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Exploring Disaster Mitigation and Preparedness of Rural Communities

ABSTRACT: *Over the past few decades, the discussion of disaster mitigation and preparedness has largely focused on the urban communities, due to the concentration of the general population in those centers. This presents a gap in our current knowledge base particularly for vulnerable places with huge rural communities. This study focused on the level of knowledge on disaster mitigation and preparedness among rural communities in Cadiz City, Philippines. It was conducted to increase the understanding of DRR (Disaster Risk Reduction) done in rural communities and explore a method to come up with a suitable program that can enhance the awareness of DRR in Cadiz City. Data were gathered from 198 respondents of the 6 rural communities in Cadiz City via a researcher-developed questionnaire survey and in-depth face-to-face interviews. The results show that the general response in terms of the level of disaster mitigation and preparedness is "in the process". Most of the respondents have acquired information on general emergency preparedness with TV reports as the most common source of information and television as the most effective means of receiving information. In general, the residents in the rural communities of Cadiz City manifest readiness and interest in their safety from disaster and in reducing their exposure and vulnerabilities to typhoons, fires, and earthquakes. Based on the results of the study, the researchers highly recommend the development of a comprehensive and operational module to guide at-risk rural communities in mitigating and preparing for disasters.*

KEY WORDS: *Disaster Mitigation; Preparedness; Rural Communities; Natural Hazards.*

INTRODUCTION

Over the past several years, the Philippines has gained momentum in disaster risk reduction and preparedness. Various stakeholders across many fields have worked together to initiate programs and legislate policies in

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the effort to amplify the demand for the people to properly prepare before a disaster strikes and improve the manner by which Filipinos handle the aftermath of disasters. For example, Republic Act 10121, or the Philippine Disaster Risk Reduction and Management Act, was enacted in 2010 to “strengthen the Philippines’ disaster risk reduction and management system by providing a framework and institutionalizing the national risk reduction and management plans” (Sudmeier-Rieux *et al.* eds., 2006; Benson, 2009; and POG, 2010).

The enactment of Republic Act 10121 has laid the basis for a paradigm shift from just disaster preparedness and response to disaster risk reduction and management. The National Disaster Risk Reduction Management Plan serves as the national guide on how sustainable development can be achieved through inclusive growth, while building the adaptive capacities of communities; increasing the resilience of vulnerable sectors; and optimizing disaster mitigation opportunities with the end in view of promoting people’s welfare and security towards gender-responsive and rights-based sustainable development (UNISDR, 2018; Valencia, 2018; and ADRC, n.y.).¹

This kind of inclusive and holistic approach to disaster risk reduction and management is particularly crucial in the Philippine conditions. The Philippines was battered by an inexhaustible number of deadly typhoons, earthquakes, volcanic eruptions, and other natural hazards (Wingard & Brandlin, 2013; Doroteo, 2015; and Valencia, 2018).

Perhaps the most notable disaster that ever hit the country was the Category 5 Typhoon Haiyan, which made its devastating landfall in the central part of the Philippines on November 8, 2013. This typhoon was record-breaking in its sheer strength as it was touted as the strongest typhoon to ever make a landfall in history. It also wreaked havoc with over 6,000 deaths and multi-billion peso worth of destruction in properties and infrastructure. The UNHCR (United Nations High Commissioner for Refugees) Agency reported that 20,000 of the 4.1 million people displaced by the disaster still live in 56 displacement sites across typhoon-affected areas a year since the onslaught (Viana, 2014; Cas, 2016; and Jha *et al.*, 2018).

J. Salceda (2013) also noted that according to the Philippine Red Cross, at least 31,835 Filipinos have reportedly been killed and 94,369,462 have been affected by natural disasters and calamities in the past 20 years (Salceda, 2013).

¹See also, for example, “NDRRMP (the National Disaster Risk Reduction and Management Plan) in 2011”. Available online at: http://www.dilg.gov.ph/PDF_File/reports_resources/DILG-Resources-2012116-420ac59e31.pdf [accessed in North Luzon, Alicia, Isabela, Philippines: October 21, 2019].

The national disaster plan could have contributed somewhat of a positive impact throughout the years after it was first laid out. But since then, the Philippines still lags behind in terms of disaster preparedness. The Philippines consistently placed in the top three or within the highest risk category among 170+ countries with the most risk of disaster in consequence of extreme natural events. The WRI (World Risk Index) is measured based on the country's exposure or risk and the country's man-made attribution including level of preparedness and responsiveness, adaptation, and susceptibility (Field *et al.* eds., 2012; WHO, 2015; and Behlert *et al.*, 2020).

