

Research Paper

Hazard preparation for the fishing community of Nato, Camarines Sur, Philippines using the participatory approach to Disaster Risk Reduction and Management (DRRM) Planning

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Abstract

The Philippines is a hazard-prone country, with typhoons as the most prevalent types of hydro-meteorological hazard. Coastal communities like Nato in the Municipality of Sagñay in Camarines Sur are especially at risk from these hazards. To address this, the Philippine government implemented the Philippine Disaster Risk Reduction and Management Act to incorporate plans from the grass-roots level (Barangay Disaster Risk Reduction and Management Plan or BDRRMP) in the National Disaster Risk Reduction and Management Framework. However, the formulation of the BDRRMP is perceived to be slow resulting partly from the lack of knowledge and skills in drafting the plan. A combination of quantitative and qualitative methods was utilized wherein a household survey for 298 respondents was conducted to gather data on Nato's socioeconomic situation, resources, gender roles, community practices and dynamics in relation to Disaster Risk Reduction and Management (DRRM). Participatory Rural Appraisal (PRA) was also conducted in the formulation of the BDRRMP for Nato. Based on the findings, the socioeconomic situation of Nato is characterized by self-perceived poverty where deprivation from non-food needs is experienced more than food needs. The knowledge and practices of the community about DRRM in Nato are generally characterized by a degree of indifference unless the hazards are occurring. Community mobilization and inter-agency cooperation are therefore necessary in the formulation and implementation of the BDRRMP, which is why this study aimed to describe the socio-economic situation of Nato; determine the knowledge and practices of local residents in Nato and draft a BDRRMP incorporating the information gathered from the first two objectives.

Key words: Disaster Risk Reduction Management, Sagñay

INTRODUCTION

In the Philippines, being a disaster prone country has been part of its history. In the 2019 report of the World Risk Index, the Philippines ranked the ninth (9th) riskiest country worldwide (Federigan 2020).

Its archipelagic characteristics make it highly exposed and susceptible to hydrometeorological hazards such as typhoon, tsunamis, storm surge and others. About twenty (20) tropical cyclones on average enter the Philippine waters every year, with approximately eight or nine of them making landfall (UN Office for Disaster Risk Reduction 2019). In 2019 alone, a total

of twenty-one (21) tropical cyclones entered the Philippine Area of Responsibility (PAR) with seven (7) of them making landfall (PAGASA 2019). PAGASA, the agency that monitors and forecasts weather condition in the Philippines, categorizes these cyclone events into: tropical depression, tropical storm, severe tropical storm, typhoon, and super typhoon. Typhoon Haiyan that occurred in 2013 was a super typhoon and one of the most expensive natural disasters in the country.

The Philippine's location within the Pacific ring of Fire, where it occupies an area of forty thousand (40,000) kilometers, and its basin in the Pacific Ocean also makes it very prone to earthquakes and volcanic eruptions. The

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Philippines has a total of fifty-three (53) volcanoes, twenty-four (24) of them considered to be active volcanoes. The threat of volcanic eruptions can cause the intensity of strong earthquakes. In the recent eruption of Taal Volcano on January 12, 2020 alone, about one hundred and seventy (170) earthquakes occurred (Sanchez, 2020).

Natural disasters can be very costly. They can claim thousands of lives, displace millions of people and render thousands or even millions homeless and jobless. From 1970 to 2009, the Philippine government spent an average of Php 5 billion to Php 15 billion (US\$100 million to US\$300 million) for direct disaster-related damages. This range is equivalent to more than 0.5% of the national gross domestic product, and this does not include the other indirect damages and secondary impacts brought about by the disasters in the country (Ani et al. 2015). According to Sanchez (2020), in 2016, “the total cost of damages by major natural disasters in the Philippines amounted to approximately 14.4 trillion Philippine pesos. Flooding, effects of the southwest monsoon, and low-pressure area account for most of the damages paid in 2016.” Given the numerous natural calamities that happened in the country, in 2019, the government secured financial protection from the World Bank that would cover the cost of risks from an earthquake and tropical cyclone events.

The cost of the natural disasters highlights the need to strengthen disaster risk governance to manage disaster risk. Although the Philippines has already instituted a legal foundation for disaster risk reduction and management focusing mainly on response-centric intervention, and local governance to enable to use of calamity funds for disaster preparedness and mitigation, the legislation was still

insufficient to support change at the local level. (UN Office for Disaster Risk Reduction, 2019) Thus, in 2010, the Philippine Disaster Risk Reduction and Management (PDRRM) Act (or Republic Act 10121) was enacted.

Among others, the PDRRM Act of 2010 mandates the drafting of a Disaster Risk Reduction and Management Plan from barangay level to the provincial level. The said plan should embody the stipulated National Disaster Risk Reduction and Management Framework (NDRRMF) which “provides for comprehensive, all hazards, multi-sectoral, inter-agency and community-based approach to disaster risk reduction and management” (PAGASA 2010). The law also mandates the participation of all sectors and all stakeholders concerned, in the drafting and implementation of the said plan. Despite this mandate, compliance of the drafting of the said plan was deemed difficult for various reasons, among them is the lack of expertise.

One coastal municipality¹ in the Third District of the Province of Camarines Sur in Bicol Region that had difficulty in drafting the said plan at the village level is the Municipality of Sagñay. Located at 13° 36' North and 123° 31' East, Sagñay is a coastal, disaster prone and high risk municipality that experiences the frequent occurrence of hydro-meteorological hazards. It has nineteen (19) villages in its territorial jurisdiction. Of these villages, Nato is the most prone and high risk village that renders the drafting of the said plan as a means to prepare the fishing community for any hazardous events very necessary. Armed with the knowledge and skills to undertake the planning, collaboration between the academe and the municipal and village level officials was done for the formulation of the said plan.

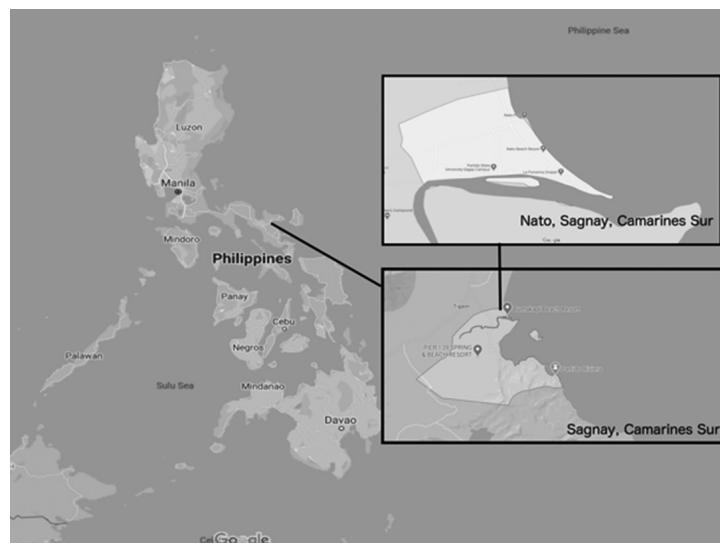


Fig. 1. Map of Nato, Sagñay, Camarines Sur (Source: Google Maps). Nato is a fishing village in the Municipality of Sagñay which is located in the Province of Camarines Sur.

¹At the local government level, Philippines has the following levels: Provinces, Cities, Municipalities and the village-level Barangays, with the exclusion of the Autonomous Region in Muslim Mindanao (ARMM). (Atienza, 2006)

Guided by the NDRRM framework, the plan was started with a description of the physical, socio-demographic and economic characteristics of the site, followed by the mapping of the hazards and risks, description of the communities' practices (including the children) before, during and after the events, and the drawing of the plan.

Nato is a fishing village located in Sagñay and is characterized by having not only the largest human population in the municipality but the largest population of small-scale fisherfolks as well. The barangay of Nato is composed of the following places: Santa Cruz, La Purisima, Del Carmen and Del Rosario, but all of them are managed by one barangay local government unit headed by a barangay captain.

Rich in natural resources, the primary sources of livelihood in Nato include fishing, farming and weaving the mangrove species *Nypa fruticans*, among others. These sources of livelihood as well as the natural resources they heavily rely on are vulnerable against the impacts of hydro-meteorological hazards. Characterized by poverty and lack of community-based Barangay Disaster Risk Reduction and Management Plan (BDRRMP), residents of Nato rely heavily on the municipal government's disaster response with minimal involvement in the formulation of the DRRMP for their community.

