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## SOCIAL SCIENCE AND EDUCATION | RESEARCH ARTICLE

## Farming Amidst Climate Change: Understanding, Perceived Effects and its Implications on the Livelihood of Farmers

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**Abstract:** This study used descriptive research methods to determine the understanding, perceived effects, and implications of climate change on the livelihood of the farmers in Barangay Sarip-Alawi, Balo-I, Lanao Del Norte. Interview Schedule was used as an instrument to obtain necessary information from the respondents of this study and the data were presented and analyzed using frequency, percentage and the weighted mean. As to level of understanding on climate change, the respondents held a very high level of understanding. The respondents strongly agreed that climate change has already occurred; that it is a global issue; it happened in their community; and it affects their livelihood. They strongly agreed that they perceived the effects of climate change on their farming activities. Moreover, the respondents strongly agreed that climate change can cause failures in their crop production, decrease of yield harvest, affect their farming schedule, affect the soil, and delay their harvesting activity. Thus, different strategies were used by the farmers to mitigate the effects of climate change on their farming and livelihood activities. Some of those mitigation and adaptation practices are by changing in cropping pattern and cropping technique calendar, diversifying of income-generating and other livelihood activities, and practicing multi-cropping.

**Keywords:** Climate Change, Perceived Effects, Coping Strategies/Mechanisms, Sustainable Farming and Implications.

### 1. INTRODUCTION

A steady shift in the climatic system caused by both natural and man-made factors is known as climate change. A region's or regions' long-term variations in atmospheric conditions are referred to as its "climate." Complex interactions between the atmosphere, hydrosphere, biosphere, cryosphere, lithosphere, and all parts of the climate system cause climate change. The main categories of climate change causes include natural causes and man-made causes. Examples of natural causes include variations in solar activity, volcanic eruption, sea surface temperature, ice cap distribution, westerly waves, and atmospheric waves. On the other hand, man-made factors include deforestation, acid rain, and Freon gas ozone layer deterioration, which results in global warming, include carbon dioxide emissions from industry and agricultural production operations. (Presidential Advisory Council on Education, Science and Technology: PACEST, 2007).

While there is a lot of scientific information on the worldwide phenomenon of climate change, little emphasis has been paid to understanding how climate change affects the individual's livelihood and how people in rural areas perceive climate change. As a result, it is critical to investigate how farmers perceive and interpret climate change and its implications for their livelihoods. This type of study may be able to provide focused solutions for responding to climate and ecological changes in a timely and effective manner. In its fourth report, the Intergovernmental Panel on Climate Change (IPCC) warns that global climate system warming is unmistakable, owing primarily to Greenhouse Gas Emissions. It predicts that the global temperature will increase between 1.8°C and 4°C above the



levels observed from 1980-1999 during the time frame of 2090-2099, depending on how human cultures continue to evolve. The report goes on to say that climate change is not just about rising temperatures; it is also about heavier, more frequent precipitation, an increase in the number of areas affected by droughts, a higher number of tropical cyclones forming with higher intensity, and rising sea levels, and among others (Kusakari, Y. et. al, 2014).

In the Philippines, agriculture is the backbone of the economy. When extreme weather events hit the country, farmers are very vulnerable, especially the small-scale farmers whose income from the farm cannot suffice the need of family members/household members. What makes the farmers more vulnerable is the fluctuating price of goods in the market and the oppressive practices of middlemen. Subsequently, when the pandemic hit, the world turned upside down. Business was closed, people were mandated to stay at home, the economy of the country was suffering from regression. Apparently, the role of the farmers continues. They continue to provide food at our table.

