



Assessing the Flood Gates: Utilization of Social Capital as Adaptation to Flooding of Selected Households in Two Barangays in Bay, Laguna, Philippines



ABSTRACT

The persistent climate crisis has directly affected the social system. In response to environmental changes, communities reconfigure their abilities by reshaping their everyday lives for sustainability and survival. This study's main objective is to examine how social capital was utilized by selected community members of Brgy. San Antonio and Brgy. Tagumpay in Bay, Laguna, Philippines as a form of adaptation to flooding. Households from Purok 6 of Brgy. San Antonio and Brgy. Tagumpay were selected through purposive sampling and complete enumeration, respectively. Utilization of the means of association at 0.05% level of significance showed that specific socio-demographic variables had a direct association with social capital resources within the community. The adaptive capacity of the participants was strengthened through relationships with their support system and their active participation in group/association activities. For attachment to neighborhood, the variable that had the most significant relationship with most of the socio-demographic characteristics was the strengthening of the spirit of collective community through the existence of formal and informal organizations. Access to resources and services helped to enhance the adaptive capacity of the community members. Adaptability became more apparent when financial and social services were within one's reach. The closeness of relationships between neighbors helped to strengthen their adaptive capacity. In community relationships, trustworthiness was considered as the most significant value. It is recommended that social capital be strengthened to enhance adaptive capacity.

Keywords: social capital, adaptive capacity, vulnerability

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INTRODUCTION

The unmitigated changes in the earth's conditions have consistently brought about serious concerns in various proportions. The persistent unpredictability of weather conditions makes both the physical and social environment more and more vulnerable to climate change. The impacts of the drastic changes in weather conditions are now being manifested through destructive calamities. Countries, such as Japan, Vietnam, Thailand, and the Philippines are among those frequently hit by natural disasters. In Vietnam, the recurring events of flooding has forced the community members to learn to live with such conditions (Danh and Mustaq 2011). Despite their vulnerable conditions, the community relied on their abilities to craft adaptive measures that help lessen possible damages in their homes. The community have formed strategies that would even make such events beneficial for them. In a United Nations Environment Programme (UNEP) Report by Hagelberg (2020), extreme flooding brought about by the climate crisis will continuously persist as the global climate continues to change rapidly.

In the past decades, the Philippines experienced several natural disasters that claimed the lives of thousands of people. To date, Typhoon Yolanda (international name: Haiyan) has been the worst and most devastating typhoon that caused massive destruction in the southern provinces in 2013. This catastrophic event placed the country under the state of national calamity (NDRRMC 2014).

One of the strongest forces causing such climate-induced phenomenon is the environmental change brought about by development. With the rapid increase of population and infrastructures, communities from both the urban and rural areas become highly vulnerable to disasters, especially flooding. Flooding has been a persisting occurrence in the Philippines. With this, studies on vulnerability and resilience to flooding, identifying adaptation measures of community members during flooding, and policies implemented in response to flooding have been conducted in various degrees in

different regions. A study by *Laska (1990)* presented the application of the General Hazards Coping Theory, a flood-coping scale used to assess the measures taken by various stakeholders in the process of adapting to floods.

The capacity for adaptation varies among different regions, countries, and socio-economic groups over time. Regions and communities that are highly exposed to climate change hazards and have limited adaptive capacity are considered most vulnerable. Limited economic resources, low levels of technology, poor information and skills, poor infrastructure, unstable or weak institutions, and inequitable empowerment and access to resources make communities and regions highly vulnerable (*Smit and Pilifosova 2003*).

As various communities had to live with different forms of environmental issues in varying degrees, the concept of adaptive capacity has become fundamentally significant in assessing the ability to cope with environmental changes and minimize their impacts on people's everyday lives. According to Asian Development Bank (*ADB 2021*), the communities that bear the brunt of climate change are sectors who are most vulnerable – farmers, fisherfolk, and those living in flood-prone areas. Strengthening the adaptive capacity of vulnerable sectors will build up their natural capacity to cope. *Vallury et al. (2022)* demonstrated that assessments of adaptive capacity at higher societal levels are increasing in frequency, yet vary widely in approach, framing, and results. This research differentiates itself from other studies, such as those of *Hudson, Hagedoorn and Bubeck (2020)* and *Danh and Mustaq (2011)*, whose both studies focused on the flooding incidents in Vietnam.

