International Journal on Culture, History, and Religion
https://ijchr.net | eISSN: 3028-1318

Received: May 16, 2025 | Accepted: June 29, 2025 | Published: July 11, 2025
Volume 7 Special Issue 2 | doi: https://doi.org/10.63931/ijchr.v7iSI2.183

Article

Tradition and Transition: Climate Change Adaptation among 4Ps Communities of Bustos, Bulacan, Philippines

Editha N. De Regla[1], **and Nestor B. Santos Jr.**[1]
[1]Bulacan State University-Bustos Campus
Correspondence: editha.deregla@bulsu.edu.ph

Abstract

This study investigates climate change understanding, responses and adaptation of 60 Pantawid Pamilyang Pilipino Program (4Ps) beneficiaries in Bustos, Bulacan, using a mixed-methods approach. Findings reveal a predominantly female participant group along with the participants' long-term residency and significant unemployment. At the same time, most participants demonstrated fair to good climate change knowledge. All identified deforestation as a key cause and experienced direct impacts like water shortages and altered weather patterns. A substantial number of participants have attended climate change training, all engaging in community clean-ups and water conservation. Although participants use diverse information sources, including social media and local government, they perceive these as only moderately effective. 4Ps may also reinforce their environmental program by establishing a formal climate change education and providing access to relevant resources to transform their beneficiaries into active agents of building a more resilient community.

Keywords: *Adaptation, Climate Change, Information, Pantawid Pamilyang Pilipino Program (4Ps)*

Suggested citation:
De Regla, E., & Santos Jr., N. (2025). Tradition and Transition: Climate Change Adaptation among 4Ps Communities of Bustos, Bulacan, Philippines. *International Journal on Culture, History, and Religion, 7*(SI2), 153-170. https://doi.org/10.63931/ijchr.v7iSI2.183

Introduction

Climate change is one of the most pressing issues of the 21st century, challenging economies and communities worldwide, especially developing countries like the Philippines (United Nations, 2024). Bustos, Bulacan, a municipality in the Philippines, is exposed to natural hazards brought by climate change, such as typhoons, floods, and droughts (Climate Change Commission, 2022). Understanding how local individuals, particularly the low-income families, perceive and react to these changes is critical for establishing a more resilient community (Walther, 2017). To support these vulnerable populations, the Philippine government implements the Pantawid Pamilyang Pilipino Program (4Ps), which provides conditional cash transfers to reduce poverty and improve resilience (DSWD, 2023). However, despite these efforts, a significant gap exists in understanding how 4Ps beneficiaries comprehend, internalize, and respond to climate change impacts within their local context (Agboola & Oloyede, 2016).

Many low-income communities lack sufficient access to timely and relevant information on climate change and its local consequences, which limits their ability to respond effectively. As Nabong and Arias (2020) point out, the perspectives and needs of these communities are often excluded from mainstream policy discussions and adaptation planning. This omission reinforces the need to meaningfully involve local stakeholders in climate-related decision-making processes to ensure their lived experiences and knowledge are reflected (Frontiers in Climate, 2024).

This study investigates the climate change knowledge and responses of 4Ps beneficiaries in Bustos, Bulacan. It examines the participants' demographic characteristics regarding sex, years of residency, and source of income. It scrutinizes the levels of knowledge and attitudes of 4Ps beneficiaries toward climate change, their practical actions, and their climate change information sources. The study combined a survey and an interview to employ mixed research methods. Data was analyzed using percentage and thematic analysis following ethical procedures and processes.

This paper aims to uncover the crucial role of information and education in shaping climate change responses and nurturing resilient communities. It also seeks to broaden the discussion on climate change adaptation strategies to cultivate further environmental knowledge and proactive behaviors. Ultimately, it advocates for formalizing climate change education into existing vulnerable social frameworks to increase the number of climate change literate individuals (Nabong et al., 2020; Landicho et al., 2016).

Methodology

This study comprehensively delved into understanding climate change and the adaptation of the 4Ps beneficiaries. It utilized a mixed-methods approach, combining a survey and an interview. The mixed-methods approach allowed the researchers to establish a vivid picture of the participants' climate change knowledge, concerns, and the practical actions they took. The study purposely focused on 60 4Ps beneficiaries in Bustos, Bulacan, Philippines. This method specifically included active beneficiaries who can provide valuable insights into how their families and communities adapt to climate change. The survey questionnaires were personally administered to the participants to ensure clear and accurate information. Participants were also informed about the study's purpose and assured that their responses would remain confidential. Interviews were held in comfortable settings chosen by participants to encourage openness, with each session audio-recorded for transcription and analysis.