Undeniably, climate change is already happening around the world. No matter what the Government will do to mitigate climate change, people continue to do things that are detrimental to the environment, thus, efforts will be in vain. Despite the obvious phenomena that people are experiencing due to climate change, they still do not act accordingly to at least mitigate climate change. Therefore, farmers should be assessed in terms of their understanding on climate change. It is in this context, the researchers desired to find out how the farmers in Barangay Sarip-Alawi, Balo-I, Lanao Del Norte understand climate change, how they perceived the effects of climate change and their coping strategies and mechanisms to address its effects. Balo-I is an agricultural municipality whose small-scale farmers planted corn, various vegetables, rice, coconut, bananas, abaca, etc. Oftentimes, farmers in Balo-I experience long season of drought and long season of rain which somehow affect their season of planting and affect the yield/harvest in the process. Moreover, this study has incorporated the sustainable development approach because it aimed to determine the practices and adaptive capability of the farmers to the effects of climate change. Their practices might either be helpful or harmful to the environment.

## 2. LITERATURE REVIEW

As cited by M.S. Reed, G. Podesta, and A.D. Thomas on their article about Combining analytical frameworks to assess livelihood vulnerability to climate change and analyze adaptation options, it was stated that the sustainable livelihoods framework offers a framework for examining both the crucial elements that go into livelihoods and the contextual factors that affect them, making it particularly pertinent to understanding vulnerability to climate change. Due to their increased susceptibility to or vulnerability to the effects of a changing climate, both of these elements have an impact on a family's or a community's capacity to adapt to environmental change.

Understanding how people can access resources such as natural, human, social, physical, and financial capital forms the foundation of the sustainable livelihood framework. The sustainable livelihoods method can be applied in a variety of ways to evaluate climate change vulnerability. The framework first offers the groundwork for determining how livelihood strategies could assist people in developing their capacity for adaptation, enabling them to more effectively deal with change and diversify their activities to increase their resilience to future change. The framework, for instance, explains how livelihoods adjust to shocks, seasonality, economic trends, or resource trends, as well as how their vulnerability can be decreased, for instance by improving access rights to alternative grazing areas during droughts or increasing the flow of information about new technologies. (Adger, 2003; Kelly and Adger, 2000; Smit and Pilifosova, 2001; Yohe and Tol, 2002; Ziervogel et al., 2006).

The framework also recognizes that different stakeholders are affected by climate change in different ways and have varying capacities for adaptation, based on how much they rely on and have access to financial assets (e.g., Carr, 2008; Ziervogel et al., 2006). In order to develop the capacity to adapt to various and dynamic livelihood contexts, participatory, people-centered, and action research methodologies are frequently utilized in sustainable livelihoods research and practice (e.g., Ashley, 2000; Small, 2007). Third, the paradigm places a strong emphasis on the necessity of addressing the fundamental causes of inadequate adaptive capabilities, such as lack of access to unequally distributed resources.

Moreover, Anupama Mahato cited on his study about Climate Change and its Impact on Agriculture in India that India's agriculture has been more reliant on the monsoons. Agriculture is greatly impacted by changes in monsoon patterns. Indian agriculture is impacted by even rising temperatures. The Indo-Gangetic Plain's pre-monsoon alterations will mostly have an impact on the wheat crop. (>0.5°C increase in time slice 2010-2039; IPCC 2007). Rice production losses during severe droughts (approximately one year in five) average nearly 40% of overall production in the states of Jharkhand, Odisha, and Chhattisgarh alone, with an estimated cost of \$800 million (Pandey, 2007).

Nelson, G. L. et. al. cited on his study about the indigenous practice and climate change response of Ati and Suludnon farmers in Iloilo, Philippines that the Ati's climate change experience had a negative impact on their livelihood. In the last nine years (2004-2012), a warmer climate and more precipitation have been seen. Fruit tree seedlings, particularly bananas, were harmed by the drought brought on by El Nino. Excess water from heavy rains has the same negative impact on bananas. Due to shallow root penetration in damp soil, bananas are readily uprooted. Similar to the Suludnon tribe's experience with climate change-related typhoons and unpredictable weather conditions generating floods and landslides, which devastated and reduced the Suludnon tribe's crop yield, particularly bananas. Pest and disease outbreaks also increased, resulting in lower yields in various crops. Tungro virus infected rice, while potato scab infected sweet potatoes. Cassava and sweet potato were also attacked by rats. Defoliation of coffee and rapid weed growth contributed to the drop in yield.