The presence of a community-based BDRRMP in Nato may serve as a tool to elevate the needs of Nato as a community to the municipal government which the Municipal DRRMO can use to address the DRRM concerns of Nato. In order to make this possible, collaboration between the academe and the local government unit of Sagñay was established for the formulation of Nato's BDRRMP using a participatory approach.

MATERIALS AND METHODS

In order to ensure that the BDRRMP is socially inclusive and can be applied by the community, the participatory approach of developing the plan was utilized in the study using two (2) methodologies:

1. Household Surveys composed of 298 respondents were conducted in Nato, particularly in Santa Cruz, Del Rosario, La Purisima and Del Carmen in order to gather data on the socioeconomic condition, demography as well as the general perspective of the barangay residents about hazards. The household surveys were conducted for ten (10) days, particularly from July 8 to 17, 2019.
2. Participatory Rural Approach (PRA) was conducted in order to gain a deeper understanding of Nato as a community, specifically its resources, gender roles, socio-cultural practices, community relationships, internal and external interactions. After which, the BDRRM Plan was formulated through the same

approach. The three-day PRA conducted in Nato incorporated the perspective of the different sectors of the community, specifically the following: 5 barangay officials, 6 senior citizens, 10 members of the youth, 7 women, and 1 Person with Disability (PWD). The participants of PRA formulated the social map, gender resource map and hazard maps. Other outputs included the seasonal calendar; community practices before, during and after hazards; and the BDRRM plan. The PRA was conducted for three (3) days, particularly from August 2 to 4, 2019. The PRA results were validated with the local government of the village on October 27, 2019.

3. The BDRRM Planning Process incorporated the quantitative data from the household survey results and qualitative data from the PRA proceedings, which was turned over to the local government unit of Sagñay, through its Municipal DRRMO on September 23, 2020.

These methodologies were all utilized to understand the distinct characteristics of Nato and its residents and subsequently formulate the BDRRM Plan that covers disaster preparedness and mitigation, disaster preparedness, disaster response and disaster rehabilitation and recovery.

RESULTS

Socioeconomic conditions

The social map of Nato (Fig. 2) illustrates an overview of the socioeconomic conditions of the barangay. This includes the map of Nato and its institutions, infrastructure and residential areas. The socioeconomic status of the households in the barangay were also identified in the social map.

The identification on whether a household is rich, average or poor is described through a set of characteristics identified by the community shown in Table 1 below.

In the social map, a total of 594 households were identified in Nato. 34.2% of these households were identified as poor. On the other hand, the average and rich households comprised 32% and 33.8%, respectively. The household survey results on the other hand indicated that 67% of the respondents rated themselves as poor, while those who rated themselves not poor and within the poverty line were 18% and 15%, respectively. The social map covers almost all of the households since the village officials who participated in the PRA also conducted the data gathering on the population of the whole village.

Most of the respondents' outlook in terms of their standard of living point to being consistent, which means that their standard of living has always been the same in the past three months and will be in the coming three months. 29% of the respondents however believe that their current situation is

Hazard preparation for the fishing community

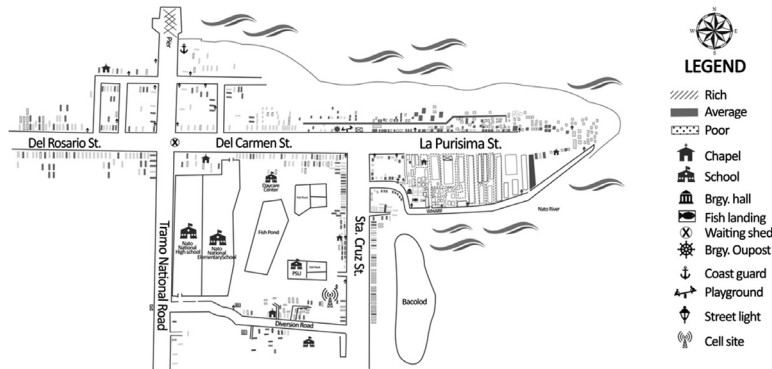


Fig. 2. Social Map of Nato. The social map was formulated by the participants of PRA and illustrates the overall physical and socio-cultural structures and systems in the community.

Table 1. Description of status of households.

Status of Household	Description
Rich	Owns and resides in a house made of concrete; owns and resides in a big house
	Owns tractors and vehicles used in farming
	All children have finished schooling
	Has permanent employment or professional household members
	No longer needs to ask for any form of assistance because they can manage their needs
	Owns and runs a business
Average	Does not experience hunger
	Has at least one child who finished schooling
	Has at least one child who is employed
	Owns vehicle for fishing
	Able to save at least a minimal amount
Poor	Has no regular employment
	Settles down or marries at a young age due to lack of education
	Has no certainty regarding the source of funds for sustenance
	Has no decent house
	Incurs debt

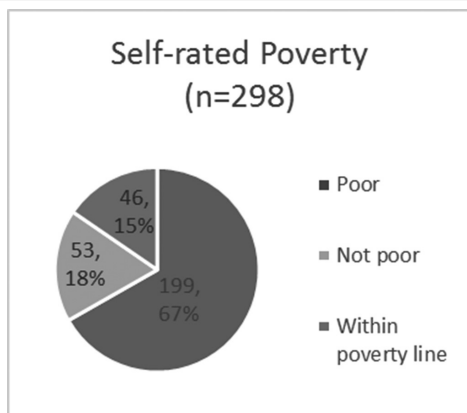


Fig. 3. Respondents' Self-rated Poverty from the Household Survey (n = 298). Respondents were asked to rate themselves according to how they perceive themselves: poor, not poor, or within poverty line.

better now compared to the past three months and 37% of the respondents believe that their current standard of living will still get better in the coming three months. Only 19% of the respondents stated that their standard of living worsened compared to the past three months and only 6% of the respondents believe that their standard of living will worsen in the coming three months.

In terms of food deprivation on the other hand, 71% of the respondents in Nato stated that they did not experience hunger or the lack of food in the past three months. However, 29% of the respondents stated that they did experience hunger and lack of food in the past three months. Among this 29% of the respondents, 75% seldom experienced this, 15% sometimes experienced this, 6% often experienced this and only 3% always experienced hunger in the past three months.

Based on the household survey results, the major sources

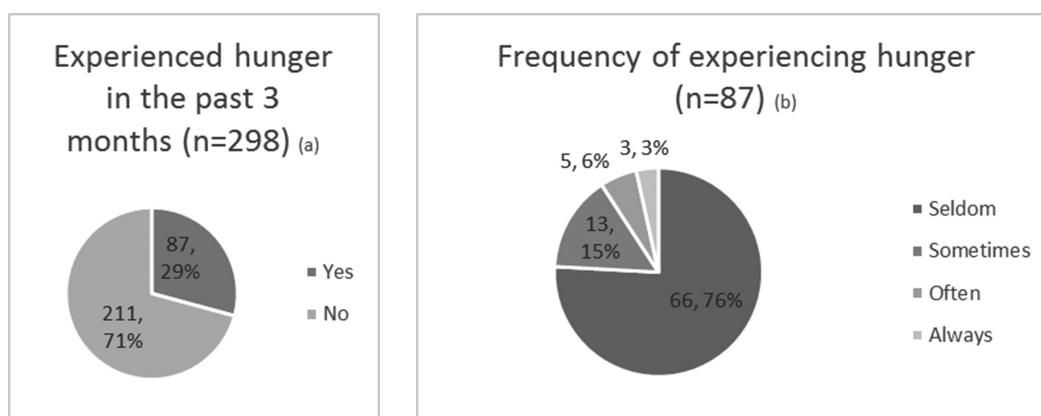


Fig. 4. Respondents' Experience with Hunger from the Household Survey. A) Overview on the respondents' experienced hunger in the past 3 months (n = 298); B) Illustration of the respondents' frequency of experiencing hunger particularly respondents who experienced hunger in A (n = 87).

of livelihood in Nato are fishing, construction-related occupations, remittances from friends and family members, sales-related occupation and rice farming. On the other hand, Table 2 outlines the economic activities in Nato and when the natural resources are usually utilized within the period of one year. Since Nato is largely a fishing community, there were a total of thirty-two (32) identified marine species caught in the sea and river surrounding Nato. Most of these species are caught within the middle of the year, specifically during the months of May to August.

The other economic activities in the village, as outlined in Table 3, are rice farming which is conducted quarterly, coconut production which is conducted every two months and *Nypa* weaving which is also conducted every quarter annually.