Hagelberg (2020) stated that climate change is likely to cause shifts in the global pattern, and intensity of flood events, and in some regions could increase the exposure of populations to severe flooding. Potential future risks underline the importance of research and intervention work aimed at strengthening local capacity to cope with flooding, especially for the poor communities in developing countries (*Few 2003*). Hence, adaptation becomes an integral part of surviving. According to *Smit and Walden (2006)*, adaptation is defined as a process, action, or outcome in a system (household, community, group, sector, region, country) that enables the system to cope with, manage, or adjust to some changing condition, stress, hazard, risk, or opportunity. Adaptations are manifestations of adaptive capacity, and these represent ways of reducing vulnerability. Adaptive capacity is considered a process of adaptation (over time) to structural and/or incidental sources of environmental stress (*Nishat*

et al. 2000). Adaptive mechanisms comprise distinct social, economic, technological, institutional, and cultural factors. Social mechanisms refer to social networks of relatives and neighbors; economic mechanisms refer to livelihood diversification or savings; technological mechanisms are technical measures to prevent flooding such as embankments or terps (mounds of earth); institutional mechanisms are (in) formal political-organizational structures and associated collective action to ameliorate vulnerability (including, for instance, access to productive assets or community microcredit systems); and cultural mechanisms are perceptions and beliefs about the nature and avoidance of flooding (*Brouwer et al. 2007*).

The term social capital was first conceptualized by Pierre Bourdieu, a French sociologist. Bourdieu reformulated the conceptualization of social relations by identifying various sources of capital that make up the social structure. Later it becomes a determinant of the exercise of power that places individuals in certain positions in the social hierarchy. Agents are distributed in the social space according to the volume and structure of their capital. Thus, the dynamics of the social world revolve around how individuals use their capital to form or navigate through existing and changing social structures. The mixture of sources of capital becomes part of an individual's disposition which largely influences the formation of internalized structures of that particular social world. The internalized system through which people are able to produce practices and perceive, understand, and evaluate such practices is referred to as "habitus" (*Ritzer 2008*). Bourdieu also argued that instead of dichotomizing objectivity from subjectivity, social scientists should be able to study social relations by being able to look at the social life from both objective and subjective points of view, where constructs of participants regarding their social world should be recognized (*Karol and Gale 2004*).

As defined by *Bourdieu (1989)*, social capital is seen as an "aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition." These generally refer to the benefits that individuals accumulate as a consequence of their participation in groups or associations. Through social capital, individuals may access economic resources in various forms such as loans or access to institutions.

There are several ways of looking at social capital. Some focus on how social relations provide the means through which individuals, households, or small groups

secure access to resources. Others view it using the community as the unit of analysis and focusing on the nature and extent of bonds or connections within the community as well as the people's involvement in informal networks and formal civic organizations. The main focus is in the manner by which community members interact and collaborate, particularly on shared issues and concerns (*Dudwick et al. 2006*). These views on social capital reveal the different dimensions of social capital: groups and networks, trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion, and empowerment and political action.

In the context of the challenges posed by impacts of climate change, social capital may be considered as a vital resource that could determine the adaptive capacity of communities to disasters. Social relationships based on reciprocity, trust and cooperation that form the core of social capital may be decisive in building more sustainable and resilient communities.

Societies have inherent capacities to adapt to the effects of climate change. According to *Adger (2003)*, these capacities are bound up in their ability to act collectively. Decisions on adaptation are made by individuals, groups within society, organizations, and governments on behalf of society. But all decisions pit one set of interests against another and create winners and losers. Thus, the effectiveness of strategies for adapting to climate change effects like flooding depends on the social acceptability of the options for adaptation, the institutional constraints on adaptation, and the place of adaptation in the wider landscape of economic development and social evolution. The effectiveness of adaptation also depends on the compounding factors of economic globalization and other trends (*O'Brien and Leichenko 2000*). It is clear that individuals and societies have adapted to climate change over the course of human history and will continue to do so - climate being part of the wider environmental landscapes of human habitation (*de Menocal 2001*). Individuals and societies have been at risk from climatic hazards and other factors, and their vulnerability can act as a driver for adaptive resource management. Various scales and actors are involved in adaptation. Some types of adaptation are undertaken by individuals in response to threats from climate, often triggered by individual extreme events. Others are undertaken by governments on behalf of society, sometimes in anticipation of change but, again, often in response to individual events (*Adger 2003*).