This shows that although efforts have been made, policies put in place, and implementation ongoing, there clearly exists a gap in understanding the factors why the Philippines' disaster framework is not producing good results. A comprehensive report published by the Philippines' Commission on Audit emphasizes the significant gaps in the country's response and management system. It underscores gaps in public spending which focused largely on reactive rather than proactive approach. In addition, the report also strongly indicates the need for better management of information as well as in raising significant awareness not only on baseline, real-time data on the nature, effect and impact of disasters, but also includes financial information (Beck *et al.*, 2012; CoA, n.y.; and Behlert *et al.*, 2020).

This shows that there is still a lot to improve in understanding the underlying causes of people's vulnerability that have yet to be fully recognized and addressed. It is in this context that the researchers deemed it vital to assess the level of disaster mitigation and preparedness, in the event of typhoon, fire, or earthquake, of the residents of rural communities in Cadiz City.

Cadiz City is a coastal and low-lying community of around 52,447 hectares. Of this, 87% or 45,102.45 hectares are considered rural. Due to its geography, Cadiz City enjoy the advantage of being the premiere center of agro-fishery resources in the island. At the same time, it puts the city at a high risk for typhoons such as Typhoon Haiyan, which heavily damaged the city. In one small island within its territory, only 10 out of 250 homes were left standing after the onslaught of typhoon Haiyan. Earlier in 2008, Typhoon Fengshen capsized an entire fishing fleet from Cadiz City, drowning more than a hundred of its crew (NDCC, 2008).²

According to Kapucu *et al.* (2014), and other scholars, rural communities have different experiences after a disaster than their urban counterparts. In particular, physical isolation, limited economic diversity, and higher

²See also, for example, "Philippine Statistics Authority, 2020". Available online at: <https://psa.gov.ph/classification/psgc/?q=psgc/barangays/06450400000> [accessed in North Luzon, Alicia, Isabela, Philippines: October 19, 2020].

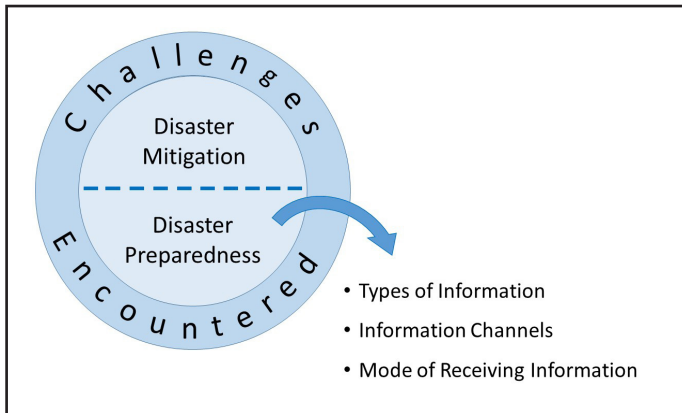


Figure 1:
The Research Paradigm

poverty rates combined with an aging population, increase the vulnerability of rural communities. Rural communities are highly dependent on natural resources, which are affected by climate change. Hence, their awareness and knowledge on disaster mitigation and preparedness is crucial in determining the success of formulating and implementing a holistic disaster plan aimed at reducing risks of disasters, particularly in a city with a relatively large rural expanse (Mathur, 2013; Kapucu *et al.*, 2014; and NCA, 2014).

Hence, the findings of this study will be significant in establishing research-based disaster management plan, which can serve as a guide to recommend policies or local legislative measures in the City of Cadiz, Negros Occidental, Philippines. Figure 1 shows the research paradigm, which guided the flow of the study.

In essence, this study sought answers to the following questions: (1) What is the level of disaster mitigation of the rural communities in Cadiz City, Philippines?; (2) What is the level of disaster preparedness of the rural communities in Cadiz City, Philippines?; and (3) What are the challenges encountered in mitigating and preparing for disasters as perceived by the respondents?

METHODS

Research Design. This study used descriptive research applying several methodological approaches (quantitative and qualitative). Specifically, the research followed concurrent triangulation design, wherein quantitative and qualitative data cross-validated, confirmed, or corroborated the survey findings. The survey determined the level of DMP (Disaster Mitigation and

Table 1:
Frequency Distribution of the Respondents

Rural Community	Population Size (No. of Households)	Sample Size
Burgos	924	28
Cadiz Viejo	1,104	33
Caduha-an	1,819	54
Andres Bonifacio	1,080	32
Jerusalem	667	20
Sicaba	1,029	31
Total	6,623	198

Preparedness) of the respondents in the event of an emergency situation. In-depth interviews highlighted the respondent’s feelings or perceptions toward DMP (RR, 2009; Creswell & Clark, 2011; and Schoonenboom & Johnson, 2017).

