Kokrajhar districts.



Manipur : Bishnupur, Noney, and Tamenglong districts.

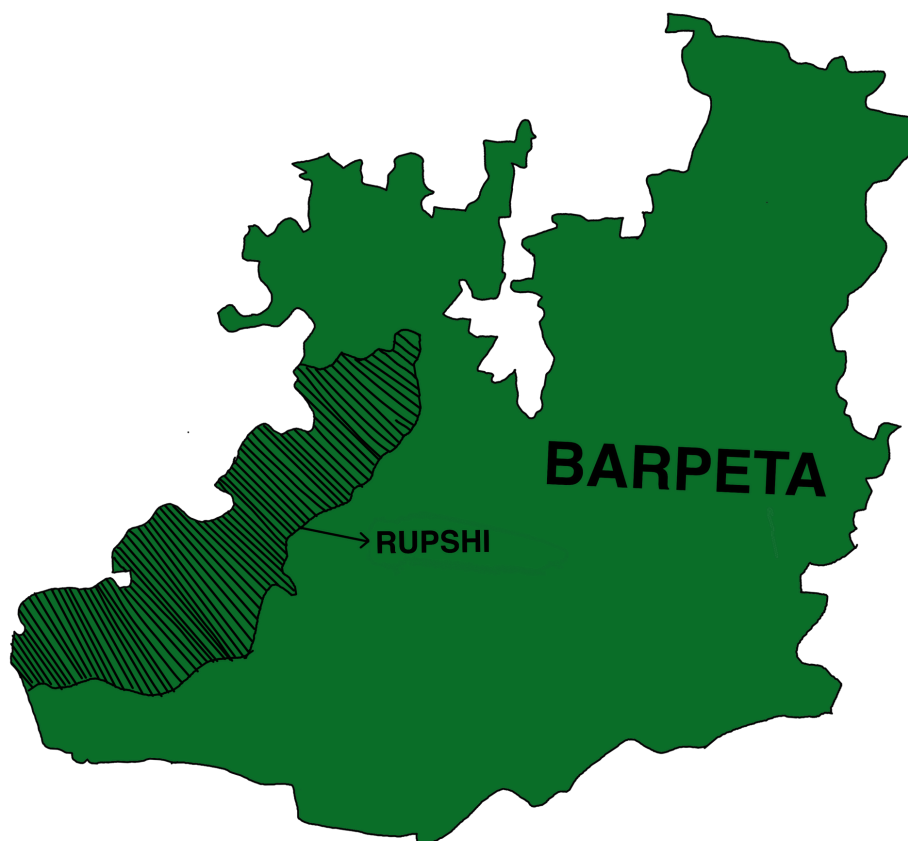


Assam:

Baksa District: Baganpara block, (Dhamdhama – C.D. block) (Villages: Uttarpara, Baganpara, Adla Shimla)



Barpeta District: Rupshi CD block (Villages: Mowamari, Lachanga, Guileza)

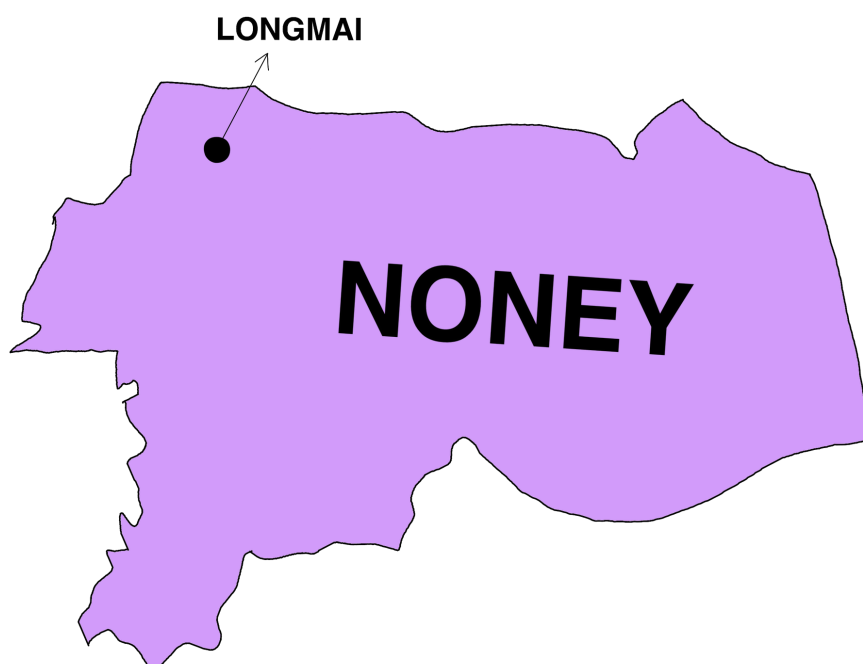


Kokrajhar District: Gossaigaon block (Villages: Kusumbil, Boalkamari, Aminkata)

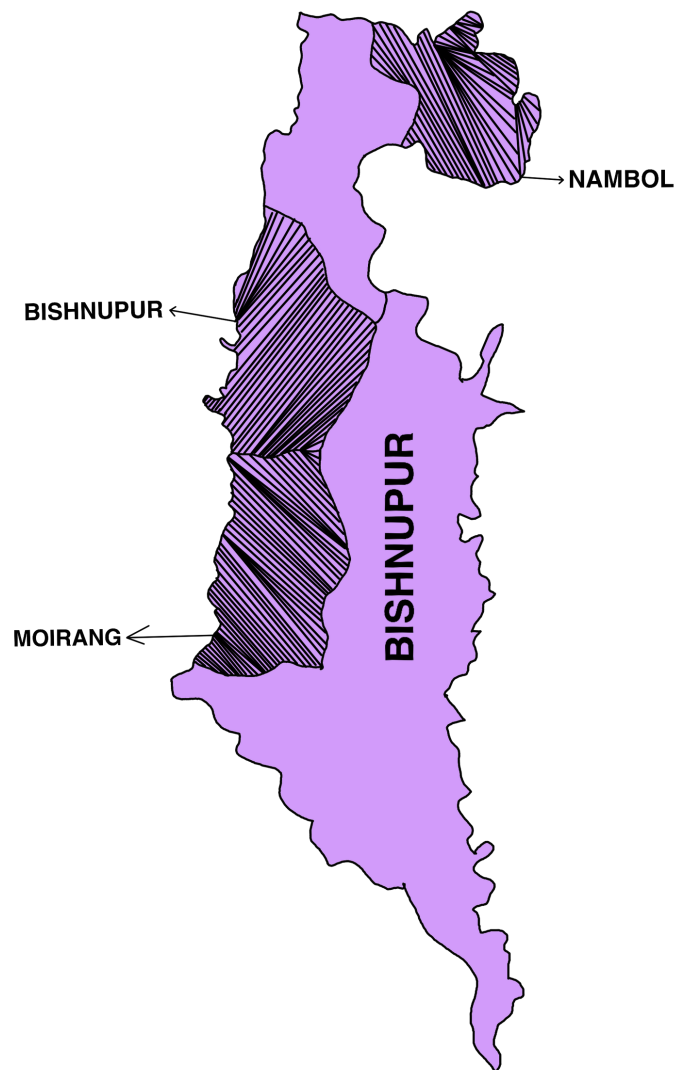


Manipur:

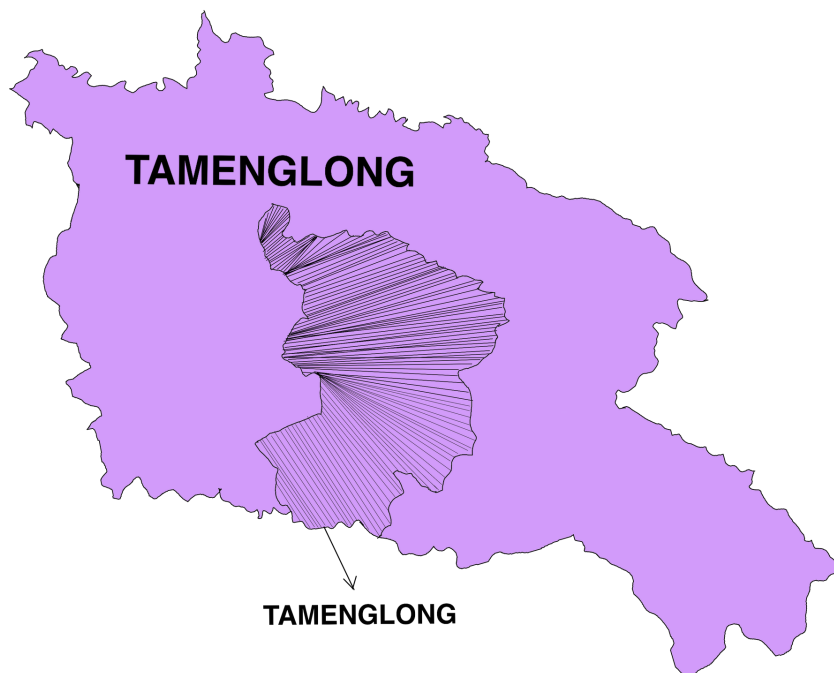
Noney District: Longmai block (Villages: Rangkhung, Longmai)



Bishnupur District: Bishnupur, Nambol, Moirang blocks (Villages: Upokpi Khunou, Ishok, Haotak)



Tamenglong District: Tamenglong block (Village: Khangchiuluon)



2.2 Sampling Design:

The study employed a multistage sampling technique, combining mixed and random sampling methods to ensure a comprehensive representation of the target population.

1 Location Selection

The rationale for choosing the locations in Manipur and Assam districts is twofold. First, the selection aims to capture a broad range of climatic conditions, which provides a comprehensive understanding of the environmental variability in these regions. Second, the locations were chosen based on the operational areas of Node partners to make it participative research, ensuring alignment with existing networks and facilitating more effective collaboration and implementation. Villages were selected on random basis. The selection also considered the diversity of socio-economic conditions, with a focus on villages where agriculture is the primary livelihood. In total, 15 villages were selected across the six districts, with three villages from each district, except for Noney (two villages) and Tamenglong (one village).

2 Household Sampling

For the household survey, a random sampling technique was used to select households within each village. To ensure adequate representation, 30% of the total households in each village were selected for the survey. This approach provided a sample size of approximately 120 households per village. This has ensured that the sample was large enough to capture the variability in household characteristics, perceptions, and adaptive capacities.

3 Focus Group Discussions (FGDs)

FGDs were conducted to gather qualitative insights from community members and key stakeholders. The participants included farmers (both male and female) and representatives from local governance bodies such as the Panchayat and Block. Each FGD with a group size of 15 to 25 participants was conducted in the selected village. The FGDs aimed to capture the collective experiences, challenges, and adaptive strategies of the communities in response to climate change.

4 Key Informant Interviews (KIs)

KIs were conducted with officials from the Environment, Forest, and Climate Change departments to gain insights into policy implementation and the effectiveness of adaptation measures at the local level. The informants were selected based on their expertise and involvement in climate-related programs and policies.

5 Data Collection

Data collection was conducted using a mixed-methods approach, integrating both quantitative and qualitative techniques:

Household Surveys: Structured questionnaires were administered to the selected households to collect data on demographics, livelihood activities, perceptions of climate change, and adaptive capacities.

Focus Group Discussions: FGDs were facilitated using a semi-structured guide to explore community-level impacts of climate change, traditional knowledge, and collective adaptation strategies.

Key Informant Interviews: KIs were conducted using an interview guide to gather detailed information on policy implementation and challenges in climate change adaptation.

6 Sampling tools: For this data collection was carried out using a combination of digital and traditional methods. Kobo Toolbox was employed to create and administer digital forms, allowing for structured and systematic data entry during the fieldwork. This tool facilitated the efficient collection of qualitative data, ensuring accuracy and consistency in the responses. In addition to the Kobo forms, FGDs and KIs were conducted to gather qualitative insights. The discussion and interviews were documented through note-taking and recordings device, which captured the nuanced and detailed perspectives of the participants.

7 Analysis Methods: The collected data was analyzed using Advanced Excel, which offered a robust platform for managing, organizing, and interpreting the qualitative data. Excel's advanced functions, including pivot tables, statistical formulas, and graphical representations, were utilized to derive meaningful patterns and trends from the data. The analysis also incorporated qualitative insights from the FGDs and KIIs. The notes from these sessions were systematically reviewed, categorized, and synthesized to identify key themes and narratives. These qualitative findings were integrated with the quantitative analysis to provide a comprehensive understanding of the research outcomes.

8 Sampling Partners

The study was conducted in collaboration with local organizations to ensure effective community engagement and data collection. The partners included:

1. Aman Foundation (Barpeta, Assam)
2. ASHA (Kokrajhar, Assam)
3. Sanjog (Baksa, Assam)
4. Realm of Nature Based Actions (RNBA, Noney, Tamenglong, Manipur)
5. People's Resource Development Association (PRDA, Bishnupur, Manipur)

These partners played a crucial role in facilitating access to the communities, conducting surveys, organizing FGDs, and ensuring the cultural appropriateness of the research instruments.

2.3 Samples:

The table provides details on the number of samples collected from each village and aggregates these numbers to show the total samples collected per district. The study has covered two states in the North-Eastern region, that is Assam and Manipur state with three districts from each state. Baksa, Barpeta and Kokrajhar district from Assam and Bishnupur, Noney and Tamenglong district from Manipur state. Within each district, it has covered Dhamdhama block from Baksa district, Rupashi block from Barpeta district, Gossaigaon block from Kokrajhar district; Bishnupur, Nambol and Moirang block from Bishnupur district and Longmai block from Noney district and Tamenglong block from Tamenglong district. Fifteen villages, three villages from each district, were selected, except Noney where only two villages were selected and one village from Tamenglong district. The table lists the block and corresponding villages from which the samples were collected and details the number of households sampled from each village. The district totals indicate the aggregate number of samples collected from all the selected villages within each district.

Table 1: Sample Distribution

S.No.	State	District	Block	Village	No. of Sample	District Total
1	Assam	Baksa	Dhamdhama	Uttarpara	123	386
2				Baganpara	136	
3				Adla Shimla	127	
4		Barpeta	Rupashi	Mowamari	124	366
5				Lachanga	122	
6				Guileza	121	
7		Kokrajhar	Gossaigaon	Kusumbil	184	431
8				Boalkamari	120	
9				Aminkata	127	
10	Manipur	Bishnupur	Bishnupur	Upokpi Khunou	73	288
11			Nambol	Ishok	103	
12			Moirang	Haotak	112	
13		Noney	Longmai	Rangkhung	120	240
14				Longmai	120	
15		Tamenglong	Tamenglong	Khangchiuluon	116	116

By sampling a significant proportion of households from each village, the study captures a wide range of experiences, perceptions, and adaptive strategies related to climate change. The total number of district allow for a district-level analysis, significant for understanding regional differences and tailoring adaptation strategies accordingly.

Literature Review

Introduction

Climate change has emerged as a critical global challenge, with significant implications for agriculture, food security, and rural livelihoods. The regions of Assam and Manipur, like many other parts of India, are particularly vulnerable due to their dependence on agriculture and the complex interplay of socio-economic factors. This literature review examines the body of research on the impacts of climate change on agriculture, with a specific focus on the effects in Assam and Manipur. It explores the observed climatic changes, their impact on agricultural practices, food security, and the adaptive strategies employed by farming communities.

Impacts of Climate Change on Agriculture

Several studies have documented the impacts of climate change on agriculture in India, with varying degrees of emphasis on different regions and crops. According to the Intergovernmental Panel on Climate Change (IPCC), agriculture is one of the most vulnerable sectors to climate change, particularly in developing countries where farming is often rainfed and highly sensitive to climatic variability (IPCC, 2014). The IPCC highlights that changes in temperature and precipitation patterns, as well as the increasing frequency of extreme weather events, are likely to exacerbate food insecurity in many parts of the world.

In the context of India, studies by Aggarwal et al. (2009) and Mall et al. (2006) have shown that climate change is expected to have adverse effects on crop yields, particularly for staples such as rice and wheat. Assam and Manipur, located in the northeastern part of the country, are no exceptions. The region's agriculture is predominantly rainfed, making it highly susceptible to variations in rainfall and temperature. Goswami et al. (2010) highlight that the northeastern states of India have experienced significant changes in monsoon patterns, with a trend towards more erratic and intense rainfall, leading to both droughts and floods.

Climate Change in Assam and Manipur

Several studies focus specifically on the northeastern region of India, where Assam and Manipur are located. This area is characterized by a unique topography and climate, making it particularly vulnerable to climate change. Ahmed et al. (2012) discuss the increasing variability in rainfall in Assam, noting that both excessive rainfall and prolonged dry spells have been recorded more frequently in recent years. This has led to flooding during the monsoon season and water shortages during the dry season, both of which severely impact agricultural productivity.

In Manipur, a study by Singh et al. (2014) observes similar trends, with increased rainfall variability leading to both waterlogging and drought conditions. These extreme weather events have resulted in reduced crop yields and have also disrupted the traditional cropping patterns, forcing farmers to adapt by either changing crop types or altering planting schedules. However, the success of these adaptations is often limited by the lack of access to modern agricultural inputs and technologies.

Food Security and Changing Consumption Patterns

The relationship between climate change and food security is well-documented in the literature. According to FAO (2016), climate change poses a direct threat to food security by affecting all four dimensions: food availability, access, utilization, and stability. In Assam and Manipur, food security is intricately linked to the success of local agriculture, which provides both sustenance and income for the majority of the population.

Research by Dubey et al. (2018) indicates that the changing climate has already begun to alter food consumption patterns in rural areas of northeastern India. The reduced availability of locally grown, fresh produce due to agricultural disruptions has led to an increased reliance on processed and inorganic foods. This shift not only undermines nutritional security but also has broader implications for public health, as diets become less diverse and more dependent on imported, less nutritious food products.

Socio-Economic Vulnerabilities

The socio-economic context of Assam and Manipur further exacerbates the vulnerabilities of these regions to climate change. Studies by Baruah (2012) and Sarma (2014) emphasize that the region's socio-economic conditions, including widespread poverty, limited infrastructure, and inadequate access to financial services, significantly hinder the ability of communities to adapt to climate change. For instance, the reliance on traditional agricultural practices, such as Jhum (slash-and-burn) cultivation, limits productivity and increases vulnerability to climatic changes.

Moreover, access to government support services, including agricultural extension and credit, is uneven across the region, with some districts better served than others. This disparity is highlighted in studies by Sharma and Singh (2015), who note that regions with better access to these services are more successful in implementing adaptive strategies, such as the adoption of new crop varieties or improved irrigation techniques.

Adaptive Strategies and Policy Responses

Despite the challenges posed by climate change, there are examples of successful adaptation strategies in Assam and Manipur. As noted by Pandey et al. (2017), some communities have begun to adopt more resilient agricultural practices, including the cultivation of drought-resistant crop varieties and the use of organic farming techniques. Additionally, there have been efforts to improve water management through rainwater harvesting and the construction of small-scale irrigation systems.

However, the literature also points to significant gaps in policy and institutional support for these adaptive measures. Mishra et al. (2016) argue that while national and state-level policies recognize the importance of building resilience to climate change, their implementation has been inconsistent. There is a need for more targeted and localized policy interventions that address the specific challenges faced by farmers in Assam and Manipur.

District Profile

Assam District Profiles:

Baksa district, located in the north-western part of Assam, has its administrative headquarters in Mushalpur. The district is bordered by Bhutan to the north, Udalguri district to the east, Barpeta and Nalbari districts to the south, and Chirang district to the west. Covering a total geographical area of 2,346.2 square kilometers, Baksa includes approximately 130,000 hectares of cultivable land and 99,000 hectares of forest land. The district falls within the Brahmaputra Valley and Himalayan foothills agro-climatic zones. Major rivers in these region is Beki, Manas, Pagladia, Pahumara and Kaldia. The climate is characterized as subtropical, with warm, humid summers followed by cool, dry winters. The actual rainfall recorded in 2023 is 2971.6mm.

According to the 2011 Census, Baksa has a population of 950,000, with a gender distribution of 470,000 females and 480,000 males. The majority of the population, about 940,000 individuals, reside in rural areas. There are a total of 192,000 households in the district, of which 189,000 are in rural areas. The district has a diverse demographic composition, with Scheduled Tribes accounting for 35% of the population, Scheduled Castes 8%, and other communities comprising 57%. The literacy rate in Baksa stands at 69%.

The predominant soil types in the district are alluvial and sandy loam. The district's agriculture is predominantly focused on crops such as paddy, maize, oilseeds, pulses, fruits, vegetables, and spices. Livestock farming is also significant, with cattle, pigs, and poultry being the primary livestock. In addition to that district also engages in fisheries. (Baksa District Handbook, 2011)

Barpeta district is located in the north-western part of Assam, sharing borders with Nalbari to the east, Kamrup and Goalpara to the south, Bongaigaon to the west, and Bhutan to the north. The district covers a total area of 2,285 square kilometers, characterized by a topography that ranges from low-lying plains to highlands. The district experiences a tropical monsoon climate, with the Brahmaputra River flowing through its southern part and several tributaries running from north to south.