The Province of Laguna, Philippines, located 30 km

south of Manila, is exposed to a multitude of hazards, with flooding as the main problem. Water overflowing from Laguna de Bay and the inland rivers alter the province's landscape creating vast bodies of water due to heavy downpours (*Lim, Jr. et al. 2015*). Laguna de Bay is also the largest lake in the country with 21 tributaries, 17 of which are in Laguna. However, it has only one outlet, the Napindan Channel, to the Pasig River and to Manila Bay. Hence, any overflow of water from the lake will severely affect its tributary waters and consequently the surrounding coastal and lowland areas. Heavy monsoon rains and strong typhoons also inundate the farmlands while the expanding urban areas are flooded due to improper waste management. Through the years, flooding in most of the towns of the province has destroyed property, impaired sources of livelihood, and affected the lives of residents.

One study analyzed and compared the degree of risk to flooding in 10 low-lying barangays in the municipality of Bay, Laguna (*Calzeta et al. 2014*). The study used an integrated approach in assessing the elements of risk, such as hazard, exposure, vulnerability, and adaptive capacity as indicators for flood risk. The study generated index maps to show social and ecological indicators and quantify the levels of risk in each of the 10 barangays. Most of the areas in Bay are frequently flooded. Brgy. Tagumpay is the most flood-prone with a hazard index of 0.92. Brgy. San Agustin is the most exposed to risk because of its high population density while Brgy. Maitim has the highest vulnerability index. However, nine out of the 10 sample barangays have high levels of resilience or adaptive capacity to flood (*Calzeta et al. 2014*).

Even though some members of the communities have learned how to cope with flooding, the whole community still ends up in a very vulnerable condition. This study aims to answer key questions that will help to understand the interconnection between adaptability and the utilization of social capital and how the impact of flooding affects the relationships of various social groups and their capacity to adapt to flooding events. Some key questions to be answered are: how does the community respond to flooding as individual households and as a group? How are the socio-demographic conditions related to the kind of specific social capital resources available during flooding events? What forms of social capital are best used as flood-mitigation measures? To what extent does social capital help strengthen the adaptive capacity of the selected households of coastal communities in Barangay San Antonio and Tagumpay in Bay, Laguna?

Specifically, this research aims to determine the socio-demographic characteristics of the households;

measure the relationship between the socio-demographic characteristics of the participants and the different forms of social capital of the households; and analyze the participants' adaptive capacity to floods in relation with social capital.

The conceptual framework (**Figure 1**) provided direction by which data on how the utilization of social capital will affect the adaptive capacity of the selected households. The framework is in the context that social relationships become significant when responding to emergency situations such as flooding. It was hypothesized that various forms of social relationships would affect the

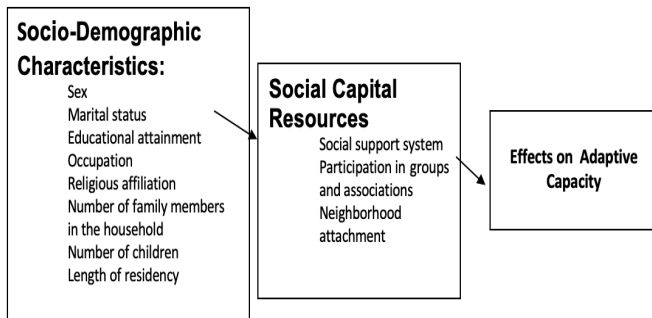


Figure 1. A conceptual model on the effects of different forms of social capital on the adaptive capacity.

Utilization of Social Capital for Flooding Adaptation

adaptation behavior of individual households as well as the local institutions. The framework further emphasizes how the utilization of social capital somehow would increase the capacity of the community to adapt to disasters, specifically flooding. It further exhibits the process of adaptation experienced by communities with the frequency of flooding as the effects of flooding appears to be altering the social and economic conditions of the individual households.