Respondents. The respondents of this study were determined by two-stage sampling. A margin of 5% is used as error tolerance. Using the Slovin’s Formula $n = \frac{N}{1 + Ne^2}$ on 29,715 households in the 12 rural communities or *barangays*, the computation yielded 395 households. Considering difficulty in traveling to or reaching the clusters, convenience, and the sample size that can be handled, 50% of this size was considered for the final stage. Hence, using proportional allocation, the sample size of 198 respondents was distributed among randomly selected six out of twelve rural communities (Ellen, 2020).³

The final list of respondents was selected randomly and proportionally from the chosen communities. They were chosen from as diverse backgrounds as possible including fisher folks, sugarcane plantation workers, teachers, community health workers, store owners, household workers, homeowners, local government officials, school personnel, drivers, carpenters, and the like.

The next table shows the distribution of the sample size among the six rural communities of Cadiz City. See table 1.

Instruments: Questionnaire. The questionnaire consists of two parts. Part I gathers information regarding the respondent’s community, type of house ownership, and length of residence. Part II-A is a four-item scale designed to determine the level of disaster mitigation of the respondent’s household and his/her community. Part II-B is also a four-item scale designed to measure the level of preparedness of the respondents in the event of an emergency situation. Moreover, this part includes the types

³See also, for example, “Slovin’s Formula: What is it and When do I use it?”. Available online at: <https://www.statisticshowto.com/how-to-use-slovin-formula/> [accessed in North Luzon, Alicia, Isabela, Philippines: March 24, 2020].

of preparedness and mitigation information the respondent has acquired or collected, information sources or channels, and manner in which the respondent would like to receive preparedness and mitigation information in the future.

Interview Schedule. A set of questions was formulated by the researchers to gauge the respondent's feelings or perceptions toward DMP (Disaster Mitigation and Preparedness).

Data Gathering Procedure. Each respondent was given a questionnaire and an ample time to answer. In the case of respondents who were not capable of answering the questionnaire by themselves, the researchers took time to assist them by translating the items in the language best understood by them. Most of the questionnaires were personally given to the respondents who were available, willing to participate, and within reasonable means of contact. The researchers met most of the respondents in their homes, some in community halls and health centers, and some others in schools during their free time.

To broaden understanding of the respondents' answers to the questionnaire, individual face-to-face interviews were conducted by the researchers and the respondents' answers to the questions were recorded, and in some instances by assistants who were trained by the researchers. The questionnaires were fielded during the first to second weeks of June, 2018; while the interviews were conducted in July, 2018.

Data Analysis. Frequency, percent, mean and standard deviation were used to determine the level of DMP (Disaster Mitigation and Preparedness) of the respondents.

RESULTS AND DISCUSSION

The level of disaster mitigation of the residents in the rural communities of Cadiz City was evaluated and computed using mean and standard deviation. Table 2 presents the responses on disaster mitigation of the residents of Cadiz City in the rural communities comprising of Burgos, Cadiz Viejo, Caduha-an, Andres Bonifacio, Jerusalem, and Sicaba. It can be noted that the general response of the respondents is "In the Process" (M=2.55 and SD=.500). See table 2.

When the respondents were asked whether their houses are built on a hazard-prone area, specifically from typhoon, fire or earthquake, they do not have knowledge what it really means being in a hazard area, because they are used to living in such conditions that are frequently battered by typhoons (M=1.83). In addition, an overwhelming portion of the respondents indicated that they do not have an insurance for their house (M=1.34). In the discussion of the factors for their having no insurance,