The researchers adapted the questionnaire from Hope's (2016) study on climate change knowledge, attitudes, and practices in Guyana, supplementing it with expert-validated items that focused on the respondents' knowledge, concerns, adaptation strategies, and sources of climate information. This instrument was designed to gather comprehensive quantitative data on demographic profiles and climate-related behaviors. Additionally, in-depth interview questions were crafted to explore participants' experiences, perceptions, and challenges in adapting to climate change.

Quantitative data from surveys were analyzed using percentages. This statistical tool helped summarize the participants' demographic characteristics, knowledge levels, attitudes, and practical measures. Qualitative data from interviews were transcribed and analyzed using thematic analysis to identify recurring themes and patterns related to participants' experiences with climate change adaptation. This method allows for an in-depth understanding of how individuals interpret their experiences and the meanings they attach to them. Ethical considerations were strictly adhered to throughout the research process.

Results/Findings

Demographic Profile of the Respondents

Table 1: Demographic Profile of the Participants in terms of Sex

Sex	Percentage of Participants
Male	21.7 %
Female	78.3 %
Total	100 %

Table 1 reveals a marked gender imbalance among the participants, with 78.3% female and only 21.7% male. This finding reflects the broader demographic trend within the 4Ps, where women comprise nearly 87% of the 4.2 million beneficiaries (Ilagan, 2019). The predominance of female recipients is linked to the program's emphasis on maternal roles in managing children's health and educational needs. This highlights the program's significant function in promoting family welfare and reinforcing the socio-economic agency of women within low-income Filipino households.

Table 2: Demographic Profile of the Participants in terms of Years of Residency

Years of Residency	Percentage of Participants
1-10 years	11.5 %
11-20 years	41.2 %
21-40 years	41.2 %
Over 40 years	6.1 %
Total	100 %

Table 2 presents the participants' residency duration within their community. The same percentage of 41.2 is observed with 11 to 20 and 21 to 40 years of residency among the participants. This is followed by 1 to 10 years of residency for 11.5 % of the participants. Meanwhile, only 6.1 percent of the participants have lived in the community for over 40 years. The numbers regarding the long-term residents indicate stability and rootedness. These individuals who spent over 11 years living in the community typically establish strong social networks and ties as crucial support systems (Nabong et al., 2020). Their relationships, in effect, progress their social capital, which enables them to effectively work through economic opportunities, agricultural practices, and local governance challenges. Moreover, the study by Baird et al. (2016) indicates that most individuals opted to remain in their communities because of their livelihood commitments and family obligations, which deepens their attachment to their homes.

Table 3 presents the demographic profile of participants in 4Ps, highlighting their primary sources of income. Forty-five percent (45%) of the participants were unemployed. It mirrors persistent trends in low-income communities, wherein systemic barriers often hinder access to stable employment, leaving families economically vulnerable. While employment is a key pathway out of poverty,

individuals in marginalized sectors frequently encounter challenges such as limited job availability and inadequate skill sets (International Labor Organization, 2025).

Table 3: Demographic Profile of the Participants in terms of Main Source of Income

Years of Residency	Percentage of Participants
Employed	8.3 %
Unemployed	45 %
Micro Business Owner	13 %
Micro Business Partners	8.7 %
Agriculture	25 %
Total	100 %

Agriculture is the second most common livelihood, supporting 25% of participants. This reflects the continued relevance of farming in rural or developing regions, where alternative employment opportunities are limited (Barrett, 2022). Additionally, 13% are self-employed through microenterprises, and 8.7% earn income by partnering in small businesses. This demonstrates the informal sector's critical role in providing economic alternatives when access to formal work is constrained (Singh, 2024). Meanwhile, just 8.3% of respondents are in formal employment, underscoring the difficulty low-income families face in securing consistent and well-compensated jobs. As a result, many rely heavily on social support programs or informal work to sustain their households (Mammen et al., 2015; Grobe et al., 2017).