As per the 2011 Census, Barpeta district has a total population of 1.7 million, with 1.5 million residing in rural areas. The gender distribution is 900,000 males and 800,000 females. The district has a Scheduled Caste (SC) population of 5.29% and a Scheduled Tribe (ST) population of 1.10%. Notably, 71% of the population in Barpeta is Muslim.

The soil in Barpeta is generally alluvial, sandy, and sandy loam, which supports a predominantly agricultural economy. The main crops include paddy, mustard, pulses, maize, and jute. Horticulture is also significant, with the production of bananas, pineapples, and oranges, along with year-round vegetable cultivation. The district also has plantations of arecanut, coconut, and various spices. Livestock farming, including cattle, goats, and poultry, is common, and fisheries play a role in the local economy as well. (Barpeta District Handbook, 2011)

Kokrajhar District (Assam)

Kokrajhar district is located on the north bank of the Brahmaputra River, sharing an international boundary with Bhutan to the north and an interstate boundary with West Bengal to the west. It is bordered by Dhubri district to the south and Chirang and Bongaigaon districts to the east. Covering a total area of 3,169.22 square kilometers, Kokrajhar features a primarily flat topography, with the foothills of Bhutan to the north and higher plains grading towards the south. The district falls under the Lower Brahmaputra Valley Zone and experiences a humid subtropical climate, characterized by warm, humid summers and cool, dry winters, with an average annual rainfall of 3,127 mm.

According to the 2011 Census, Kokrajhar district has a population of 900,000, with 93.81% living in rural areas. The population is almost evenly split between males (51%) and females (49%). The SC and ST communities make up 35% of the total population. The district has a literacy rate of 67%.

Of the total geographical area, 89,784 hectares, or 28.33%, is cultivable. The soil texture varies from sandy loam to clay loam, making agriculture the main occupation in the district. Major crops include paddy, jute, black gram, maize, and pulses. Horticultural activities involve the cultivation of both Kharif and Rabi vegetables, along with fruit trees such as banana, pineapple, citrus, and jackfruit. Spices like chili, ginger, turmeric, and black pepper are also grown. Additionally, livestock farming of cattle, poultry, and goats, along with fisheries, contributes to the district's economy. (Kokrajhar District Handbook, 2011)

Manipur District Profile:

Bishnupur District (Manipur)

Bishnupur district is located in Manipur, bordered by Imphal West district to the north, Churachandpur district to the south, and Imphal and Thoubal districts to the east. The district is divided into three main parts: valley plains, lake areas, and regions covered by hillocks and forests. It is home to the largest freshwater lake in Northeast India. The total area of Bishnupur district is 496 square kilometers, and it receives an average annual rainfall of 1,442 mm.

As per the 2011 Census, the district has a population of 240,000, equally divided between males and females. The average literacy rate is 76%. Scheduled Castes and Scheduled Tribes make up 11% of the population, while the remaining 89% consists of other communities.

In Bishnupur, 49.3% of the land is cultivable, while 30% consists of water bodies. The district is known for its paddy cultivation and is the highest producer of vegetables in the region. Fisheries also play a vital role in the local economy. Livestock farming, including cattle, goats, pigs, and poultry, is prevalent in the district. (Bishnupur District Handbook, 2011)

Noney(Manipur) district, located in the western part of Manipur, is one of the hill districts of the state. It is bordered by Senapati and Imphal districts to the east, Jiribam to the west, Tamenglong to the north, and Churachandpur and Pherzawl districts to the south. The district encompasses a geographical area of 1,242 square kilometers. According to the Census of 2011, Noney has a population of approximately 37,000 individuals, with a gender distribution of 19,000 males and 18,000 females. The population is predominantly rural, with 97 percent residing in rural areas. The district has a significant representation of Scheduled Tribes (ST), comprising 92.4 percent of the total population. The literacy rate in Noney stands at 71 percent.

Tamenglong (Manipur) district, situated in the northwestern part of Manipur, is also a hill district. It shares borders with Senapati district to the east, the state of Assam to the west and north, and Noney district to the south. The district spans a larger geographical area of 4,395 square kilometers, with 88 percent of the land designated as forest according to geographical forest assessments. The district has a population of approximately 160,000, with a nearly equal gender distribution of 78,000 males and 79,000 females, according to the 2011 Census. Tamenglong is primarily inhabited by various indigenous communities, including the Rongmei, Zemei, and Liangmei, all of whom belong to Scheduled Tribes. The literacy rate in Tamenglong is 75 percent.

Both Noney and Tamenglong districts are characterized by hilly topography with steep slopes and small valleys. The region is traversed by five major rivers: Barak, Irang, Leimatak, Makru, and Ijei. The climate of these districts is classified as moderate subtropical, with hot and humid summers and extremely cold winters. Annual rainfall patterns in the districts vary, with the southwestern part receiving less than 1,400 mm, the northeastern part receiving between 1,400 mm to 2,000 mm, and the central north and south areas receiving higher amounts.

The predominant soil types found in these districts include red loamy soil, red sandy soil, and red gravelly soil. The major agricultural crops cultivated in these regions are paddy, maize, potatoes, pineapples, bananas, oranges, and chilies. Livestock farming also plays a significant role in the local economy, with cattle, pigs, goats, and poultry being the primary farm-based livelihoods.

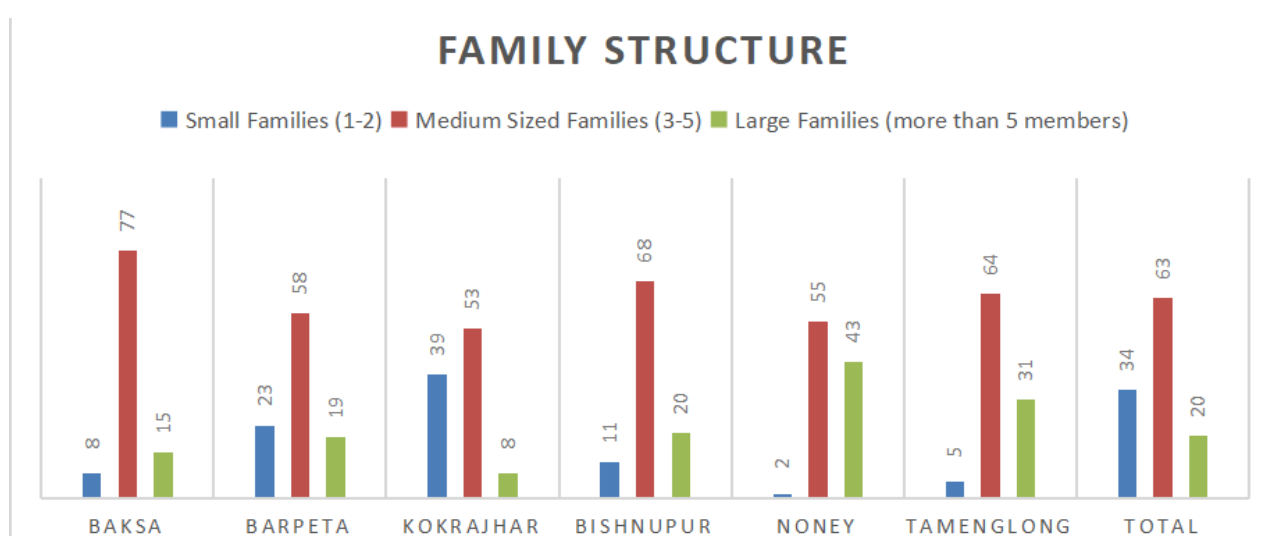
This overview highlights the geographical, demographic, and agricultural characteristics of Assam and Manipur districts, providing a comprehensive understanding of the region's unique attributes. (Tamenglong District Handbook, 2011)

In Bishnupur, 49.3% of the land is cultivable, while 30% consists of water bodies. The district is known for its paddy cultivation and is the highest producer of vegetables in the region. Fisheries also play a vital role in the local economy. Livestock farming, including cattle, goats, pigs, and poultry, is prevalent in the district. (Bishnupur District Handbook, 2011)

Research Findings

Section 1: Demographic Profile:

The table provides an overview of the distribution of total family members across six districts in Assam and Manipur. The table categorizes families into three groups based on their size-small families (1-2 members), Medium-sized families (3-5 members), and large families (more than 5 members)- across six districts. The total number of households surveyed across all districts is 1827. Small families constitute 34percent of the total surveyed families, whereas medium-sized families make up the majority, accounting for 63 percent of the total. Large families are less common, constituting only 20percent of the total. There is predominance of medium sized families across most districts, which reflects a common family structure. All districts have notable concentration of medium-sized families, constituting 77percent in baksa, 58 percent in Barpeta, 53percent in Kokrajhar, 68percent in Bishnupur, 55percent in Noney, and 64percent in Tamenglong. of the district's total.



Graph 1 : Family Structure of Respondents in Percentage

Table 2 : Family Structure of Respondents

Family Size/Districts	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Total
Small Families (1-2)	31	84	168	33	4	6	625
Medium Sized Families (3-5)	299	212	229	196	133	74	1143
Large Families (more than 5 members)	56	70	34	59	103	36	358
Total (n)	386	366	431	288	240	116	1827

The presence of a significant number of large families in Noney and Tamenglong suggests joint family structure, suggests cultural or socio-economic factors that favor larger households, and also can have higher resource needs, dependency ratios.

Table 3 : Household-Sex and Age wise distribution

Sex/District	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Total
Adult Male	672	525	604	530	549	218	3098
Adult Female	621	522	614	491	503	218	2969
Children below 14 years	298	441	230	261	272	145	1647
Total	1591	1488	1448	1282	1324	581	7714

The table shows that total sampled population covered 7714 households' members across all districts. The population is evenly distributed between males constituting 40 percent, females as 39 percent and children below 14 years making up 21percent. Out of the total population a total 7714 household members detail surveyed were collected.

Table 4 : Age-group distribution of household members :

Age Group/ District	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
0 to 14	19	30	16	20	21	25	21
15 to 35	34	25	35	33	33	28	32
36 to 60	32	25	36	31	30	28	30
Above 60	15	21	13	16	16	19	17
Grand Total(n)	1591	1488	1448	1282	1324	581	7714

The table provides data on the distribution of different age groups across six districts. Kokrajhar shows a distinct pattern with a higher proportion of people in the working-age group (15 to 60 years), that is 71 percent of total population. Tamenglong and Barpeta has more an age diverse population with significant young and old age group; that is 54 percent and 51 percent respectively of total population. Baksa and Bishnupur and Noney has 66percent, 64 percent and 63 percent respectively of total working population.

Table 5 : Gender distribution of households :

Sex/District	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Female	41	46	49	40	37	51	47
Male	55	53	49	59	62	48	51
Other	4	2	2	1	1	1	2
Grand Total(n)	1591	1488	1448	1282	1324	581	7714

The table represents the percentage distribution of gender across six districts. The 'other' gender category remains small across all districts ranging from 1 to 4 percent, whereas Baksa has the highest percentage of individuals identifying as 'Other'. Noney has the highest percentage of males (62 percent), along with its lower percentage of females. Tamenglong has the highest percentage of females among the districts, and also highest in Tamenglong, exhibiting 51 percent of total population. It also indicates that 47percent of total population are female, 51 percent are male and remaining 2 percent identified them as other.

Table 6 : Education Status of the Sampled Household Members

Education/District	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Illiterate	4	15	5	16	16	5	10
Primary	9	22	17	22	4	12	16
Middle	24	29	34	22	22	44	29
Higher	52	23	34	24	19	20	30
Graduate	10	10	9	14	34	19	13
Master	1	1	1	1	5	0	1
Grand Total(n)	1591	1488	1282	1448	1324	581	7714

The table represents the percentage distribution of the population across different educational levels for each district. The majority of individuals in Baksa have a higher level of education (52percent), middle education level also holds a significant proportion (24 percent). The percentage of illiterate population is minimal in Baksa. Barpeta shows balanced distribution between Primary (22percent), Middle(29 percent) and Higher (23 percent) education levels. The percentage of illiterate individuals is notably higher (15 percent). Kokrajhar has a large percentage of individual at the middle and higher (34 percent) education levels, and also low level of illiteracy (5percent). Similar to Barpeta, Bishnupur has a notable proportion in primary (22 percent), middle (22 percent) and higher (24 percent) education levels. The proportion of illiterate individuals constitutes 16 percent, which is highest among all districts. Noney has a distinct distribution with a higher concentration of graduate levels (34 percent), also relatively higher illiteracy level (16 percent). Tamenglong has the highest percentage of middle education (44 percent) among all districts.

Across all the districts, the higher education level has the highest representation, with an average of 30 percent across the districts, which indicates a significant portion of the population has received education till 12th class. The graduate and master levels have lower percentages, indicating that advanced education is less common in sampled rural areas.

Table 7 : Religion distribution

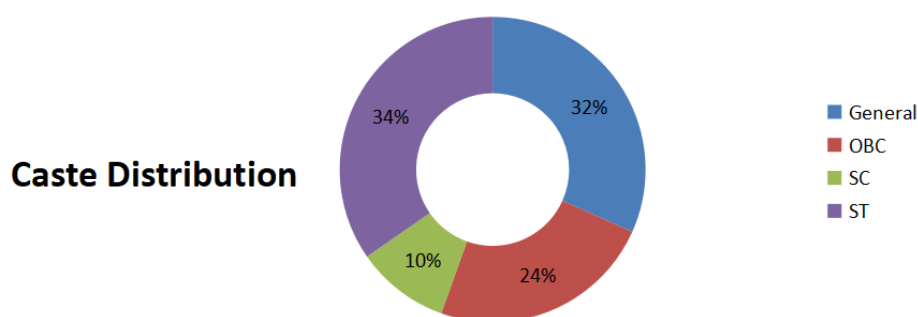
Religion/District	Baksa	Barpeta	Bishnupur	Kokrajhar	Noney	Tamenglong	Grand Total
Christianity	10	0.5	0	0	100	100	22
Hindu	90	0.5	70	91	0	0	52
Other (Meitei)	0		30	0	0	0	5
Muslim	0	99	0	9	0	0	22
Grand Total	386	366	288	431	240	116	1827

The table highlights the religious diversity across districts, with distinct concentration of religious groups in different areas. Christianity is the predominant religion in Noney and Tamenglong with smaller representation in Baksa (10percent). Hinduism is the dominant religion in Baksa(90 percent), Bishnupur (70percent), and Kokrajhar (91 percent). The Meitei is a community name, and they don't identify themselves in any other religion but Meitei, so the findings have separated them as different categories. The Meitei is primarily concentrated in Bishnupur (30 percent), on the other hand Islam is the predominant religion in Barpeta (90percent) and has a smaller representation in Kokrajhar (9percent).

Table 8 : Caste Distribution of Respondents

Caste Category	Baksa	Barpeta	Bishnupur	Kokrajhar	Noney	Tamenglong	Grand Total
General	3	99	51	14	0	0	32
OBC	44	0	28	43	0	0	24
SC	13	1	21	14	0	0	10
ST	40	0	0	28	100	100	35
Grand Total	386	366	288	431	240	116	1827

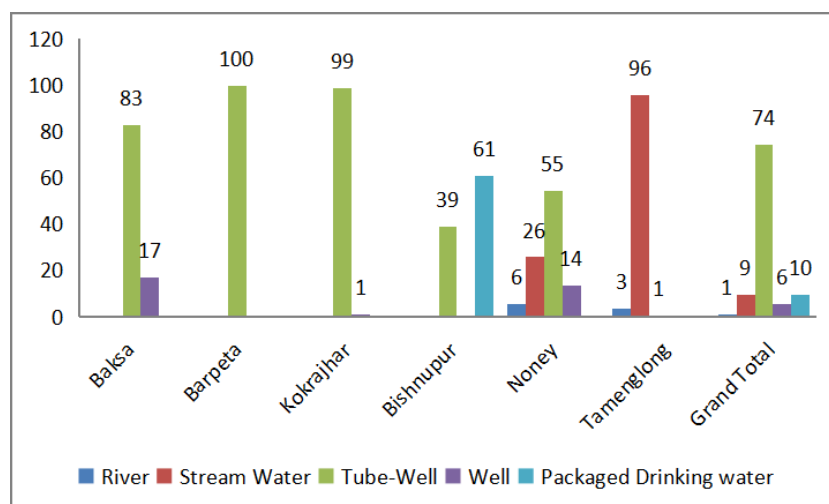
The table provides a distribution of four caste categories, which is General, OBC, SC and ST, across six districts. General category has a 32 percent representation of the total population, and the highest concentration in Barpeta district, accounting for 20 percent of total respondents. OBC categories making up 24 percent of the total sample, majority of them are located in Baksa and Kokrajhar. Total 10 percent of the respondents are belonging to SC category, and notable presence in Baksa, Kokrajhar and Bishnupur district. All respondents from Noney and Tameglong belong to ST category, and notable representation in Baksa and Kokrajhar district.

**Graph 2 : Caste Distribution of Respondents**

Section 2 : Household Information

Source of energy: The study has analyzed the primary source of energy used across different districts. The energy sources listed are electricity and solar power. A total 99.8 percent of the total energy sources reported as electricity as the main source. Solar power has a minimal presence, only located in Barpeta, Kokrajhar and Noney districts. This suggests that while solar power is present, it is not a significant energy source in the regions covered.

Source of Fuel: Information on the primary source of energy used for cooking is asked in the study. The energy sources listed are cow dung, electricity, firewood and LPG. The study found that approx. 31 percent of the total use firewood, 68 percent use LPG, other 1 percent use cow dung and electricity as the source of energy for cooking. LPG is the most prevalent source of energy in all districts. Although, 27 percent of the total respondent from Baksa has also reported firewood as the main source of energy.



Graph 3 : Source of Drinking Water

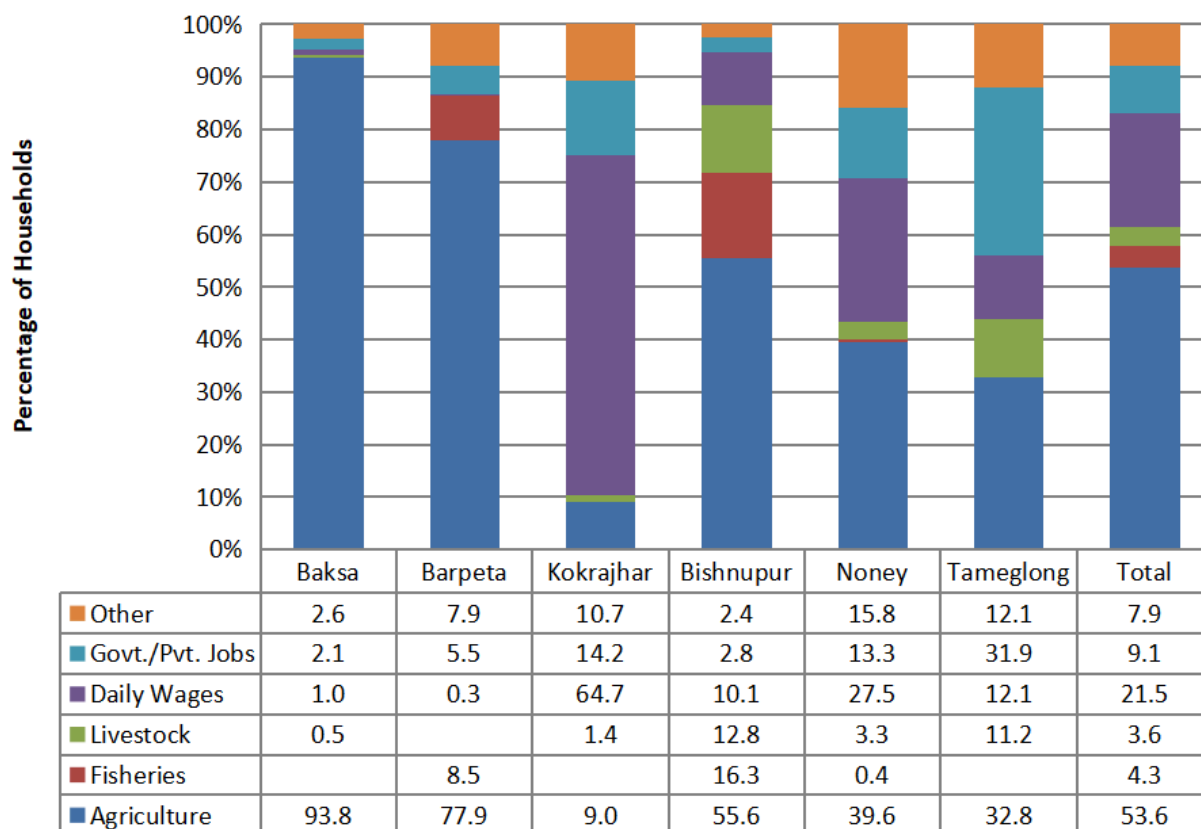
The graph outlines the use of various water sources across six regions. The sources listed are River, Stream Water, Tube-Well, Well and Packaged Drinking Water. Tube-well is the most commonly used water source in Baksa, Barpeta, Kokrajhar, and Noney. Stream Water is significantly used in Noney and Tameglong districts because of geographical structure. On the other hand 61 percent of total respondents from Bishnupur use packaged water for drinking and cooking purpose. Due to land conflicts in regions of Bishnupur, there is no source of clean drinking water is provided by the concerned department, so they have to buy the packaged water for drinking purposes. River is another source of drinking water which is availed in Noney and Tamenglong districts.