Table 2:
Disaster Mitigation of Residents of Rural Communities of Cadiz City

Items	M	SD	Interpretation
1. Is your house located in a hazard area?	1.83	1.297	I don't know
2. Do you have insurance for your house in case of typhoon, fire or earthquake? If none, what are the factors that contribute to your having no insurance?	1.34	.876	No
3. Have you considered elevating, relocating, or buy-out of your house?	2.07	1.405	I don't know
4. When you buy property, will you consider the occurrence of a natural hazard?	3.37	1.164	Yes
5. Would you be willing to spend more to make your property more disaster-ready or disaster-resistant? If you, how much would you be willing to spend? Give an estimate.	3.29	1.194	Yes
6. Has your government raised flood-prone highways or roadways?	2.03	1.378	I don't know
7. Does your community carry out periodic clearing of canals, esteros, ditches and waterways?	2.74	1.247	In the process
8. Does your city perform city-wide tree pruning program?	3.01	1.327	In the process
9. Does the city have a Geographic Information System (GIS)?	2.89	1.277	In the process
10. Does your City Disaster Risk Reduction Management Council conduct public awareness and education programs about disaster preparedness?	2.48	1.143	I don't know
11. To your knowledge, does PNU Visayas offer programs to help the community in its hazard mitigation? If so, please provide details.	3.33	1.137	Yes
12. Does the city maintain potable water well fields, treatment plants and/or distribution center?	2.42	1.161	I don't know
13. Does the city have portable or fixed generation able to sustain critical facilities for >72 hours?	2.93	1.227	In the process
14. Have you made an inventory of facility, appliances, machines, or fixtures in your home/determined the actual cash value of every item in the house?	2.19	1.215	I don't know
15. Does your city adopt building codes, zoning or land use controls? If so, please provide details.	2.35	1.156	I don't know
As a whole	2.55	.500	In the process

the respondents pointed out that they do not know about house or property insurance and if ever they knew about it, paying for it is beyond their budget. However, they expressed willingness to do so if the government or other institutions help them finance the costs.

The residents were also not quite sure in having their house “bought-out”, elevated, or relocated (M=2.07) to a safer place because it would entail high costs, adjustment issues, inconvenience, and difficulty in accessing basic utilities such as water and electricity if they ever had to transfer to relocation sites. But if given the opportunity to transfer, the respondents would consider the occurrence of a hazard in planning and building their next house (M=3.37). The respondents also emphasized

that if only they had enough financial resources, they are willing to spend anywhere from PhP (Philippines Pесо) 50,000 to PhP 200,000, or 1,100 to 4,400 USD (Dollar United States of America), to make their house disaster-ready ($M=3.29$).

When asked whether they have knowledge or have participated in the citywide programs of Cadiz on raising flood-prone highways or streets ($M=2.03$), periodic clearing of waterways ($M=2.74$), and tree-pruning ($M=3.01$), they said that to their knowledge, these are ongoing programs but some streets are yet to be worked on and clearing operations are not conducted regularly. In rural communities, tree pruning is conducted on a per request basis. However, the residents are observed to take it upon themselves to remove hazardous things like big branches of trees and hanging parts of their house before a typhoon hits.

In terms of GIS (Geographic Information Systems), the residents have an initial background of what it is and how it works and indicated that to their knowledge, the city is in the process of creating a digital hazard map of Cadiz City ($M=2.89$). On the item if the CDRRMC (City Disaster Risk Reduction and Management Council) is conducting public awareness and education programs about hazard mitigation, they knew that the agency is doing some programs but are not carried out regularly ($M=2.48$).

This is corroborated by the information given by the aforementioned office which maintains that it trains CHW (Community Health Workers), council members and peacekeepers as first responders in the event of disasters in far-flung communities once a year only. Although some residents take part in the training, they are not prioritized for such kind of training. They know that PNU (Philippine Normal University) Visayas has programs that helps Cadiz City in being disaster-ready ($M=3.33$). On item 12, the respondents do not know if the city is working on potable water fields and treatment plants, but have still not utilized them ($M=2.42$).

The CDRRMC acknowledged that the implementation of this project would be in 2016 as the program has already been allocated. The residents said the city government is “in the process” of putting up portable power generation ($M=2.93$). On item 14, the respondents suggested they cannot be certain as to the cash value of facilities, appliances, machines, or fixtures in their home so they do not know if their list is a real inventory ($M=2.19$). As stated by the CDRRMC, stand-by generators are assigned at the emergency clinics and city hall only. On item 15, the respondents were not aware if the city adopts building codes, zoning, or land use controls ($M=2.35$). In general, the rural dwellers are “in the process” of doing disaster mitigation on a regular basis ($M=2.55$).