The study of CK Jha and V. Gupta on the "Farmer's perception and factors determining the adaptation decision to cope with climate change: An Evidence from rural India" shows that the key catalysts of the adaptation of the farmers to climate change was based on their long-term observations on climate change and with their personal experiences. This study implied that the farmers are basically adapting to climate change when he/she has personal experienced and observance on the effects of climate change so that he/she knows how to response to climate change. Based on the long-term experience of farmers to climate change, they are more than enough to decide on different techniques they can use to minimize the negative impact of climate change to their farming and livelihood system. The study also found out that the key socio-economic variables such as the farmer's age, gender, household size, education level, off-farm income, and farm-size influence farmers' adaptation decisions.

Nelson, G. L. et. al. pointed out on their study that traditional knowledge is significant source of information for climate change adaptation using coping mechanisms that have evolved through and been passed down through generations. They conducted their study by using key informant interviews, focus groups, and farm visits to gather information about the indigenous knowledge of the Suludnon and Ati in Iloilo for climate change adaptation. The responses revealed that their adaptations to climate change include farming methods based on biodiversity, adjustments to the cropping calendar, use of indigenous varieties, eating of non-traditional/wild foods, indigenous warning systems, and a variety of revenue streams. This means that despite the negative effects of climate change on their way of life, the Suludnon and the Ati tribes have managed to become sustainable and climate-resilient farming communities by combining traditional farming methods with the use of particular agricultural technologies.

The study of Maruhom on the adaptation of farmers to climate change at Maligo, Pualas Lanao Del Sur showed that the twenty-six farmers of Barangay Maligo have awareness on climate change as a global issue/concern. The result showed that their adaptation to climate change was more of change cropping pattern and cropping technique/calendar, change in current farm management practices, increase fertilizers/pesticides, change in planting schedule, and change in seed variety /crop rotation and diversification of income-generating/livelihood activities. The pressing problem faced by the farmers as a result of her study was low yield but high price and lack of materials. The instrument she used was field interview using structured questionnaire and analyze with the use of frequency and percentage. This result showed that the farmers are aware of climate change, and they have different strategies on coping with and adopting to climate change. Climate change is highly affecting the yield and crops produced by the farmers. The use of different strategies therefore should be prioritized and applied by the farmers as they perceived the effects of climate change.

The study of Saipoden on the adaptation to climate change among farmers at Pantar, Piagapo, Lanao Del Sur showed that farmers fully perceived the effect of climate change and strongly agree that frequent typhoon that caused flooding is one of the effects perceived on climate change. The findings showed that the farmers strongly agree that delayed harvesting activity, low profit, low income, and affect farmer's health are the perceived impact of climate change. The adaptation practiced by the farmers are moderately using organic fertilizer and raising of land drainage. The survey instrument used in her study was a survey questionnaire. This result that the farmers should practice more adaptation to cope on the effects of climate change. Climate change is both a global and local issue. Each of the farmers should practice adaptation so that the effects of climate change on the harvest yield and income of the farmers can be lessened.

The study of Peñalba, E. H. (2019) about Adaptation to climate change among farmers in Bulacan, Philippines, she discovered that farmers perceive substantial health and livelihood threats despite having limited knowledge of how climate change happens, using a combination of qualitative data from key informant interviews and focus group discussions, as well as secondary data from government agencies. They acknowledge that changing climate conditions have had a significant impact on temperature and rainfall, posing a substantial threat to water supplies. Interconnected impacts on their farming activities include crop damage, pest infestation, and a reduction in rice yield. As a result, they constantly deploy common adaptation strategies as direct responses to climate variability, such as the planting of new crop types, the use of chemical fertilizers and pesticides, farming technology, and household income diversification. However, they are unable to use modern adaptation techniques and technologies that they believe are more suited and useful due to a lack of financial resources. These findings point to a more deliberate effort to transition short-term climatic variability coping techniques into long-term climate change adaptation strategies.

