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Agricultural Profitability through Resilience: Smallholder Farmers' Strategies for Coping with Extreme Weather in Guimba, Nueva Ecija

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Abstract— *This study investigated the knowledge strategies and coping utilized by smallholder farmers in Guimba, Nueva Ecija to reduce and adjust to the effects of climate change. Smallholder farmers, who are frequently susceptible to climate change, utilize various traditional and innovative methods to strengthen their ability to withstand and recover from these consequences. Based on the results of this study, farmers in Guimba, Nueva Ecija demonstrate a profound comprehension of the adverse weather conditions, such as typhoons, droughts, and excessive rainfall, which they ascribe to climate change. While they have a fundamental understanding of climate change and its effects, their knowledge of scientific intricacies is restricted, indicating a need for information that is particular to the context. Although farmers possess knowledge about climate change, they are not actively engaging in proactive actions to adapt to it. Instead, they rely on reactive coping mechanisms. This highlights the necessity for targeted educational and communicative endeavors to promote the acceptance and implementation of approaches. Furthermore, the absence of available resources poses a significant barrier to achieving successful adaptation, highlighting the importance of pushing for inexpensive and feasible measures for adaptation. Farmers recognize the benefits of agroforestry and have started integrating the growth of fruit trees, particularly mangoes, into their coping techniques.*

Keywords— ***Climate Change, Knowledge, Practices, Smallholder Farmers, Strategies***

I. INTRODUCTION

Global agricultural systems face significant challenges due to climate change, with smallholder farmers particularly vulnerable due to limited resources and infrastructure (*Balangkas ng Pamamahala sa Kapaligiran at Panlipunan para sa proyekto ng GCF na "Pag-Aakma ng Agrikultura ng Pilipinas sa Pagbabago ng Klima",* FAO, Publications, September 2022*)*. Over generations, these farmers have developed extensive knowledge and techniques to cope with changing environmental conditions. This study investigates how smallholder farmers in Guimba, Nueva Ecija, are adapting to climate change through their practices and knowledge. It aims to identify patterns, barriers, and opportunities for enhancing adaptive capacity, exploring both traditional and novel adaptation strategies. The role of collaboration between researchers, policymakers, and farmers in leveraging indigenous and scientific knowledge is also examined *(Empowering Rice Farmers in Nueva Ecija, Philippines: A Strategic Approach to Boosting Income through Special Purpose Rice Production,* Published in Scientific Research an Academic Publisher*)*. This research contributes to the growing body of knowledge on climate change adaptation in agriculture, informing policy and development interventions (ADB, 2019). By examining the knowledge, practices, and attitudes of smallholder farmers in Guimba Nueva on

climate change, this study aims to provide an explanation for their current activities. Specifically, it described the following:

1. The impacts of extreme events observed by smallholder farmers in Guimba.
2. Smallholder farmer's coping strategies and adaptation practices to typhoons.
3. Smallholder farmer's coping strategies and adaptation practices to drought.
4. Smallholder farmer's coping strategies and adaptation practices to intense rains.

II. METHODOLOGY

This study employs a descriptive survey research design to investigate the adaptation strategies and knowledge of smallholder farmers in Guimba, Nueva Ecija, towards climate change (Bhat, 2023). Data collection involved a self-administered survey questionnaire developed based on an extensive literature review and pilot testing.

The research was carried out in Nueva Ecija's Guimba. In the Philippine province of Nueva Ecija, Guimba—officially known as the Municipality of Guimba (Tagalog: Bayan ng Guimba; Ilocano: Ili ti Guimba)—is a first-class municipality. The Guimba Farmers were the study's responders. Respondents to this study came from Lennec, Bacayao, Pacac, Narvacan 1, Narvacan 2, Casongsong, and Galvan Guimba, Nueva Ecija, using stratified random sampling.

Stratified random sampling was used to select respondents from various barangays in Guimba (Iliyasu & Etikan, 2021). The questionnaire focused on farmers' responses to extreme weather events such as typhoons, droughts, and heavy rains, exploring their coping mechanisms and adaptation practices. The study also conducted follow-up surveys to understand motivations and barriers influencing farmers' adaptation behaviours.