MATERIALS AND METHODS

The study covered two barangays from the municipality of Bay, Laguna, Philippines, namely Brgy. San Antonio and Brgy. Tagumpay (**Figure 2**). Municipal officials recommended the selection of households based on their location along the coastline of Laguna Lake and the degree of damages caused by intense flooding. The officials identified the two barangays as most prone to flooding. In October 2013, the NDRRMC reported that San Antonio, Bay, Laguna continuously experiences knee-high floods due to heavy monsoon rains (*Carcamo 2013*).

Brgy. San Antonio has a land area of 138.72 ha, 3.330 % of the total land area of Bay. It has a total

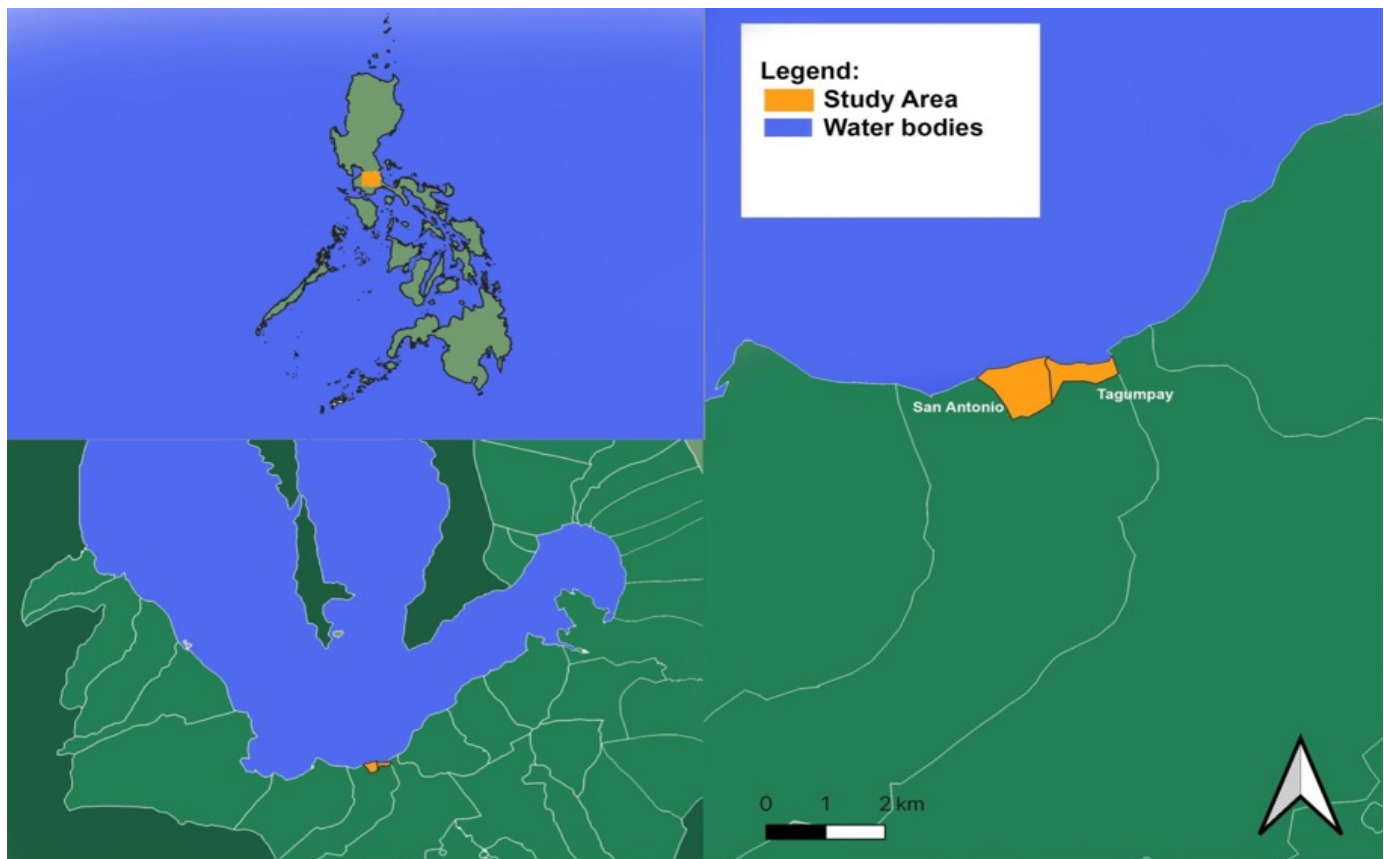


Figure 2. Location map of Barangays San Antonio and Tagumpay, Bay, Laguna, Philippines.

population of 5,730 and 1,421 households in 2020 (NSO 2021) while Brgy. Tagumpay has a land area of 62.94 ha, 1.511 % of total land area; with a total population of 3,118 and 465 households in 2010 (NSO 2010). At the barangay level, two *puroks* (division within a barangay) were also identified based on the frequency of flooding. *Purok 6* of Brgy. San Antonio and *Purok 6* of Brgy. Tagumpay were identified by the Officer of the Disaster Risk Reduction Office of the Municipality.

