

Implementation of Disaster Risk Reduction and Management in Flood-Prone Areas in Camarines Sur: Basis for Policy Recommendations

Jennifer Cordez San Jose

Partido State University, Philippines

Abstract: The study determined the Level of Implementation of Disaster Risk Reduction and Management (DRRM) in Flood-Prone Areas in Camarines Sur, Philippines. Specifically, the study focused on the level of implementation and problems encountered in four thematic areas of DRRM, namely: Prevention and Mitigation, Preparedness, Response, and Rehabilitation and Recovery.

The Descriptive-Evaluative Inferential Method was used in the study. A five-point Likert scale questionnaire was used in gathering the data. The reliability of the questionnaire was determined by means of Kuder Richardson Formula. The same was validated by academic experts well-versed in the topic and disaster management practitioners. Purposive or selective sampling was used in choosing the MDRRMC while convenience sampling was the sampling technique used for community residents. One hundred twenty-one (121) members of the Disaster Risk Reduction and Management Council and three hundred (300) residents in flood-prone areas in Camarines Sur, Philippines were the respondents of the study. The population represented by the 300 respondents were household members specifically, the head of the family. Frequency count, percentage, rank, weighted mean, and Wilcoxon Mann Whitney U-Test were the statistical tools used in the study.

Findings revealed that DRRM Programs were implemented in flood-prone areas in Camarines Sur namely, Milaor, San Fernando, Libmanan, Sipocot, Camaligan, Canaman, Magarao, Buhi, Nabua and Iriga City. Conversely, some of the problems encountered by the respondents on four thematic areas rated as “*Serious*” were: lack of community drills, inadequate disaster facilities and equipment, poor implementation of laws, absence of Standard Operation Manual, inadequate community warning system, lack of disaster response vehicles, and the reluctance of residents to pre-emptively evacuate.

Keywords: Disaster Risk Reduction and Management, Flood-Prone Areas, Policy Recommendations

I. INTRODUCTION

The Philippines is geographically located both at the typhoon belt and the ring of fire. Because of this, the country is prone to multiple recurring hazards such as cyclones, floods, earthquakes, and landslides. There are millions of human beings afflicted every year and there are billions of people injured and displaced because of the effect of the disaster (Arcaya, & Dillo, 2019).

In the last half-century, the country experienced hydrometeorological events such as typhoons and floods, which accounted for 80% of the natural disasters. Its long coastlines with a high concentration of people and economic activity and heavy dependence on agriculture and natural resources contribute to its high risk. Typhoons, which occur on average about 20 times per year, are the most common natural hazard that Filipinos face. The annual monsoon season causes severe flooding in many places though floods also occur due to human activity such as deforestation and encroachment of low-lying areas. The occurrence of these disasters has grown rapidly. Due to their uneven regularity, however, it is difficult to predict the number of typhoons that may occur in any one year (ADBI Working Paper Series, 2018).

In the World Risk Report, 2016, the Philippines is considered among the countries as the most vulnerable country with the highest disaster risk. It has 26.70 % risk, 52.46 % exposure, and 50.90% vulnerability. It has an estimated multi-hazard loss of US \$7.893 million annually, equivalent to 69% of social expenditures in the country (Alcayna, Bollettino, Dy, & Vinck, 2016 cited in Arcaya & Dillo, 2019).

Super typhoon “Yolanda” (Haiyan; international name) is one of the most powerful and devastating tropical cyclones that struck the Philippines in 2013 (Typhoon Haiyan). Exceeded 185 kph when it landed. The strong winds smashed off the roofs of thousands of homes and knocked down shanties, trees, and lifelines. But in the wake of Yolanda’s catastrophic destruction, the weaknesses and significant gaps in the country’s disaster response and management system were exposed once more. Despite a solid and functioning disaster risk reduction and management (DRRM) structure, the government’s response still came across as reactive and not proactive, insufficient, inefficient, and for the most part, too slow (Typhoon Haiyan).

Bicol Region, Philippines, is vulnerable to natural disasters. The region is visited by intense typhoons every year. According to the National Economic Development Authority, the presence of active volcanoes creates a constant threat to Bicolanos. Flooding and landslides are common. Flooding is experienced in the Bicol River Basin in the provinces of

Albay and Camarines Sur. There is high siltation in the river basin area as water carries materials coming from Mt. Mayon. Flood has apparently brought thousands and millions of fatalities in the world.