III. RESULTS AND DISCUSSION

The gathered information from the farmers of Guimba focuses on how they react in different climate events that affect their crops and farm income. Since their main source of income is farming, they are heavily affected with different climate phenomena such as typhoon, drought, and heavy rain. Survey is conducted to collect information on how they are affected form different climate events and how they react or what are their coping mechanisms during those times of climate events (Langkulsen, et al., 2022).

Reduced farm income due to damaged crop form typhoon and heavy rains and reduced farm income due to slow growth of crop from dried land caused by drought were the remarkable impact to farmers during their experience from these climate events as identified on Table 2. Damaged crops were the result of the farmers' inability to react on different climate events. They are not able to make preventive actions to avoid or at least reduced the amount of damage to their crop. They are biased to old practices and are not changing their methods. They are not also changing their types of crop that will wind stand on the specific climate event to have alternative source of income from farming related activities still (Mudatsir, 2021).

Table 1. Top impacts of extreme events observed by smallholder farmers in Guimba

TYPHOON	DROUGHT	EXCESSIVE RAIN
Damage crops that caused the reduction of harvest	Reduce yields due to dry crops which causes growth to be sluggish	Reduce harvest due to crop damage because of excessive rain/flooding
Decrease in farm revenue		

Due to the reduction of income, farmers tend to find other source of income from not farming related activities. This results to unproductivity of the farm land. Because of the extreme climate events, farmers tend to do nothing and wait for the weather to become better and favorable to the kind of crop they are yielding. This often times leads to little to no income that makes the small farmers to get a loan to support their living while they cannot do anything about their farm. Respondents also perform early harvest of their crop when the extreme climate phenomena hit them to save what is still available to harvest (Hamilton, Henderson & Derocher, 2023).

Table 2 shows that the main coping strategies and adaptation practices against typhoon for smallholder farmers in Guimba, Nueva Ecija are replanting of crop (30%), do nothing and wait for better weather (35%), improve farm practices to avoid erosion (contour farming, installing ripraps, change to typhoon-resistant crops) (40%) and collect water or use water from the rivers (90%).

Table 2. Smallholder farmer's coping strategies and adaptation practices to typhoons (n=50, multiple answers).

	Practice	%
Crop yield	1. Replanting of crop. Repeat cultivation process	30%
	2. Do nothing and wait for better weather	25%
	3. Find alternative sources of income (off-farming, hired labor, livestock)	10%
	4. Early harvest of the crop	30%
	5. Improve farm practice: chance to climate resilient crops, installing make ship support for crops	5%
Farm income	1. Find alternative sources of income (off-farming, hired labor, livestock)	20%
	2. Apply for a loan	20%
	3. Do nothing and wait for better weather	35%
	4. Replanting crops after typhoon	10%
	5. Work on someone else's farm	10%
Other livelihood/ sources of income	1. Do nothing and wait for better weather	25%
	2. Work on someone else's farm	35%
	3. Improve farm practices to avoid erosion (contour farming, installing ripraps, change to typhoon-resistant crops	40%
Water Resources	1. Do nothing and wait for better weather	10%
	2. Collect water or use water from rivers	90%

Table 3. Smallholder farmer's coping strategies and adaptation practices to drought (n=50, multiple answers)

	Practice	%
Crop yield	1. Stop planting and look for another source of income	10%
	2. Do nothing and wait for rain	10%
	3. Replanting of crop. Repeat cultivation process	15%
	4. Improve farm practice: chance to drought resilient crops apply fertilizers/pesticides/weeding	65%
Farm income	1. Look for alternative source of income	50%
	2. Apply for a loan	20%
	3. Do nothing and wait for rain	30%
Other livelihood/ sources of income	1. Work on someone else's farm	90%
	2. Do nothing and wait for better weather	10%
Water Resources	1. Do nothing and wait for rain	10%
	2. Use/collect from a new source for irrigation and consumption (river, well, machine pumps)	90%

Table 3 displays that the coping strategies and adaptation practices against drought for smallholder farmers in Guimba, Nueva Ecija are improve farm practice: chance to drought resilient crops apply fertilizers/pesticides/weeding (65%), look for alternative source of income (50%), work on someone else's farm (90%) and use/collect from a new source for irrigation and consumption (river, well, machine pumps) (90%).

Table 4. Smallholder farmer's coping strategies and adaptation practices to intense rains.