Knowledge about Climate Change

Table 4: Participants' Knowledge about Climate Change

Knowledge Level	Percentage of Participants
Fair	40 %
Good	52 %
Excellent	8 %
Total	100 %

Table 4 shows that 52% of the participants understand climate change, demonstrating good knowledge. It shows that the 4Ps beneficiaries have a foundational understanding of climate change, suggesting that although they are not experts, they are aware of the primary issues and their significance. The percentage of participants who have excellent climate change knowledge is 8%. These 4Ps beneficiaries likely possess in-depth knowledge of scientific aspects and mitigation and adaptation strategies. 40% of the participants have a fair level of climate change knowledge. This number implies a level of awareness of misconceptions in their understanding. Still, their climate change knowledge can be enriched. A study by

Vidal et al. (2018) explains that despite awareness, involvement in adaptation and mitigation workshops is frequently limited due to a lack of resources and local government support. This study stresses the need for programs to enhance 4Ps beneficiaries' literacy on climate change.

During the interview, 4Ps beneficiaries recognized climate change as an ongoing issue. They identified human activities like burning fossil fuels and deforestation as two major contributors to climate change. According to the Intergovernmental Panel on Climate Change (IPCC, 2021), human-induced climate change is present and felt. The 4Ps beneficiaries' recognition of their ability to adapt exhibits an increasing awareness of personal responsibility and community initiative in addressing environmental challenges.

The Cause of Climate Change

Table 5: Participants' Perception regarding the Main Causes of Climate Change

Causes of Climate Change	Percentage of Participants
Agricultural Practices	90 %
Deforestation	100 %
Industrial Activities	83 %
Pollution	92 %
Others	80 %

Table 5 illustrates the perceptions of 4Ps benefits regarding the leading causes of climate change. All the participants (100%) acknowledged deforestation as the leading cause of climate change. The 4Ps beneficiaries understand the crucial role of trees in the forests against environmental degradation and climate change. They have public awareness regarding the production of excessive carbon when trees are cut down. 4Ps beneficiaries may also have been impacted by awareness campaigns about this cause of climate change. Deforestation accounts for approximately 11 to 20% of global greenhouse gas emissions due to carbon dioxide release when forests are denuded (IPCC, 2021). The loss of forests reduces carbon absorption and disrupts climate patterns, leading to extreme weather events (Kaplan, 2024).

Moreover, pollution was identified by 92% of the participants. There is a clear consensus among the 4Ps beneficiaries that various forms of pollution significantly contribute to climate change, which confirms their awareness of greenhouse gases coming from industries, vehicles, and waste. Agricultural practices were voted on by 90% of the participants. They considerably recognize the impact of food production on the environment, suggesting their understanding that gases are emitted from poultry, the use of fertilizers, and energy consumption. They might be aware of the agricultural

practices' subtle but equally significant contributions to climate change. The recognition by 4Ps beneficiaries of pollution and farming practices as significant contributors underscores the multifaceted nature of climate change, influenced by various human activities (Pan et al., 2024).

Still, 83% of industrial activities were considered a cause of climate change. As expected, industrialization is understood to have an association with gas emissions due to fuel consumption. Although lower than deforestation and pollution, this percentage indicates a link in the 4Ps beneficiaries' thoughts between the industry and its environmental effects. Other causes of climate change were obtained with 80% responses from the participants. This number suggests that a substantial portion of the 4Ps beneficiaries recognize a broader range of factors contributing to climate change. It includes the elements of natural causes, consumption, waste, and disposal.

Meanwhile, the interviews indicate that participants understand the interconnectedness between human actions and climate health. While they acknowledge human-induced factors, they also believe climate change is a natural phenomenon created by God. This dual perspective reflects a blend of scientific understanding and spiritual beliefs, suggesting the need for culturally sensitive educational initiatives to engage communities in climate action effectively (Gonzalez, 2020). These insights highlight the importance of enhancing education and awareness to foster greater community engagement in addressing climate change impacts.

Concerns about Climate Change and Its Effects on the Community

Table 6 revealed a high level of concern among the 4P beneficiaries. A very high percentage of 90% (53% very concerned and 37% moderately concerned) express their worry about climate change. The beneficiaries perceived that this issue was relevant and needed to be addressed in their community. The high levels of concern can be linked to direct impacts such as increased flooding and changing weather patterns, particularly among communities with lower socio-economic status, which are more vulnerable due to limited resources (Vidal et al., 2018). The 53% very concerned participants feel a sense of urgency about the significant threats of climate change.