Table 9: Primary Source of Income:

Occupation/District	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tameglong	Total
Agriculture	93.8	77.9	9.0	55.6	39.6	32.8	53.6
Fisheries	0.0	8.5	0.0	16.3	0.4	0.0	4.3
Livestock	0.5	0.0	1.4	12.8	3.3	11.2	3.6
Daily Wages	1.0	0.3	64.7	10.1	27.5	12.1	21.5
Govt./Pvt. Jobs	2.1	5.5	14.2	2.8	13.3	31.9	9.1
Other	2.6	7.9	10.7	2.4	15.8	12.1	7.9
Total (n)	386	366	431	288	240	116	1827

The table represents the percentage distribution of different occupations across six districts. The primary source of income of the households are Agriculture, Fisheries, Livestock, Daily Wages, Government or Private Jobs and other, which include small business, driving and weaving. Approx 57 percent of the total sampled respondents are engage in agriculture for the income. Daily wages accounts for 22percent of the total, with high percentages in Kokrajhar (65 percent) and Noney (28 percent). Government and Private Jobs contribute 9 percent, with the highest in Tamenglong (32percent). A total 8 percent of the total respondents engage in fisheries and livestock for the income. Significance presence of fisheries is in Bishnupur (65percent) and Barpeta (9percent) districts.

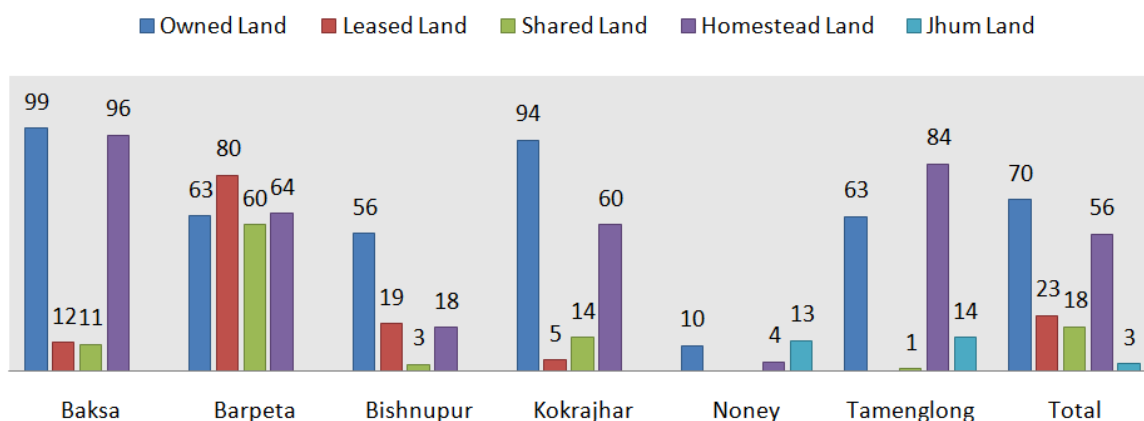
Primary Source of Income



Graph 4: Distribution of Primary Source of Income

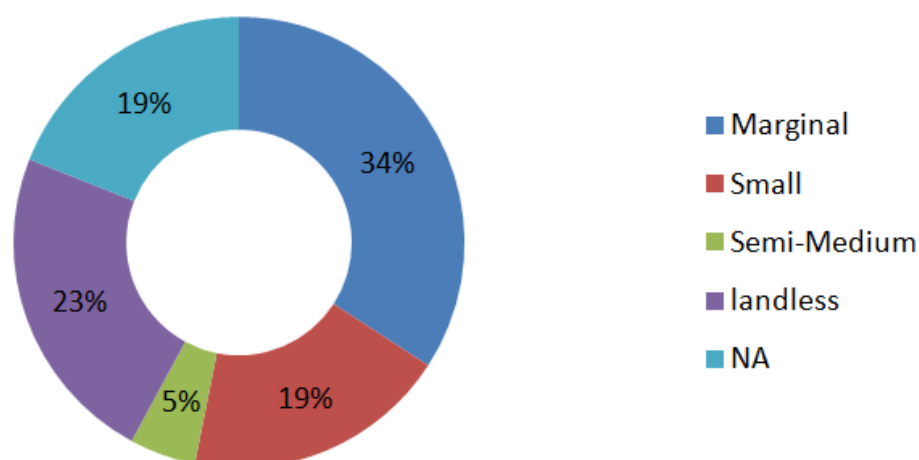
Section 3: Physical Capital: Land Distribution:

Land ownership: The graph illustrates the diverse patterns of land ownership across six districts. In Baksa, 99 percent of respondents own land, 96 percent have homestead land, with 12 percent and 11 percent holding leased and shared land, respectively. Barpeta exhibits a varied land ownership structure, with 80 percent of the land being leased, 60 percent shared, and 64 percent used as homestead land. In Kokrajhar, 94 percent of respondents own land, 60 percent have homestead land, and 14 percent possess shared land. Bishnupur has 56 percent of respondents owning land, along with smaller portions of leased, shared, and homestead land. The land ownership patterns in Noney and Tamenglong differ from the other districts. There is no record of land data in these regions. However, Jhum land is notable, with 13 percent of respondents in Noney and 14 percent in Tamenglong engaging in this traditional form of land use.



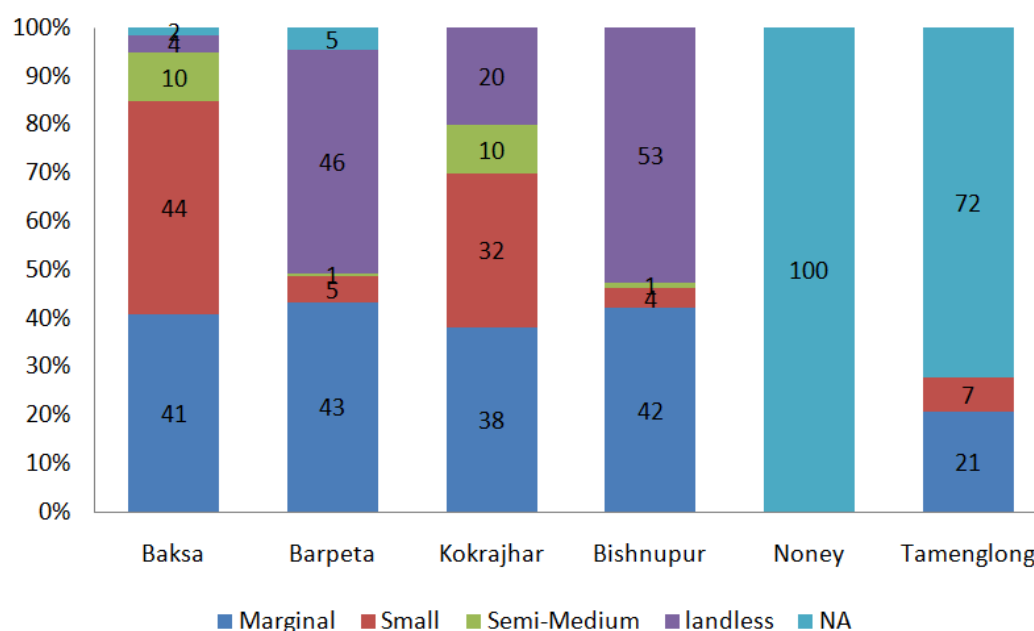
Graph 5: Land Ownership Distribution

Total Land Holding Distribution



Graph 6: Land Ownership Distribution

The graph represents the distribution of landholding categories among respondents. The largest proportion of respondents falls into the marginal category, representing 34 percent. This also indicates that a significant portion of the population may have limited access to agriculture resources. About 19 percent of the respondents are categorized as Small landholders. There are 5 percent of respondents own semi-medium land size. A significant 23 percent respondents are landless. Additionally, there is a gap in data collection, with 19 percent of the respondents resided in Noney and Tamenglong districts have not provided information on their land size.



Graph 7: Land Holding Distribution : District Wise

1 In Noney and Tamenglong districts there is no patta land system. All lands are under one head of the village, and the head provide lands to the residing families. So there is a gap in land measurement taken in this study.
 2 Marginal landholders own less than 1 hectare.
 3 Small landholders own land between 1 to 2 hectares.
 4 Semi-Medium landholders own land between 2 to 4 hectares.

Above graph provides insight into the distribution of landholding categories across six districts. Marginal landholding is the most prevalent category across the districts, except in Noney, where data is unavailable. Specifically, 41% of respondents in Baksa, 43% in Barpeta, 38% in Kokrajhar, 42% in Bishnupur, and 21% in Tamenglong fall into this category. This widespread presence of marginal landholding shows limited access to agricultural resources for a large portion of the population.

The districts of Baksa and Kokrajhar exhibit a higher proportion of small landholders compared to others. In Baksa, 44% of respondents are small landholders, while Kokrajhar has 32%. In contrast, Barpeta (5%), Bishnupur (4%), and Tamenglong (7%) show lower percentages of small landholders. The disparity in the distribution of small landholding across districts highlights the regional differences in land ownership patterns.

Semi-medium landholding is relatively uncommon across all districts. Only 10% of respondents in Baksa and Kokrajhar fall into this category, while Barpeta and Bishnupur each have just 1%. The limited presence of semi-medium landholding reflects the overall scarcity of mid-sized agricultural land among respondents. Landlessness is most prominent in Bishnupur, which records the highest proportion of landless respondents, followed by Barpeta and Kokrajhar. Conversely, Baksa has the lowest proportion of landless individuals, indicating a higher rate of land ownership in this district.

Significant data gaps are observed in the Noney and Tamenglong districts. These gaps suggest that the current data may not fully represent the actual landholding distribution in these regions, potentially limiting the accuracy of the findings for these districts.

Agriculture Practices Across Districts: The table reflects the distribution of different agriculture practices across six districts, segmented by seasonal cultivation and types of cultivation.

Table 10 : Distribution of Different Agriculture Practices

Crop Cultivation	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Irrigated Kharif Cultivation	22.54	35.79	74.48	27.08	2.08	0.00	34.04
Irrigated Summer Cultivation	0.26	11.48	47.33	24.31	15.83	0.86	19.49
Irrigated Rabi Cultivation	0.26	39.34	55.92	7.99	0.00	0.00	22.39
Rainfed Kharif Cultivation	38.86	1.91	7.42	43.06	11.67	0.00	18.66
Rainfed Rabi Cultivation	0.78	1.64	1.39	10.42	0.00	0.00	2.46
Jhum Kharif Cultivation	0.00	1.37	0.93	0.00	15.83	0.86	2.63
Jhum Rabi Cultivation	0.00	1.91	0.00	0.00	8.33	17.24	2.57
Jhum Summer Cultivation	0.00	1.91	0.00	0.00	8.33	17.24	2.57
Plantation	1.04	1.91	50.58	1.04	27.50	30.17	18.23
Vegetation	6.74	3.55	4.64	22.57	15.00	38.79	11.28

Irrigated Cultivation:

Kharif Season: Kokrajhar exhibits the highest level of irrigated Kharif cultivation at 74.48 percent, followed by Barpeta (35.79 percent) and Bishnupur (27.08 percent). These districts have a strong reliance on irrigation for Kharif crops. Baksa also contributes significantly, with 22.54 percent, while Noney shows very limited irrigated Kharif cultivation with 2.08 percent.

Summer Season: Similarly, Kokrajhar has highest percentage of respondents engaged in summer season with 47.33 percent. Bishnupur with 24.31 percent and Noney with 15.83 percent

also have substantial irrigated summer cultivation, while Baksa shows minimal activity with 0.26 percent. Local paddy varieties are produced during this season in Assam districts.

Rabi Season: Kokrajhar is prominent in irrigated Rabi cultivation with 55.92 percent, followed by Barpeta 39.34 percent. Bishnupur with 7.99 percent and Baksa with 0.26 percent have lower levels of irrigated Rabi cultivation, while Noney and Tamenglong do not engage in this practice.

Rainfed Cultivation:

Kharif Season: Bishnupur has the highest percentage of respondents in rainfed Kharif cultivation with 43.06 percent. Baksa with 38.86 percent also has significant rainfed Kharif cultivation. Kokrajhar with 7.42 percent and Barpeta with 1.91 percent show minimal reliance on rainfed practices for this season.

Rabi Season: Rainfed Rabi cultivation is generally low across all districts, with the highest being Bishnupur of 10.42 percent. This indicates a lesser focus on rainfed cultivation during the Rabi season compared to Kharif.

Jhum Cultivation:

Kharif Season: Noney with 15.83 percent and Tamenglong with 0.86 percent are the only districts practicing Jhum Kharif cultivation, highlighting the geographical and traditional significance of this method in these areas.

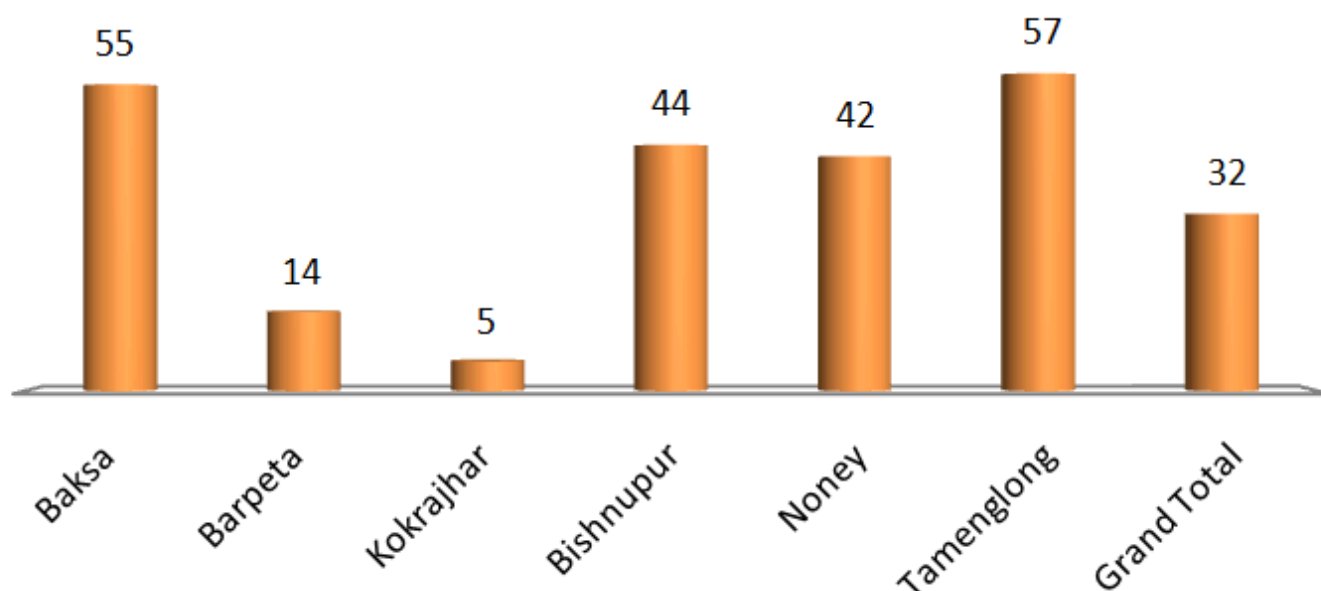
Rabi and Summer Seasons: Similar to Kharif, Jhum cultivation during Rabi and Summer seasons is primarily practiced in Noney and Tamenglong, with Tamenglong showing higher activity. This reflects the continued reliance on shifting cultivation in these districts.

Plantation: Assam has a substantial plantation activity with 50.58 percent, representing a strong presence of plantation agriculture, likely for crops such as pineapple, banana, jackfruit, arecanut, bamboo, rubber, citrus plants like lemon, and other commercial crops. Floriculture is practiced in Kokrajhar. Tamenglong with 30.17 percent and Noney with 27.50 percent also show considerable plantation practices, pointing to the economic importance of plantations in these regions in which plantation of banana, litchi, king chilies, maize, orange, lemon, papaya, rubber and many vegetables are produced.

Vegetation: Tamenglong has the highest cultivation in vegetation with 38.79 percent. Bishnupur with 22.57 percent and Noney with 15 percent also have significant vegetation, represents diverse crop cultivation practices.

Kokrajhar consistently shows a strong emphasis on irrigated agriculture across Kharif, Summer, and Rabi seasons, with a notable focus on plantation agriculture. Bishnupur relies more on rainfed Kharif cultivation, but also has significant irrigated practices in Summer. Noney and Tamenglong stand out for their reliance on traditional Jhum cultivation and their significant vegetation and plantation practices. Baksa has a balanced approach between rainfed and irrigated practices, with a notable presence in Kharif cultivation. Barpeta shows mixed agricultural practices, with a significant focus on irrigated Rabi cultivation.

The findings indicate that paddy is the main crop during the Kharif season across all districts. Local paddy varieties are primarily cultivated during the summer season in Assam districts, while mustard is the major crop during the Rabi season. Jhum Kharif cultivation, which includes a multicropping system, is crucial in districts like Noney and Tamenglong, where traditional agricultural practices continue to support a wide variety of crops. Jhum cultivation has mixed farming system and prevalent in this region.



Graph 8 : Respondents' Income from Agriculture

The graph highlights the varying importance of agriculture as an income source across different districts. In Tamenglong and Baksa, agriculture is likely primary economic activity, while in Barpeta and Kokrajhar it plays a lesser role. Tamenglong has the highest percentage of respondents generating income from agriculture with 57 percent, closely by Baksa with 55 percent. Bishnupur and Noney also show substantial involvement in agriculture, with 44 and 42 percents respondents, respectively, deriving income from the agriculture sector. Barpeta has only 14 percent of respondent and Kokrajhar with 5 percent generating income from agriculture that shows agriculture may be less prevalent as a primary income source in these districts compared to others. Kokrajhar district shows a lesser dependence on agriculture and there could be a shift towards other income-generating activities.

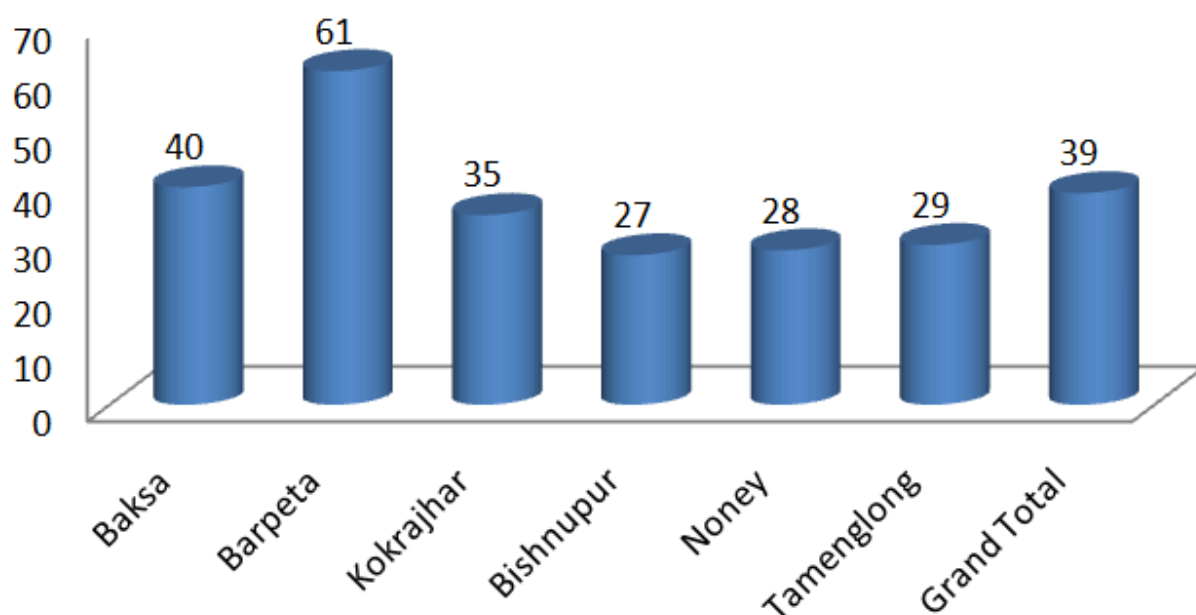
Table 11: Agriculture Income Analysis of Respondents:

Agriculture Income	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Total
Below 50k	40	13	5	13	19	35	19
50k to 100k	14	1	0	27	18	21	11
100k to 150k	1	0	0	4	4	1	1
more than 150k	0	0	0	1	0	0	0
Total (n)	386	366	431	288	240	116	1827

The table shows the distribution of respondents who generate income from agriculture across six districts, categorized by income level. The majority of respondents (19 percent) across all districts earn below 50k from agriculture, with Baksa (40 percent) and Tamenglong (35percent) having the most significant numbers in this category. This highlights the prevalence of low agricultural income among respondents, which could point to challenges such as small landholdings, low productivity, or limited access to markets and resources. The high concentration of respondents in the below 50k income bracket suggests economic vulnerability in the agricultural sector, particularly in Baksa and Tamenglong. Only a small number (12 percent) of respondents fall into the higher income brackets (50k to 100k, 100k to 150k, and more than 150k). This indicates that high agricultural income is relatively rare in these districts, suggesting potential economic constraints within the agricultural sector.