In 2006 November, the worst typhoon since the record has been written struck Bicol Region. REMING intensified into a typhoon of minimal strength. But in less than 24 hours it strengthened to an even large, solid rotating mass of pure fury. REMING churned Lagonoy Gulf and headed for Camarines Sur but along its wake ferocious winds left almost nothing of Rapu-Rapu and Batan islands, stripped off the forests of Catanduanes, destroying 80% of all its houses and buildings, and ramming ships and tankers aground. Naga City, which was under the Northern Eyewall, was battered heavily by the winds with some low-lying areas under partial floodwaters. Large trucks were flipped, and buildings never escaped damage. With power and communication lines down, it took a day for Filipinos to see the full picture of REMING's aftermath. Aerial surveys of Camarines Sur, Albay, and Catanduanes showed complete devastation. Schools, government structures, hospitals, banks, and many important buildings were destroyed. At the foot of Mayon Volcano, whole families, villages, and barangays were buried in volcanic debris giving up most of the fatalities. Officials estimated 1,200 dead and missing reminding them of Mayon's famous 1814 eruption (Typhoon2000).

Based on the Geo-Hazard Mapping conducted by the Mines Geosciences Bureau (MGB), almost half of Camarines Sur's municipalities are classified as high-risk areas for flooding, which include the towns of Baao, Bato, Bombon, Buhi, Bula, Cabusao, Calabanga, Camaligan, Canaman, Gainza, Libmanan, Magarao, Milaor, Minalabac, Nabua and San Fernando which are mostly part of the Bicol River Basin(c).

Through the years, the Philippines has adopted various approaches from disaster preparedness and response in the 1970s, to disaster management in the 1980s, to disaster risk management in the 1990s, and eventually disaster risk reduction in the years 2005 and beyond. In 2010, Republic Act No. 10121, or the Philippine Disaster Risk Reduction and Management (PDRRM) Act was enacted. RA 10121 provides for the development of policies and plans and the implementation of actions and measures pertaining to all aspects of DRRM, including good governance, risk assessment and early warning, knowledge building, and awareness-raising, reducing underlying risk factors, and preparedness for effective response and early recovery. This law should have strengthened disaster management in the country.

Nonetheless, many would marvel why despite the efforts of the national and local governments and other organizations in strengthening the disaster risk reduction and management in the Philippines, many are still caught unprepared when actual disasters occur in our localities.

Objectives of the Study

The study determined the level of implementation of DRRM programs in flood-prone areas in Camarines Sur.

Specifically, the study sought to answer the following questions:

1. What is the level of implementation of the Disaster Risk Reduction and Management programs in most flood-prone areas in Camarines Sur, along?
 - 2.1 Prevention and Mitigation
 - 2.2 Preparedness
 - 2.3 Response and
 - 2.4 Rehabilitation and Recovery.
2. What problems are encountered in the implementation of programs in various thematic areas of DRRM?
3. What policy recommendations can be generated from the findings of the study?

II. METHODOLOGY

The study used the Descriptive-Evaluative Inferential Method. Specifically, the study evaluated the level of implementation of DRRM Programs in flood-prone areas in Camarines Sur, the problems encountered in the implementation of DRRM programs, and the formulation of policies to achieve zero-casualty during and aftermath of disasters.

Purposive or selective sampling was used in choosing the MDRRMC as respondents. All members of the MDRRMC were given a questionnaire. Conversely, convenience sampling was used in determining the community residents as another group of respondents. Whoever was conveniently located around the location was asked to answer the questionnaire. Three hundred (300) community residents, specifically the head of the family and 121 members of the MDRRMC answered the five-point Likert scale questionnaire.

Frequency count, rank, percentage, and weighted mean were used in determining the level of implementation of DRRM Programs along with the four thematic areas in the locale of the study. Wilcoxon Mann Whitney was employed in determining the significance of DRRM Programs to the safety of the community residents, the significance of an agreement on the rank orders of the level of implementation of DRRM Programs, and problems encountered.

III. RESULTS AND DISCUSSIONS

This section presents the discussions and tabular presentations of the level of implementation of DRRM programs, the problems encountered in the implementation of DRRM programs in four thematic areas, and the DRRM policies formulated based on the findings of the study.

Table 1. Summary of the Level of Implementation of Disaster Risk Reduction and Management Programs Along with the Four (4) Thematic Areas

Phases of Disaster Risk Reduction and Management	MDRRMC/CDRRMC			Community Residents			Average		
	W _x	I	R	W _x	I	R	W _x	I	R
1. Disaster Preparedness	3.62	MI	1	3.03	I	2	3.32	I	1
2. Disaster Response	3.53	MI	2	3.08	I	1	3.30	I	2
3. Disaster Prevention and Mitigation	3.48	MI	3	2.99	I	3	3.18	I	3
4. Disaster Rehabilitation & Recovery	3.14	I	4	2.75	I	4	2.94	I	4
Average Weighted Mean	3.44	MI		2.96	I		3.18	I	

Legend:

- 4.20-5.00 – Very Much Implemented (VMI)
- 3.40-4.19 – Implemented (MI)
- 2.60-3.39 – Implemented (I)
- 1.80-2.59 – Fairly Implemented (FI)
- 1.00-1.79 – Not at All (NA)

Table 1 presents the summary of the level of implementation of programs along with the four (4) thematic areas of DRRM by the two groups of respondents.