Both quantitative and qualitative research designs were utilized for this study. Quantitative data were gathered through the survey while qualitative research was conducted through face-to-face in-depth interviews with selected key informants. The descriptive design was used to support the results of the statistical analysis. The basis for this type of design was the qualitative data generated through the in-depth interviews with the key informants.

At the time of data collection, data on the number of households situated along the coastline were not available; hence, only one *Purok* in Brgy. San Antonio with twenty households from *Purok 6* was selected through purposive sampling. Enumeration was employed in *Purok 6* of Barangay Tagumpay where 40 households out of 45 were identified and surveyed. A total of 60 households were surveyed but it only received 55 responses.

Interviews were conducted with key informants: the barangay captain, the officer of the Municipal Disaster Risk Reduction Council (MDRRC) and barangay council officers.

For the quantitative data, a structured survey questionnaire was used to gather the needed information from the selected households. The questionnaire was divided into three parts. The first part determined the socio-demographic profile such as the age, civil status, educational attainment, occupation, number of household members, and years of residency in the barangay. The second part of the instrument covered the different forms of social capital in terms of a social support system, participation in groups and associations, and neighborhood attachment. Questions were in a likert-scale and yes-no dichotomous format. The third part described factors used in the level of adaptive capacity of households. The questionnaire was constructed in English but translated to Filipino. The questionnaires were pre-tested when during the initial interview with the barangay officials.

An open-ended questionnaire was used for the in-

depth interview with key informants. The qualitative part included questions on experience and perceptions of the value of social capital in helping the community cope with flooding, thus enabling them to learn how to adapt to such incidents.

The questions were constructed based on the factors identified by the research conducted by *Van Kien (2011)* as adopted from the questions of *Van Ha et al. (2004)*, and from the research on social capital conducted by *Dudwick et al. (2006)*.

The household survey employed the Simple Random Sampling without Replacement (SRSWOR). Frequency and percentages were used to determine the socio-demographic profile of the participants.

For measure of association between socio-demographic profile and different forms of social capital, this study utilized the following statistical equations:

Point-biserial: $Y, r_{XY} = r_{pb}$. to analyze the association between a quantitative variable and a dichotomous nominal variable.

ETA: Eta squared = $SS_{\text{effect}} / SS_{\text{total}}$, - to measure the strength of association between the dependent and independent variables.

Cramer's V— used to measure the degree of association between two variables

These were used because the responses were all at the qualitative level of measurement. For the number of household members and number of children in the household, ETA measure of association was used. For a dichotomous variable like sex and whether or not they stayed somewhere else, point-biserial was used. The other categorical variables were analyzed using a chi-square test of independence with Cramer's V as its measure of association. The test of significance was set at 0.05% level.

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Participants

There were more females than male participants, with female participants accounting for 70.90 % of the sample (**Table 1**). Most (78%) are married and living with their spouses, 16 % are single, and 5.54 % are widowed. The mean family size is 5 members, with 3 children (s.e. = 0.2506).

Table 1. Distribution of respondent's qualitative socio-demographic profile (n=55).