It can be deduced from these results that there are a lot of challenges

encountered by the respondents in their efforts of reducing their risks and vulnerabilities to disasters. In particular, seven out of fifteen items (47%) in disaster mitigation had the respondents answer “I don’t know” including their knowledge if their house is a hazard area. The ISDR (International Strategy for Disaster Reduction) of the United Nations identified that:

[...] populations are often concentrated on natural flood plains or along known earthquake fault lines, or in cities and settlements where houses and infrastructures are not safely built and where land use is poorly planned, leading to disastrous effects in the event of an earthquake, even a slight one. What is not generally realized is that many disasters could have been greatly mitigated with adequate forethought and preparation and that the cost of this mitigation would have been small compared to the cost of relief and recovery efforts (UNISDR, n.y.).

On house insurance item, overwhelming percentage of the respondents did not have any and owed it partly to not knowing about insurance. This is all particularly important since:

[...] the UN/ISDR emphasizes risk awareness and assessment; knowledge development; public commitment and institutional frameworks; and early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities as important strategy for disaster reduction (UNISDR, n.y.).

The role of educational institutions cannot be understated in disaster risk reduction. The UNESCO (United Nations Educational, Scientific, and Cultural Organization), in 2014, identified two certain ways of helping vulnerable populations to cope with risk, raising public awareness and improving education about natural disasters. The United Nations also:

[...] recommends that governments must integrate disaster risk reduction into their laws, programs and plans, and ensures the participation of local communities in planning. Integrated risk reduction strategies and mitigation measures must be developed and strengthened planning, prevention, preparedness, awareness raising, education and emergency services for relief and recovery (UNESCO, 2014).

Educational institutions, like the PNU (Philippine Normal University) Visayas, are significant partners to government in reducing disaster risks in communities. Table 3 presents the responses on disaster preparedness of the residents in the rural communities of Cadiz City.

When asked if they have prepared a disaster supply kit with emergency supplies like food, water, and medicines in their home, respondents are “in the process” of doing it (M=3.05). They indicated “in the process” when asked whether they have prepared and discussed family emergency plan such as how they would communicate or establish a meeting place if separated (M=2.91). The respondents do not know if they have practiced or drilled on what to do during an emergency (M=2.44). On the question

Table 3:
 Disaster Preparedness of the Residents of Rural Communities of Cadiz City

Items	M	SD	Interpretation
1. Made sure you had a disaster supply kit with emergency supplies like food, water, and medicines in your home.	3.05	1.352	In the process
2. Prepared and discussed family emergency plan such as how you would communicate or established a meeting place if separated, emergency out of town contact, a place where you would live during that time you needed to leave your house.	2.91	1.377	In the process
3. Practiced or drilled of what to do in an emergency at home.	2.44	1.465	I don't know
4. Volunteered to prepare or respond to a major emergency.	2.35	1.441	I don't know
5. Attended meetings dealing with emergencies.	2.90	1.420	In the process
6. Have taken special training (First Aid, CPR, CERT, etc) for the past three years.	2.05	1.413	I don't know
7. Followed emergency information and alert systems.	3.28	1.215	Yes
8. Informed/instructed family members on how to turn off utilities.	3.64	.945	Yes
9. Kept my family records and other important documents safe.	3.84	.662	Yes
10. Collected preparedness and mitigation information.	3.43	1.152	Yes
As a whole	2.99	.745	In the process

whether they have volunteered to prepare or respond to a major emergency, respondents do not know if some of the meetings and orientations in their community centers are part of these emergency response trainings (M=2.35).

However, they would consider attending meetings dealing with emergencies even if these are not conducted regularly (M=2.90). The respondents are not sure whether they have taken special training (first aid, CPR, CERT, etc) for the past three years because they were only given the very basic training and may not be significant (M=2.05). Interestingly, on the item if they have followed emergency information and alert systems, the respondents said yes (M=3.28). They have already informed and instructed family members on how to turn off utilities (M=3.64) and have kept family records and documents safe (M=3.84). Lastly, the respondents are sure that they have obtained and collected information about DMP (M=3.43). Overall, the respondents are “in the process” of fully preparing themselves to be disaster-ready at all times (M=2.99).