Bishnupur and Noney stand out as having respondents across all income categories, including the highest bracket, suggesting some diversity in agricultural income levels. Kokrajhar and Barpeta have a minimal number of respondents in the middle and upper income categories, demonstrating that most of the agricultural income in these districts is concentrated in the lower brackets.

Income Analysis from Livestock:



■ Percentage of Respondents who generate Income from Livestock

Graph 9: Respondents' Income from Livelihoods

This graph presents the percentage of respondents who generate income from livestock across six districts. About 61 percent of respondents in Barpeta, 40 percent in Baksa, 35 percent in Kokrajhar generate income from livestock. Noney with 28 percent, Tamenglong with 29 percent and Bishnupur with 27 percent have similar levels of respondents earning from livestock. The significantly higher percentage in Barpeta represents that livestock farming is a major component of the agricultural economy in this district. Districts like Baksa and Kokrajhar have a moderate reliance on livestock income, indicating that livestock farming is an important, but not the predominant, source of livelihood. The lower percentages in Noney, Tamenglong, and Bishnupur suggest that livestock is a supplementary income source rather than a primary one. This is due to geographic and economic factors that make other forms of income generation more viable or preferred in these districts.

Table 12: Livestock Income Analysis of Respondents:

Livestock Income	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Below 50k	38	55	33	22	21	25	35
50k to 100k	1	2	1	5	5	4	3
100k to 150k	0	1	0	1	1	0	1
more than 150k	0	4	0	0	1	0	1
Total (n)	386	366	431	288	240	116	1827

This table presents the distribution of income generated from livestock across different income brackets in six districts. Barpeta has the highest number of respondents in lower category, with 55 percent, represents that a significant portion of the population engaged in livestock farming earns a relatively low income. Baksa follows with 38 percent respondents, and Kokrajhar with 33percent, also indicating a similar trend. Tamenglong (25 percent), Noney (21 percent), and Bishnupur (22 percent) have fewer percentage of total respondents in this category, but the majority of their livestock farmers still fall within the below 50k income range. The sharp decline in the percentage of respondents in the 50k to 100k bracket across all districts represents that few livestock farmers manage to scale their operations to a more profitable level.

Having large percentage of respondents involved in the livestock farming, it reflects primarily low-income across all districts, with only 5 percent of higher earnings, especially in districts like Barpeta.

Income from Dairy: Only a small fraction of respondents, representing 8 percent of the total, generate income from dairy sales. Notably, Kokrajhar exhibits the highest engagement in dairy income, with 19 percent of respondents involved in this activity. Other districts show lower participation, with 7 percent in Barpeta, 3 percent in Baksa, 6 percent in Bishnupur, and 9 percent in Tamenglong contributing to their income through dairy sales. This data suggests that dairy farming is a relatively less common source of income across these regions.

Table 13: Dairy Income Analysis of Respondents:

Income from Dairy	Baksa	Barpeta	Kokrajhar	Bishnupur	Tamenglong	Grand Total
Below 50k	3	6	19	6	0	7
50k to 100k	0	1	0	1	9	1

Kokrajhar shows the highest involvement in dairy at the lower income bracket (below 50k), suggesting a widespread but low income. Tamenglong stands out in the 50k to 100k bracket, indicating a more profitable but less widespread dairy practice. Barpeta and Bishnupur have low levels of dairy income across both brackets, showing limited but consistent dairy activity. Baksa has minimal dairy income, while Noney shows no dairy income.

Other Source of Income: Occupational Diversity and Trends:

Table 14: Respondents Involved in Other Occupation

District	Percentage of Respondents involved in Other Occupation
Baksa	17
Barpeta	28
Kokrajhar	83
Bishnupur	35
Noney	23
Tamenglong	56
Grand Total	36

In Baksa, 17 percent of respondents are engaged in occupations outside of their primary jobs. Of these, 69 percent work as daily wage laborers, 8 percent are employed in private jobs, and the remaining 23 percent are involved in various activities such as business, driving, social services, and government jobs. In Barpeta district, 28 percent of respondents are engaged in other occupations. In Kokrajhar, a substantial 83 percent of respondents are involved in other occupations. A significant portion, 37 percent, are daily wage workers, followed closely by 34 percent involved in business. Additionally, 6 percent are engaged in fisheries, and another 23 percent work in private and government jobs.

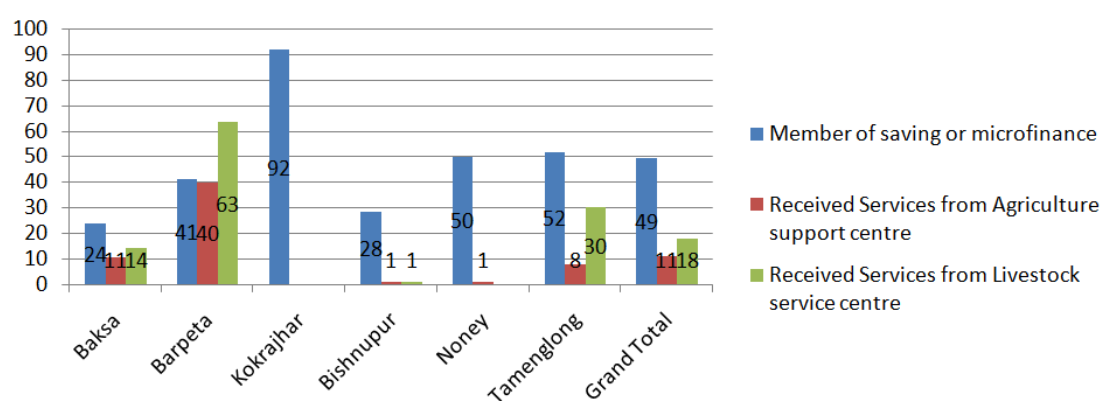
Similarly, in Bishnupur, 35 percent of respondents are involved in other occupations. The district has a high percentage of daily wage workers, comprising 49 percent of those engaged in secondary occupations. Fisheries is also a prominent occupation, with 23 percent of these respondents involved in it. Tamenglong district also shows a significant number of daily wage workers, making up 26 percent of those engaged in other occupations. There is also a considerable number of people involved in private and government jobs in this region. In Noney district, daily wage labor is prevalent, with 26 percent of those involved in other occupations working in this field.

Table 15: Other Income Analysis of Respondents

Income from Non-Farming	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Below 50k	12.2	21.0	19.5	7.6	2.9	7.8	9.8
50k to 100k	4.1	0.3	50.3	25.0	16.3	32.8	21.0
100k to 150k	0.0	0.3	4.4	1.0	1.7	6.0	1.9
more than 150k	0.3	0.3	8.4	1.0	1.7	9.5	3.1
Total (n)	386.0	366.0	431.0	288.0	240.0	116.0	1827.0

The table represents income distribution from non-farming activities across six districts. Kokrajhar has the highest income levels across most categories, with 50.3percent of respondents earning between 50k to 100k and 8.4percent earning more than 150k. Tamenglong also shows a strong distribution in higher income categories, particularly between 50k to 100k (32.8percent) and more than 150k (9.5percent). Barpeta and Baksa have more respondents in the lower income bracket, particularly below 50k. Overall 21 percent of the total respondents fall in 50k to 100k income category.

Section 4: Household Access to Socioeconomic services:

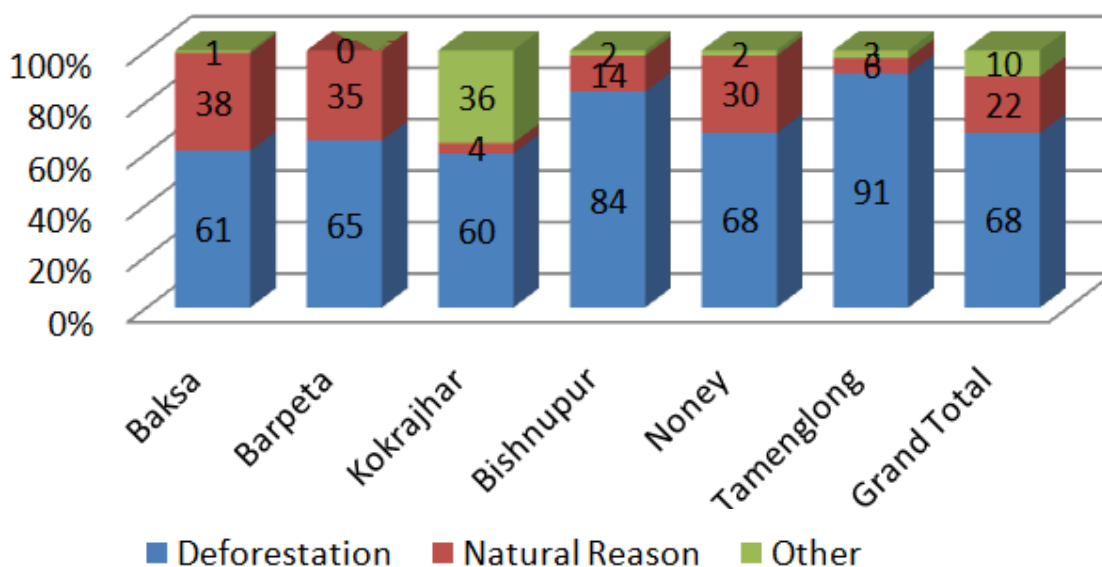


Graph 10: Access to Socioeconomic Services

Kokrajhar and Noney show high participation in savings or microfinance (92% and 50% respectively) but lack access to agricultural and livestock services. Barpeta, in contrast, excels in agricultural (40%) and livestock (63%) services but has moderate financial inclusion (41%). Tamenglong demonstrates balanced access, with moderate to high participation in savings (52%) and livestock services (30%), but still has a gap in agricultural services (8%). Baksa shows limited access across all categories, with the lowest engagement in savings (24%), agriculture (11%), and livestock services (14%). Bishnupur has low participation across all services, indicating a need for significant improvement. The findings highlight the need for more comprehensive support systems, particularly in districts like Kokrajhar, Noney, Baksa, and Bishnupur, to ensure development and access to essential services.

Section 5: Impact of Climate Change:

Knowledge about Climate Change: The vast majority of people surveyed 90%, are aware of climate change. However, there are some differences across districts. For example, in Baksa, only 65% of people said they knew about climate change, while in Noney, everyone surveyed was aware of it. Most people learned about climate change through awareness campaigns, news, and social media. Many also mentioned that they've noticed changes in the climate around them, which made them more aware of the issue. Additionally, 91% of respondents said they've observed noticeable changes in the climate over the past 10 years.



Graph 11: Climate Change Reasons:

The graph indicates that deforestation is perceived as the leading cause of climate change, with 68% of respondents across the districts identifying it as the primary factor. This suggests a widespread recognition of the impact of deforestation on the environment. In comparison, only 22% of respondents attributed climate change to natural causes, indicating a lower awareness or concern about these factors. Additionally, 10% of respondents mentioned other causes, including pollution, population growth, vehicle emissions, infrastructure development, factories, and automobiles. This highlights an awareness of multiple contributing factors to climate change beyond just deforestation and natural causes.

Table 16: Natural Disaster and Incidence over 10 years

New Measures Adopted	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Reared livestock of different breed	27	30	9	46	19	4	24
Raised new livestock	32	23	16	30	12	24	23
Investment in livestock pests and diseases	5	37	87	6	34	15	35
Started agro forestry	8	15	7	4	32	42	14
Water conservation practices	22	93	45	3	42	69	44
Invested in ponds for irrigation	9	17	15	42	15	2	18
Provided supplemental irrigation	1	1	3	39	1	3	8
Changed in cropping pattern	35	23	83	42	23	44	44
New crops grown	5	34	1	35	20	6	17
Left land fallow	2	1	80	31	2	5	25
Change in planting date seedling etc	26	11	91	30	12	56	39
Insurance of crops done	3	3	0	0	0	0	1
Soil conservation practice	5	35	0	0	6	34	11
Practice compatible cropping millets etc	1	4	2	3	4	9	3
Adopted improved seeds improved drought	12	4	80	0	1	3	22
Used increased amount of inorganic fertilizers	1	0	87	41	34	21	33
Used increased amount of organic fertilizers	4	29	0	4	16	20	11

Table represents distinct patterns in climate-related incidents across the six surveyed districts, each facing unique challenges due to varying environmental conditions. Flooding is a major issue in Noney(4720percent)??,Barpeta (5214percent), and Bishnupur (5419 percent), pointing to the need for better flood management systems. Heat waves are particularly severe in Tamenglong and Noney (6025 percent), with Tamenglong experiencing the highest impact, where 591percent of respondents identified this as a significant issue. Rising temperature is a raising concerns in these areas, which has severe implications on health and agriculture. Windstorms and hailstorms frequently affect Noney (4920 and 1921 percent) and Bishnupur (608percent), causing damage to homes and crops. Heavy rainfall is common in Noney (6527 percent), Kokrajhar(7417 percent), and Bishnupur(259percent), increasing the risk of flooding, erosion and land-slides in hilly region. Drought is a significant problem in Bishnupur (726percent) and Noney (188percent), affecting water supplies and farming.Thunderstorms are reported in Bishnupur (140percent), Kokrajhar(4410percent), and Tamenglong (54percent), causing damage and disruptions. Cyclones are an issue in Tamenglong (98percent), leading to severe damage and long-term recovery challenges.

Disease outbreaks related to climate change are especially high in Tamenglong (460percent), with Bishnupur (4516percent) and Kokrajhar (4611percent) also seeing notable incidents. This highlights the need for better healthcare infrastructure and public health interventions. Insect infestations are reported in Bishnupur (3914percent) and Kokrajhar(368percent), impacting crops and health. Erosion is another concern in Noney (2510percent) and Barpeta (267percent), leading to loss of fertile land and farming challenges.

Each district faces its own set of climate related challenges, with some areas more vulnerable to specific incidents like flooding, heat waves, or disease outbreaks. Following analysis elaborates on the impact of climate change:

Tamenglong:

Impact of Heat Waves

Tamenglong district has been experiencing increasingly severe heat waves, which have significantly impacted the local population and their way of life. The rising temperatures have led to various health problems, including frequent cases of fever, headaches, fatigue, and general sickness. Residents have reported a noticeable correlation between higher temperatures and an increase in diseases, making heat waves a major public health concern.

Additionally, the extreme heat has disrupted economic activities, making it challenging for residents to work and affecting their income. Agricultural activities have also suffered, with high temperatures reducing crop productivity and worsening the impact of excessive summer rainfall. This combination has led to a significant decline in food security and economic stability. Daily life has been disrupted as residents struggle to carry out routine activities in unbearable heat, resulting in decreased productivity and quality of life. The long-term effects include water scarcity during winter and increased challenges in adapting to these changing conditions, highlighting the urgent need for effective adaptation strategies to mitigate the impact of heat waves.

Impact of Climate Change on Diseases

Climate change has also led to a rise in new and emerging diseases in Tamenglong. The changing environmental conditions have resulted in the emergence of diseases previously unknown in the region, with frequent outbreaks affecting both humans and animals. The health of local residents has been increasingly compromised by new pathogens, leading to more frequent illnesses and an expanded variety of health problems. Livestock and poultry have not been spared, with outbreaks of viruses and bird flu causing severe economic losses and disrupting food security. The increasing incidence of these diseases has placed a strain on healthcare resources, driving up costs and further burdening families. The dual health crisis affecting both humans and animals underscores the need for improved healthcare infrastructure and adaptation strategies to address these climate-induced health challenges.

Impact of Heavy Rainfall

Heavy rainfall in Tamenglong district has caused extensive damage to agriculture, infrastructure, and local livelihoods. The intense and prolonged rains have resulted in the destruction of crops and agricultural fields, leading to severe disruptions in food supply and economic stability. Standing vegetables and fruit crops, particularly oranges, have been particularly affected, with entire farms being wiped out due to waterlogging and soil erosion. Home gardens and smaller-scale agricultural practices have also been impacted, reducing local food supply and increasing household burdens. The broader social and economic impacts include displacement of residents and significant financial losses due to the destruction of agricultural resources. The need for effective disaster management strategies and support systems is crucial to help the community recover and build resilience against future climate-related events.

Other Environmental Challenges

Tamenglong district faces additional environmental challenges including cyclones, insect infestations, cold waves, erosion, hailstorms, thunderstorms, and windstorms. Cyclones have led to extensive damage to roofs, houses, and crops, while insect infestations have decreased agricultural productivity by destroying crops. Cold waves have affected soil fertility and vegetation, and erosion has reduced soil quality, impacting crop health. Hailstorms and thunderstorms have caused significant damage to crops and infrastructure, while windstorms have blown away roofing and vegetation. Flooding, particularly near riverbanks, has led to the destruction of vegetable farms and gardens, exacerbating food insecurity and economic strain. Each type of environmental disaster presents unique challenges, underscoring the need for comprehensive disaster management and adaptive strategies to mitigate these impacts.

Noney District

Impact of Heat Waves

In Noney district, heat waves have led to a range of health issues, including increased cases of headaches, fever, coughs, and skin diseases, particularly affecting children who experience frequent sickness and dehydration. The intense heat has caused fatigue, burnout, and loss of appetite. Economically, residents face higher living costs due to increased electricity bills for cooling and additional healthcare expenditures. The heat has also caused delays and difficulties in agricultural work, reducing crop yields and placing financial strain on farmers. The combination of heat-related problems and decreased agricultural productivity has resulted in significant economic and health challenges for the community.

Impact of Insect Infestations and Pests

Rising temperatures and humidity in Noney district have led to increased pest and insect activity, negatively affecting agricultural productivity. Pests have caused significant damage to crops, including pineapples and vegetables, leading to substantial income losses. The need for increased investment in pesticides and herbicides has further strained household finances, reducing overall agricultural profitability.

Impact of Floods

Flooding in Noney district has caused damage to agricultural lands, including the loss of crops and destruction of infrastructure. The financial strain on families has increased due to decreased agricultural production and the need for repairs and recovery from flood damage. This has compounded the economic challenges faced by residents.

Impact of Cyclones and Windstorms

Cyclones and windstorms have caused considerable damage to roofing, houses, and crops in Noney district. The destruction of property and disruption to agriculture have resulted in high costs for repairs and rebuilding, as well as loss of income from damaged crops and infrastructure.

Impact of Hailstorms

Hailstorms have severely damaged crops, including maize, fruits, and vegetables, leading to reduced yields and increased financial losses. The need for crop recovery and the loss of income due to decreased agricultural output have added to the economic burdens faced by farmers.

Impact of Thunderstorms

Thunderstorms have resulted in damage to roofs, crops, and infrastructure, disrupting both agriculture and daily life. The associated costs of repairs and recovery have further strained household finances and reduced agricultural productivity.

Impact of Erosion and Soil Degradation

Erosion in Noney district has led to reduced soil fertility, impacting crop yields and quality. Unseasonal weather patterns contribute to soil degradation and lower agricultural productivity, increasing the need for soil management and fertilizers and reducing income from agriculture.

Bishnupur District

Bishnupur District has experienced a range of environmental and climatic challenges that have significantly impacted its residents. Persistent drought conditions have led to severe crop failures, particularly affecting vegetables and irrigation systems. This has reduced agricultural yields and increased costs for fertilizers and insecticides, straining financial resources. Water scarcity has also impacted sanitary conditions, leading to potential health problems and diminished quality of life.

Flooding has submerged crops and destroyed agricultural land and equipment, resulting in substantial financial losses and economic difficulties. The damage to livestock and fishing gear has compounded these issues, leading to widespread disease outbreaks and health concerns. Heat waves have further damaged crops, decreased yields, and increased the need for irrigation, contributing to economic strain. Windstorms and hailstorms have caused damage to infrastructure and agricultural activities, leading to increased repair costs and reduced productivity.

Heavy rain has exacerbated flooding and crop destruction, leading to increased daily expenses and economic challenges. Soil erosion has reduced field fertility, decreasing agricultural productivity and increasing maintenance costs. The combined effects of these challenges have led to significant changes in daily routines and resource management, necessitating adaptations in agricultural practices and income generation strategies.

Kokrajhar District

Kokrajhar District has been significantly affected by various environmental and climatic challenges. Drought conditions have severely damaged crops, particularly paddy and vegetables, due to insufficient rainfall and dried-up tubewells. This has led to reduced agricultural production and increased prices of goods and services, causing financial strain on local communities. Additionally, the scarcity of water has resulted in health issues such as dehydration and other heat-related ailments.

Flooding has exacerbated the situation by inundating fields and causing extensive damage to crops, fisheries, and infrastructure. This has further driven up the prices of goods and services and led to health problems like skin diseases and respiratory issues due to contaminated water and damp conditions. Windstorms and thunderstorms have also caused significant damage to infrastructure, including roofs and properties, leading to additional repair costs and disruptions in daily living.