Arifah, et al (2021) on their study about Farmer's Perception of Climate Change and the Impacts on Livelihood in South Sulawesi, using Cross sectional survey the study was conducted with a random sample of 120 smallholders' farmers that were distributed into 4 districts in South Sulawesi. They found out that the majority of respondents believed climate change is real, and about 83% said it has had a negative impact on their livelihood. Increasing temperatures and protracted dry seasons have lowered rain-fed rice output, indicating the influence of climate change. The findings also show that pests and plant diseases have increased in various locations as a result of the inclement weather. Climate change has also impacted the availability of water resources. As a result, policy implications include the need for suitable solutions to assist farmers in making adaptation decisions in this situation.

### 3. RESEARCH METHOD AND MATERIALS

The nature of the study is quantitative research utilizing descriptive research design. This study employed quantitative approaches to determine the understanding, perceived effects, and implications of climate change on the livelihood of the farmers. The Local the study Barangay Sarip-Alawi, Balo-I Lanao Del Norte. Barangay Sarip-Alawi, formerly known as Payawan, belongs to the Municipality of Balo-I Lanao Del Norte. Historically, Barangay Sarip-Alawi and Barangay Landa are one Barangay, and it was called Barangay Payawan. Later, Barangay Payawan was divided into two Barangays, namely: Barangay Sarip-Alawi and Barangay Landa. Sarip-Alawi was derived from ancestral names which are Sarip and Alawi. Geographically, the Barangay is part of Tagoloan while politically, it is part of Balo-I. The main source of livelihood of the barangay is farming since it is an agricultural community. During the four (4) months stay of the researchers in the barangay where they served as practicum students, they profiled 53 households who engaged in farming. The researchers took all fifty-three (53) households as their respondents to the study where they interviewed the household heads who had directly engaged in farming. The respondents of the study were all Meranaos who happened to be followers of the teachings of Islam.

The researchers had taken first the courtesy call to the Barangay Chairwoman of Barangay Sarip-Alawi and asked permission to conduct their study in the barangay. Then another courtesy call was conducted to the farmers to inform them about the study and purpose of the researchers. The rationale of the study was clearly discussed and presented to the respondents of the study. Thus, providing the

respondents with informed consent was made. The researchers collected information from the fifty-three (53) farmers through personal interview using an interview schedule. The researchers considered the time availability of the farmers in answering the interview. During the scheduled interviews, the researchers made sure that the information drawn from the respondents will be dealt with utmost confidentiality to gain trust and confidence from them hence, extracting data from them was made easier.

The researchers utilized interview schedule as the main data gathering tool. The interview schedule was self-made and was divided into three (3) parts. Part I of the interview schedule has something to do with the demographic and socio-economic profile of the respondents. Part II contains the level of farmers' understanding on climate change. Part III identifies the perceived effects of climate change on the farming activities and livelihood of the farmers. Lastly, Part IV contains the coping strategies or mechanisms to address the effects of climate change. Since the interview schedule was self-made one, the researchers conducted a pilot-testing in Barangay Landa to test the validity of the tool so that adjustments and corrections be made before the actual conduct of the study.

Descriptive statistics were used to quantify the frequency counts, and percentages of the responses of the respondents of the farmers from Baranga Sarip-Alawi such as age, sex affiliation, civil status, educational attainment, household size, farm size, years in farming, monthly income, harvest per year, livestock raised, crops planted, agricultural programs availed and coping strategies and mechanisms. It likewise used weighted means to determine the level of understanding of farmers on climate change and the perceived effects of climate change on the livelihood of the farmers. The table below is the Likert scale used in this study.