Resource utilization by gender

The gender resource map of Nato (Fig. 5) illustrates the

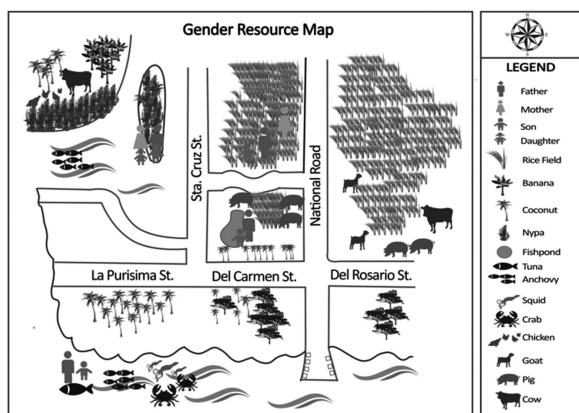


Fig. 5. Gender Resource Map of Nato from the PRA. The gender resource map was formulated by the participants of PRA and illustrates the various natural resources in Nato and its utilization according to gender roles.

natural resources found in the barangay as well as the gender roles in the management and utilization of these resources. The map shows that the natural resources are used in farming, fishing and *Nypa* weaving.

Farming resources include rice, livestock and fruit-bearing trees. In the management and utilization of rice and fruit-bearing trees, both men, women and the male children are involved. When it came to livestock, only the men and children are involved.

Fishing resources include those fish and other marine resources that can be harvested in the sea, river and fishpond in Nato. In the different fishing activities conducted, only the male members of the household are involved. Lastly, the *Nypa* plantation in Nato provides for another source of livelihood in the barangay which is *Nypa* weaving. In the management and utilization of these resource, all of the men and women of the household are involved.

Community understanding of hazards and Disaster Risk Reduction and Management (DRRM)

According to the community members of Nato, typhoon or *bago*, is mainly caused by climate change. This phenomenon is further aggravated by burning of garbage, illegal logging, factories, pollution and illegal fishing / fish bombing. More human activities were identified in which community members believe contribute to the increasing occurrence and intensity of typhoons that affect communities. Specifically, the human activities identified were burning of garbage, illegal logging, mining, illegal fishing and fish bombing, pollution from factories and vehicles, illegal sources of income, use of plastic, improper waste disposal, quarrying, production of materials from trees and construction of homes. The lack of capacity building for the community members was also identified.

Hazard preparation for the fishing community

Table 2. Seasonal calendar of fishing activities in Nato.

English Name	Local Name	Scientific Name	J	F	M	A	M	J	J	A	S	O	N	D
1. Yellow fin tuna	<i>Bangkulis</i>	<i>Thunnus albacares</i>						■	■					
2. Blue fin tuna	<i>Bangkulis</i>	<i>Thunnus thynnus</i>			■									
3. Skipjack tuna	<i>Pundahan</i>	<i>Katsuwonus pelamis</i>			■		■	■						
4. Frigate tuna	<i>Turingan</i>	<i>Auxis thazard</i>					■	■	■					
5. Commerson's anchovy	<i>Dilis</i>	<i>Stolephorus commersonii</i>					■	■				■		
6. Round scad	<i>Sibobog</i>	<i>Decapterus punctatus</i>						■	■	■				
7. Roughear scad	<i>Lordiste</i>	<i>Decapterus tabl</i>						■	■					
8. Indian scad	<i>Sibobog</i>	<i>Decapterus russelli</i>						■	■					
9. Bigeye scad	<i>Abugmun</i>	<i>Selar crumenophthalmus</i>						■	■					
10. Indian mackerel	<i>Buraw</i>	<i>Rastrelliger kanagurta</i>						■	■	■				
11. Narrow-barred Spanish mackerel	<i>Tangigi</i>	<i>Scomberomorus commerson</i>						■	■	■				
12. Bali sardinella	<i>Turay</i>	<i>Sardinella lemuru</i>						■	■	■				
13. Yellowstreaked Snapper	<i>Maya maya / Dugso</i>	<i>Lutjanus lemniscatus</i>					■	■						
14. Celebes threadfin bream	<i>Bisugo/Kanasi</i>	<i>Nemipterus celebicus</i>						■	■	■				
15. Red filament threadfin bream	<i>Bisugo/Kanasi</i>	<i>Nemipterus marginatus</i>						■	■	■				
16. Teardrop threadfin bream	<i>Bisugo/Kanasi</i>	<i>Nemipterus isacanthus</i>						■	■	■				
17. Large hairtail	<i>Langkoy na puti / itom</i>	<i>Trichirus lepturus</i>		■	■									
18. Bigeye barracuda	<i>Titso</i>	<i>Sphyraena forsteri</i>						■	■	■				
19. Obtuse barracuda	<i>Titso puti</i>	<i>Sphyraena obtusata</i>						■	■	■				
20. Blue trevally	<i>Lison / Talakitok</i>	<i>Carangoides ferdau</i>						■	■	■				
21. Squid	<i>Pusit</i>	<i>Teuthida</i>						■	■	■				
22. Rainbow runner	<i>Bulangawan</i>	<i>Elagatis bipinnulata</i>						■	■	■				
23. Slender ponyfish	<i>Sapsap/tambong</i>	<i>Equulites elongatus</i>						■	■	■				
24. Orangefin ponyfish	<i>Sapsap</i>	<i>Photopectoralis bindus</i>						■	■	■				
25. Common ponyfish	<i>Sapsap/Dalupani</i>	<i>Leiognathus equulus</i>						■	■	■				
26. Toothpony	<i>Sapsap</i>	<i>Gazza minuta</i>						■	■	■				
27. Smalltoothed ponyfish	<i>Sapsap</i>	<i>Gazza achlamys</i>						■	■	■				
28. Splendid ponyfish	<i>Sapsap/Barurog</i>	<i>Eubleekeria splendens</i>						■	■	■				
29. Striped ponyfish	<i>Dalupani</i>	<i>Aurigequula fasciata</i>						■	■	■				
30. Redbelly yellowtail	<i>Dalagang bukid</i>	<i>Caesio cuning</i>						■	■	■				
31. Tufted sole	<i>Palad</i>	<i>Dexillus muelleri</i>											■	
32. Unicorn leatherjacket filefish	<i>Sulay bagyo</i>	<i>Aluterus monoceros</i>					■	■	■		■			

Table 3. Seasonal calendar of economic activities in Nato aside from fishing.

Economic Activities Aside From Fishing	J	F	M	A	M	J	J	A	S	O	N	D
Rice farming	■			■	■		■			■		
Coconut production			■		■		■		■		■	
<i>Nypa</i> weaving				■			■			■		

Storm surge, on the other hand, was directly related to the occurrence of typhoons. Although flooding was not directly related to the occurrence of typhoons, it highlighted several human activities that contribute to the increased intensity of flooding in the area that could have been prevented if properly addressed, like the lack of trees, illegal logging, absence of a proper dump site or improper waste disposal and the clogging due to the abundance of water lilies in flood-prone areas in the

barangay.

Household survey findings also identified the causes of the hazards in Nato. According to the responses, excessive deforestation, population increase, increase in residential areas, increase in improper waste disposal and increase in poverty incidence are the identified causes of the hazards that occur in Nato.

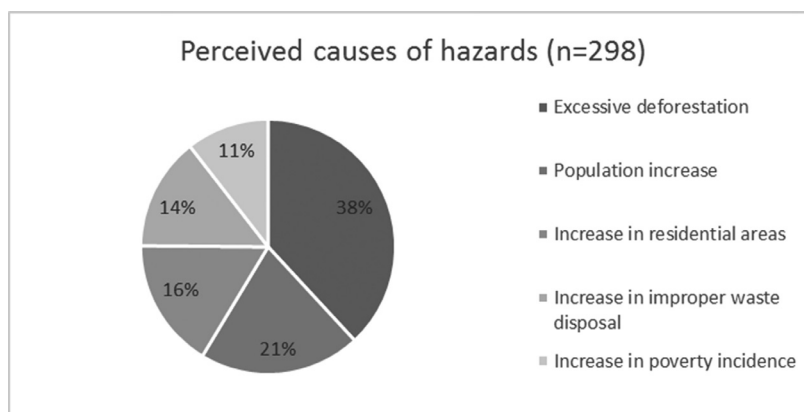


Fig. 6. Respondents' Perceived Causes of Hazards from the Household Survey (n = 298). This figure illustrates the variety of causes identified by respondents to have a direct and indirect relationship with hazards and its impacts on the community. Each respondent was asked to choose multiple responses regarding their perceived causes of hazards and the results were ranked according to the highest number of responses from the respondents.