Meanwhile, 37% of the moderately concerned still acknowledge the issue and its potential effects. They might be aware of the problem, though direct impacts were not experienced. This percentage still gives an alarming view of climate change. Only 10% were recorded to have slightly concerned feelings. This small fraction of the 4Ps beneficiaries sees climate change as a minor issue and may not threaten their community. They might be less educated, less affected, or more uncertain about the impacts of climate change. Therefore, broader research emphasizing the importance of

community awareness in addressing climate change suggests that heightened concern can lead to greater advocacy for effective policies (World Bank, 2022). The expressed concerns may also motivate community-driven initiatives to enhance resilience and promote sustainable practices.

Table 6: Participants' Concerns about Climate Change and Its Effects on the Community

Concern Level	Percentage of Participants
Slightly Concerned	10 %
Moderately Concerned	37 %
Very Concerned	53 %
Total	100 %

Interviews with 4Ps beneficiaries revealed a mix of fear and hope regarding climate change; while they acknowledged the potential devastation it brings, they believe collective action can lead to positive change. This duality reflects a typical psychological response to environmental crises, where individuals recognize the severity of the situation yet remain optimistic about their ability to contribute to solutions (Clayton et al., 2017). The belief that everyone can play a role in improving circumstances aligns with findings that community engagement is vital for addressing climate challenges (Black et al., 2024). While 4Ps beneficiaries are acutely aware of climate change threats, their willingness to believe in potential improvements catalyzes community-driven solutions.

Specific Impacts of Climate Change Observed in the Community

Table 7 highlighted significant observations by 4Ps beneficiaries regarding immediate change impacts in their community. All the participants (100%) observed droughts or water shortages and changes in weather patterns as the most significant impacts of climate change in the community. This finding indicates that unpredictable weather and water resource scarcity are the most prevalent indications of climate change. It may seriously affect their daily lives as water is a basic resource that moderates the weather. It also underscores the vulnerability of the Philippines' agricultural systems to climate change, with alterations in rainfall patterns and extreme weather events significantly impacting crop yields (Virtucio, 2008). Also,

droughts can lead to severe water shortages, threatening agricultural practices and food security (World Bank, 2022).

Table 7: Specific Impacts of Climate Change Observed in the Community

Impacts of Climate Change	Percentage of Participants
Changes in Weather Patterns	100 %
Crop Failure or Agricultural Issues	95 %
Droughts of Water Shortages	100 %
Increased Flooding	92 %
Others	80 %

The previous responses confirm the 95% agreement among 4Ps beneficiaries about crop failures or agricultural issues as an impact of climate change in the community. The observance of water shortage and changing weather patterns severely affects the agrarian activities, emphasizing the direct risk to economic vulnerability and food security. 92% of the participants experienced an increase in flooding. Although it contradicts drought, Bustos, Bulacan is beside the Angat River, which causes flooding when intense and heavy rainfall events occur. Increased flooding damages crops and disrupts local economies and livelihoods, particularly affecting low-income populations reliant on agriculture (Asian Development Bank, 2022). In addition, 80% of the 4Ps beneficiaries reported other indications of climate change effects in the community. These could be health-related, effects on biodiversity, and personal sources of income.

Interviews with 4Ps beneficiaries confirmed their deep concerns about the impacts of climate change. They stressed that unpredictable weather patterns lead to erosion and flooding. They also mentioned that the dry season, accompanied by rising temperatures, threatens agriculture. They also recognized broader climate phenomena, such as rising sea levels and increasing sea temperatures, which harm marine ecosystems. These changes have tangible consequences, including property damage and adverse effects on crops and livestock, resulting in significant income loss.

As a municipality with a strong agricultural base, Bustos faces distinct challenges under a changing climate. Interviewees expressed concerns about the source of potable water during heavy rainfall periods. This situation raises potential health risks. The collective impact of these environmental stressors highlights the critical need for responsive and sustained support systems. Strengthening local adaptive strategies is essential to protecting food systems and securing livelihoods. Accordingly, climate extremes continue to pose severe risks to food security and rural

economies in the Philippines (World Food Programme, 2021; Asian Development Bank, 2022). The lived experiences shared by 4Ps beneficiaries reinforce the urgency of implementing community-focused interventions that address current vulnerabilities and promote long-term resilience against ongoing climate threats.