**Table 1. Range Interval Judgment for level of understanding and perceived effects of climate change**

Scale	Range Interval	Qualitative Description for the perceived effects of climate change	Level of understanding of farmers on climate change
5	4.20 – 5.00	Strongly Agree	Very High
4	3.40 – 4.19	Agree	High
3	2.60 – 3.39	Undecided	Moderate
2	1.80 – 2.59	Disagree	Low
1	1.00– 1.79	Strongly Disagree	Very Low

## 4. Results and Discussion

### 4.1. Demographic Characteristics of the Respondents

The demographic characteristics of the respondents include the following: age, sex affiliation, civil status, educational attainment, and household size:

**Table 2. Distribution of the Demographic Characteristic of the Respondents**

Characteristics	Frequency	Percentage
Age		
15-25 years old	3	5.7%
26-35 years old	13	24.5%
36-45 years old	19	35.84%
46-55 years old	11	20.75%
56-65 years old	6	11.32%
66 and above	1	1.88%
Total	53	100%
Sex Affiliation		
Male	38	71.69%
Female	15	28.30%
Total	53	100%
Civil Status		
Married	52	98.11%

Characteristics	Frequency	Percentage
Widowed	1	1.88%
Total	53	100%
Educational Attainment		
No Formal Schooling	16	30.18%
Elementary Level	11	20.75%
Elementary Graduates	10	18.86%
High School Level	4	7.54%
High School Graduates	6	11.32%
College Level	4	7.54%
College Graduates	2	3.8%
Total	53	100%

The results revealed several key demographic characteristics of the fifty-three (53) respondents. The bigger portion of respondents (19 or 35.84%) were aged 36-45, with an average age of 42, and ages ranging from 15 to 66 years old. In terms of sex affiliation, 38 or 71.69% were male, highlighting the male dominance in farming due to the physical nature of the work, although 15 or 28.30% were female. Almost all farmers (52 or 98.11%) were married, with only 1 or 1.88% being widowed or widower, indicating that farming is a family-reliant occupation. Educational attainment among the farmers was generally low, with 16 or 30.18% having no formal education and only 2 or 3.8% possessing a college degree. Household sizes varied, with 19 or 36% having 4-6 members, 18 or 34% having more than 6 members, and 16 or 30% having 3 or fewer members. These findings suggest that the farming community in Barangay Sarip-Alawi is composed largely of middle-aged, married individuals with low educational attainment and small to medium household sizes.

#### 4.2. Socio-Economic Characteristics of the Respondents

The demographic characteristics of the respondents include the following: age, sex affiliation, civil status, educational attainment, and household size:

**Table 3. Distribution of the Demographic Characteristic of the Respondents**

Characteristics	Frequency	Percentage
Household Size		
3 and below	16	30%
4-6 members	19	36%
More than 6	18	34%
Total	53	100%
Farm Size		
5,000 sqm	3	5.66%
1 hectare	32	60.37%
1.5 hectare	1	1.88%
2 hectares	7	13.20%
3 hectares	5	9.43%
4 hectares	3	5.66%
5 hectares	2	3.8%
Total	53	100%
Years in Farming		
1-10 years	15	28.30%
11-20 years	25	47.16%
21-30 years	10	18.87%
31-40 years	3	5.66%
Total	53	100%
Monthly Income		
₱1,000-₱3,000	32	60.38%
₱4,000-₱6,000	16	30.18%
₱7,000-₱12,000	5	9.43%
Total	53	100%

Characteristics	Frequency	Percentage
Harvest per year		
Once a year	7	13.21%
Twice a year	36	67.92%
Thrice a year	9	16.98%
Quarterly	1	1.88%
Total	53	100%
Livestock Raised		
Cow	14	26.42%
Goat	5	9.43%
Carabao	2	3.77%
Crops Planted		
Corn	35	66.04%
Vegetables	14	26.42%
Rice	9	16.98%
Camote	8	15.09%
Banana	7	13.21%
Ginger	2	3.77%
Coconut	1	1.89%
Peanut	1	1.89%
Cassava	1	1.89%