Since the most frequent calamity happening in Nato was identified to be typhoons, the respondents were also asked about their perception towards typhoons, specifically on how they understand typhoons. 35% of the responses perceived typhoons as rainy and windy weather, 28% perceived typhoons as bad weather condition and 21% perceived typhoons as a weather system that is formed at sea. Technically, typhoons are characterized by high winds and heavy rains and originate from the sea. Based on the responses from the respondents, most of them are aware that typhoons involve rainy and windy weather and is a bad weather condition.

Since typhoons frequently occur in Nato, the knowledge of the respondents regarding the worst-case scenario of super typhoons was also measured. 51% of the responses generally perceived signal no. 5 typhoons as super typhoons, while 22% perceived a signal no. 5 typhoon as a very strong storm.

The respondents are accurate by being aware that signal no. 5 typhoons are also known as super typhoons. However, the specific characteristics of super typhoons may have been overlooked, specifically the characteristics of the winds, the damage to structure and damage to vegetation. Signal no. 5 or super typhoons are generally characterized by winds of more than 220 kph and wave height of more than 14 meters with the

possibility of storm surge of more than 3 meters at coastal areas. (PAGASA, About Tropical Cyclones, <http://bagong.pagasa.dost.gov.ph/information/about-tropical-cyclone>, Last accessed 26 September 2020) There were responses that characterize the winds of 171-220 kph that can be expected during a super typhoon, which is more or less accurate, but this only accounts for 4% of the responses.

In determining the respondents' knowledge regarding the effects of typhoons on the community, they were asked to choose from multiple options about the effects of typhoons, 33% stated that the effect of typhoons in the community is damaged infrastructure. 20% of the responses stated that typhoons cause the loss of livelihood, while 12% of the responses stated that typhoons are the cause for health risks like hunger, sickness, and the like.

Household survey findings also measured knowledge about the laws and concepts in relation to Disaster Risk Reduction and Management (DRRM). The laws in relation to this are Republic Act 10121 or the Philippine Disaster Risk Reduction and Management Act and Republic Act 9729 or the Climate Change Act. The concepts are Disaster Risk Reduction and Management (DRRM) and Climate Change.

Table 4. National Laws in the Philippines in relation to DRRM.

Republic Act Number	Title	Description
9729	Climate Change Act of 2009	An act mainstreaming climate change into government policy formulations, establishing the framework strategy and program on climate change, creating for this purpose the Climate Change Commission, and for other purposes
10121	Philippine Disaster Risk Reduction and Management Act of 2010	An act strengthening the Philippine disaster risk reduction and management system, providing for the National Disaster Risk Reduction and Management Framework and institutionalizing the National Disaster Risk Reduction and Management Plan, appropriating funds therefor and for other purposes

Figure 7 below illustrates the respondents' knowledge about laws and concepts relevant to disaster risk reduction and management. Regarding their knowledge about Republic Act 10121, 91% stated that they didn't know about the law, while only 9% stated that they knew this law. Regarding their knowledge about Republic Act 9729, 86% stated that they didn't know this law, while only 14% stated that they knew this law. On the other hand, when the respondents were asked about the concept of disaster risk reduction and management, 75% stated that they didn't know about DRRM, while only 25% stated that they knew about DRRM. Regarding their knowledge about climate change, 65% of the respondents stated that they did not know climate change, while 35% stated that they knew what climate change is.

Trainings regarding DRRM were conducted in Nato. The household survey findings also identified the knowledge gained through these trainings. According to the household survey results, only 29% participated in trainings regarding disasters, while a considerable 71% did not.

Practices about Barangay Disaster Risk Reduction and Management (BDRRM)

Nato has several community practices before, during and

after specific hazards occur in their barangay. These hazards are typhoon, storm surge and flood. The community practices in relation to them are specified in Tables 5, 6 and 7 below.

Practices before the occurrence of hazards generally revolve around preparing the houses, belongings and livestock before preparing their families for evacuation. Households usually get updates from the news through radio and make the necessary preparations before the typhoon is projected to pass through their municipality. The household survey results further highlight that the preparatory activities before hazard occurrence involve tying the house securely; keeping belongings in the most secure areas of the house; and preparing food and water supply.

Community practices during the occurrence of each hazard in Nato involve preparatory and recovery activities. During the occurrence of each hazard, it is notable that community members do not get involved in rescue operations because it is primarily their responsibility to keep themselves safe first.

The community practices, especially those conducted after the occurrence of the abovementioned hazards, may necessitate repairs or sending relatives to the nearest hospitals or health centers which incur expenses. Among the respondents, 52.82% comprise those whose recovery from hazard occurrence is funded by incurring debt. 31.89% on the

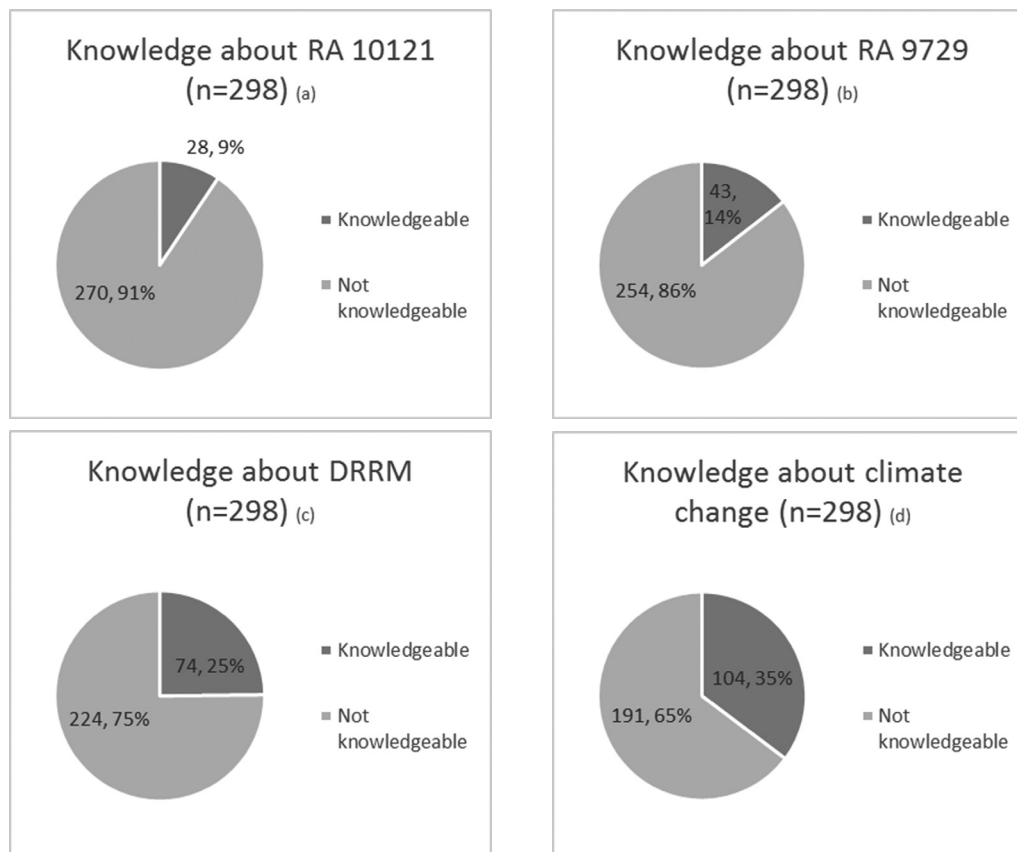


Fig. 7. Respondents' Knowledge about DRR Laws and Concepts from the Household Survey (n = 298). A) Knowledge about RA 10121; B) Knowledge about RA 9729; C) Knowledge about DRRM; D) Knowledge about climate change.

Table 5. Community practices in the event of typhoons.

TYPHOON		
<u>Before</u>	<u>During</u>	<u>After</u>
Listening to radio news regarding updates on the typhoon	Ensuring that the whole family stays in a safe place	Helping in cleaning the evacuation center
Cutting the branches of trees	Getting updates regarding the strength of the typhoon	Clearing operations in the community level
Safekeeping of belongings and important documents	Getting information about the evacuation location (flood-prone or damage-prone)	Cleaning the house
Placement of heavy objects on the roof like sacks of sand, heavy tires and tying these objects on the roof	Keeping the children safe	Clearing operations in the household level
Preparation of food supply to be brought to the evacuation center	Listening to the radio for news and updates	
Charging of batteries for cellular phones and flashlights because long brownouts are usually expected		
Transferring livestock to a safer location		
Evacuating the whole family to evacuation centers		

Table 6. Community practices in the event of storm surge.