Table 4 reveals the frequency of the responses of the respondents regarding the type of information on DMP (Disaster Mitigation and Preparedness) they have acquired or collected in the past 3 years. It can be taken from the results that general emergency preparedness is the most frequent information gained by the respondents (61%). Information on

Table 4:
Type of Information on Disaster Mitigation and Preparedness Collected or Acquired
in the Past Three (3) Years

Types of Information	Frequency	Percentage
General emergency preparedness.	120	61%
Organizing equipment and supplies/Formulating a disaster kit.	111	56%
Making disaster plans.	65	33%
Emergency response trainings.	68	34%
Structural and non-structural mitigation.	38	19%
Disaster insurance.	32	16%
Emergency information concerning seniors.	54	27%
Emergency information concerning pets.	31	16%
Emergency information concerning those with special needs.	56	28%
Emergency for business/organizations.	30	15%

Table 5:
Information Channels or Sources on Disaster Mitigation and Preparedness

Information Channels or Sources	Frequency	Percentage
Radio hosts/reporters.	133	67%
TV anchors/reporters.	136	69%
Schools.	128	65%
Friends/relatives.	138	70%
PAGASA.	103	52%
Local Emergency Management Unit.	72	36%
Mayor's Office of Emergency Services.	75	38%
Volunteers.	71	36%
Cadiz City Disaster Risk Reduction Management Council.	80	40%
Non-Government Organizations (NGOs).	59	30%
Internet.	69	35%
Religious Organizations.	68	34%
Civic Organizations.	51	26%

organizing equipment and supplies is the second most frequent information gained (56%). Thirty-three per cent (33%) of the rural dwellers gained information on making disaster plans while thirty-four percent (34%) have acquired trainings on emergency response. See table 4.

The data in table 5 show that among the most common sources of information on DMP (Disaster Mitigation and Preparedness) of the respondents are friends and relatives (70%), TV anchors (69%), and radio hosts (67%).

It can be gleaned from table 6 that approximately seven out of ten respondents chose television (71%) as the most common mode of receiving information on DMP (Disaster Mitigation and Preparedness). The

Table 6:
Manner of Receiving Information on Disaster Mitigation and Preparedness in the Future

Mode or Manner of Receiving Information	Frequency	Percentage
Fact sheet/brochure.	72	36%
Meetings/symposia/briefings/orientations.	122	62%
Radio.	133	67%
Television.	140	71%
Newspaper	79	40%
Internet (website/email, etc.).	75	38%
Social media.	92	46%
Outdoor advertisements (posters, billboards, fliers).	78	39%
Others (please specify).	11	5%

other most frequent responses are radio (67%) and meetings/symposia/briefings/orientations (62%). See table 6.

During the interviews, the participants agreed that preparing for an incoming disaster will help lessen the impact even though their coastal location naturally exposes them to typhoons, storm surges, high tides, and even tsunamis. They shared that they are concerned about the safety of their families and community. They stressed that to be effectively prepared, there must be correct information conveyed to them, i.e. when and where typhoons are exactly going to hit, how strong they will be, etc. Television and radio are the two most frequent and common sources of announcement of the participants about incoming typhoons. Typhoon Haiyan, locally known as Yolanda, which hit the country in November 2013 and brought record high deaths and destruction is considered as the most destructive natural disaster that struck the participants.⁴

When asked what their preparations are before a typhoon, they relayed that they store an emergency supply bag loaded with food such as rice, noodles, and canned goods and other emergency devices such as flashlight, match, and/or lighter. When further probed if these supply bags always come in handy and ready-to-use, the participants emphasized that only when there are official announcements of incoming disasters do they put these together. Otherwise, they do not prepare an emergency supply kit in advance and regularly. They also added that the local government provides relief goods but after a few weeks unlike non-government organizations which usually come to their aid right away.⁵

⁴See, for example, Interview with Respondent A, one of the fisher folks, in Cadiz City, the Philippines, on 5th July 2018; Interview with Respondent B, one of the sugarcane plantation workers, in Cadiz City, the Philippines, on 5th July 2018; and Interview with Respondent C, one of the teachers, in Cadiz City, the Philippines, on 5th July 2018.

⁵See also, for example, Interview with Respondent D, one of the community health workers, in Cadiz City, the Philippines, on 10th July 2018; Interview with Respondent E, one of the store owners, in Cadiz City, the Philippines, on 10th July 2018; and Interview with Respondent F, one of the household workers, in Cadiz City, the Philippines, on 10th July 2018.