Hailstorms have caused notable destruction to crops and properties, including house roofs and areca nut plantations, resulting in decreased agricultural productivity and increased repair costs. Heavy rain has led to flooding, infrastructure damage, and increased prices for goods and services. Sporadic rain has disrupted agricultural practices, impacting crop production and financial stability. Heat waves have exacerbated health problems and reduced crop yields, while insect infestations have damaged crops and increased pest management costs.

Kokrajhar District faces a complex array of challenges due to environmental changes. Addressing these requires comprehensive strategies for disaster preparedness, improved infrastructure, and adaptive agricultural practices to enhance resilience and support community well-being.

Baksa District:

Baksa District has been profoundly affected by a range of environmental incidents, including droughts, floods, windstorms, thunderstorms, hailstorms, heavy rain, sporadic rain, erosion, heat waves, diseases, and insect infestations. Drought has disrupted daily activities and farming, leading to reduced agricultural production and financial strain. This has also impacted livestock, affecting children's education and overall livelihoods.

Flooding has caused extensive damage to homes, agricultural lands, and infrastructure, resulting in significant financial and physical distress. Windstorms and thunderstorms have similarly disrupted farming and damaged infrastructure, leading to income loss and economic hardship. Hailstorms have affected communication and farming activities, causing significant income loss and additional challenges.

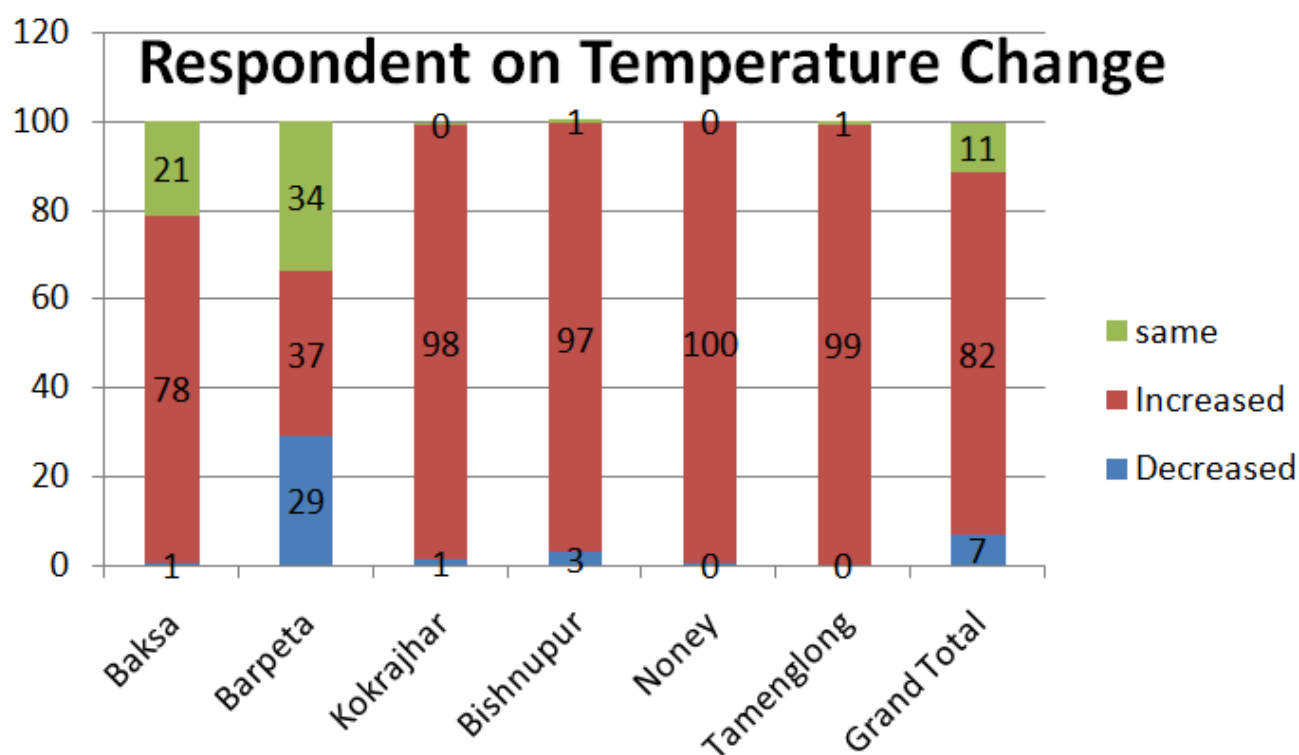
Heavy rain and sporadic rain have both caused disruptions in daily life and agriculture, leading to reduced income opportunities and increased financial strain. Erosion has degraded agricultural land, resulting in decreased productivity and economic challenges. Heat waves have exacerbated stress and reduced agricultural output, while diseases and insect infestations have further disrupted daily life and economic stability.

Barpeta districts:

Flooding and intense rainfall have led to substantial soil degradation by causing surface runoff and erosion that washes away nutrient-rich topsoil. This loss of fertile soil has significantly diminished agricultural productivity, resulting in decreased food production and prompting many people to migrate in search of more arable land. Simultaneously, reduced water availability and contamination from pollution or floods have compromised clean drinking water sources, leading to an increase in waterborne diseases and other health issues within the community.

Over the past decade, extreme weather conditions, including heatwaves and flooding, have facilitated the emergence of new diseases and parasites affecting both crops and livestock. The extreme heat has exacerbated rates of skin infections and infertility in livestock, while the aftermath of floods has introduced additional health challenges. The rise in mosquito populations has further intensified these problems, causing severe infections in both livestock and humans and compounding the overall health crisis.

Temperature and Rainfall:



Graph 12: Respondent on Temperature Change

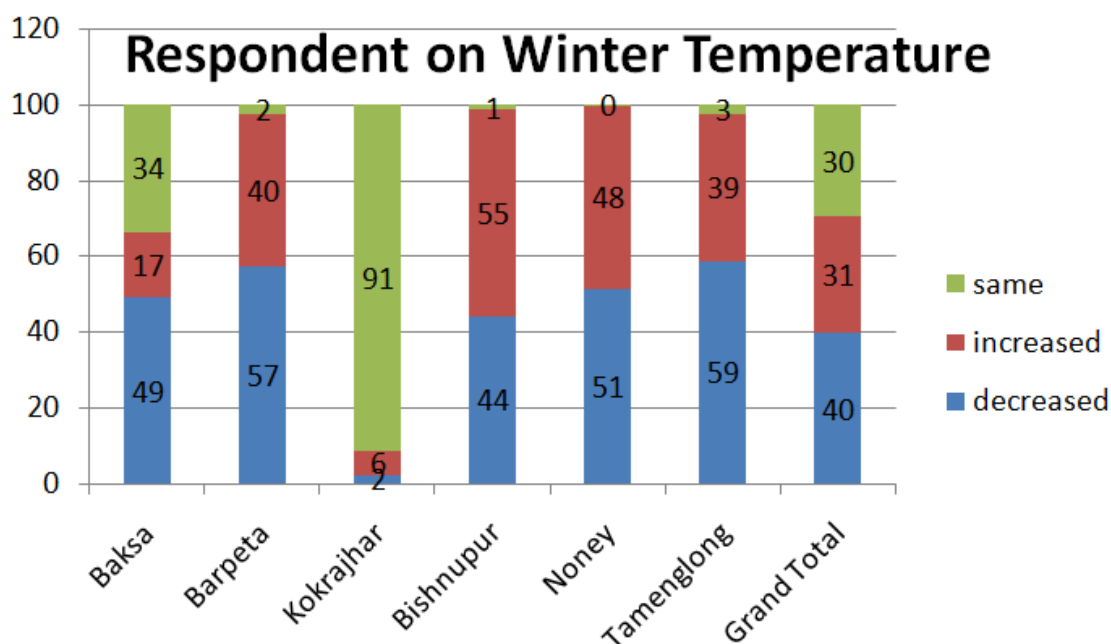
The graph shows the analysis of temperature change across different districts indicates the following findings:

1. **Temperature Increase:** The majority of respondents across the districts report an increase in temperature. Specifically, 78 percent from Baksa, 37 from Barpeta, 98 from Kokrajhar, 97 from Bishnupur, 100 from Noney, and 99 from Tamenglong observed rising temperatures, reflecting a widespread trend of increasing temperatures across the regions.
2. **Temperature Decrease:** Reports of temperature decrease are relatively rare, with only 1 percent from Baksa and Kokrajhar, 3 from Bishnupur, and none from Noney or Tamenglong indicating a decreasing trend. This suggests that temperature decrease is not a common observation in these areas.
3. **Stable Temperature:** A small percentage of respondents report no change in temperature. This includes 21 from Baksa, 34 from Barpeta, and 1 each from Bishnupur and Tamenglong, indicating that for a minor segment of the population, temperature has remained relatively stable.

The data highlights a significant perception of rising temperatures (82 percent), with minimal reports of decreasing or stable conditions (18 percent), pointing to a prevalent trend of warming across the surveyed districts.

The graph shows the analysis of winter temperature changes across different districts reveals the following findings:

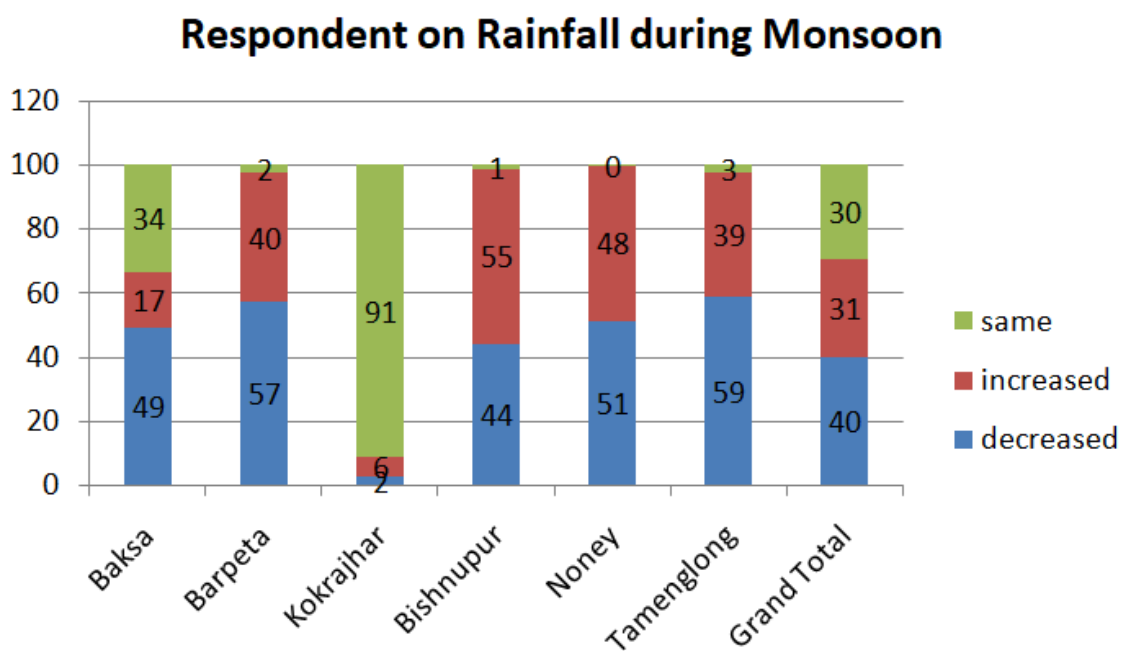
1. **Temperature Decrease:** A significant number of respondents report a decrease in winter temperatures. Specifically, 59 percent from Baksa, 20 from Barpeta, 97 from Kokrajhar, 46 from Bishnupur, 68 from Noney, and 72 from Tamenglong observed lower winter temperatures, indicating a prevalent trend of cooling during winter across these regions.
2. **Temperature Increase:** Fewer respondents report an increase in winter temperatures. This includes 12 from Baksa, 46 from Barpeta, 2 from Kokrajhar, 53 from Bishnupur, 31 from Noney, and 28 from Tamenglong, suggesting that temperature increases in winter are less commonly observed compared to decreases.



Graph 13 : Respondent on Winter Temperature

3.Stable Temperature: A small proportion of respondents report stable winter temperatures, with 30 from Baksa, 34 from Barpeta, and minimal reports from other regions. This indicates that for a minor segment of the population, winter temperatures have remained relatively unchanged.

The data indicates a dominant perception of decreasing winter temperatures with 60 percent, with relatively fewer reports of warming or stability in winter temperatures across the surveyed districts.



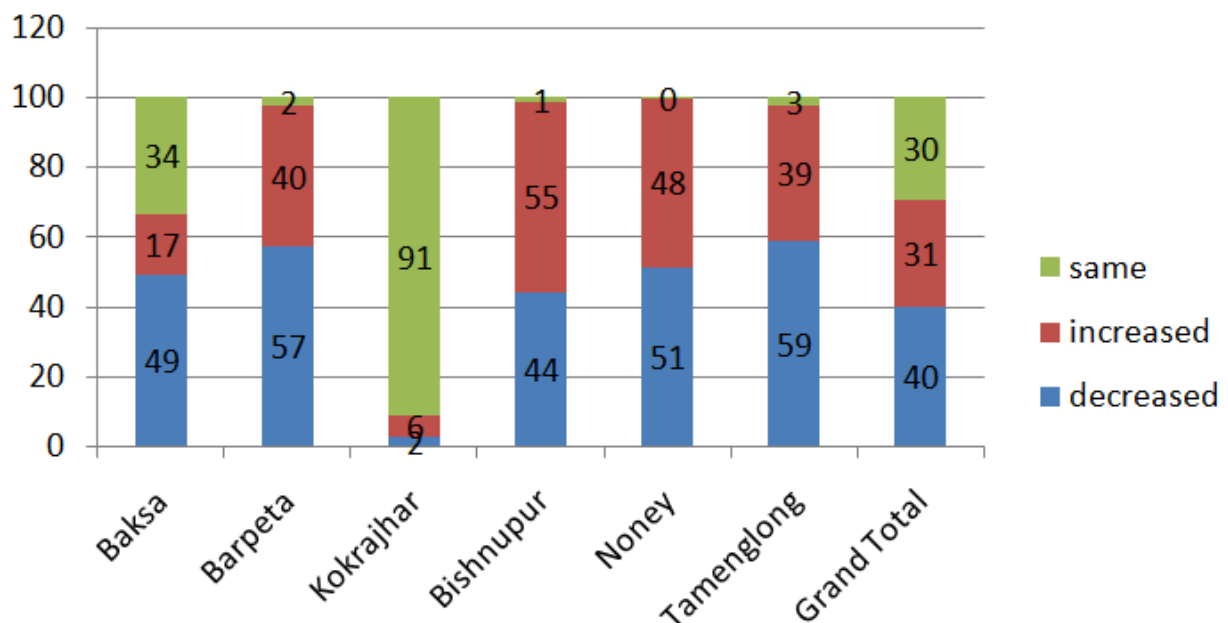
Graph 14 : Respondent on Rainfall Pattern during Monsoon

The research findings on monsoon rainfall changes across various districts, which are summarized as follows:

1. **Rainfall Decrease:** The majority of respondents in Bishnupur (93) reported a decrease in monsoon rainfall. Other districts with notable decreases include Barpeta (63), Baksa (33), and Tamenglong (26). The overall percentage of respondents observing a decrease in rainfall is 38%.
2. **Rainfall Increase:** A significant number of respondents, particularly from Noney (98) and Tamenglong (74), reported an increase in monsoon rainfall. Other districts showing increased rainfall include Baksa (39), Barpeta (36), and Kokrajhar (3). The overall percentage of respondents noting an increase is 35%.
3. **Stable Rainfall:** Very few respondents reported stable monsoon rainfall. This includes Kokrajhar (88) and a minimal number in Baksa (27), Bishnupur (0), Noney (1), and Tamenglong (0). The overall percentage of respondents indicating stable rainfall is 27%.

There is a variation in perception of monsoon rainfall, with a considerable portion of respondents observing either a decrease or an increase, while a smaller percentage report no significant change.

Respondent on Rainfall in Other Season



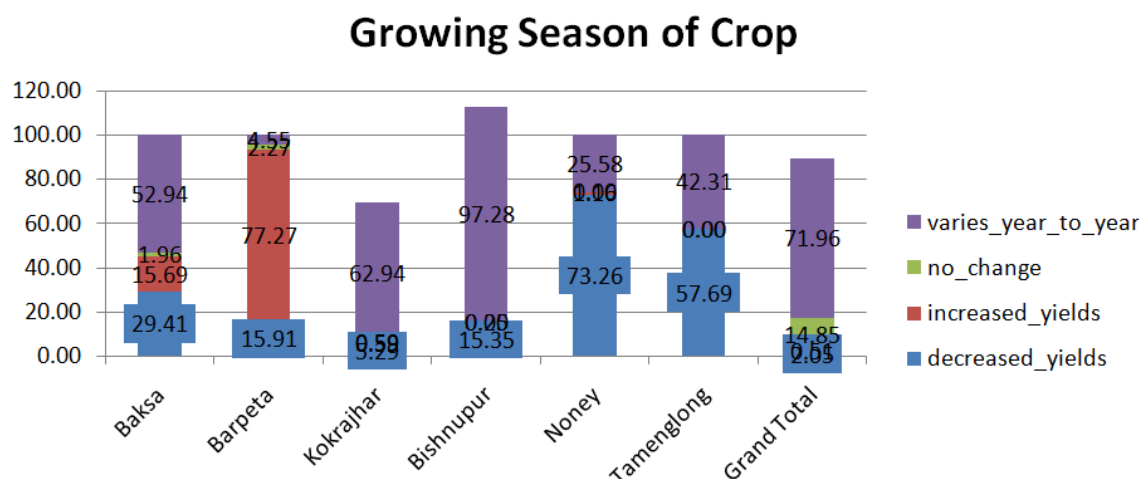
Graph 15 : Respondent on Rainfall Pattern during Other Season

The findings from the data on rainfall in seasons other than monsoon are as follows:

1. **Rainfall Decrease:** The majority of respondents in Tamenglong (59) and Baksa (49) observed a decrease in rainfall during other seasons. Notable decreases were also reported in Barpeta (57) and Noney (51). Overall, 40 percent of respondents reported a decrease in rainfall.
2. **Rainfall Increase:** A significant number of respondents from Bishnupur (55) and Noney (48) noted an increase in rainfall. Other districts showing an increase include Barpeta (40) and Tamenglong (39). The overall percentage of respondents experiencing an increase in rainfall is 31 percent.
3. **Stable Rainfall:** Few respondents reported stable rainfall patterns, with the highest number in Kokrajhar (91) and lower numbers in Baksa (34) and Barpeta (2). The overall percentage of respondents indicating stable rainfall is 30 percent.

There is a notable distribution in observations of rainfall changes in seasons other than monsoon, with a significant portion of respondents reporting either a decrease or an increase, and a smaller percentage reporting stability.

Impacts on Growing Season:



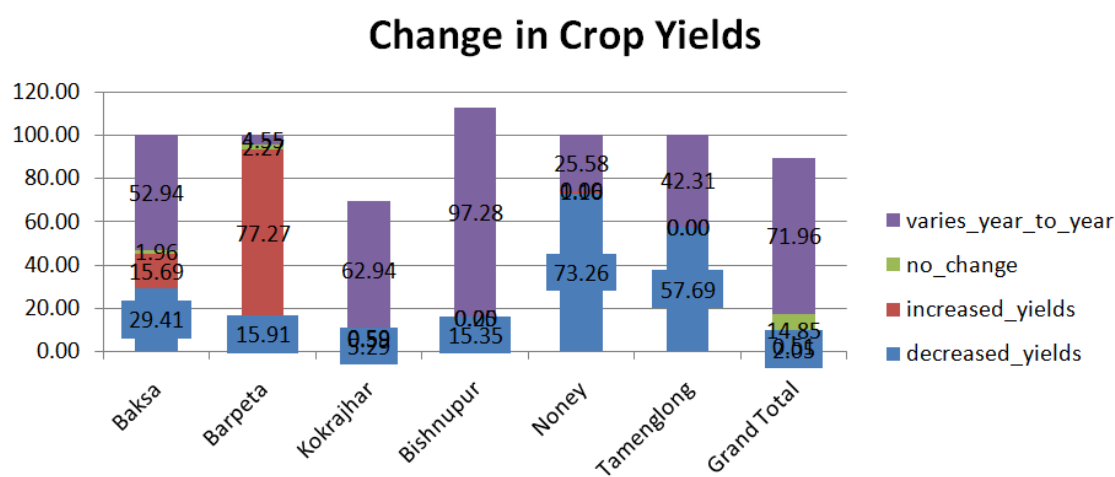
Graph 16: Respondent on Change in Growing Seasons

Above graph shows the analysis of the data on the growing season for crops indicates the following findings:

1. Unpredictable Growing Season: The predominant observation across all districts is an unpredictable growing season, with high percentages in Baksa (88.86%), Barpeta (88.52%), and Kokrajhar (99.07%). This indicates that most regions are experiencing significant variability in growing conditions, leading to challenges in crop management.
2. Shorter Growing Season: A notable percentage of respondents reported a shorter growing season, particularly in Baksa (10.88%), Barpeta (10.66%), and Bishnupur (8.33%). This suggests that, in some areas, the duration of the growing season has been reduced.
3. Longer Growing Season: A very small proportion of respondents observed a longer growing season, with the highest percentage in Noney (4.58%). Overall, this change is minimal compared to other categories.
4. No Change: The observation of no change in the growing season is minimal across the board, with the highest being 1.25% in Noney and none reported in most districts.