The socio-economic characteristics of the respondents revealed the following: the data on farm size reveals that most farmers in Barangay Sarip-Alawi operate on small plots, with 32 or 60.37% owning just 1 hectare, which likely restricts their agricultural output and income. Many farmers start young, with nearly half farming for 11-20 years, indicating a long-term reliance on farming despite low returns. The majority of the farmers live below the poverty line, earning only 1,000-3,000 pesos per month, highlighting their economic challenges and the need for income diversification. Most farmers harvest twice a year, primarily focusing on corn due to its ease of cultivation and low maintenance costs. Additionally, livestock ownership is low, further emphasizing their economic struggles, as they cannot afford essential farm animals like cows, goats, and carabaos. The crop data underscores a dependency on corn, though a variety of other crops are also cultivated. A critical implication of this data is the apparent lack of support from governmental agricultural programs, as all respondents indicated they had not benefited from such programs. This suggests a disconnect between the Department of Agriculture and small-scale farmers, highlighting the need for improved outreach and resource allocation to enhance the productivity and livelihoods of farmers in Barangay Sarip-Alawi.

#### 4.3. Level of Understanding of Farmer on Climate Change

Table 4 presents the level of understanding of farmers on climate change. There were thirteen (13) indicators that were answered and rated by the respondents.

**Table 4. Distribution of respondents' responses on their level of understanding.**

Statement Indicators	Weighted Mean	Level of Understanding
1. Climate change has already occurred.	5.00	Very High Level
2. Climate change a global issue.	4.98	Very High
3. Climate change happened in our community.	5.00	Very High
4. Climate change can be avoided.	3.49	High Level
5. Climate change is caused by human activities.	4.21	Very High Level
6. Climate change can affect the livelihood of farmers.	5.00	Very High Level
7. The effects of climate change can be lessened or resolved by the government.	4.02	High Level
8. Climate change can reduce crop production.	4.98	Very High Level
9. Climate change poses a serious threat for farmers.	5.00	Very High Level
10. Typhoons are caused by climate change.	5.00	Very High Level

Statement Indicators	Weighted Mean	Level of Understanding
11. Long days of raining is an indicator of climate change.	4.96	Very High Level
12. Drought is caused by climate change.	4.94	Very High Level
13. Extreme weather conditions (extreme heat/extreme cold) is an indicator of climate change.	4.91	Very High Level
TOTAL WEIGHTED MEAN	4.73	Very High Level

**Scaling:** 4.20 – 5.00- Very High Level; 3.40 – 4.19- High Level; 2.60 – 3.39- Moderate Level; 1.80 – 2.59- Low Level; 1.00– 1.79- Very Low Level.

The survey results reveal that farmers in Barangay Sarip-Alawi have a very high level of awareness and understanding of climate change, as indicated by the weighted means close to 5.00 for most statement indicators. They unanimously agree that climate change has already occurred and affects their local area, posing a serious threat to their livelihood and reducing crop production. This consensus aligns with global studies showing that rural populations, particularly those reliant on natural resources, are highly aware of climate change. The strong agreement on specific climate change indicators, such as typhoons, long days of rain, and droughts, is consistent with scientific observations of increasing frequency and severity of extreme weather events. Although there is a recognition that human activities contribute to climate change, reflected in the weighted mean of 4.21, there is uncertainty about whether it can be avoided, as shown by the lower weighted mean of 3.49. The farmers’ belief in the potential of government intervention to mitigate the effects of climate change, with a weighted mean of 4.02, suggests some trust in policy measures, although skepticism remains about their effectiveness. These findings highlight the necessity for enhanced education and resources to boost confidence in mitigation strategies and government interventions, emphasizing the importance of implementing effective climate adaptation practices to sustain farming activities and livelihoods amidst ongoing climate challenges.