Items		Frequency	Percentage
Sex	Male	16	29.09
	Female	39	70.90
Marital Status	Married	43	78.18
	Single	9	16.36
	Widow/widower	3	5.54
	College	6	10.91
Education	High school	32	58.18
	Elementary	17	30.91
	Fisherman	8	14.54
Occupation	Self-employed	1	1.82
	Professional	1	1.82
	Others	44	81.48
	NA*	1	1.82
Religion	Jehova's Witness	1	1.82
	Roman Catholic	53	98.15
Number of family members in household	Less than 5	32	58.18
	6 – 10	21	38.18
	More than 10	2	3.64
Number of children	Less than 2	21	38.18
	3-5	27	49.09
	More than 6	5	9.09
Years of residency	Less than 5 years (0)	3	5.54
	5-10 years (1)	4	7.27
	More than 10 years (2)	47	85.45
	NA*	1	1.82
Stayed in another place	Yes (0)	32	58.18
	No (1)	23	41.82

*NA – No Answer

High school graduates made up 58 % of the population while 30.91% completed elementary school and 10.91% finished college. Given the location of the municipality of Bay, employment is considered as one of

the driving forces for migration. Even with its location along the coast, only 8 (14.54%) engaged in fishing, and the majority of the respondents (81.48%) are employed somewhere else.

Eighty-six percent of the population had been staying in their residence for more than 10 years. Most of the respondents are Roman Catholic (98.15%) and a minority are Jehova's Witnesses (1.82%).

Relationship between Socio-Demographic Characteristics and Forms of Selected Social Capital

Variation in the forms of social capital was attributed to the specific characteristics of the participants. Socio-demographic variables were tested for possible correlates with each of the forms of social capital. However, only three were found to have significant relationship with specific socio-demographic variables. The variables with significant correlates were under support system, participation in group organizations/activities, and neighborhood attachment.

Relationship with the Support System

Ninety percent of the population believed in the closeness of members of the community and that somebody in the community would help others to access public relief and to evacuate or find another shelter in times of disasters (**Table 3**). Moreover, above 60 % of them were positive that they could ask for help in times of financial difficulty and the flooding season, would receive advice that they seek, learn new skills in their community and would be invited to local-fund raising activities. In contrast, 45% still thought they might fail to borrow a boat during floods. In addition, one's education could have an effect on whether one would be offered help in learning

Table 2. Summary statistics of household size and number of children in the household (n=55).

	Number of Household Members	Number of Children
Mean	5.3889	2.8679
Median	5	3
Standard Error of the mean	0.3274	0.2640
Standard Deviation	2.4061	1.9219

Table 3. Correlation matrix between socio-demographic profile and support system (n=55).

Factors	Socio-Demographic Characteristics	Measure of Association	Probability
Giving advice	Years of residency	0.3876	0.016
Seeking financial help	Occupation	0.4205	0.021
Being offered help in accessing public relief/assistance	Years of residency	0.4547	0.003
Helping with the evacuation procedures	Years of residency	0.4794	0.002

new skills. Also, one's residency was associated with one's perception on evacuation assistance. Lastly, one's belief on whether someone could help him and his family evacuate may depend on the place and years of residency.

Participation in Groups and Associations

Out of all groups identified, 44.44% of the respondents expressed being part of a fishery association, while 40.74% were members of an agricultural cooperative and 37.04% were members of a women's association. Among the specified groups, three organizations were found to have strong association with the socio-demographic variables. At 0.05% level of significance, it was found that membership in the Samahan ng Kabataan may be determined by one's marital status and religion while education was significantly correlated with one's membership in a senior citizen group. One's membership in the municipal council was moderately associated with years of residency (**Table 4**). Importance of groups and organization was manifested through the active membership of the participants.

Degree of Neighborhood Attachment

For neighborhood attachment, only two items were found to have an association with socio-demographic characteristics such as religion, occupation, number of household members, and number of children. These characteristics had a great impact on one's participation in formal and informal gatherings (**Table 5**).

The respondents strongly believed that their neighbors mean a lot to them. The majority also were

very satisfied in discussing with their neighbors. Most also liked meeting with neighbors to have coffee, participate in recreational activities, and fiestas and celebrate family gatherings. Such activities strengthen the ties within the community which strengthens the community capital *Hanifan (1916)*.

Access to Groups and Networks

After determining the different forms of social involvement, the respondents' perception of community issues particularly their access to different groups and networks was determined. All respondents believed that factors such as gender, socio-economic status, age, education, and elections, were considered as a necessary criterion in assessing one's leadership skill.

Based on the survey, cooperation was the most valued characteristic (**Table 7**). Community respect was the least valued. One's perception of trustworthiness as the most important value was affected by one's marital status and sex. The perception of community respect was associated with the number of persons in a household.

Analyzing adaptive capacity through the use of social capital

Given the access to resources, the data present a summary of the various forms of measures that lead to the strengthening/weakening of the adaptive capacity of the respondents (**Table 9**).