The data indicates that the growing season for crops is largely unpredictable across the regions studied, with a smaller number of areas experiencing a shorter or longer growing season. The variability in growing conditions is a key concern for agricultural planning and management.

Impacts on crop yields:



Graph 17: Respondent on Change in Crop Yields

The analysis of changes in crop yields across different districts presented in the above graph exhibits the following findings:

1. **Variation in Crop Yields:** The predominant trend observed is a variation in crop yields from year to year. This is particularly pronounced in Bishnupur (97.28%) and Kokrajhar (62.94%), with significant percentages also in Baksa (52.94%) and Tamenglong (42.31%). This indicates that crop yields are highly variable, posing challenges for consistent agricultural productivity.
2. **Decreased Yields:** A substantial percentage of respondents reported decreased crop yields, with the highest in Noney (73.26%) and Tamenglong (57.69%). This suggests that many regions are experiencing a decline in crop production.
3. **Increased Yields:** Only a small proportion of respondents observed increased yields, with the highest in Barpeta (77.27%). This suggests that improvements in crop yields are limited and not widely experienced across the regions.
4. **No Change in Yields:** Minimal reports of no change in crop yields were noted, with the highest being 2.27% in Barpeta. This indicates that stable yields are relatively rare.

The data highlights significant variability in crop yields, with a notable proportion of regions experiencing decreased yields. Consistent crop yields are infrequent, and only a small number of areas report increased yields. This variability in crop productivity underscores the challenges faced by farmers in adapting to changing agricultural conditions.

Main Challenges in Agriculture : The table provides insights into the primary challenges faced by farmers in various districts due to climate change. The challenges include water scarcity, soil degradation, pest and disease outbreaks, and extreme weather events.

Table 17: Main Challenges in Agriculture

Challenges in Agriculture	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Water Scarcity	8	12	86	55	3	12	34
Soil Degradation	3	1	7	39	16	15	12
Pest and Disease Outbreaks	9	1	81	33	23	14	30
Extreme Weather Events	5	0	58	36	6	14	22
excess of water due to flood				1			0

Water Scarcity: The most widespread challenge reported is water scarcity, with notable impacts in Kokrajhar (86) and Bishnupur (55). This challenge affects 34% of the respondents overall, indicating a critical issue with water availability for agricultural practices.

Soil Degradation: Soil degradation is a significant concern, especially in Bishnupur (39), though less prevalent compared to water scarcity. Overall, 12% of the respondents cited soil degradation as a major issue.

Pest and Disease Outbreaks: Pest and disease outbreaks are prevalent, particularly in Kokrajhar (81) and Bishnupur (33). This challenge impacts 30% of respondents, highlighting ongoing issues with pests and diseases affecting crop health.

Extreme Weather Events: Extreme weather events are noted as a concern by 22% of the respondents, with the highest impact reported in Kokrajhar (58) and Bishnupur (36). This reflects the impact of weather variability on agricultural stability.

Excess Water Due to Floods: Excess water due to flooding is mentioned by only one percent of respondent, indicating it is a less common but still relevant issue.

The table represents that water scarcity, pest and disease outbreaks, and soil degradation are the most significant agricultural challenges reported.

Findings on loss of cash crops due to climate incidences:

1. Crop Loss:

General Impact on Cash Crops: Paddy crops are notably affected across districts, with a high concentration of issues reported. Bishnupur district exhibits the highest frequency of paddy-related issues, with 233 mentions of decreased yields and crop damage. While, other districts are also affected, but reported fewer issues compared to Bishnupur.

Kokrajhar reports significant issues with crop production (55 mentions), primarily due to heavy rain, thunderstorms, and insufficient rainfall during critical periods. Bishnupur reported significant damage to paddy, brinjal, and vegetables due to heavy rainfall, pest incidents, and unpredictable rainfall patterns. Noney and Tamenglong reported very few in cash crop damage but still notable impacts from pests and unpredictable rainfall. Baksa has isolated reports of decreased paddy production mainly due to less rainfall and pest attacks.

Specific issues like heavy rainfall and thunderstorms have caused destruction of standing crops reported frequently due to extreme weather conditions. Irregular rainfall during planting and harvesting periods contributes significantly to reduced yields and crop damage. Insect and pest attacks damage the crops exacerbated by pest and insect outbreaks.

The findings indicate widespread losses in cash crops, particularly paddy, due to extreme and unpredictable weather events, inadequate rainfall, and pest infestations. Bishnupur and Kokrajhar are identified as the most severely impacted areas. The results underscore the need for effective climate adaptation strategies, especially in the most affected districts.

2. Vegetable Loss: Kokrajhar district is identified as the most severely affected, with substantial mentions of vegetable crop loss attributed to climate-related factors. The primary issues include heavy rainfall, thunderstorms, and erratic weather patterns that disrupt growing conditions and lead to significant crop damage. Noney and Tamenglong districts also report considerable damage to vegetable crops. In Noney and Tamenglong, the key problems are heavy rainfall, thunderstorms, and flooding, which have severely impacted vegetable cultivation.

Main causes of vegetables loss reported due to heavy rainfall, thunderstorms, flooding and pest infections. Across multiple districts, including Kokrajhar, heavy and often unpredictable rainfall has been a major factor in vegetable crop loss. The intensity and unpredictability of these rainfalls cause extensive damage to vegetable fields, leading to substantial crop destruction. In Noney and Tamenglong, flooding has been a significant issue. Floodwaters have submerged vegetable fields, resulting in the loss of crops and posing a considerable threat to agricultural productivity in these areas. Pest attacks, which are sometimes worsened by adverse climatic conditions, have also contributed to vegetable crop losses, particularly noted in Tamenglong. These infestations further exacerbate the challenges posed by extreme weather.

The study findings highlight a significant loss of seasonal vegetables, especially in Kokrajhar, where 172 instances of crop damage were reported. Specific crops like green chilies have been particularly affected, underscoring how certain vegetables are more susceptible to particular climatic stresses.

Unpredictable rainfall is a recurring issue across the districts, causing widespread damage to vegetable crops. This variability disrupts planting schedules and damages crops that are not resilient to such changes in weather patterns. Although less frequently mentioned, extreme weather events such as heatwaves and hailstorms also contribute to vegetable crop loss. These events add an additional layer of complexity to the challenges faced by vegetable farmers, affecting crop health and yields.

3. Loss related to fruit plantation: Kokrajhar has emerged as one of the most affected districts concerning fruit plant damage due to extreme weather events. The district recorded numerous instances where fruit plants suffered significant losses because of hailstorms, thunderstorms, and heavy rainfalls. The frequency and severity of these incidents have posed substantial challenges to fruit growers in the region. Noney and Tamenglong districts also reported significant losses in fruit plants, particularly due to hailstorms and thunderstorms. The damage in these areas underscores the widespread nature of the problem, affecting various fruit crops across different stages of their growth cycle.

Respondents highlighted that crops like mangoes, litchis, and strawberries were heavily damaged during hailstorms. This issue is particularly severe in Kokrajhar, where these fruits are essential for the local economy and agriculture. Heavy rainfall is another significant factor leading to fruit crop damage. The data shows that excessive rain has harmed a variety of fruit plants, including mangoes, strawberries, bananas, and oranges. This kind of rainfall can cause issues such as fruit rot, reduced fruit quality, and in some cases, the total loss of fruit-bearing plants. In extreme cases, respondents reported total damage to their fruit plantations, particularly due to heavy rainfall and hailstorms. Windstorms have also been identified as a cause of damage, particularly affecting mangoes during the flowering season. This highlights that different stages of fruit development are susceptible to various climatic challenges, making it difficult for farmers to protect their crops throughout the growing season.

A significant number of respondents reported decreased yields in their fruit crops, particularly oranges. The adverse weather conditions, especially hailstorms and heavy rain, have led to reduced productivity, which has serious economic implications for the farmers who rely on these crops for their livelihoods. Another critical issue reported was the low bearing of fruits, with oranges being specifically mentioned. This reduction in fruit production not only affects the immediate yield but also has longer-term impacts on the sustainability of fruit farming in these regions.

4. Impact of Climate related incidences on Livestock: Kokrajhar emerges as one of the most severely impacted districts, with numerous instances of livestock loss due to various climate-related incidents. The district recorded significant damage to a wide variety of livestock, including cows, goats, ducks, and poultry. The frequent occurrence of thunderstorms, hailstorms, and other extreme weather events has resulted in substantial losses for farmers in the region. These districts also reported notable losses in livestock, particularly due to hailstorms and heatwaves.

The extreme weather events like thunderstorms and hailstorms are the most frequently cited causes of livestock damage across all districts surveyed. Respondents reported severe impacts, including death and injury to cows, goats, pigs, and poultry. In particular, Kokrajhar has experienced significant losses due to these events, which have devastated herds and flocks, further straining the livelihoods of those dependent on livestock. The occurrence of extreme heat has emerged as a significant factor in livestock mortality, particularly affecting pigs and poultry. The intense heat experienced in districts like Kokrajhar has led to the death of numerous animals, highlighting the vulnerability of livestock to rising temperatures.

The spread of various forms of flu has caused substantial losses, particularly among poultry and pigs. The data includes reports of flu outbreaks that have killed large numbers of animals, with some cases involving the loss of up to 100 chickens or multiple pigs in a single incident. The data also indicates that diseases, particularly flu, have caused widespread mortality among poultry and pigs.

5. Impact of climate change on Orchards and Nurseries: Tamenglong is the only district where orchard loss has been specifically reported, with the mention of bamboo plantations being impacted by landslides. In Noney, there is a notable report of decreased orange yields. This finding suggests that climate change and associated environmental factors such as altered precipitation patterns, temperature fluctuations, or other stressors are negatively impacting fruit production in the region. The data also hints at indirect impacts of climate-related orchard damage on livestock. The degradation of orchard areas due to extreme weather or environmental stress reduce available forage or shelter for livestock, thereby impacting their health and productivity.

Table 18: Change in Amount of Water in Streams, Rivers and Ponds

Change in amount of water	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Decreased	75	73	49	98	70	99	69
Increased	25	25	48	2	30	1	29
No-Change	0	2	3	0	0	0	2

The table provides an overview of changes in water availability across six districts: Baksa, Barpeta, Kokrajhar, Bishnupur, Noney, and Tamenglong.

1. **Decreased Water Availability:** A significant majority in all districts report a decrease in water availability, with Tamenglong (99), Bishnupur (98), and Baksa (75) having the highest numbers. This suggests widespread water scarcity across these regions.
2. **Increased Water Availability:** A smaller yet notable number of respondents in Kokrajhar (48) and Noney (30) report increased water availability, indicating some areas may be experiencing changes in water dynamics, possibly due to localized factors.
3. **No Change in Water Availability:** Very few respondents, mainly in Barpeta (2) and Kokrajhar (3), report no change in water availability, highlighting that most regions are experiencing some degree of fluctuation in water resources.

The findings indicate a concerning trend of decreased water availability for drinking and irrigation in several districts over the past five years, particularly in Bishnupur and Kokrajhar. While some areas, especially Kokrajhar, have reported increases in water levels, these are outliers compared to the broader trend of declining water resources.

Drying of Tube-Well: There is 76 percent of respondent from Kokrajhar and 43 percent from Tamenglong reported the drying up of tube-well. This indicates that they are going to face severe challenges in accessing groundwater. Bishnupur (40 percent) also indicates the emerging issues with groundwater availability. Whereas, Barpeta (24 percent) and Noney (22 percent) have lower, yet concerning reports. Only 2 percent in Baksa reported the issues of groundwater. The data highlights a concerning trend of drying tubewells across multiple districts, particularly in Kokrajhar and Bishnupur.

Table 19: Reasons for change in the water sources:

Reason of changes in water level	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Heavy Rainfalls	12	1	3	4	5	26	4
Inadequate Rainfalls	2	24	57	85	16	35	38
NA	98	76	40	11	79	39	58

The table reflects respondents' perceptions across six districts regarding the reasons for changes in water levels. The reasons include heavy rainfalls, inadequate rainfalls, and instances where no specific reason (NA) was provided. Here is a comprehensive analysis:

Inadequate Rainfalls as a Major Factor: Bishnupur (85) and Kokrajhar (57) report the highest instances of water level changes attributed to inadequate rainfall. This suggests that these districts are experiencing significant water scarcity, likely due to insufficient precipitation, which could lead to reduced groundwater recharge and lower surface water levels. Tamenglong (35) and Barpeta (24) also report substantial concerns regarding inadequate rainfall.

Impact of Heavy Rainfalls: Tamenglong (26) has the highest number of reports attributing water level changes to heavy rainfall. This indicates that, in this district, excessive rainfall may be leading to flooding, which can disrupt water management systems and lead to temporary increases in water levels. Noney (5) and Bishnupur (4) also report some influence of heavy rainfalls, though to a lesser extent.

High Proportion of Unspecified Reasons (NA): A significant proportion of respondents did not specify a reason for the change in water levels, with Baksa (98), Barpeta (76), and Noney (79) showing the highest instances of "NA". This indicates a lack of awareness or knowledge among respondents regarding the factors influencing water levels, or it might reflect complexities in the local water systems that are difficult to attribute to a single cause.

The data suggests a geographical variability in the causes of water level changes across the districts. Bishnupur and Kokrajhar are primarily affected by inadequate rainfall, leading to water scarcity. Conversely, Tamenglong experiences significant impacts from heavy rainfall, indicating contrasting climate conditions across these regions.

Impact on Irrigation: The data on the impact of irrigation challenges paints a detailed picture of how water-related issues are affecting agricultural practices across various regions. The most frequently cited issue is the change in the period for growing crops. This reflects a significant disruption in traditional farming schedules, likely due to irregular water supply or unpredictable weather patterns. Farmers are facing difficulties in timing their planting and harvesting, which in turn affects the overall yield and production.

Flooding has been reported as a significant issue, particularly with instances of damaged paddy crops and excessive water due to poor irrigation infrastructure. These reports point to the dual challenge of managing not only water scarcity but also excess water, which can be equally detrimental to agricultural productivity.

Drought conditions have been identified as a key factor affecting irrigation, with instances of groundwater depletion, increased costs, and drying wells during the dry season. These challenges are compounded by the unpredictable nature of droughts, making it difficult for farmers to plan and execute their irrigation strategies effectively.

The use of pumping systems for irrigation is noted in a few cases, highlighting the reliance on alternative methods to access water. While these methods offer some relief, they may not be sustainable or sufficient to meet the needs of all farmers, particularly in areas with severe water scarcity.

Table 20: Climate Change Impact on Income/Economic Stability:

Impact on Economic stability	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Total
Reduced Agriculture Income	28	60	88	72	12	34	54
Increased Cost of Living	5	1	86	66	30	55	39
Loss of Livelihood	20	1	85	42	2	9	32
Increased Migration to Urban Areas	6	4	15	34	1	6	28
Total (n)	386	366	288	431	240	116	1827

The table shows the impact of economic stability across various districts. Kokrajhar district is experiencing the highest impact in terms of reduced agricultural income, suggesting that climate-related issues or economic challenges in this district are severely affecting farm earnings. Barpeta and Bishnupur districts also report a significant number of cases, while other districts show varying levels of impact. Kokrajhar has the highest impacts across all categories, other districts like Barpeta and Bishnupur also report notable challenge. Overall data also indicates that reduced agriculture income with 54 percent. Kokrajhar and Bishnupur show the highest instances of increased migration to urban areas, suggesting that residents are moving to other areas in search of better economic opportunities due to poor conditions in their home districts.

Migration: There is migration from these districts, as the table has shown. There is only one percent migration from Baksa, 31 percent from Barpeta, 1 percent from Kokrajhar, 2 percent from Bishnupur, 5 percent from Noney and 9 percent from Tamenglong districts, that accounts of total 8 percent migration from sampled population. Barpeta is the highest migratory districts in sampled areas.

Table 21: Gender bifurcation of Migrants:

Sex/Districts	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Female	1	25		1	3	6	36
Male	2	90	3	5	8	4	112
Grand Total	3	115	3	6	11	10	148

The number of female migrants is relatively low across most districts, with the highest number being in Barpeta (25). Other districts show minimal female representation, particularly Baksa and Bishnupur, where only 1 female respondent is reported. Male migrants are significantly more compared to females across all districts. Higher male representation might indicate that more males are migrating for work or economic opportunities. Barpeta has the highest number of male respondents (90), which contrasts sharply with the low female numbers. Except Tamenglong, where female migrants are more in number.

Barpeta (115 respondents), Bishnupur (2 respondents), Noney (2 respondents) migrated permanently for the work, whereas Baksa (3 respondents), Bishnupur (4 respondents), Kokrajhar (3 respondents), Noney (9 respondents) and Tamenglong (10 respondents) migrate seasonally for the work. Barpeta has a large number of permanent migrants, whereas Tamenglong has only seasonal migrants.

Primary reason for migration across all districts is economic, with individuals seeking better job opportunities. From Baksa, migration is mainly for economic reasons, including private sector jobs, suggesting limited local employment. On the other hand, from Bishnupur migration is for economic needs and educational purposes. Kokrajhar migration is due to insufficient local job opportunities. Migration from Noney and Tamenglong is for educational and economic purpose.

Work ranges from unskilled labor (e.g., daily wage, carpenter) to skilled professions (e.g., fashion designer, nurse). Some entries are unclear, possibly due to language barriers or errors.

District-Specific Work Choices:

- Baksa: Predominantly manual and small business jobs, such as factory work, private jobs, and craftsmanship.
- Barpeta: Migrants often work in farming, small shops, and as drivers or craftsmen, reflecting a preference for small-scale or self-employment.

- Bishnupur: A diverse range including skilled labor (carpentry, teaching) and unskilled work (daily wage, beautician), with some migrants pursuing education.
- Kokrajhar: Includes manual labor and educational pursuits, indicating a mix of work and learning opportunities.
- Noney: Data lacks specific job categories, suggesting a wide range of employment or incomplete information.
- Tamenglong: Migrants engage in formal or skilled jobs such as company work, call centers, and fashion designing.

Migrants from districts like Baksa, Barpeta, Bishnupur, Kokrajhar, Noney, and Tamenglong are engaging in a wide variety of jobs after migration, ranging from unskilled labor to skilled professions. Economic necessity drives much of this migration, with many taking up whatever work is available. Supporting these migrants through vocational training, economic development in their home districts, and support for small businesses could help improve their livelihoods and reduce the need for future migration.

Section 6: Addaption and Mitigation Measures

Table 22: Adaptation of New Measures in Context of Climate Change:

New Measures Adopted	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney	Tamenglong	Grand Total
Reared livestock of different breed	27	30	9	46	19	4	24
Raised new livestock	32	23	16	30	12	24	23
Investment in livestock pests and diseases	5	37	87	6	34	15	35
Started agro forestry	8	15	7	4	32	42	14
Water conservation practices	22	93	45	3	42	69	44
Invested in ponds for irrigation	9	17	15	42	15	2	18
Provided supplemental irrigation	1	1	3	39	1	3	8
Changed in cropping pattern	35	23	83	42	23	44	44
New crops grown	5	34	1	35	20	6	17
Left land fallow	2	1	80	31	2	5	25
Change in planting date seedling etc	26	11	91	30	12	56	39
Insurance of crops done	3	3	0	0	0	0	1
Soil conservation practice	5	35	0	0	6	34	11
Practice compatible cropping millets etc	1	4	2	3	4	9	3
Adopted improved seeds improved drought	12	4	80	0	1	3	22
Used increased amount of inorganic fertilizers	1	0	87	41	34	21	33
Used increased amount of organic fertilizers	4	29	0	4	16	20	11

The table provides a comprehensive look at the diverse adaptation measures adopted by various districts in response to climate change, revealing significant trends and insights into regional priorities and challenges. Here's a detailed analysis of these adaptation strategies:

Adoption of Livestock-Related Measures

1. Rearing Livestock of Different Breeds: The data shows a moderate level of adoption of diverse livestock breeds, particularly in Bishnupur (46) and Barpeta (30). This indicates that farmers in these regions are adjusting to climate-induced stress by diversifying their livestock breeds, a strategy likely aimed at enhancing resilience and reducing vulnerability to climate impacts.
2. Raising New Livestock: Raising new livestock appears to be a common strategy, with notable activity in Bishnupur (30), Tamenglong (24), and Baksa (32). This reflects a general trend toward increasing livestock numbers or diversifying livestock types, suggesting that communities are turning to livestock farming as a way to adapt to changing environmental conditions and secure their livelihoods.
3. Investment in Livestock Pests and Diseases Management: Kokrajhar stands out with a significant number of farmers (87) investing in managing livestock pests and diseases. This high level of activity suggests a greater incidence of livestock health issues in this region, necessitating focused interventions to protect livestock from the adverse effects of climate change.