Practical Measures Undertaken

Table 8: Participants' Actions Personally Taken to Address Climate Change

Personal Action Taken	Percentage of Participants
Conserving Water and Energy at Home	100 %
Educating Others about Climate Change	45 %
Participating in Community Clean-up Drives	100 %
Planting Trees or Maintaining Gardens	87 %
Others	58 %

Table 8 revealed the proactive measures taken by 4Ps beneficiaries to combat climate change. All the participants unanimously reported that they participated in community clean-up drives. As part of the 4Ps, they are highly encouraged to join this program, organized and supervised by the local community leaders. Aside from fulfilling their commitment, they also enhance their community responsibility and engagement to improve their environment visibly (World Bank, 2022).

All the participants also agreed to conserve water and energy at home. This action by the beneficiaries is easily and voluntarily implemented. It has a tangible impact on water and electricity bills while promoting basic environmental practices. Given the practice of saving electricity bills, the 87% agreement of the participants confirmed the importance of tree planting or garden maintenance. This action provides them with space to spend time without using electricity. Plants and trees provide the oxygen necessary for breathing and a home for animals. These also provide shade for resting, relaxation, hobbies, and leisure. In short, tree planting or garden maintenance contributes to carbon sequestration and local biodiversity. According to Nyelele et al. (2019), planting trees effectively enhances the environment and improves air quality.

Furthermore, more than half of the 4Ps beneficiaries (58%) undertook other actions against climate change. These actions include recycling, taking public transportation, and health-related options like diet and exercise. Meanwhile, less than half of the participants (45%) were only engaged in the education of others. This

finding may be due to their lack of knowledge and confidence, perceived difficulties, initiation, preference for direct action, and social discomfort.

Moreover, the emphasis on education highlights the importance of knowledge dissemination in addressing climate change. By educating others, 4Ps beneficiaries help build a more informed community capable of responding to environmental challenges. This aligns with findings from the Department of Social Welfare and Development (DSWD), which stresses the need for public awareness campaigns on climate change among vulnerable populations (DSWD, 2012). Overall, the actions taken by 4Ps beneficiaries reflect a commendable commitment to addressing climate change at the community level, enhancing resilience while serving as a model for other communities facing similar challenges.

Participation in any training/workshops related to climate change

Table 9 shows that 73% of 4Ps beneficiaries have attended training or workshops related to climate change. The participants' high engagement level acknowledges the importance of climate change education and capacity building. Their interests can be translated into an enriched understanding of the issues, which can help educate others to produce a more robust impact on adaptation strategies and mitigation actions (World Bank, 2022). These programs equip community members with the necessary literacy to tackle climate-related challenges (Vidal et al., 2018). On the other hand, 27% of the 4Ps beneficiaries have not had the opportunity to attend such sessions. This portion of the participants may lack formal exposure to climate change education due to access, relevance issues, and schedule conflicts. Increasing their awareness can lead to more proactive behaviors regarding the environment and sustainable practices (Asian Development Bank, 2022).

Table 9: Participants' Participation in Training/Workshops Related to Climate Change

Participation	Percentage of Participants
Yes	73 %
No	27 %
Total	100 %

Interviews with 4Ps beneficiaries revealed a strong desire to expand their climate change knowledge, with all participants expressing interest in learning more, despite most having last attended formal training two years ago. They preferred seminars and workshops organized by government and non-government agencies, and events led by academic institutions. Participants also sought information through

various media channels, including the Internet, newspapers, and television shows, indicating a proactive attitude toward self-education and community involvement.

Their desire for continued education aligns with findings emphasizing the need for ongoing capacity-building initiatives within vulnerable populations (World Bank, 2022). By participating in training sessions and utilizing diverse information sources, 4Ps beneficiaries can develop the skills necessary to contribute meaningfully to climate action efforts in their communities. With this, the study of De Regla (2025) regarding development and facilitation of community-based climate action projects in the community such as tree planting, waste reduction campaigns, recycling practices, energy efficiency initiatives, poster making and slogan making will strengthen understanding and engagement of the community in the mitigation and adaptation of climate change and other related issues.