STORM SURGE		
<u>Before</u>	<u>During</u>	<u>After</u>
Listening to radio news regarding updates on the typhoon	Staying in the evacuation center	Requesting for confirmation from the MDRRMO if it is safe to return home
Safekeeping of belongings and important documents	Praying in the evacuation center	Returning home upon confirmation from MDRRMO
Placement of heavy objects on the roof like sacks of sand, heavy tires and tying these objects on the roof	Complying with the documentation process of the Municipal LGU	Evaluating the damage to the house and other properties and belongings
Transferring livestock to a safer location	Ensuring that the children and senior citizens are safe and healthy	Returning livestock to the original location
Preparation of food supply to be brought to the evacuation center	Preparing food and other needs in the absence of assistance from the government	Returning belongings to the original location
Evacuating the whole family to evacuation centers		

Table 7. Community practices in the event of flood.

FLOOD		
<u>Before</u>	<u>During</u>	<u>After</u>
Preparation of the following belongings: clothes, kitchen materials, flashlight, radio, documents, medicine, food and money	Praying	Evaluating the damage to the house and other properties and belongings
Transferring livestock to a safer location		Cleaning
Ensuring the security and safety of the house		Clearing operations
Evacuating the whole family to evacuation centers		Returning belongings to the original location
		Thanking God

other hand are able to save a little amount despite recovering from hazard occurrence and 14.95% utilize their savings to recover. Among the respondents, only 0.34% claimed that they are able to save a huge amount despite recovering from hazard occurrence. Furthermore, based on the household survey results, the average cost of damages after the occurrence of hazards is Php 44,174.00 (approximately US\$ 864.81 at the time of the household survey).

Furthermore, in the household survey results, community members also get involved in tree or mangrove planting, planning of activities and drills or simulation activities. However, it must be noted that only 29% of the respondents participate in such activities, while 71% do not. According to the household survey results, 66% of the respondents stated that community activities helpful in mitigating or lessening the impact of hazards are absent while 32% stated that these were present.

The Barangay Disaster Risk Reduction and Management (BDRRM) Plan

Based on the hazard map, Nato is very vulnerable to typhoons. On the other hand, La Purisima, Del Carmen and Del Rosario are very vulnerable to storm surges depending on the sea level rise. Among the three places however, La Purisima was identified to be the area with the highest risk due to its location and the presence of several houses near the sea and beyond the sea wall.

The estimates of damages were formulated by identifying the number of infrastructure, natural resources, senior citizens, children, pregnant women, differently-abled individuals and indigenous people that can be affected by typhoons in the four areas within Nato.

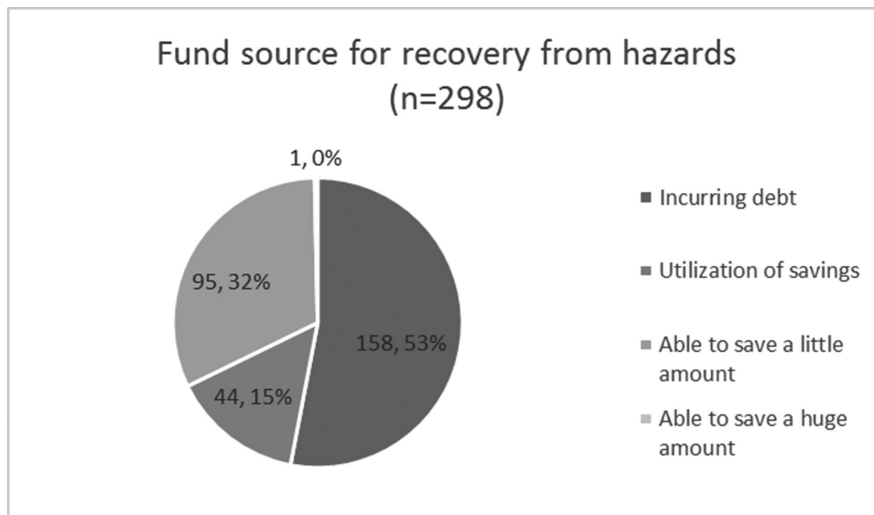


Fig. 8. Respondents' fund source for recovery from hazards from the household survey (n = 298). This figure illustrates the respondents' source of funds in recovering from the impacts of hazards in their community.

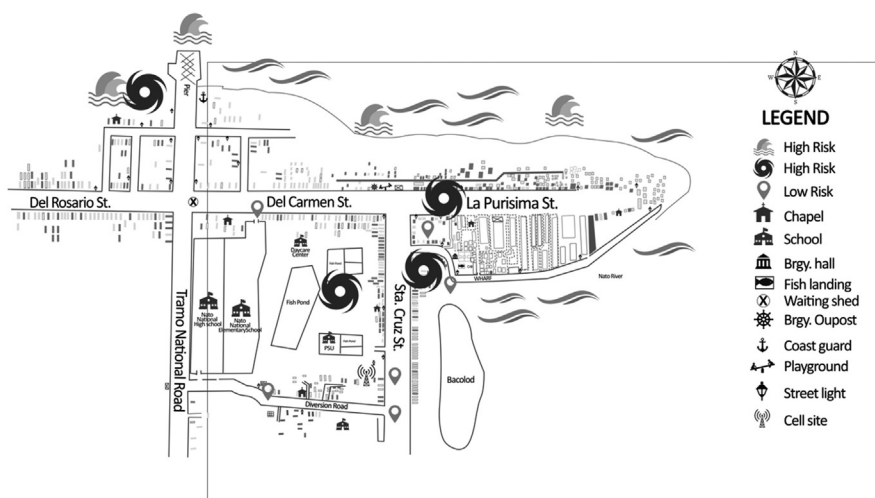


Fig. 9. Hazard Map of Nato. The hazard map was formulated by the participants of PRA and illustrates the hazard types experienced in Nato and the degree of risk in specific areas.

In Del Rosario, an estimated total of 190 households were projected to be at risk when typhoons occur including infrastructures like the port, terminal, offices, resorts, shops and a basketball court. Farms and livestock are also at risk. Among the vulnerable sectors of the community, a total of 130 individuals are estimated to be at risk as well.

In Del Carmen, an estimated total of 138 households were projected to be at risk when typhoons occur including infrastructures like the schools, chapel, white house, shops, resorts, basketball court, outposts, parks, establishments and vehicles. A fishpond and livestock are also at risk. Among the vulnerable sectors of the community, a total of 153 individuals are estimated to be at risk as well.

In La Purisima, an estimated total of 444 households were projected to be at risk when typhoons occur. An estimated total of 200 and 140 households were projected to be at risk when storm surge and floods occur, respectively. Aside from the households, infrastructures at risk also include schools, fish landing area, basketball court, passenger boats, barangay health center, chapel and ice storage. The natural resources used in fishing activities are also at risk. Among the vulnerable sectors of the community, a total of 78 individuals are estimated to be at risk as well.

In Sta. Cruz, an estimated total of 136 households were projected to be at risk when typhoons occur. An estimated total of 140 and 17 households were projected to be at risk when flood and storm surge occur, respectively. Aside from the households, infrastructures at risk also include a school, chapel, cell site and flowing water source. The natural resources that are also estimated to be at risk include mangroves, nypa, rice field, quarrying and livestock. Among the vulnerable sectors of the community, a total of 355 individuals are estimated to be at risk as well.

The hazard map and the estimates of damages, and other findings of this study were all utilized to develop the BDRRM Plan for Nato using the participatory approach. BDRRM Plans were formulated by the community members of Nato. All three hazards identified by the community have their corresponding plans. For each hazard, there are four (4) plans specifically formulated for disaster prevention and mitigation, disaster preparedness, disaster response and disaster rehabilitation and recovery.

BDRRM Plan for Typhoon

The Disaster Prevention and Mitigation Plan for Typhoon (Table 8) highlighted the need to construct the seawall since the seawall is still incomplete and aids in mitigating the impact of storm surge during typhoons. A more stringent policy on proper waste management and disposal will also be implemented because improper disposal of wastes clog canals

and waterways which cause flood during typhoons. Proper relocation was also included due to the location of several households outside the seawall and in hazardous areas in the village. In order to build the capacity of residents and lessen their chances of suffering the negative impacts of typhoons, seminars, workshops and training were also incorporated in the plan.

The Disaster Preparedness Plan for Typhoon (Table 9) focused on the preparations needed when a typhoon is known to be hitting the village. Since evacuation centers were already accessible for the residents of Nato, the plan included the enhancement of security in the vicinity of the evacuation centers. Training of volunteers for search and rescue procedures will also be conducted to enhance preparation especially in cases where search and rescue operations are needed but there is a shortage of manpower in the event of a typhoon. Disaster preparedness kits which includes flashlights, medicines and ropes for households at risk was also incorporated in the plan. Procurement of utility vehicles was also planned since the residents of Nato rely heavily on transportation during evacuation because the location of the evacuation center is at the town center and not in Nato, due to its hazardous location.