	Practice	%
Crop yield	1. Replanting of crop. Repeat cultivation process	30%
	2. Do nothing and wait for better weather	10%
	3. Look for alternative source of income	5%
	4. Early harvest of crop	25%
	5. Build canals and embankments, control the water supply	30%
Farm income	1. Do nothing just wait for a good weather	25%
	2. Plant again	20%
	3. Apply for a loan	55%
Other livelihood/ sources of income	1. Work on someone else's farm	90%
	2. Do nothing just wait for a good weather	10%
Water Resources	1. Do nothing just wait for a good weather	30%
	2. Irrigation management (close/regulate irrigation; clean the irrigation system)	40%
	3. Collect water from the rain	30%

The impact of the lack of knowledge to cope up with extreme climate events make the farmer to improvise or perform what they knew is best thing to do like working in other farm, collecting excess water from typhoon and even just replanting and repeating the cultivation process when their crop is being damaged (Prabhakar, et al., 2019).

IV. CONCLUSION AND RECOMMENDATIONS

Based on the study, farmers are often affected by different weather and the effects of weather phenomena such as typhoons, droughts, and heavy rain hit their farm output or their income from their crop. These types of weather phenomena cause a reduction in their crop yield and farm income. The common reason is that they need to be equipped with knowledge on how to deal with this weather when it comes to managing their crop during those climate events. Another reason is their bias toward old practices. Some of them need to be open to doing new things that might help them on their farm. They are mostly old-fashioned and keep doing what they are used to doing and often resort to doing nothing and waiting for good weather. As a result, ultimately their farm income suffers and they tend to look for other sources of income outside farming.

Farmers in Guimba, some of them. Already trying to plant some fruit-bearing trees on the side of their farms as a response to the changing weather. Although this helps but on a small amount only because they do not do it as their main source of income when their main crop is not available due to weather. The local government must conduct awareness and create program of actions and development (Subia, 2020) on how to deal with different weather and help the farmers be ready during those events. Also, other alternatives must be introduced to the farmers to be able to have continuous farm income all year round

REFERENCES

[1] Bhat, A. (2023, November 24). Descriptive Research: Definition, Characteristics, Methods + Examples. QuestionPro. https://www.questionpro.com/blog/descriptive-research/

[2] Building Climate Resilience in the Agriculture Sector of Asia and the Pacific. (2019, February 21). Asian Development Bank. https://www.adb.org/publications/building-climate-resilience-agriculture-sector-asia-and-pacific

[3] FAO Publications, September 2022. Crop Prospects and Food Situation. https://openknowledge.fao.org/items/c010ecec-fca0-445f-be73-72858ca1f9a1

[4] Hamilton, S. G., Henderson, E. M., & Derocher, A. E. (2023). Spatial and temporal harvest risk to polar bears in the Canadian Beaufort Sea. Arctic Science, 9(4), 856–868. https://doi.org/10.1139/as-2023-0003

[5] Iliyasu, R., & Etikan, I. (2021). Comparison of quota sampling and stratified random sampling. Biometrics & Biostatistics International Journal, 10(1), 24–27. https://doi.org/10.15406/bbij.2021.10.00326

[6] Langkulsen, U., Cheewinsiriwat, P., Rwodzi, D. T., Lambonmung, A., Poompongthai, W., Chamchan, C., … Moses, C. (2022). Coastal Erosion and Flood Coping Mechanisms in Southern Thailand: A Qualitative Study. International Journal of Environmental Research and Public

Health, 19(19). https://doi.org/10.3390/ijerph191912326

[7] Mudatsir, R. (2021). Analysis of Household Income and Welfare Level Of Oil Palm Farmers in Central Mamuju Regency. Journal TABARO, 5(1), 508–516.

[8] Prabhakar, M., Gopinath, K. A., Reddy, A. G. K., Thirupathi, M., & Rao, C. S. (2019). Mapping hailstorm damaged crop area using multispectral satellite data. Egyptian Journal of Remote Sensing and Space Science, 22(1), 73–79. https://doi.org/10.1016/j.ejrs.2018.09.001

[9] Subia, G. S. (2020). Fortuitous: A proposed activity-based book in mathematics of chance. International Journal of Scientific and Technology Research, 9(3), 450–453.