These findings corroborate to the study of Saipoden on the adaptation to climate change among farmers at Pantar, Piagapo, Lanao Del Sur showed that farmers fully perceived the effect of climate change and strongly agree that frequent typhoon that caused flooding is one of the effects perceived on climate change. The findings showed that the farmers strongly agree that delayed harvesting activity, low profit, low income, and affect farmer’s health are the perceived impact of climate change.

#### 4.4. Perceived effects of climate change on the farming and livelihoods of the farmers.

Table 5 present the distribution of respondents’ responses as to the perceived effects of climate change on the farming and livelihoods of the farmers. There were five (5) indicators that were answered and rated by the respondents.

**Table 5. Distribution of respondents’ responses as to the perceived effects of climate change on the farming and livelihoods of the farmers.**

Statement Indicators	Weighted Mean	Qualitative Interpretation
1. Failure of crops production	5.00	Strongly Agree
2. Decrease of yield or harvest.	4.98	Strongly Agree
3. Farmers cannot work properly during drought and rainy season	4.68	Strongly Agree
4. Soil erosion due to heavy rainfall	4.87	Strongly Agree
5. Delayed harvesting activity	4.98	Strongly Agree
Total Weighted Mean	4.90	Strongly Agree

**Scaling:** 4.20 – 5.00- Strongly Agree; 3.40 – 4.19- Agree; 2.60 – 3.39- Neutral; 1.80 – 2.59- Dis-agree; 1.00– 1.79- Strongly Dis-agree

The findings reflect respondents’ strong agreement on various issues affecting agricultural productivity. The unanimous consensus is that crop production failure is a critical concern, as evidenced by the highest possible score of 5.00. Close behind, the decrease in yield or harvest and delayed harvesting activities both received scores of 4.98, highlighting these issues as nearly equally

significant. Soil erosion due to heavy rainfall also garnered a high score of 4.87, indicating a strong recognition of its detrimental impact. While still strongly agreed upon, the ability of farmers to work properly during drought and rainy seasons scored slightly lower at 4.68.

Based on the total weighted mean, respondents rated and answered the statements 4.90 which interpreted as “strongly agree”. This implies that climate change is negatively affecting the livelihood and farming activity of the 53 farmers of Barangay Sarip-Alawi, Balo-I Lanao Del Norte. Failures of crop production, decrease of yield or harvest, cannot work or farm properly during drought and rainy season, soil gets eroded because of heavy rainfall, and delayed harvesting activity are the effects perceived by the farmers.

These findings corroborate to the study of Arifah, et al (2021), she found that the uncertainty of weather conditions may cause changes in rainfall and temperature patterns. These changes are perceived by the farmers and are often associated with a risk of decreasing crop productivity. The finding showed that increasing temperatures and protracted dry seasons have lowered rain-fed rice output, indicating the influence of climate change. The findings also show that pests and plant diseases have increased in various locations as a result of the inclement weather. Peñalba, E. H. (2019) mentioned that the farming activities are also at risk from interrelated impacts such as damage to crops, pest infestation, and decrease in rice yield due to the effects of climate change.

#### 4.5. Coping strategies or mechanisms to address the effects of climate change

Table 6 presents the responses of the respondents on the coping strategies and mechanisms applied to address the effects of climate change. The respondents have multiple responses to this question. The total number of respondents is 53.

**Table 6. Distribution of respondents’ responses on the coping strategies or mechanisms to address the effects of climate change.**

Responses	Frequency (f)	Percentage (%) (N=53) [(f/N)*100]
Change in cropping pattern and cropping technique calendar	42	79.24%
Diversification of income-generating and livelihood activities	31	58.49%
Practice multi-cropping (planting different crops at the same time)	28	52.83%
Avoid burning plastics	18	33.96%
Planting trees to avoid flooding	15	28.30%
Utilize organic fertilizers and organic pesticides	14	26.41%
Practice composting	11	20.75%
Join community activities that promote environmental conservation and climate change mitigation	9	16.98%
Reduce, Reuse and Recycle of household trash	6	11.32%
Create awareness and education	5	9.43%
Implement soil conservative techniques	3	5.66%
Reforestation	1	1.88%