The Disaster Response Plan for Typhoon (Table 10) focused on addressing the needs of the community immediately after the typhoon hits Nato. Activities include medical assistance, short-term livelihood, housing and educational assistance, distribution of relief goods and clearing of damage. These activities aim to address the immediate needs of the residents of Nato right after the typhoon hits.

The Disaster Rehabilitation and Recovery Plan for Typhoon (Table 11) highlighted the activities that can aid Nato to build back better after a typhoon hits the village. The activities identified by the participants of PRA were tree planting and development of alternative livelihood to ensure the sustainable management of their socio-economic and ecological resources.

BDRRM Plan for Storm Surge

The Disaster Prevention and Mitigation Plan for Storm Surge (Table 12) is relatively similar with its counterpart for Typhoon. This is because the participants explained that storm surges usually happened in Nato when there is a typhoon, thus they are closely related with each other. The activities incorporated in the plan include seminars, workshops and information campaigns on awareness raising about disaster risk reduction and management; construction of the sea wall; relocation of households in high risk areas; and construction of break water structure to further lessen the impact of storm

surges when it happens in Nato.

The Disaster Preparedness Plan for Storm Surge (Table 13) highlighted the provision of disaster preparedness kits which was also related with its counterpart for Typhoon.

The Disaster Response Plan for Storm Surge (Table 14) focused on house to house visits; clearing operations, distribution of relief goods; and reconstruction and repairs, particularly those affected by the storm surge.

The Disaster Rehabilitation and Recovery Plan for Storm Surge (Table 15) highlighted activities that will help Nato build back better in the event of a storm surge. The activities under this plan include counselling for the affected households and individuals which will serve as their physical and emotional rehabilitation; *BANGKABUHAYAN* which means provision of *bangkas* or boats to augment for the losses in *kabuhayan* or livelihood due to the storm surge's impact. Seminars for cultivating, household backyard farming, backyard fish ponds and fish cages and provision of vegetable seeds that can aid in capacitating those who were affected to be self-sufficient despite the impact of the storm surge was also incorporated in the plan.

BDRRM Plan for Floods

The Disaster Prevention and Mitigation Plan for Flood (Table 16) focused on activities that can be done in order to prevent the negative impacts of flood in Nato. The activities included under the plan were mangrove planting along the riverbanks, proper solid waste management, information and education campaigns about the village ordinance on solid

waste management and H2O Lily. H2O Lily is a locally termed activity coined during the PRA one of the participants which aims to remove the invasive and flood-causing water lilies in a major waterway in Nato and come up with product development studies which can utilize these water lilies. This way, the impacts of flood are mitigated and at the same time, an additional source of livelihood would be provided for the residents of Nato.

The Disaster Preparedness Plan for Flood (Table 17) highlighted capacity building activities on preparations that must be done to lessen the impact of flood; procurement of materials for rescue operations in the event of flood; development and installation of a flood early warning system and the formation of Task Force *Baha* (Flood). In this task force, thirty (30) persons will be identified and trained to form the task force that will be active during the occurrence of flood.

The Disaster Response Plan for Flood (Table 18) focused on immediate activities that can be conducted after the occurrence of flood in Nato, and these include search and rescue operations for low-lying areas that are flood-prone; distribution of relief goods; and medical assistance for those affected by the flood.

The Disaster Rehabilitation and Recovery Plan for Flood (Table 19) highlighted means in which Nato can build back better after the occurrence of flood in their village. The activities include tree planting, rapid assessment of the overall impact of flood in Nato and psychosocial intervention for those who were affected by the flood.

Table 8. Disaster prevention and mitigation plan for typhoon.

DISASTER PREVENTION AND MITIGATION							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC ²	MDRRMC ³	OTHER AGENCIES
1. Construction of Seawall	Seawall covering PSU, La Purisima, Nato Port to the boundary of Sto. Niño	2020-2021	Barangay & Municipal LGU ⁴	50 million	√	√	DPWH ⁵
							DOST ⁶
							CONGRESSMAN'S OFFICE
							PROVINCIAL LGU
							NATIONAL GOVERNMENT
2. Proper waste disposal and segregation (penalties and responsibilities)	Containers and MRF (4 pcs., 1 per area)	2019 onwards	Barangay & Municipal LGU	2.5 million	√	√	DENR ⁷
	Penalties and Responsibilities and materials recovery facility						PSU ⁸
3. Proper Relocation	Affected households from Sta. Cruz and La Purisima are relocated	2020-2025	Barangay, Municipal & Provincial LGU	2 billion	√	√	BIR
							CONSTRUCTION AGENCIES
							HOUSING AGENCIES
							DOST
4. Seminars, Workshops and Training camp on awareness about DRRM	90% of the Community Knowledgeable about DRRM	2019 onwards	Barangay & Municipal LGU	500,000	√	√	DENR

² Barangay Disaster Risk Reduction and Management Council
³ Municipal Disaster Risk Reduction and Management Council
⁴ Local Government Unit
⁵ Department of Public Works and Highways
⁶ Department of Science and Technology
⁷ Department of Environment and Natural Resources
⁸ Partido State University

Table 9. Disaster preparedness plan for typhoon.

DISASTER PREPAREDNESS							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Enhance security of evacuation centers	Evacuees are provided with Basic needs, water, CR, and temporary dividers	2020 onwards	Barangay & Municipal LGU	5 million	√	√	DILG ⁹
2. Training of volunteers on search and rescue procedures	Training conducted	2019 onwards	Barangay & Municipal LGU	300,000	√	√	PNP ¹⁰
	Formation of a volunteer group specializing in search and rescue operations during typhoons						COAST GUARD
3. Distribution of disaster preparedness kits	Purchased flashlights, medicines, rope, etc. for every household at risk	2019 onwards	National Government, Barangay & Municipal LGU	1 million	√	√	DILG PRIVATE ORGANIZATIONS
4. Procurement of Utility Vehicles	Procured vehicles for Nato	2022-2023	Barangay & Municipal LGU	2 million		√	DILG

⁹ Department of the Interior and Local Government
¹⁰ Philippine National Police

Hazard preparation for the fishing community

Table 10. Disaster response plan for typhoon.

DISASTER RESPONSE							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Medical Assistance	Injured and sick evacuees are assisted (100 Households)	2019 onwards	Barangay & Municipal LGU	1 million	√	√	DOH ¹¹
	Records and documentation of distribution						DSWD ¹²
2. Livelihood Assistance	List of households who suffered grave damages in their livelihood	2019 onwards	Barangay & Municipal LGU	1 million	√	√	DA ¹³
	Records and documentation of assistance						DOLE ¹⁴
3. Housing Assistance	List of households who suffered grave damages to their homes	2019 onwards	Barangay & Municipal LGU	1 million	√	√	NHA ¹⁵
	Records and documentation of assistance						PRIVATE ORGANIZATIONS
4. Educational Assistance	List of students who suffered grave damages to their school supplies	2019 onwards	Barangay & Municipal LGU	1 million	√	√	DEPED ¹⁶
	Records and documentation of assistance						PRIVATE ORGANIZATIONS
5. Distribution of relief goods	Record of distribution	2020 onwards	National Government, Barangay & Municipal LGU	2 million		√	DSWD
	Documentation						PRIVATE ORGANIZATIONS
6. Clearing of damage	Roads affected are passable	2019 onwards	Barangay & Municipal LGU	1 million		√	DPWH
	Damaged infrastructure are cleared						PNP
							CASURECO ¹⁷

¹¹ Department of Health

¹² Department of Social Welfare and Development

¹³ Department of Agriculture

¹⁴ Department of Labor and Employment

¹⁵ National Housing Authority

¹⁶ Department of Education

¹⁷ Camarines Sur Electric Cooperative

Table 11. Disaster rehabilitation and recovery plan for typhoon.

DISASTER REHABILITATION AND RECOVERY							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Tree planting	Documentation of trees planted and tree planting activity	2019 onwards	Barangay & Municipal LGU	500,000		√	DENR
2. Alternative livelihood development	Developed sources of income for recovery and rehabilitation	2019 onwards	Barangay & Municipal LGU	2.5 million		√	DOLE
	Documentation						DA
							NEDA ¹⁸

¹⁸ National Economic and Development Authority

Table 12. Disaster prevention and mitigation plan for storm surge.