The participants also informed the researchers that families along coastal areas, including some of them, are given tags to occupy permanent houses provided by the National Housing Authority. When asked if they are willing to be relocated in order to be safer from storm surges, the participants were less enthusiastic. They said that the resettlement sites, although are “nice houses”, are located far from their source of livelihood.⁶

Sand bags are piled along the breakwater as a barrier for high tides and storm surges. The practice of *bayanihan* is evident through collective efforts in putting up sand bags and in contributing financial assistance when their members become victims of calamities. When typhoon is approaching, the fishermen hide their pump boats at the mouths of the river where their devices are safely covered by trees. As regards the building of dikes to replace sand bags, there is already an ocular inspection conducted by the government for this specific project.⁷

Although the *barangay* conducts practice drills for typhoons, earthquakes, tsunamis, and fires, these do not reach the smaller zones called *puroks*. On one hand, the participants recommended the creation of *Bantay-Dagat* (volunteers) to monitor the seas in their *puroks* and cities and to drive away fishermen from other cities and municipalities illegally encroaching their territories.⁸

The PKASFA (*Purok Kakahuyan* Small Fishermen Association), a local people’s organization composed of 37 fisherman-members, took it upon themselves to reforest their stretch of coast with mangrove trees. As of January 2018, the group was able to plant 84,000 mangrove trees with the help of a civil society group. They also inform others to stop cutting down young and mature mangrove trees and use the old/felled ones instead. In addition, two members of the PECASPAA were sent to a two-day seminar-workshop to learn about basic search and rescue operations and first-aid treatment by the City Rescue Bureau.⁹

Fish pens in the contributory rivers clog waterways but some participants contradicted this because the structures already existed even before there was flooding in their area. Traditional knowledge including the movement of the northwest wind (locally termed *kanaway*) is used by fisher folk as an early warning sign of an incoming typhoon and how strong or weak

⁶See also, for example, Interview with Respondent G, one of the homeowners, in Cadiz City, the Philippines, on 17th July 2018; Interview with Respondent H, one of the local government officials, in Cadiz City, the Philippines, on 17th July 2018; and Interview with Respondent I, one of the school personnel, in Cadiz City, the Philippines, on 17th July 2018.

⁷See also, for example, Interview with Respondent J, one of the drivers, in Cadiz City, the Philippines, on 25th July 2018; and Interview with Respondent K, one of the carpenters, in Cadiz City, the Philippines, on 25th July 2018.

⁸See also, for example, Interview with Respondent A, one of the fisher folks, in Cadiz City, the Philippines, on 5th July 2018; Interview with Respondent D, one of the community health workers, in Cadiz City, the Philippines, on 10th July 2018; and Interview with Respondent G, one of the homeowners, in Cadiz City, the Philippines, on 17th July 2018.

⁹See also, for example, Interview with Respondent B, one of the sugarcane plantation workers, in Cadiz City, the Philippines, on 5th July 2018; Interview with Respondent E, one of the store owners, in Cadiz City, the Philippines, on 10th July 2018; and Interview with Respondent J, one of the drivers, in Cadiz City, the Philippines, on 25th July 2018.

it will be. The participants also highlighted that self-discipline is needed. Whatever trash is thrown into the sea returns to cause humans damage.¹⁰

Along this line, they inform and reprimand others about throwing trash into the seas. Possibly because of their exposure to environmental education conducted by PNU (Philippine Normal University) Visayas in the past years and TV news reports, the participants recognize that dumping trash to the sea is disastrous as these will come back and obstruct narrow waterways leading to seas and choke up marine plants and animals especially those that take shelter in mangrove forests. They share information to other families in their neighborhood.¹¹

Lastly, it can be interpreted from the feelings and views of the rural population of Cadiz City that they place importance upon disaster preparedness and management. The residents expressed strong concern about the effects of the hazards of typhoon, earthquake, or fire to their family and community. They also agreed that being prepared for emergencies can keep their family and properties safe. The residents also believed that community preparedness can make a difference in the ability of emergency officials to respond after a disaster.¹²

CONCLUSION

Cadiz City is geographically exposed to threats posed by natural hazards such as typhoons, flood events, etc. As revealed in this study, the residents of the city in general exhibit readiness and interest in equipping themselves to be prepared for disaster and more importantly to reduce their exposure and vulnerabilities to various kinds of hazards most particularly to typhoons, fire, and earthquakes.

Further, the findings reveal that the residents are “in the process” both of mitigating and preparing for disasters. They are carrying out steps to prepare themselves and to reduce their risks and vulnerabilities from disasters. However, their efforts are without challenges. In general, it seems that the respondents’ lack of knowledge and awareness in terms of disaster risk management render them unable to equip themselves properly in reducing their risks and vulnerabilities. The residents’ reasons for their houses not being insured and for their apprehension in relocating to safer communities include absence of knowledge, costs and government’s lack of support.