Sources of Information on Climate Change

The survey results in Table 10 reveal the various information sources on climate change utilized by the 4Ps beneficiaries. All participants (100%) received information from social media and local government programs or announcements. This finding means that they have universal access to these channels. The unanimous agreement with social media underscores its pervasive nature in modern society and its ability to influence (Gonzalez, 2020). This is because social media is accessible, provides real-time updates, and can share information quickly. Meanwhile, literacy is crucial to filter false and fabricated information regarding climate change.

Table 10: Participants' Sources of Information on Climate Change

Sources of Information	Percentage of Participants
Community Meetings or Gatherings	53 %
Educational Institutions	82 %
Family or Friends	72 %
Local Government Programs or Announcements	100 %
Social Media	100 %
Others	73 %

The complete agreement with local government programs or announcements indicates that the medium used by these authorities easily reaches everyone in the community. Hence, community engagement initiatives and effective community awareness campaigns regarding climate change are present. Also, local governments are responsible for providing accurate and timely information. About 82% of the 4Ps beneficiaries learned from educational institutions. Numerous academic institutions,

from basic to tertiary schools, are in Bustos, Bulacan. Their commitment to provide either formal or informal education regarding climate change is deemed necessary. However, a portion may suggest further improvement regarding their strategies and platforms.

Furthermore, 73% of the beneficiaries have other sources of information. They received climate change information using traditional media and non-government organizations (NGO) through community workshops, journals, publications, and informal discussions in their workplaces (Vidal et al., 2018). The influence of family and friends also stands out as a source of information for 72%. It highlights the essence of interpersonal communication and physical social networks in exchanging climate change information, which can be influential, yet risky due to inaccurate information. Community meetings and gatherings still provided climate change information for more than half of the 4Ps beneficiaries (53%). Despite significance, more traditional and face-to-face forums are not universally accessed because the local government utilizes social media. This area opens the opportunity to improve direct engagement and discussions.

Interviews revealed that social media is the primary information channel for many participants. Updates from local government officials, such as the Municipal Mayor or the Provincial Governor, are closely followed, and barangay leaders, particularly the Barangay Captain, are viewed as trusted messengers. In addition to social media, participants regularly turn to mainstream media sources like television, radio, and print, particularly relying on trusted outlets such as GMA News and DZBB. This reliance on familiar, reputable media reflects a broader community preference for credible and consistent sources of climate information (Gonzalez, 2020).

The diverse range of information sources utilized by 4Ps beneficiaries emphasizes the importance of multi-channel communication strategies in raising awareness about climate change. These findings highlighted a proactive approach among 4Ps beneficiaries to seek information on climate change, demonstrating an understanding of the importance of being informed to effectively participate in community discussions and actions related to climate resilience.

Effectiveness of Source of Information

Table 11 reveals the perceptions of the 4Ps beneficiaries regarding the effectiveness of various information sources in enhancing their understanding of climate change. Most participants (60%) consider their climate change information sources moderately effective. This percentage suggests that their sources are generally helpful in increasing their understanding. Still, the percentage leaves room for further

improvement. Beneficiaries likely obtain knowledge and clarity, but it is incomplete or lacks depth. It may be accessible and relevant, yet it lacks specificity and persuasiveness.

Table 11: Effectiveness of the Information Sources in increasing the understanding of Climate change as perceived by the respondents

Effectivity Level	Percentage of Participants
Slightly Effective	10 %
Moderately Effective	60 %
Very Effective	30 %
Total	100 %

A considerable 30% of the 4Ps Beneficiaries have a very effective perception of their climate change information. They find their information sources impactful, clear, and practical. Their information sources are excellent in promoting a strong discernment of climate change. Other factors contributing to this effectiveness are the beneficiaries' quality of access to the information, their prior knowledge and literacy, and learning styles.

Only a minority of the participants (10%) viewed their climate change information as slightly effective. These 4Ps beneficiaries only obtain modest gains from their sources, which provide insignificant, incomplete, confusing, and irrelevant information. Hence, this low percentage implies that most beneficiaries are receiving a level of understanding of climate change. Targeted communication is needed to enhance public engagement and understanding of climate issues significantly (Vidal et al., 2018).