DISASTER PREVENTION & MITIGATION							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Seminars, workshops & campaign on awareness about disaster risk reduction and management	Increase in awareness and knowledge development for 120 community members in every seminar conducted	2019 onwards	Barangay & Municipal LGU	300,000	√	√	PSU
	3 seminars, workshops and campaigns conducted (2-3 days per activity)						PAG ASA ¹⁹
							DOST
2. Construction of sea wall	500 meters sea wall constructed from Nato Port to La Purisima	2020-2021	Barangay & Municipal LGU	20 million		√	PROVINCIAL LGU
	200 meters sea wall constructed from Nato Port to the boundary of Nato and Sto. Niño	2022-2023		7.5 million			NATIONAL GOVERNMENT
							DPWH
							CONGRESSMAN'S OFFICE
3. Relocation	100 households relocated from high risk areas	2020 onwards	Barangay & Municipal LGU	50 million		√	PROVINCIAL LGU
							NATIONAL GOVERNMENT
							NHA
							DOST
4. Construction of break water from Nato Port to the boundary of Nato & Sto. Niño and Nato Port to La Purisima	400 meters of break water constructed with proper documentation	2025-2027	Barangay & Municipal LGU	40 million		√	PROVINCIAL LGU
							CONGRESSMAN'S OFFICE
							NATIONAL GOVERNMENT
							DOST

¹⁹ Philippine Atmospheric, Geophysical and Astronomical Services Administration

Table 13. Disaster preparedness plan for storm surge.

DISASTER PREPAREDNESS							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Provision of disaster preparedness kits	Provided 2,000 kits for each household	2020 onwards	Barangay & Municipal LGU	5 million	√	√	DSWD
							PRIVATE ORGANIZATIONS

Hazard preparation for the fishing community

Table 14. Disaster response plan for storm surge.

DISASTER RESPONSE							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. House to house visit after the calamity	Provided assistance based on the needs of the households with proper documentation	2020 onwards	Barangay & Municipal LGU	5 million	√	√	DSWD
	PRIVATE ORGANIZATIONS						
2. Clearing operations	Number of households affected and assisted for clearing are identified and properly documented	2020 onwards	Barangay & Municipal LGU	5 million		√	DSWD
	Number of electric cables and meters identified and restored are properly documented						CASURECO
3. Distribution of relief goods	600 packs distributed to affected households	2020 onwards	Barangay & Municipal LGU	10 million	√	√	DSWD
							PRIVATE ORGANIZATIONS
4. Reconstruction & repairs	Number of totally & partially damaged facilities are identified and documented	2020 onwards	Barangay & Municipal LGU	20 million	√	√	NATIONAL GOVERNMENT

Table 15. Disaster rehabilitation and recovery plan for storm surge.

DISASTER REHABILITATION & RECOVERY							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Counselling of the member of the family being affected. (emotional / physical rehabilitation)	Number of persons affected are identified and documented	2020 onwards	Barangay & Municipal LGU	500,000		√	MHU ²⁰
	Counselling processes are well-documented						DSWD
2. BANGKABUHAYAN (provision of means & materials)	Number of fisherfolks affected are documented	2020 onwards	Barangay & Municipal LGU	15 million	√	√	BFAR ²¹
	Provision of means and materials are properly documented and monitored						DA
3. Seminars for cultivating / household backyard farming / fish ponds / fish cages	1 representative per household each street or zone participate	2020 onwards	Barangay & Municipal LGU	400,000	√	√	BFAR
	954 individuals participate in the seminars and trainings (4 days) with proper documentation						PSU
							DOST
							DA
4. Releasing of vegetable seeds for backyard gardening	Number of households adopting the project is well-documented and monitored within a year	2020 onwards	Barangay & Municipal LGU	5 million	√	√	DSWD

²⁰ Municipal Health Unit

²¹ Bureau of Fisheries and Aquatic Resources

Table 16. Disaster prevention and mitigation plan for flood.

DISASTER PREVENTION & MITIGATION							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Mangrove planting	1,000 pieces of mangrove trees are planted along the riverbanks with proper documentation and monitoring	2020	Barangay & Municipal LGU	50,000	√	√	DOST
							PSU
							DENR
							DA
2. Solid waste management	Provision of 4 pieces of MRF (1 per sitio)	2020	Barangay LGU	40,000			DENR
							PSU
3. IEC on the Barangay Ordinance regarding Solid Waste Management	Activity conducted and covered all households of the barangay with proper documentation	2020 onwards	Barangay LGU	100,000	√		PSU
							DOST
							DENR
4. H2O Lily	Water lilies near the Wharf are cleared	2020 onwards	Barangay & Municipal LGU	100,000	√	√	DOST
	Product development studies and activities are conducted to provide additional livelihood						DOLE
							PSU
							DENR

Table 17. Disaster preparedness plan for flood.

DISASTER PREPAREDNESS							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Seminar on preparations to be done to lessen the impact of flood	100 residents of Nato participate in the 3-day seminar	2020	Barangay & Municipal LGU	60,000	√	√	RED CROSS
							PSU
2. Procurement of materials for rescue operations	20 pcs life vest	2020	Barangay & Municipal LGU	80,000	√	√	DILG
	4 pcs axe						NATIONAL GOVERNMENT
	10 pairs boots						
	2 pcs wheelbarrow						
	2 pcs cable						
	10 pairs gloves						
20 m ropes							
3. Development of a Flood Early Warning System	Flood early warning system constructed or prepared for the reference of the community during floods	2020	Barangay & Municipal LGU	250,000		√	DILG
							DOST
4. Formation of Task Force <i>Baha</i>	30 persons are identified and trained to form the task force that will be active during the occurrence of flood	2020	Barangay LGU	100,000	√		COAST GUARD

Hazard preparation for the fishing community

Table 18. Disaster response plan for flood.

DISASTER RESPONSE							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Search & Rescue Operations	30 persons are trained and available to conduct search and rescue operations	2020	Barangay & Municipal LGU	100,000	√	√	DSWD
	Residents in need of search and rescue are addressed with proper documentation						PNP
							COAST GUARD
2. Distribution of relief goods	Relief goods are distributed to 100 residents affected by the flood with proper documentation	2020 onwards	Barangay & Municipal LGU	10 million	√	√	DSWD
							PRIVATE ORGANIZATIONS
							PNP
3. Medical assistance	Assistance is given to 100 residents affected by the flood with proper documentation	2020 onwards	Barangay & Municipal LGU	10 million	√	√	DSWD

Table 19. Disaster rehabilitation and recovery plan for flood.

DISASTER REHABILITATION AND RECOVERY							
ACTIVITIES	INDICATOR OF ACCOMPLISHMENT	TIMEFRAME	RESPONSIBLE AGENCY	BUDGET (in Php)	SOURCE OF FUNDS		
					BDRRMC	MDRRMC	OTHER AGENCIES
1. Tree planting	Banhi & Coconut trees are planted and documented properly	2020 onwards	Barangay & Municipal LGU	100,000	√	√	DA
							DENR
2. Rapid Assessment	Task Force Baha (30 persons) conduct rapid assessment with comprehensive report on the damages and overall impact of flood in Nato	2020 onwards	Barangay & Municipal LGU	100,000	√	√	PNP
							NEDA
							PSU
3. Psychosocial intervention	Intervene on residents who underwent trauma during the flood incident with proper documentation and monitoring	2020 onwards	Barangay LGU	50,000	√		ATENEO DE NAGA UNIVERSITY

DISCUSSION

The current DRRM situation in the community of Nato are influenced by two factors. The first one is the poverty contexts of households, and the second one is their actual experience of natural hazards, particularly experiences after these hazards hit their community. These two factors were carefully considered and incorporated in the formulation of the BDRRMP in Nato.

Poverty and hunger are intertwined issues. In the case of Nato however, most of the respondents perceive themselves as poor (Fig. 3) but do not perceive themselves as people who always experience hunger (Fig. 4) that if they do, it is more seldom than often. This may be attributed to the natural resources that they can easily access around them in which they do not always need monetary resources to utilize. It can further be implied that the poverty they perceive and experience is more on the deprivation of basic non-food needs than food needs.