All participants (100%) have access to weather/climate forecasts. They were updated on the weather

Table 4. Correlation matrix between socio-demographic characteristics and organizational participation in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Organizations	Socio-Demographic Characteristics	Measure of Association	Probability
Samahan ng Kabataan	Marital status	0.5479	<0.0001
	Religion	0.4821	0.002
Senior citizen	Education	0.4670	0.002
	Years of residency	0.4812	0.002
Municipal council			

Table 5. Correlation Matrix between socio-demographic characteristics and neighborhood attachment in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Factors	Socio-Demographic Characteristics	Measure of Association	Probability
Regular meeting with neighbors Existence of formal or informal groups, associations, and networks that have strengthened the spirit of collective community.	Number of household members	0.3651	0.007
	Occupation	0.8347	<0.001
	Religion	0.5612	0.002
	Number of household members	0.4335	0.001
	Number of children	0.3780	0.005

conditions and were able to react when the weather condition worsened. Their reactions toward the worsening conditions may have also come from the information gathered on adaptation strategies in the event of flooding (98.18%). Almost half of the participants were able to access other forms of services that helped to make adaptation to flooding events more bearable.

According to 47 respondents (85.45%) who had access to financial services, quick response was the most

readily available service in their households. Most of the 93% who could access social services availed themselves of medical services, temporary shelters and feeding programs. Among the social services being availed by the participants, medical assistance ranked the first while loans from government institutions ranked last (**Table 10**).

All participants were well-informed and updated on the weather conditions. Everyone in the community

Table 6. Respondents' perception of factors affecting one's leadership in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Items	Age	Education	Gender	Socio-economic status	Elections	Occupation	Others
Not a factor	47 (85.45%)	39 (70.91%)	55 (100%)	52 (94.55%)	34 (61.84%)	34 (61.84%)	39 (70.91%)
Factor	8 (14.55%)	16 (29.09%)	0%	3 (5.45%)	21 (38.18%)	21 (38.18%)	16 (29.09%)

Table 7. Respondents' perception of most valued characteristics among network members in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Factors	Frequency	Percentage	Rank
Cooperation	37	67.27%	1
Trustworthiness	28	50.91%	2
Honesty	23	41.82%	3
Reciprocity	19	34.55%	4
Community respect	14	25.45%	5
Others	10	18.18%	6

Table 8. Correlation Matrix of the socio-demographic profile and the most valued characteristic Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Socio-Demographic Characteristic	Factors	Measure of Association	Probability
Marital status	Trustworthiness	0.3542	0.032
Sex	Trustworthiness	0.3087	0.022
	Reciprocity	0.2969	0.028
Number of household members	Community respect	0.3017	0.025

Table 9. Effect of respondents' access to resources on their adaptive capacity in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Items	Social services	Financial services from government	Information about adaptation strategies on flood	Forecast on weather and climate
Yes	51 (92.73%)	47 (85.45%)	54 (98.18%)	55 (100%)
No	4 (7.27%)	8 (14.55%)	1 (1.82%)	0

Table 10. Distribution of respondents' availment of social services in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Social service	Frequency	Percentage (%)	Rank
Medical assistance	38	79.17%	1
Temporary shelter	33	68.75%	2
Feeding programs	33	68.75%	3
Temporary employment	16	33.33%	4
Others	4	7.27%	5
Waivers on government loans	3	5.45%	6

regularly listened to weather forecasts. Television was their number one source of information (**Table 11**).

Despite the information drive, a respondent mentioned that he/she was not yet confident enough to apply various adaptive strategies during flooding events. Moving belongings to an elevated area was one of their best strategies in times of flooding (**Table 12**). According to 47 respondents who already had access to financial funds, quick response was the most readily available service to their households (**Table 13**). For the 93% who could access social services, most availed themselves of medical services, temporary shelters, and feeding programs. Among the socio-demographic variables,

occupation had the most effect on one's access to social services (**Table 14**). Education and marital status, on the other hand, moderately affected the respondent's access to social service and financial service, respectively.

The adaptive capacity of a household was strongly anchored on the utilization of their social capital. The varying associations between the socio-demographic characteristics and the different forms of social capital highlighted the importance of the formation of a collective community and the efficacy of the adaptive strategies that the community employed in times of disasters. Community engagement, through several factors, serves as an important component of social capital.