Additionally, reliance on various sources such as social media, local government announcements, and educational institutions highlights the need for a multifaceted approach to climate change education. By ensuring that information is clear, relevant, and accessible, community members can be more literate to effectively engage with climate change issues (World Bank, 2022).

Conclusions

The 4Ps beneficiaries in Bustos, Bulacan, are generally composed of women and have long years of residency, demonstrated climate change awareness, concern, and a willingness to act despite socio-economic challenges. Rooted in their community and exposed to environmental risks, they engage in basic mitigation efforts and show eagerness to learn more. There is a critical need for localized and contextual, skills-based climate education and improved communication strategies to build climate-

resilient communities. Strengthening community outreach, enhancing access to information, and empowering 4Ps members as local climate champions will foster deeper engagement, long-term adaptive capacity, and active agents of building a more resilient community.

Acknowledgement

We extend our heartfelt gratitude to the 4P's beneficiaries of Bustos Municipality for their invaluable participation and sincere cooperation, which greatly contributed to the success of this study. Special thanks to our fellow Science Instructors and friends from Bulacan State University-Bustos Campus for their support and insightful feedback. We are also profoundly grateful to our families for their unwavering encouragement.

This research was made possible through the generous support of Bulacan State University. Above all, we thank the Lord for the wisdom and guidance that led us to complete this work, which is dedicated to fostering environmental awareness and empowering communities to protect our shared planet.

References

[1] Agboola, O. P., & Oloyede, A. D. (2016). Awareness of climate change and sustainable development among undergraduates. Obafemi Awolowo University.

[2] Asian Development Bank. (2022). Applying spatial analysis to assess crop damage: A case study of the Pakistan 2022 floods. ADB. https://www.brecorder.com/news/40300412

[3] Baird, S., Ferreira, F. H. G., Özler, B., & Woolcock, M. (2016). More evidence on the effectiveness of cash transfers: Review of the evidence, knowledge gaps, and policy implications. World Bank Research Observer, 31(1), 1–29. https://doi.org/10.1093/wbro/lkv017

[4] Barrett, C. B. (2022). Agriculture and economic development. In D. R. Just & C. B. Barrett (Eds.), Handbook of agricultural economics. Elsevier Science.

[5] Black, G. F., Jamrozik, E., Khan, W., Peralta, S., Havenga, B., Merritt, M. W., & Kelley, M. (2024). Making the case for community involvement in research on climate and health: Opportunities and lessons. Frontiers in Climate, 6, Article 1456417. https://doi.org/10.3389/fclim.2024.1456417

[6] Clayton, S., Manning, C., Krygsman, K., & Speiser, M. (2017). Mental health and our changing climate: Impacts, implications, and guidance. American

Psychological Association and ecoAmerica. https://www.apa.org/news/press/releases/2017/03/mental-health-climate.pdf

[7] Climate Change Commission. (2022). Philippine Climate Change Action Plan. Retrieved from https://climate.gov.ph

[8] De Regla, E. N. (2025). Climate change awareness and mitigation strategies among students and residents of Bulacan, Philippines: A socio-educational perspective. Bulacan State University–Bustos Campus. International Journal on Culture, History, and Religion, DOI: https://doi.org/10.63931/ijchr.v7i1.117

[9] Department of Social Welfare and Development. (2012). DSWD calls on partners to support programs to weather climate change. https://www.dswd.gov.ph/dswd-calls-on-partners-to-support-programs-to-weather-climate-change/

[10] Department of Social Welfare and Development (DSWD). (2023). Pantawid Pamilyang Pilipino Program Overview. Retrieved from https://www.dswd.gov.ph/programs/pantawid-pamilyang-pilipino-program/

[11] Frontiers in Climate. (2024). Local knowledge matters: Understanding communities' decision-making processes in climate change adaptation. Frontiers in Climate, 5, Article 1294271. https://doi.org/10.3389/fclim.2023.1294271

[12] Gonzalez, C. G. (2020). Racial capitalism, climate justice, and climate displacement. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3626490

[13] Grobe, D., Davis, E., & Son, S. (2017). Employment and training programs serving low-income populations: Lessons learned and policy implications. MDRC. https://www.mdrc.org/publication/employment-and-training-programs-serving-low-income-populations

[14] Hope, Stacy A. (2016). Knowledge, Attitudes and Practices Study on Climate Change Adaptation and Mitigation in Guyana.