In Nato, the general self-perception of households is that they are poor and the situation will stay the same in the future. Self-rated poverty and perceived standard of living say a lot about how the respondents perceive themselves and their surrounding circumstances, their current socioeconomic status and their willingness to be more prepared during disasters. It is notable that most of the respondents perceive themselves as poor and yet, the monthly income that they believe is necessary to overcome this perceived poverty is not significantly different compared to the respondents who rated themselves as not poor. This means that the ability to cope or willingness to improve one's capacity may be greatly affected by how they perceive themselves. Relatively, when a person believes that he or she is poor, one's willingness to improve one's capacity to be better prepared during disasters are negatively affected as well, indicating an attitude of relying more on short-term benefits like receipt of relief goods right after the disaster than capacitating oneself to be better prepared when disaster strikes.

Furthermore, the neutral point of view regarding the standard of living compared to three months ago as well as the expected standard of living in the future indicate a degree of satisfaction on the current situation instead of exerting effort to improve their capacity to be more resilient against hazards and disasters that can greatly affect their community. There is a considerable number of respondents however who believed that the standard of living has improved compared to the last three months and also believed that it will improve in the future.

Thus, interventions like participatory approach to BDRRMP Planning is important in "empowering communities, due to its potential to restructure the relations between civil

society and the state and between the local and national scales in such a way that underlying structural vulnerabilities could be reduced over time." (Maskrey, 2011) It must be emphasized that part of the participatory approach is having an understanding of the situation of the communities to manage and reduce disaster risks and addressing their situation is not something that can be done immediately. Reduction of vulnerabilities can only happen over time and in the long-run be more effective if the community is able to collaborate with national agencies and organizations with the resources and responsibilities to do so.

The need for awareness raising and capacity enhancement is also evident because several of the respondents were not yet able to participate in them. This may be because the training venue was not accessible for them which can make conducting them in Nato as an alternative option. To an extent, a gap is evident in the dissemination of information regarding DRRM in Nato. A comprehensive approach in disseminating information about hazards and disaster risk reduction and management is still lacking in the implementation of trainings for the community. Training content is still relatively reactive by only informing the community members about what should be done when the hazards are already being experienced.

The lack of knowledge in some of the technical aspects of hazards as well as the laws and concepts regarding DRRM (Fig. 7) may indicate the lack of connection between the knowledge providers and the community. This may be caused by highly technical information dissemination strategies or unwillingness of the community to be part of these strategies, but this is a gap that must clearly be bridged through participatory approach that will ensure the connection between the knowledge providers and the community.

Essentially there are two types of knowledge applicable to disaster risk reduction within the community: scientific knowledge (i.e., hard data developed within the community) and indigenous knowledge (i.e., data developed or adapted by the indigenous communities themselves). (Mercer, Dominey-Howes, Kelman & Lloyd, 2007) Both may be advantageous to a community in reducing their vulnerability to environmental hazards. (Mercer, Dominey-Howes, Kelman & Lloyd, 2007) Therefore, it is paramount that the gap between these two data sources is closed and they are integrated in a culturally compatible and sustainable way which benefits both hazard scientists and the indigenous communities. (Mercer, Dominey-Howes, Kelman & Lloyd, 2007) This is also important, in bridging the gap between the knowledge providers and community members of Nato. A system must be established that will enable an integration of various knowledge and skills that were produced scientifically and indigenously to ensure that their application will be done as

smoothly and effectively as possible.

During the formulation of the BDRRM Plan (Tables 8-19), participating stakeholders were aware that Nato still needed a lot of equipment and technological improvements for disaster risk reduction and management. However, some of them were not incorporated in the plan because they were also aware of the budgetary challenges of the barangay and the municipality. The lack of knowledge on possible activities for disaster prevention and mitigation as well as disaster rehabilitation and recovery, which compose the long-term plans in the BDRRM Plan, was also a challenge in its formulation. This is why some of the activities identified are the ones that they typically conduct during the occurrence of hazards, specifically for disaster preparedness and disaster response.

This further highlights the need for empowering communities by localizing and contextualizing initiatives. "At the national scale, a number of disaster- and risk-management-related systems have been developed, but there have been limited attempts to synthesize their components and select the most important ones to be used in undertaking local assessments." (Orencio & Fuji, 2013) A collaboration among stakeholders, not only within the barangay and municipality, but outside these places as well, increase the chances of accessing the needed resources for the community's risks and vulnerabilities against hazards to be reduced using sustainable means. This collaboration can be more effective if it is science-based as much as it is based on local knowledge and skills regarding hazards and if it is effective in contributing to the efforts of empowering Nato as a community by maximizing its potential to be resilient against hazard occurrence.

The participatory approach to BDRRM Planning not only aims to gain a deeper understanding about the potential of a community's local resources to be utilized for disaster risk reduction and management but also to take a step towards empowering the local residents into crafting plans that they can have a sense of ownership with. As with the case of Nato, the participatory approach to planning helped the community members understand the different factors that affect the implementation of the plans, particularly the planning components, activities, budget, responsible agencies and timeframe. They were also introduced to the planning process of the government because they interacted with elected officials of the barangay local government unit and this connection between the community and the barangay local government encouraged further dialogue and collaboration.

Conducting the activities in the fishing community of Nato however, entails its own unique socio-cultural experience. Households and residents in Nato are relatively used to research activities, like household surveys and group

activities like PRA. Prolonged activities that involve interviewing them about their households and views or containing them in the PRA venues can be arduous for them. Some participants even went out for a while to go fishing because this is more important for them than preparing for something that does not directly affect them yet. This is the challenge in a fishing community like Nato, you can only invite participants if it does not hinder them from their fishing activities. Their worldview in the face of disasters is limited to what they experienced while fishing and they have always survived, so it is also a challenge to convince them of the necessity of getting involved in drafting the plan for their village, more so in drawing community maps and formulating seasonal calendars.

Community members, however, who are aware of disaster risk reduction and management strategies, the potential of their resources to make them more resilient as a community and willingly collaborate with government agencies responsible for DRRM can further be empowered to develop further in terms of disaster risk reduction and management. However, the formulation of the BDRRM Plan is only the first step in ensuring the sustainability of these efforts that requires a combination of efforts from the different sectors, institutions and stakeholders inside and outside of the community.

This combination of efforts is important because when it comes to participatory disaster risk reduction and management, communities by themselves, as experienced in other countries, "simply do not control resources and could not influence decision-making processes in a way that could unlock access to safe land, enable the management of complex water-sheds or implement the large-scale public works necessary to reduce risk." (Maskrey, 2011) This is true even in the context of empowered communities. In the context of Nato as a community however, a considerable amount of effort is still needed to improve their sense of empowerment and ownership as well as link them to agencies and institutions that can concretize these senses. This initial research on BDRRM Planning in Nato highlighted the collaboration between community members, the academe, and government officials in finalizing the BDRRM Plan. This establishes the foundation towards further collaboration to implement the said plan in the community of Nato.

REFERENCES

- Atienza M.E. 2006. Local Governments and Devolution in the Philippines. In: Morada, N. and Tadem, T. E. (eds.) "Philippine Politics and Governance", Department of Political Science, University of the Philippines Diliman, Quezon City, pp. 429.430.

- Ani P.A., Daquio C.R., and Aquino A.P. 2015. Republic Act 10121: An Approach in Strengthening Disaster Risk Reduction and Management in the Philippines. <https://ap.ffc.org.tw/article/838> (Last access 26 September 2020).
- Bureau of Fisheries and Aquatic Resources. 1998. Fisheries Administrative Order. <https://www.bfar.da.gov.ph/lawAndRegulation.jsp?id = 3> (Last access 26 September 2020).
- Federigan L. 2020. The Philippines is 9th Riskiest Country. <https://www.manilatimes.net/2020/01/11/business/columnists-business/the-philippines-is-9th-riskiest-country/673207/> (Last access 26 September 2020).
- Maskrey A. 2011. Revisiting community-based disaster risk management. *Environmental Hazards*, 10: 42-52.
- Mercer J., Dominey-Howes D., Kelman I., and Lloyd K. 2007. The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. *Environmental Hazards*, 7: 245-256.
- Orencio P. and Fuji M. 2013. A localized disaster-resilience index to assess coastal communities based on an analytic hierarchy process (AHP). *International Journal of Disaster Risk Reduction*, 3: 62-75.
- Philippine Atmospheric, Geophysical and Astronomical Services Administration. 2010. Republic Act No. 10121. <https://www.officialgazette.gov.ph/2010/05/27/republic-act-no-10121/> (Last access 26 September 2020).
- Sanchez M.J. 2020. Natural Disasters in the Philippines at a Glance. <https://www.statista.com/topics/5845/natural-disasters-in-the-philippines-at-a-glance/> (Last access 26 September 2020).
- UN Office for Disaster Risk Reduction. 2019. "Disaster Risk Reduction in the Philippines: Status Report 2019", United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific, Bangkok.