¹⁰See also, for example, Interview with Respondent C, one of the teachers, in Cadiz City, the Philippines, on 5th July 2018; Interview with Respondent H, one of the local government officials, in Cadiz City, the Philippines, on 17th July 2018; and Interview with Respondent K, one of the carpenters, in Cadiz City, the Philippines, on 25th July 2018.

¹¹See also, for example, Interview with Respondent E, one of the store owners, in Cadiz City, the Philippines, on 10th July 2018; Interview with Respondent I, one of the school personnel, in Cadiz City, the Philippines, on 17th July 2018; and Interview with Respondent J, one of the drivers, in Cadiz City, the Philippines, on 25th July 2018.

¹²See also, for example, Interview with Respondent C, one of the teachers, in Cadiz City, the Philippines, on 5th July 2018; Interview with Respondent F, one of the household workers, in Cadiz City, the Philippines, on 10th July 2018; and Interview with Respondent I, one of the school personnel, in Cadiz City, the Philippines, on 17th July 2018.

In addition, the city government performs some measures towards DMP (Disaster Mitigation and Preparedness) like conducting public awareness and education programs, elevating flood-prone roadways, clearing of waterways, and tree pruning but are either not conducted on a regular basis, or are still not done systematically. Some residents said that the city is well-prepared such that it recorded zero casualties at the onslaught of the strongest typhoon ever recorded which hit Central Philippines in November 2013. Others were a bit skeptical and noted that even though lives were not lost, a lot of houses and properties were still brought down and flooded during Typhoon Haiyan; an indication that there are still things needed to be done in regard to disaster management.

Based on the foregoing, it is recommended that the local government, through the City Disaster Risk Reduction Management Office, develop and implement a long-term and holistic disaster management plan which will highlight public awareness campaigns, early warning system, insurance, and the like. Additionally, it is recommended that the city government shall coordinate all the efforts of the rural communities to establish an efficient, regular and systematic disaster management in the city. It shall continue to engage active participation from all sectors including education, business, industry, agriculture, and others to ensure the sustainability of the program.

The periodic conduct of orientation and training on disaster risk reduction by government and non-government organizations will help the respondents brace themselves in the event of an incoming disaster and not only prepare when there are official announcements. Practice drills may also involve far flung areas and volunteers may be organized to keep watch on vulnerable areas and encroachers. The local government may consider timely distribution of provisions to families affected by disasters. Moreover, information dissemination on proper disposal of waste be conducted regularly to minimize the effects of these on humans and the environment. Coastal clean-ups and mangrove growing should also be considered as top priorities of agencies and organizations as part of their social responsibilities.

In Cadiz City, PNU (Philippine Normal University) Visayas has been involved in many extension programs related to the environment in its adopted community. It includes mangrove planting, coastal clean-up and the conduct of lectures to adults and homeowners about health- and environment-related topics and issues. It is reasonable that the respondents “did not know” about the extension work that the university does as indicated in the results since the work is concentrated in only one *barangay*. Thus, the current strategic development plan of the university

should include expanding the scope of its community work.

More importantly, in line with the Philippine agenda on disaster risk reduction, the university should highlight the issue of disaster management in its community work through the conduct of seminars, workshops, and lectures to vulnerable communities in close partnership with the concerned government agencies such as the City Disaster Risk Reduction Management Office and LGUs (Local Government Units). This is important because the work on disaster risk management should be done through a holistic and integrated approach.

In relation to this, this study highly puts forward the development of a comprehensive and operational module that will serve as a guide to vulnerable communities in their DMP as part of the city's disaster management plan. The module will cover general emergency preparedness, organizing equipment, making disaster plans, emergency response training, structural and non-structural mitigation, disaster insurance, and specific emergency training concerning seniors, pets, people with special needs, and for business/organizations.

The university should closely coordinate with the CDRRMO and non-government organizations like CREATE (Cadiz City Rescue Emergency Assistance Team) in the conduct of training and drills. Training of qualified faculty and volunteers will also become a top priority of the program. The close coordination between the university and government agency will ensure efficient and effective delivery of the program that will cover the entire City of Cadiz. Through this, it is hoped that a solid, systematic, and workable program of reducing the vulnerability of the rural communities of Cadiz City can be implemented.¹³

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¹³**Statement:** This is to certify that our research is a product of our collaborative effort. It is an original, with some literature review from other sources. Our research is not plagiarized – relevant statements of authors in the literature review are properly cited. We certify further that our research has never been reviewed nor published in any other scholarly journal. This certification is issued on 26th July 2021 for whatever legal and official purposes it may serve.

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