Agroforestry and Water Conservation Efforts

1. Agroforestry Initiatives: Tamenglong (42) shows the highest adoption of agroforestry practices, which play a crucial role in both climate adaptation and environmental sustainability. Other districts like Noney (32) and Barpeta (15) are also engaging in agroforestry, indicating a growing awareness of the need to integrate trees into agricultural landscapes to enhance resilience and sustainability.
2. Water Conservation Practices: Barpeta (93) and Tamenglong (69) are actively engaged in water conservation, reflecting the critical importance of managing water resources in these areas. With changing rainfall patterns and increasing climate variability, these districts are prioritizing water conservation to ensure the long-term sustainability of their agricultural practices.

Changes in Irrigation and Cropping Patterns

1. Investment in Ponds for Irrigation: Bishnupur (42) and Barpeta (17) have made significant investments in ponds for irrigation, highlighting a focus on securing water resources for agriculture. This investment suggests that farmers in these districts are taking proactive steps to ensure they have reliable water sources to sustain their crops in the face of unpredictable weather patterns.
2. Changes in Cropping Patterns: Kokrajhar (83) leads in changing cropping patterns, which could involve adopting more drought-resistant crops or adjusting planting schedules to better align with new climate realities. Other districts like Bishnupur (42) and Baksa (35) also show significant activity, indicating a widespread recognition of the need to adapt cropping practices to the changing environment.
3. Introduction of New Crops: There is moderate adoption of growing new crops, particularly in Bishnupur (35) and Barpeta (34). This strategy reflects a broader effort to diversify agricultural production as a response to climate change, allowing farmers to reduce their risk by not relying solely on traditional crops that may be more vulnerable to climate stress.

Soil and Crop Conservation Practices

1. Soil Conservation Efforts: Soil conservation practices are notably prevalent in Barpeta (35) and Tamenglong (34). These efforts are essential for maintaining soil health and productivity, particularly in regions experiencing increased climate variability. By preserving soil integrity, these districts are better positioned to sustain agricultural productivity in the long term.
2. Minimal Adoption of Crop Insurance: The data reveals minimal adoption of crop insurance across all districts, suggesting a potential gap in financial protection for farmers against climate-related losses. This low uptake could be due to limited access to insurance products or a lack of awareness of their benefits, highlighting an area where increased education and outreach could be beneficial.

3. Increased Use of Inorganic Fertilizers: Kokrajhar (87) and Bishnupur (41) report increased use of inorganic fertilizers, likely as a response to declining soil fertility and the need to maintain or boost crop yields under changing environmental conditions. While this practice may offer short-term benefits, it also raises concerns about the long-term sustainability of relying on chemical inputs to sustain agricultural productivity.

Specific Climate Adaptation Practices

1. Practice of Compatible Cropping (e.g., Millets): There is minimal adoption of compatible cropping practices, such as millet cultivation, across the surveyed districts. The highest number is in Tamenglong (9), but overall, this practice is not widespread. This low adoption rate suggests that more efforts are needed to promote the benefits of compatible cropping systems that can thrive under challenging climate conditions.
2. Adoption of Improved Seeds (e.g., Drought-Resistant Varieties): Kokrajhar (80) leads in the adoption of improved seeds, particularly drought-resistant varieties. This proactive approach indicates that farmers in this district are keenly aware of the need to secure crop yields in the face of increasing climate stress, and are taking steps to enhance their agricultural resilience through the use of better-adapted seed varieties.

Regional Focus and Priorities:

- a. Kokrajhar: Kokrajhar shows a strong focus on investing in livestock health, changing cropping patterns, and adopting improved seeds. The district appears to be actively adapting to climate change with a combination of agricultural and livestock-focused strategies, indicating a well-rounded approach to managing climate risks.
- b. Barpeta: Barpeta is heavily engaged in water and soil conservation practices, reflecting a priority on managing natural resources effectively. These efforts suggest a strategic focus on sustaining agricultural productivity by protecting the fundamental resources on which farming depends.
- c. Tamenglong: Tamenglong demonstrates significant engagement in agroforestry and water conservation, highlighting a commitment to sustainable land management practices. This district's focus on integrating trees into agricultural landscapes and conserving water resources underscores its dedication to long-term environmental sustainability.
- d. Bishnupur: Bishnupur focuses on livestock rearing and changing cropping patterns, indicating a balanced approach to climate adaptation. By diversifying both livestock and crops, Bishnupur is enhancing its resilience to climate change.

Common Trends:

- a. Diverse Adaptation Strategies: The data reveals that there is no one-size-fits-all approach to climate adaptation. Different districts are employing a variety of strategies, ranging from livestock management to changes in cropping patterns, to cope with climate change. This diversity of approaches reflects the unique challenges and opportunities present in each district.
- b. Environmental Sustainability: Water conservation and agroforestry emerge as key adaptation measures in several districts, indicating a broader awareness of the need for sustainable practices. These measures not only help mitigate the impacts of climate change but also contribute to the long-term health of the environment.
- c. Areas for Improvement: The minimal adoption of crop insurance and compatible cropping practices suggests potential areas for development. Increasing access to financial products like crop insurance and promoting the benefits of compatible cropping systems could enhance the resilience of farmers across the surveyed districts.

Section 7: Other Climate Change Challenges

Change in food consumption habits: The study presents a concerning shift in consumption habits across various districts, highlighting the impact of climate change, economic pressures, and accessibility issues on dietary patterns. The findings suggest that these changes are not only altering the types of foods people consume but also potentially leading to long-term health consequences.

Shift Towards Processed and Inorganic Foods

1. **Increased Dependency on Processed Foods:** There is a growing reliance on inorganic and processed foods across multiple districts. This trend may be driven by the declining availability and quality of fresh, organic produce, which could be linked to the effects of climate change. As traditional agricultural outputs diminish, communities are increasingly turning to industrialized food products. This shift raises concerns about the potential health risks associated with a diet higher in processed foods.
2. **Health Concerns:** In several districts, the increase in consumption of inorganic and processed foods has sparked concerns about the long-term health impacts. The shift away from fresh, nutritious foods towards more industrialized products may contribute to the rise in chronic health conditions over time, emphasizing the need for awareness and intervention.

Reduced Availability of Fresh Produce: The data reveals a significant decrease in the consumption of fresh vegetables and meat in many areas, particularly in districts like Kokrajhar. Factors such as high humidity, frequent flooding, and reduced agricultural yields have contributed to this decline. As fresh produce becomes scarcer, diets have shifted towards more accessible, though less healthy, food options.

Impact of Climate on Food Availability: Climate change is directly affecting the availability of fresh and organic foods. Issues such as pest infestations, erratic weather patterns, and infrastructural developments (e.g., railway construction affecting river fish habitats) have further reduced the accessibility of locally sourced, fresh produce. These environmental challenges are compounding the difficulties faced by communities in maintaining a healthy diet.

Increased Consumption of Packaged and Fast Foods: Among younger populations, there is a noticeable increase in the consumption of fast foods and packaged items. These foods, often seen as more convenient and appealing, are replacing traditional meals, leading to a decline in healthier, home-cooked options. The preference for street foods and packaged snacks reflects a broader cultural shift that may be influenced by urbanization and changing lifestyles.

Economic and Accessibility Issues :

1. **Cost and Availability:** The rising cost of living, exacerbated by climate impacts on agriculture, has forced many to rely on cheaper, inorganic, and processed foods. In some districts, there is also a growing dependence on imported foods, which may be more affordable or accessible than local produce affected by adverse weather conditions. This economic pressure is driving changes in consumption patterns, as people prioritize cost over quality in their food choices.
2. **Impact on Local Agriculture:** The reduced availability of fresh, locally grown produce due to climatic challenges is making it harder for communities to access healthy foods. As a result, there is an increasing reliance on less nutritious, imported alternatives, which may not only be less healthy but also undermine local agricultural economies.

The data indicates a significant transformation in consumption habits across various districts, largely driven by the impacts of climate change, economic factors, and accessibility issues. There is a clear shift towards processed and inorganic foods, reduced consumption of fresh produce, and an increased reliance on packaged and fast foods. These changes are likely to have long-term health implications for the affected populations, as the nutritional quality of their diets deteriorates.

Addressing these challenges will require targeted interventions to improve the resilience of local agriculture, ensure access to healthy food options, and promote awareness of the health risks associated with processed and inorganic foods. Efforts to support local food systems, enhance food security, and encourage healthier eating habits will be crucial in mitigating the negative effects of these changing consumption patterns.

Off-Farm based activities: The study presents a comprehensive overview of the prominent activities, challenges, and adaptations occurring across various districts, highlighting how communities are responding to socio-economic and environmental changes.

Prominent Activities Across Districts

1. **Business and Entrepreneurial Activities:** In several districts, there is a notable prevalence of business-related activities. For instance, Bishnupur shows a significant focus on business initiatives, indicating a possible shift towards entrepreneurship and small business ventures. This shift might be a response to economic pressures or changes in the local climate, driving individuals to explore alternative income sources beyond traditional agriculture.
2. **Community-Based Organizations and Small Business:** In Baksa, activities related to "Society" are prominent, which likely refers to community-based organizations or cooperatives. Additionally, small business and farm-based enterprises are also highlighted, reflecting efforts to diversify income and reduce reliance on conventional farming methods. This trend suggests a growing recognition of the need for sustainable and resilient economic activities in the face of changing circumstances.

Challenges in Starting New Programs

1. **Impact of Communal Riots:** A significant challenge in starting new programs or activities is the impact of communal riots, particularly in districts like Kokrajhar. The data indicates that social and political unrest has severely hindered economic activities, with repeated mentions of the inability to initiate new ventures due to these conflicts. This highlights the broader impact of social instability on local economies, where fear and insecurity can stifle innovation and progress.
2. **Stagnation in New Activities:** In several districts, there is a noticeable lack of new activities, often attributed to the disruptive effects of communal riots or other adverse events. Kokrajhar and Tamenglong are particularly affected, where the social environment has created significant barriers to economic development. This stagnation reflects the challenges that communities face in trying to adapt to new opportunities when confronted with persistent instability.

Adaptation and Shifts in Occupations

1. **Transition to Wage Labor:** A trend towards wage labor is evident, particularly in districts like Kokrajhar. As agricultural productivity declines, individuals are increasingly seeking stable income sources through paid employment. This shift might represent an adaptive strategy, where people are moving away from traditional farming to more secure, albeit less lucrative, forms of work.
2. **Focus on Handicrafts and Weaving:** In districts like Bishnupur and Kokrajhar, there is a resurgence in traditional crafts such as handicrafts and weaving. This highlights that communities are leveraging cultural knowledge and skills to create alternative income streams.
3. **Livestock and Poultry Farming:** The data also indicates a shift towards livestock and poultry farming in several districts. This diversification is likely a response to the unpredictability of crop yields, as animal husbandry offers a more reliable source of income. By expanding into livestock and poultry farming, communities are better equipped to withstand the financial impacts of poor harvests.

Climate and Weather-Related Challenges: Climate conditions are also emerging as a direct challenge to economic activities. Instances such as the "shifted hotel venue due to heatwave" and "timing changes due to inappropriate weather" illustrate how extreme weather events are disrupting business operations. These challenges underscore the increasing need for climate resilience in local economies.

New Initiatives and Entrepreneurship

1. Retail and Service Initiatives: In response to declining agricultural income, some districts, like Noney, have reported the initiation of retail businesses. These new ventures are likely part of broader efforts to support families financially, demonstrating a proactive approach to overcoming economic challenges by diversifying income sources.
2. Diversification of Income Sources: In some districts, individuals are engaging in a mix of traditional and non-traditional activities, including social initiatives, small-scale retail, tailoring, and handicrafts. This diversification reflects a strategic adaptation to the changing economic landscape, where multiple income streams can provide greater financial security.

Support needed to better cope with climate change: Financial aid, training and education, improved infrastructure and access to technology are the major supports identified in the study. There are specific support requests which were also registered like tree plantation and environmental conservation, awareness and government initiatives and industrial contributions. There is emphasis on reforestation, tree plantations and conservation of natural resources. Several respondents emphasize the need for government awareness programs, better training on climate issues, and government aid, particularly in herbicides and farming techniques. There is also need for more funding by industrialists and development organizations, emphasizing their role in contributing to climate change and the need for them to support mitigation and adaptation efforts are highlighted in the study.

Concluding Remarks

This study delves into the multifaceted effects of climate change on agriculture, food security, and socio-economic conditions in the states of Assam and Manipur. The research primarily focuses on how changing climatic patterns, characterized by erratic rainfall, increased frequency of extreme weather events, and rising temperatures, are influencing agricultural practices, food availability, and the overall well-being of rural communities.

Key findings:

S.N o.	Key Findings	Baksa	Barpeta	Kokrajhar	Bishnupur	Noney & Tamenglong
1.	Primary Source of Income	Agriculture	Agriculture	Daily Wages	Agriculture	Agriculture
2	Major Climate Incidences	Flood Heavy Rain Heat Wave	Flood Heavy Rain Drought	Flood Heavy Rain Heat Wave	Drought Hailstorm Sporadic Rain	Heat Wave Heavy Rain Windstorm
3	Major Impacts	Disrupted Farming Damaged House Infrastructure Reduced Agriculture Production	Soil Erosion Emergence of New Disease and Parasites Increased Mortality of Livestock	Destroyed Vegetables and Flowers Increase in Insect Attack	Submerged Crops and Agriculture Land Contaminated Water Increase in Insect Attack	Destruction of Horticulture Crops Soil Erosion Water Stream Drying Up
4.	Growing Season of Crop	Unpredictable Growing Season				
5.	Change in Crop Yields	Variation in Crop Yields	Increased Yields	Variation in Crop Yields	Variation in Crop Yields	Decreased Yields
6.	Challenges in Agriculture	Water Scarcity, Soil Degradation, Pest and Disease Outbreaks, Extreme Weather Events, Excess of Water due to Flood				
7.	Change in Amount of Water	Decreased in Water level in Streams, Rivers, Wells and Ponds				
8.	Reason of Change in Water Level	Heavy and Inadequate (Inconsistent) Rainfall				
9.	Impact on Livestock		Increase in Livestock Mortality	Increase in Livestock Mortality	Decreased in Aquaculture Practices	
10.	Impact on Economic Stability	Reduced Agriculture Income, Increased Cost of Living, Loss of Livelihood, Increased Migration in Urban Areas				
11.	Migration	Low	High	Low	Low	Moderate
12.	Food Consumptions	Increased Dependency on Processed Foods, Reduced Availability of Fresh Produce and Organic Foods				

The table provides an analysis of various key findings across five districts: Baksa, Barpeta, Kokrajhar, Bishnupur, and the combined districts of Noney & Tamenglong. Each district displays unique challenges and impacts, particularly concerning the primary sources of income, climate incidences, and the subsequent effects on agriculture, livestock, economic stability, and migration patterns.

Baksa (Assam) is primarily an agricultural dependent district, with the majority of its residents relying on farming for their livelihood. The district is frequently hit by floods, heavy rainfall, and heat waves, which severely disrupt farming activities. These climatic events damage house infrastructure and reduce agricultural production. The growing season for crops has become increasingly unpredictable, leading to variations in crop yields. Farmers in Baksa face multiple challenges, including water scarcity, soil degradation, pest and disease outbreaks, extreme weather events, and an excess of water due to frequent floods. The water levels in streams, rivers, wells, and ponds have decreased, largely due to heavy but inconsistent rainfall. That impacts irrigations on other seasons. While the district does not report specific data on livestock impacts, the overall economic stability is under threat. The reduced agricultural income, increased cost of living, and loss of livelihood have driven some migration to urban areas, although the levels remain low. Additionally, there is an increase in dependency on processed foods, with fresh produce and organic food becoming less available.

In **Barpeta**, agriculture remains the primary source of income, similar to Baksa. However, the district also faces significant climatic challenges, including floods, heavy rainfall, and droughts. These events contribute to soil erosion, the emergence of new diseases and parasites, and a worrying increase in livestock mortality. The growing season for crops is unpredictable, though there has been an observed increase in crop yields, due to changes in farming practices or adaptations of modern techniques. Like Baksa, Barpeta's farmers are grappling with water scarcity, soil degradation, pest outbreaks, and the excess water from floods. The district has also seen a decrease in water levels across various water bodies, again attributed to inconsistent rainfall. Economic stability in Barpeta is precarious, with reduced agricultural income and an increased cost of living pushing many to migrate to urban areas. The district experiences a high rate of migration, further exacerbated by the shift towards processed foods as fresh and organic options dwindle.

Kokrajhar stands out from the other districts in that daily wages, rather than agriculture, constitute the primary source of income for many of its residents. Nevertheless, the district is not immune to severe climatic events, facing frequent floods, heavy rain, and heat waves. These conditions have led to the destruction of vegetables and flowers, and an increase in insect attacks, further destabilizing the agricultural sector. The growing season for crops is unpredictable, and crop yields vary, indicating instability in agricultural productivity. Farmers in Kokrajhar face similar challenges to those in Baksa and Barpeta, including water scarcity, soil degradation, and extreme weather events. The decrease in water levels due to inconsistent rainfall has further complicated the situation. Livestock mortality has increased, adding to the economic burdens faced by the community. The district has seen a reduction in agricultural income, an increased cost of living, and a resultant rise in migration to urban areas, though the migration levels are still considered low. The shift towards processed foods has become more pronounced as fresh and organic options become less accessible.

In **Bishnupur**, agriculture is again the predominant source of livelihood. The district is particularly vulnerable to drought, hailstorms, and sporadic rain, which have devastating effects on the local agriculture. Crops and agricultural land are often submerged, water sources contaminated, and insect attacks intensified. The growing season for crops in Bishnupur has become increasingly unpredictable, leading to variations in yields. The challenges facing farmers include water scarcity, soil degradation, and pest and disease outbreaks, compounded by extreme weather events. A significant decrease in water levels in streams, rivers, wells, and ponds has been observed, attributed to inconsistent rainfall patterns. Unlike other districts, Bishnupur has also seen a decrease in aquaculture practices due to these climatic challenges and contamination of water. Economic stability is threatened by reduced agricultural income and an increased cost of living, leading to a loss of livelihood and some migration to urban areas. Despite these challenges, migration levels in Bishnupur remain low. However, the dependency on processed foods has increased as the availability of fresh, organic produce has diminished.

Finally, in the combined districts of **Noney & Tamenglong**, agriculture is the mainstay of the economy. The districts experience extreme climate events, including heat waves, heavy rain, and windstorms, which have led to the destruction of horticulture crops, soil erosion, and the drying up of water streams. These factors have contributed to a noticeable decrease in crop yields. Farmers here face significant challenges similar to those in other districts, including water scarcity, soil degradation, and pest outbreaks. The inconsistent rainfall has led to decreased water levels in streams, rivers, wells, and ponds. Although specific data on livestock impacts are not provided, the economic stability of these districts is clearly compromised. Reduced agricultural income, increased cost of living, and loss of livelihood are driving moderate levels of migration to urban areas. As with the other districts, there is a growing dependency on processed foods due to the reduced availability of fresh, organic options. The analysis highlights the severe and widespread impacts of climate change across these districts, particularly on agriculture, economic stability, and food security. The variations in climatic events and their effects on the livelihoods of people underline the urgent need for targeted interventions to build resilience in these vulnerable communities.

Diversification in Occupations:

1. **Economic Adaptation through Wage Labor:** The shift towards wage labor, particularly in districts like Kokrajhar, suggests that traditional agriculture is becoming less viable due to declining productivity. As a result, individuals are seeking more reliable, albeit lower-paying, employment options. This transition reflects a broader economic adaptation where communities are prioritizing income stability over traditional livelihoods.
2. **Leveraging Cultural Knowledge for Economic Resilience:** The resurgence of traditional crafts such as handicrafts and weaving in districts like Bishnupur and Kokrajhar indicates that communities are turning to culturally embedded skills as a means of generating alternative income streams. This suggests a conscious effort to diversify livelihoods and reduce dependency on agriculture, thereby enhancing economic resilience.
3. **Diversification through Livestock and Poultry Farming:** The shift towards livestock and poultry farming across several districts highlights a strategic response to the unpredictability of crop yields. By diversifying into animal husbandry, communities are seeking to mitigate the risks associated with poor harvests and create more stable income sources. This diversification underscores the need for alternative livelihoods in the face of climate-related agricultural challenges.
4. **Emergence of New Ventures and Entrepreneurship:** The initiation of retail businesses in districts like Noney, in response to declining agricultural income, indicates a proactive approach to overcoming economic challenges. This suggests that communities are increasingly engaging in entrepreneurial activities as a way to diversify income sources and support their families financially, reflecting a broader trend towards economic diversification.
5. **Strategic Income Diversification:** The engagement in a mix of traditional and non-traditional activities, such as social initiatives, small-scale retail, tailoring, and handicrafts, across various districts, reflects a strategic adaptation to the changing economic landscape. This diversification of income sources suggests that communities are seeking greater financial security by not relying on a single form of livelihood, thereby enhancing their overall economic resilience.