Table 11. Respondents' source of climate forecast in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Source	Frequency	Percentage (%)	Rank
TV	37	67.27%	1
Barangay officers	33	60%	2
Radio	16	29.09%	3
Newspaper	5	9.09%	4
Municipal officers	4	7.27%	5
Others	3	5.45%	6

Table 12. Respondents' adaptation strategies in coping with flooding in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Adaptation strategies	Frequency	Percentage (%)	Rank
Moving belongings to elevated area	42	76.36%	1
Immediate evacuation	31	56.36%	2
Monitoring weather updates	29	52.73%	3
Storing food	26	47.27%	4
Positioning sandbags	18	32.72%	5
Harvesting before floods	14	25.45%	6
Adding second floor to house	13	23.64%	7
Others	5	9.09%	8

Table 13. Distribution of respondents' availment of financial service in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Financial service	Frequency	Percentage (%)	Rank
Quick response fund	38	79.17%	1
Calamity fund	33	68.75%	2
Conditional cash transfer	16	33.33%	3
Others	3	6.25%	4

Table 14. Correlation Matrix of socio-demographic profile and respondents' access to social and financial services in Brgy. San Antonio and Brgy. Tagumpay, Bay, Laguna, 2017 (n=55).

Socio-demographic characteristic	Access to services	Measure of Association	Probability
Occupation	Social services	0.4951	0.004
Education	Social services	0.3674	0.024
Marital status	Financial services	0.3798	0.019

Consequently, this heightens the adaptive capacity of the specific communities in Barangay San Antonio and Barangay Tagumpay, both coastline communities in Bay, Laguna. In addition, local government units play a vital role in providing assistance during events of flooding. As mentioned by Calzeta *et al.* (2014) looked into the flood risk index of ten (10) barangays in the Municipality of Bay, Laguna, Philippines, the presence of an early-warning system is essential for the community to be more prepared in times of disaster.

The participants were certain to have access to emergency funds and social services, such as medical services, temporary shelters, and feeding programs. They were convinced that in times of crises, they could rely on their neighbors for support so that they could be more resilient and able to overcome all adversities that may come their way.

CONCLUSION AND RECOMMENDATION

The intensifying flooding incidents have left serious impacts, causing drastic changes in the social and economic conditions of communities in the Philippines. With the worsening human conditions, communities have developed strategies to cope with flooding.

The survey of 55 households exhibited results that manifest their deep relationship within the neighborhood. Such a relationship is considered a form of social capital since it provides them with the kind of support in times of need. Aside from joining recreational activities, fiestas and family gatherings, the participants expressed the importance of finding time to discuss ways of coping with disaster, more specifically flooding. Cooperation is most valued in the neighborhood along with trustworthiness and honesty. These values help strengthen the ability of the participants to cope with flooding.

Although community members claimed that through time, they had learned to rely only on themselves in times of emergencies, they also recognized the importance of having a sense of community within the neighborhood where the sense of *bayanihan* (helping each other) is still very much apparent. As described by the participants, *bayanihan* reflects the character of the community. Support systems and neighborhood attachment served instruments that help the community, as individual households and as a collective, to respond to flooding or for flood mitigation. Consequently, the more solid the relationships within the community, the more resilient the residents become, and the more they are able to adapt to flooding events.

There is a need to explore further the different forms of social capital and how to make the community members recognize the importance of maintaining and strengthening their social capital to increase their adaptive capacity - strengthen social networks within communities to bolster adaptive capacity at the community level. Active participation and membership in community groups and associations should be encouraged and may even be institutionalized by the local government units. The various groups and associations should be encouraged to engage in capacity building and conservation activities that will promote environmentally sustainable practices within their communities. This will ensure that social capacity will truly be translated to resilient adaptive capacities at the community level.

Flooding had greatly affected the living condition of all the participants of the study. It had brought problems and constraints that caused destruction of houses and disruption of livelihood in the community. However, the misfortune brought about by flooding has somehow strengthened the ties among neighbors as much as it has strengthened individual and collective resiliency. The various forms of social capital are oftentimes taken for granted, but become highly significant in times of disaster. The degree of strength or weakness in the interrelationship among community members would also measure the level of one's capacity to adapt to flooding.

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