[15] Ilagan, L. (2019). Vulnerability assessment of coastal resources in Lian, Batangas, to climate change hazards using the combined CIVAT and ICSEA-C toolkit from classified LiDAR data. [Unpublished manuscript].

[16] Intergovernmental Panel on Climate Change (IPCC). (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (V. Masson-Delmotte, P. Zhai, A. Pirani, et al., Eds.). Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/

[17] International Labour Organization. (2025). World employment and social outlook: Trends 2025 [Report]. https://www.ilo.org/resource/other/world-employment-and-social-outlook-trends-2025-figures

[18] Kaplan, S. (2024, April 21). Extreme heat and drought weakened forests' ability to absorb carbon dioxide in 2024. The Washington Post. Retrieved from https://www.ehn.org/extreme-heat-and-drought-weakened-forests-ability-to-absorb-carbon-dioxide-in-2024

[19] Landicho, L. D., Visco, R. G., Huy, C., Wulandari, C., & Vilayphone, A. (2016). Enhancing local adaptive capacities of selected upland farming communities in Southeast Asia. Asia-Pacific Network for Global Change Research.

[20] Mammen, S., Berry, A., Bird, S., & Chandler, A. (2015). Rural low-income families' quest for economic security. Family Science Review, 22(1), 1–16. https://www.familyscienceassociation.org/wp-content/uploads/2021/07/2018-22-1-Rural-low-income-families-quest-for-economic-security_-Mammen-Berry-Bird-_-Chandler.pdf

[21] Nabong, E. C., Whiteford, L. M., Arias, M. E., & Mihelcic, J. R. (2020). Climate change adaptation priority strategies in the Philippines: Differences between local government decision makers and marginalized coastal communities. Environmental Engineering Science, 37(6), 371–380.

[22] Nyelele, C., Kroll, C. N., & Nowak, D. J. (2019). Present and future ecosystem services of trees in the Bronx, NY. Urban Forestry & Urban Greening, 41, 333–345. https://doi.org/10.1016/j.ufug.2019.04.012

[23] Pan, Y., Birdsey, R., Murdiyarso, D. (2024). Global forest carbon sinks and the threats imperiling them.

[24] Singh, S. (2024). Informal economy and sustainable growth in emerging markets. World Economic Forum. https://www.weforum.org/stories/2024/10/sustainable-growth-emerging-markets-informal-economy/

[25] United Nations. (2024). Climate action: Causes and effects of climate change. https://www.un.org/en/climate-change/causes-and-effects

[26] United Nations Development Programme (UNDP) Guyana. (2016). Knowledge, Attitudes & Practices Study on Climate Change in Guyana (Appendix 2: General Survey). Georgetown, Guyana: UNDP.

[27] Vidal, A. L. A., San Pedro, A. B., Redoble, F. A., & Bermudez, M. M. (2018). Level of awareness and participation of Pantawid Pamilyang Pilipino Program beneficiaries on climate change adaptation and mitigation. International Journal of Research - Granthaalayah, 6(7), 1–12. https://pdfs.semanticscholar.org/70f1/5be21362f5.pdf

[28] Virtucio Jr., F. (2008). Climate change in the Philippines: A contribution to the Country Environmental Analysis Workshop. World Bank.

https://research.fit.edu/media/site-specific/researchfitedu/coast-climate-adaptation-library/asia-amp-indian-ocean/southeast-asia-amp-philippines/Virtucio.--2008.--CC-in-the-Philippines.pdf

[29] Walther, C. (2017). Literature review of studies related to climate change impacts in the Philippines. Environmental Policy and Science, 33(4), 118–125. https://doi.org/10.1016/j.envpol.2016.11.034

[30] World Bank. (2022). Philippines Country Climate and Development Report (CCDR). https://documents1.worldbank.org/curated/en/099071824063528637/P506594116167 10a1af301001b87d4d158.docx

[31] World Food Programme. (2021). World Food Programme Philippines Country Brief: September 2021. https://www.preventionweb.net/publication/world-food-programme-philippines-country-brief-september-2021