Recommendations

In light of the findings, the following recommendations are proposed:

Adoption of Climate-Resilient Agricultural Practices:

- a. Encourage the adoption of modern, climate-resilient agricultural techniques, including improved irrigation systems, drought-resistant crop varieties, and integrated pest and disease management (IPDM). These practices can enhance productivity and reduce vulnerability to climate-induced losses.

b. Promote the transition from traditional rainfed to more sustainable and resilient agricultural systems.

Strengthening Agricultural Infrastructure:

- a. Invest in infrastructure that supports climate-resilient agriculture, such as flood-resistant storage facilities, check dams for water conservation, and climate-controlled farming environments (e.g., greenhouses).
- b. Improve access to modern agricultural inputs and technologies, particularly in the most vulnerable districts.

Enhancing Food Security and Nutrition:

- a. Implement programs that increase the availability and accessibility of fresh, organic produce to counter the rising consumption of processed foods. This could include promoting kitchen gardens, supporting local food markets, and providing subsidies for organic farming.
- b. Educate communities about the health risks associated with processed foods and the benefits of maintaining a diet rich in fresh, organic produce.

Addressing Socio-Economic Disparities:

- a. Expand access to financial services, agricultural support, and livestock services, particularly in underserved districts. This could involve strengthening microfinance institutions, providing targeted subsidies, and offering technical assistance to farmers.
- b. Foster community-based initiatives that empower local populations to adapt to climate change, such as cooperative farming, shared water management systems, and collective marketing of produce.

Policy and Research Development:

- a. Develop and implement policies that prioritize climate adaptation in agriculture, focusing on the most vulnerable districts identified in the study. These policies should be informed by ongoing research into the specific impacts of climate change on different crops and regions.
- b. Support further research into the socio-economic impacts of climate change on rural communities, with a particular focus on migration, employment shifts, and changes in land use.

Capacity Building and Education:

- a. Strengthen extension services to provide farmers with the necessary knowledge and skills to adapt to climate change. This includes training on sustainable farming practices, water conservation, and the use of climate-resilient technologies.
- b. Launch educational campaigns aimed at raising awareness of climate change impacts and the importance of adaptive strategies in agriculture.

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List of Tables and Graphs:

Map Lists:

Map1: Assam Map
Map2: Manipur Map
Map3: Baksa District Map
Map4: Barpeta District Map
Map 5: Kokrajhar District Map
Map 6: Bishnupur District Map
Map7: Noney District Map
Map8: Tamenglong District Map

Graphs List:

Graph1: Family Structure of Respondents
Graph2: Caste Distribution of Respondents
Graph3: Source of Drinking Water
Graph4: Distribution of Primary Source of Income
Graph5: Land Ownership Distribution
Graph 6: Land Holding Distribution
Graph7: Land Holding Distribution- District Wise
Graph 8: Respondents' Income from Agriculture
Graph 9: Respondents' Income from Livelihoods
Graph10: Access to Socioeconomic Services
Graph 11: Climate Change Reasons
Graph 12: Respondent on Temperature Change
Graph 13: Respondent on Winter Temperature Change
Graph14: Respondent on Rainfall Pattern during Monsoon
Graph15: Respondent on Rainfall Pattern in Other Season
Graph 16: Respondent on Change in Growing Seasons
Graph 17: Respondent on Change in Crop Yields

Tables List:

Table1: Sample Distribution
Table2: Family Structure of Respondents
Table3: Household-Sex and Age wise Distribution
Table4: Age-group Distribution of Household Members
Table5: Gender-Distribution of Households
Table6: Education Status of the Sampled Household Members
Table7: Religion Distribution
Table8: Caste-Distribution of Respondents
Table9: Primary Source of Income
Table10: Distribution of Different Agriculture Practices
Table 11: Agricultur Income Analysis of Respondents
Table 12: Livestock Income Analysis of Respondents
Table 13: Dairy Income Analysis of Respondents
Table 14: Respondents Involved in Other Occupation
Table15: Other Income Analysis of Respondents
Table16: Natural Disaster and Incidence over 10years
Table 17: Main Challenges in Agriculture
Table 18: Change in Amount in Streams, Rivers, Wells, Ponds
Table 19: Reasons for Change in the Water Sources
Table 20: Climate Change Impact on Income/Economic Stability
Table 21: Gender Bifurcation of Migrants
Table 22: Adaptation of New Measures in Context of Climate Change

Annexure – 1

BRIEF OF THE ORGANIZATIONS INVOLVED IN RESEARCH:

AMAN FOUNDATION:

Established in April 2021, AMAN Foundation is dedicated to serving society primarily through its flagship initiative, the AMAN Education Program. With a core mission to alleviate poverty and foster sustainable livelihoods, AMAN focuses its efforts on empowering rural communities in Assam, specifically in the riverine areas of BARPETA district. Through a combination of educational interventions, training sessions, and awareness programs, AMAN aims to empower youth and marginalized groups, including daily wage earners, farmers, and children. The foundation envisions sustainable livelihoods with dignity, particularly in flood-prone regions, as a means to foster development. By actively engaging communities and promoting local cultural heritage, AMAN strives to cultivate resilience and cultivate an environment of peace and contentment in rural areas.

ASHA:

Based in Kachukata village, Kokrajhar district, ASHA is dedicated to fostering socio-economic development through its livelihood and education initiatives. Founded by local youths, ASHA's overarching goal is to establish a just society. The organization operates across 1 district, 5 blocks, and 40 villages, implementing various activities aimed at community upliftment. These activities encompass supporting 50 Self Help Groups (SHGs), establishing 6 Village Organizations, and extending assistance to 2500 households. ASHA's target beneficiaries include SHGs, BPL families, migrant laborers, and tribal communities. With a vision to create a peaceful society and a mission centered on empowering rural communities through education and sustainable livelihoods, ASHA is committed to making a meaningful impact in the region.

SANJOG:

SANJOG, a prominent livelihood promotion organization in Assam, operates extensively across four lower Assam districts, providing vital interventions and emergency relief during crises such as COVID-19 and floods. The organization has successfully piloted initiatives such as mushroom and climate-resilient vegetable cultivation, significantly impacting marginalized households. SANJOG also champions the promotion of bio-digestors and sustainable farming practices, forging partnerships with organizations like Fair Climate Fund and KOSHER climate for large-scale projects. Committed to achieving lasting impact, SANJOG prioritizes disaster risk reduction, livelihood restoration, and WASH initiatives, collaborating closely with DISPECS for support. With a strong focus on renewable energy, SANJOG collaborates with the SELCO Foundation to promote micro-enterprises and expand outreach, thereby advancing sustainable community development.

Realm of Nature Based Actions (RNBA):

Established in 1985, the Realm of Nature Based Action (RNBA) is a grassroots NGO committed to socio-economic development across Manipur, Nagaland, and Assam. RNBA's core focus lies in promoting indigenous eco-cultures, enhancing income generation opportunities, fostering peace processes, and building grassroots capacities. With a vision of a self-reliant society where individuals recognize their responsibility towards humankind and nature, RNBA's mission revolves around ensuring sustainable ecosystems, partnering with the impoverished, striving for peace and justice, and promoting equitable livelihoods. Noteworthy are RNBA's interventions that have directly impacted 148 villages, benefitting 93,113 families and 1,51,693 individuals, with an estimated 6,06,772 indirect beneficiaries.

PEOPLE'S RESOURCE DEVELOPMENT ASSOCIATION (PRDA):

Originally founded as a youth group to aid flood-affected communities during the construction of the Ithai Dam in Manipur, PRDA has evolved its focus towards livelihood promotion, women and child rights, access to entitlements, and natural resource management for marginalized sections in the state. Amidst the Covid-19 pandemic, PRDA demonstrated its commitment by providing relief to 7000 individuals and supplying 163 oxygen concentrators through ActionAid Association of India. The organization has further established counseling centers catering to 200 youths, facilitated over 100 blood donations, supported 51 looms, assisted 80 women with livelihood opportunities, and contributed to environmental conservation efforts by planting over 5000 saplings in the Bishnupur district.

Survey Questionnaire**CONSENT FORM FOR SURVEYS**

This study is being conducted by Seven Sisters Development Assistance (SeSTA) in collaboration with the partner name to access the impacts of climate change on rural communities in Assam and Manipur. I, Investigator name, am conducting survey in this area. For this study, you will be completing a short survey about the household information, income, and climate impact related information on the household. All responses you provide for this study will be completely confidential. When the results of the study are reported, you will not be identified by name or any other information that could be used to infer your identity. Your participation in this survey is voluntary. You may withdraw your consent and discontinue participation in the survey anytime.

You have given consent to be a subject of this research and respond to the survey as truly as possible. Do you wish to participate in this study?

Yes, I am consenting to participate

No, I am not consenting to participate

Survey Questionnaire:

Section 1:

a. District: Barpeta/Baksa/Bishnupur/Kokrajhar/Tamenglong

b. Block:

c. Village Name:

Section 2:

General Household Information:

a. Respondent Name:

b. Mobile No:

c. Religion:

Hindu/Muslim/Christianity/Buddhism/Atheism/Animism/Other.....

d. Caste: ST/SC/General/OBC....

e. Community Name:

f. Total Family members: Adult Male: Adult Female: Children below 14 years:

g. Household member information:

	Name	Relation w/t HH head	Sex(F/M/Other)	Age	Education	Occupation (Primary/Secondary)	Marital Status
1							
2							
3							
4							
5							
6							

- Household Information:

a) Primary source of drinking water: Tube Well/Well/Canal/River/Others

b) Main source of energy for light: Electricity/Solar Power/Kerosene/Others

c) Primary source of Income of the household in the past 12 months (80percent of household income): Agriculture/Wages/Business/Salary/Livestock/Fisheries/others.....

d) Main source of fuel used for cooking: Firewood/LPG/Cow Dung/Biogas/Electricity/Rice Husk/Others

Section 3: Physical Capital

a.Land measurement in this village: Bigha/Acre (dropdown)

a.Land Holding size:

1. a)Owned Land:

2. b)Land leased from others:

3. c)Shared Land

4. d)Homestead Land:

5. e) Jhum Land:

6. f) Total Operational Land:

a.Plot Information (2022-2023)

1.Total land:

2.Total rainfed land:

3.Total irrigated land:

4.Total Jhum cultivation land:

5.Total Operational Land

6.Total Fallow Land:

a.Crop Information (2022-2023, Last Year Production)

1.Irrigated Kharif Cultivation:

Land:

Crop type:

Income 2023:

1.Irrigated Summer Cultivation:

Land:

Crop type:

Income 2023:

1.Irrigated Rabi Cultivation:

Land:

Crop type:

Income 2023:

- Rainfed Kharif Cultivation:
- Land:
- Crop type:
- Income 2023:
-
- Rainfed Rabi Cultivation:
- Land:
- Crop type:
- Income 2023:
-
- Jhum Kharif Cultivation:
- Land:
- Crop type:
- Income 2023:
-
- Jhum Rabi Cultivation :
- Land:
- Crop type:
- Income 2023:
-
- Jhum Summer Cultivation:
- Land:
- Crop type:
- Income 2023:
-
- i) Plantation:
- Land:
- Crop type:
- Income 2023:
- Vegetation:
- Land:
- Crop type:
- Income 2023:
-
- Others:
- Land:
- Crop type:
- Income 2023:
-
-
-
- Livestock Information:
- a) Pig : Number:, Income 2023:
- b) Goat: Number:, Income 2023:
- c) Cow: Number:, Income 2023:
- d) Poultry: Number:, Income 2023:
- e) Other: Number:, Income 2023:

- Income from Dairy:
-
- Household Income Information (2022-2023):
- Name of Occupation:
- Income:
- Household Access to socioeconomic services:
- a) You or any family member is a member of saving or micro finance institutions: Yes/No
- b) Your household received services from agriculture support centre over the past 12 months period: Yes/No
- c) Your household received services from livestock service centre over the past 12 months period: Yes/No
- Section 4: Knowledge and Perception about Climate Change, Reasons and Impact:
- 4.1) Knowledge about Climate Change
- a) Have you heard about climate change? Yes/No
- b) If yes, what is your main source of information about climate change...
- c) Do you think climate of this place is different than it was 10 year before? Yes/No
- d) What may be the main reason of the climate change? Deforestation/Natural Reason/Other
- e) What are the main three consequences/incidence in this area in this past 10 years? Drought/Flood/Windstorm/Thunderstorm/Hailstorm/Heavy Rain/Sporadic Rain/Erosion/ Heat Wave/Cold Wave/Disease/Insect/Other.....
- f) How it has impacted your household and members
-
-
-
-
- Information on Temperature:
- a) Summer: Decreased/Increased/Same
- b) Winter: Decreased/Increased/Same
-
- Information on Rainfall:
- a) In which month did the rainy season begin?
- b) Monsoon: decreased/increased/same
- c) Other season: decreased/increased/same
-
- Impact due to (4.1.e) listed incidence:
- Impact on household
- Impact on drinking water and irrigation
- Impact on work
- Impact on Children Education
- Impact on Women

- Impact on Household:

a) How has the growing season for crops changed? No change/Shorter Growing Season/Longer Growing Season/Unpredictable Growing Season

b) Have you experienced changes in crop yields?

Increased yields/decreased yields/No change/Varies year to year

c) What are the main challenges you face in farming due to climate change?

Water Scarcity/Soil Degradation/Pest and Disease Outbreaks/Extreme Weather Events/Other (Please Specify)

d) In past 5 years did you or any family members bear any loss due to climate change incidences? Yes/No

If Yes, Describe the loss

i) Cereals/Cash Crops:

ii) Vegetables:

iii) Fruits:

iv) Livestock:

v) Orchard/Nursery land:

vi) Cultivable Land:

vii) Other loss in non-agricultural business:

4.6) Impact on drinking water and irrigation last 5 years:

a) What changes have you observed in amount of water in streams, rivers, wells, ponds? Increased/decreased/No changes/ Other

b) Are any tube wells, wells, hand pumps in state of drying up? Or dried?

c) What are the main reasons of changes in the water sources? Inadequate rainfalls/adequate rainfalls/

d) How it has impacted irrigation?

4.7) Impact on Work and Migration:

a) How climate change affected your income or economic stability? Reduced Agriculture Income/Increased Cost of Living/Loss of Livelihood/Increased Migration to Urban areas/Other (Please Specify)

b) Do you or any family member migrated for work? Yes/No

c) Name:

d) Sex:

e) Type of Migration: Seasonal/Permanent

f) Reason of Migration:

g) Work:

h) Wages/Salary:

a. Impact on Children and Women:

a) Did the climate change impacted women and children? Yes/No

b) How it has impacted: (unpaid work increased because of migration etc...)

c) How it has impacted children education:

d) Has the incidence of illness increased in your family over the past 10 years? Yes/No

e) If yes, Please describe (Respiratory Problems/Waterborne Disease/Heat-Related Illness/Malnutrition/Other.....

- Section 5: Farm based coping strategies/ Action adopted by Households due to Impact of Climate Change over the past 10years
- Received farm based skill development training to cope with the impact of climate change? Yes/No
- What measures have you taken to adapt to climate change in agriculture pattern?
- Changed in cropping pattern (Change in crop rotation, intercropping)
- New crops grown
- Left land fallow
- Change in planting date (seedling, etc.)
- Insurance of Crops done
- Soil conservation practice
- Practice Compatible Cropping (millets etc.)
- Adopted improved seeds (improved, drought resilient, water resilient varieties, etc.)
- Used increased amount of inorganic fertilizers in the field
- Used increased amount of organic fertilizers

- What measures have you taken to adapt to climate change in Water Conservation?
- Water Conservation Practices
- Invested in ponds for irrigation
- Provided supplemental irrigation
- What other measures taken to adapt to climate change in farm based livelihoods?
- Reared livestock of different breed Yes/No
- - Raised new livestock Yes/No
- - Investment in livestock pests and disease Yes/No
- - Started agro forestry Yes/No

- Section 6: Off-Farm based
- 6.1) Changed the food consumption habit: please describe
- 6.2) Started more off-farm activities/employment: please describe

- 6.3)What support do you need to better cope with climate change?
- Financial Aid
- Training and Education
- Improved Infrastructure
- Access to Technology
- Others (Please Specify)

- FGDs Questionnaire:
- Objective of FGDs: The objective of FGDs is to understand the multidisciplinary effect of climate change on the village, including impacts on farmers, women, and children, as well as agriculture, forest and livestock. It also aims to assess the village's preparedness for extreme climate events along with measures taken in recent times.

- Name of the Location: (Village, Block, District):

- Total members present in the FGDs:
- FGDs with Farmers (Women and Men):
- Village Profiling:
- Can you briefly describe your village in terms of livelihood?
- What are the changes you noticed in economic activities in your community in past 10 years?
- What could be the possible reasons of the change?

- What could be the possible reasons of the change?

Climate Change:

- How different climate of this place than it was 10 years before?
- What could be the reason of the climate change?
- How temperature and rainfall pattern have changed?
- What is the main consequences/incidence of climate change in this area in this past 10 years?
- How climate change-induced changes in the seasons affect your livelihood(s)?
- Impact on agriculture, fisheries, livestock etc.
- In what ways are the crops you plant dependent on the weather? Which weather warnings do you use to know when to sow or harvest crops?

Impact of Climate Change on Water Resources and land:

- What changes have you observed in amount of water streams, rivers, wells and ponds?
- What are the main reasons of change in the water sources?
- Impact of water resource change on the village?
- What are the impacts on soil? (soil degradations due to flood/drought)

Impacts on Bio-Diversity:

- Describe the change in forests and plants as compared to 10 years before?
- What are the impacts on Trees, Shrubs, Medicinal and non-timber forest products, Grass/Fodder, Wildlife, Birds, and Insects?
- What kind of changes observed in the Floristic behavior over the past 10 years? (for hint: Early flowering/fruitletting, Late Flowering/Fruitletting, Change in the size of flower/fruit)

Disease and Health Impacts:

- Any new disease in crops, new insects/parasites in the crops, new disease or parasites in the livestock in village over the past 10 years?
- Describe infestation over the past 10 years?
- Are there some diseases that are common during certain times of the year? Are there some diseases that are more common when it rains/when it is dry? (questions to ASHA workers)
- Are incidences of illness increased over the past 10 years? Describe the disease and the issues around it. (questions to ASHA workers)

Natural Disaster:

- Any natural disasters or events due to climate change (identify the main disaster events in the village in past 10 years)?
- To what extent these events have impacted/affected village over the past 10 years?
- How many days on average residents of village were not able to work/unemployed to the disasters/events (last years information)?

Coping Mechanisms:

- What are the coping strategies used by community in relation to the hazards identified? Any mechanisms adopted and resilience built by the community over the years to climate change incidences?
- Any mitigation strategies adopted by the village to climate change incidences?
 1. Impact on women and Children: (specially focusing discussion with women)
 - a. What are livelihoods women are indulge in? (map livelihoods women are associated with)
 - b. Discuss about the change of livelihoods adopted by the women in the past 10 years?
 - c. What are the difficulties associated with it?(taking up more labour work)
 - d. How climate change has impacted household work? (water issues, sole household responsibilities due to migration of family members etc)
 - e. How severity of climate affects children education?

- FGDs with Youth (Male and Female):
-
- What are the livelihoods options are being taken up by the youth in the village?
- How you see the impact of climate change on employment?
- How you see the effect on education?
- Describe how have the changes in the number and severity of extreme events modified coping strategies? (Eg. How long/often do men have to move away to find work)? What impact does this have on the village?
- What are the impacts of Climate Change on Migration over the past 10 years in the village?
- What are the impacts on adolescent girl (education, work, any other challenges)?
- Any other challenges due to climate change?

- KIIs
- with School Principle/teachers/SMC:
- Percentage of children is regular to school.
- If any irregularity? What are the reasons of irregularity?
- Which age group of children is more irregular?
- Percentage of dropouts in schools? Reasons of dropout?
- How severity of the climate change impacts the children education?
- What are the measures taken to secure children education?

- KIIs with
- - District Environment Offices:
- - District Agriculture Offices:
- -District Disaster Management Authorities:
- -District Forest Offices:
- -District Water Resources Departments
- -District Health Offices
- -District Horticulture Departments
- -District Fisheries Departments
- -Block Development Offices
- - Block Panchayat Offices

- 1) Name of the officers:
- 2) Name of the position:
- 3) What are the policies related to climate change? (Current and the past five years policies)
- 4) What are the measures taken in the district in the last five years? (Specific detail)
- 5) What are the challenges in implementing policies?
- 6) Activities related to climate change mitigation in the last five years? (specific activities details)
- 7) Activities done in selected village regarding climate change?
- 8) Plans for this financial year related to climate change.
- 9) Any other information wanted to share to help in climate change research?



Photo 1: FGDs in Rangkhung village, Noney District



Photo 2: FGDs in Kusumbil village, Kokrajhar District



Photo 3: FGDs in Longmai, Noney District



Photo 4: FGDs in , Upkopi Khunau Bishnupur District



Photo 5: FGDs in , Guileza village, Kokrajhar District



Photo 6: KII in Kokrajhar with Agriculture Officer



Photo 7: FGDs in Lachanga village, Barpeta District



Photo 7: FGDs in Mowamari village, Barpeta District



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