The result shows that 79.24% or 42 of the respondents used to change in cropping pattern and technique calendar as their strategy to cope with the effects of climate change. A total of 58.49% or 31 used to diversify their income-generating and other livelihood activities. This means that they do not rely on one livelihood like farming. Then 52.28% or 28 were practicing multi-cropping, example is that they planted more than one crops like vegetables and at the same time they planted corn. At least 33.96% or 18 refrained from burning plastics, as burning plastic is one of human activities that can contribute to global warming and that the change in our temperature is happening. There were 28.30% or 15 who have been doing tree planting, as they are aware that trees absorbed water and trees also can prevent disastrous events that will hit a certain place. There were 26.41% or 14 of the farmers were using organic fertilizers, 20.75% or 11 were practicing composting, 16.98%

or 9 had joined community activities promoting environmental conservation and climate change mitigation inside their Municipality. Only 11.32% or 6 were practicing the 3R's (Reduce, Reuse, and Recycle), then 9.43% or 5 are aware of the effects of climate change through attending seminars and training based on the discussions on Climate change. At least 5.66% or 3 implements soil conservative techniques such as crop rotation and 1.88% or 1 is applied reforestation.

Farmers all throughout the world are seriously threatened by climate change. Good weather, including high and low temperatures, rainfall, wind speed, and many other factors, is crucial for agriculture. Estimated that climate change would cut world agriculture productivity by 17 percent by 2050. Thus, needs for adaptation and mitigation to climate change should be emphasized as soon as possible. As farmers fully understand the indicators of climate change and perceived the effects of climate change, they should have strategies or mechanisms to cope with the negative effects of climate change. Farmer's perception of climate change and risk in the short and long run both impact the farmer's choice of adaptation strategies (Jodha et al., 2012; Ayanlade et al., 2017).

As cited by Nelson, G. L. et, al. on their study, they found out that the Ati and Suludnon farmers have adopted different strategies to cope with climate change. Such adaptations are change in cropping calendar, biodiversity-based farming system, continuous use of local/indigenous varieties that are resistant to climate hazards, use/consumption of non-traditional wild foods in times of scarcity, indigenous climate hazards indicators and warning systems, diversification of sources of income, indigenous Rituals and Beliefs, and indigenous structures. These eight strategies have helped the farmers of Ati and Suludnon to cope with the effects of climate change.

The findings imply that to cope with the effects of climate change, there should be adaptation to climate change. Such adaptation practices can help the farmers enhance their skills and knowledge with regard to climate change and its possible impact to the farming and livelihood. The farmers can practice multi-cropping, they can use organic materials for their crops to grow with resistance and achieve healthy outcomes. These results further imply that the farmers should start to learn and practice more about adaptation to climate change, because the occurrence of climate change cannot be prevented by its natural causes, but with the strategies set by the farmers to cope, it is more likely to avoid the effects of climate change to the farming and livelihood system.

## 5. CONCLUSION

The survey results from Barangay Sarip-Alawi reveal that the farming community is predominantly composed of middle-aged, married men with low educational attainment, managing small plots of land that limit their agricultural output and income. Despite their economic challenges, farmers demonstrate a high level of awareness and understanding of climate change, unanimously recognizing its severe impact on their livelihoods, including crop production failure, decreased yields, and soil erosion due to heavy rainfall. However, there is a notable disconnect between the farmers and governmental support programs, leading to skepticism about the effectiveness of interventions. To cope with the effects of climate change, farmers have adopted various adaptive strategies, such as changing cropping patterns, diversifying income sources, and practicing environmentally sustainable methods. These findings underscore the urgent need for enhanced outreach, resource allocation, and education to bolster confidence in mitigation strategies and support the sustainable livelihoods of small-scale farmers. Effective climate adaptation practices are essential to address the ongoing challenges posed by climate change and ensure the resilience of farming activities in Barangay Sarip-Alawi.

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