Among the four (4) thematic areas, it is clearly shown that disaster preparedness ranked first with a weighted mean of 3.32 followed by disaster response (3.30), disaster prevention and mitigation ranked third (3.18) while disaster rehabilitation and recovery ranked fourth (2.94). Much-implemented DRRM areas were disaster preparedness, disaster response, and disaster prevention and mitigation while rehabilitation and recovery were only implemented. The weighted mean ranged from 3.14-3.62.

A parallel study was found in Tolentino (2015) wherein the levels of implementation of DRRM Programs in four (4) thematic areas in various municipalities in Camarines Norte are the same; however, indicators were only rated fairly implemented.

On the part of the community residents, disaster response ranked first, followed by disaster preparedness, disaster prevention, and mitigation, and ranked fourth was disaster rehabilitation and recovery. All indicators were rated “implemented” by the community respondents.

Similarly, both MDRRMC and community residents professed that disaster rehabilitation and recovery were the least implemented among the four thematic areas. It is understood that the local government units must address concerns on rehabilitation and recovery. It is indeed the LGU that should spearhead the rehabilitation and recovery process because this is a long process, and all rehabilitation programs must be sustainable. Further, the LGU key officials should be resourceful in identifying linkages to address the immediate needs of the affected families and make resources sustainable.

Table 2. Summary of Problems Encountered by the Respondents in the Implementation of various Thematic Areas of Disaster Risk Reduction and Management

Phases of Disaster Risk Reduction and Management	MDRRMC/CDRRMC			COMMUNITY RESIDENTS			Average		
	W _x	I	R	W _x	I	R	W _x	I	R
1. Disaster Preparedness	2.82	S	1	2.89	S	3	2.85	S	1
2. Disaster Rehabilitation & Recovery	2.67	S	2	2.99	S	1	2.83	S	2
3. Disaster Response	2.62	S	3	2.83	S	4	2.71	S	3
4. Disaster Prevention and Mitigation	2.50	FS	4	2.90	S	2	2.70	S	4
Average Weighted Mean	2.65	S		2.90	S		2.77	S	

Legend:

- 4.20-5.00 Very Much Serious (VMS)
- 3.40-4.19 Much Serious (MS)
- 2.60-3.39 Serious (S)
- 1.80-2.59 Fairly Serious (FS)
- 1.00-1.79 Not at All (NA)

Summary of problems encountered in the implementation of DRRM programs is reflected in Table 2.

Serious problems were encountered in the implementation of DRRM programs on Disaster preparedness,

rehabilitation, and recovery, and disaster response while “fairly serious” problems were encountered in the implementation of DRRM programs on prevention and mitigation.

On the other hand, community residents considered the implementation of DRRM programs in all thematic areas as “serious” problem. Disaster rehabilitation and recovery ranked first, second was disaster prevention and mitigation, third was disaster preparedness, and fourth was disaster response. The weighted mean ranged from 2.83-2.99.

Since all thematic areas were considered by the community residents as “serious problems”, it is high time that local officials take serious measures to address these problems.

The five topmost problems as professed by the two groups of respondents in prevention and mitigation were: lack of actual community drills with a weighted mean of 2.94; inadequate disaster management facilities and equipment (2.93); poor implementation of DRRM laws (2.86), lack of cooperation during evacuation (2.81); and lack of disaster management orientation (2.80). In disaster preparedness three of the serious problems were: the absence of standard operation manual for disaster (3.07); unavailability of a community warning system (3.05); and lack of preparedness equipment and other equipage (2.99). In disaster response, lack of transportation facilities and equipment was a serious problem with a weighted mean of 2.93; the resistance of community residents to evacuate (2.90); inadequate communication facilities during and after disasters (2.88), and lack of well-trained emergency response team or rescuers (2.88). Finally, absence of psychological counseling for traumatized victims with a weighted mean of 3.06; lack of equipment (2.95); lack of cooperation of community residents on rehabilitation and restoration activities (2.91); insufficient livelihood assistance (2.90); lack of funds (2.89) and lack of support from higher authorities (2.71) were serious problems along with disaster rehabilitation and recovery.

Policy Recommendations Generated From the

IV. FINDINGS OF THE STUDY

In the light of the findings of the study, the following policies are recommended:

Prevention and Mitigation

- A mandatory submission of municipal hazard map and yearly updating of hazard assessment report by the MDRRMO/LDRRMO. Situational assessment on flood/disaster risk so that the LDRRMC could anticipate innovative measures for flood/disaster preparedness.
- The members of the Sangguniang Panglungsod/Bayan should create an ordinance allocating additional funds for mitigation projects and activities and construction of typhoon/disaster-resilient infrastructures.
- Adherence to the land-use management code of the city/municipal engineers.

Disaster Preparedness

- A mandate by the members of the Sangguniang Bayan/Panglungsod in collaboration of the LCEs on the installation of functional warning system and facilities and equipment in all municipalities and cities in Camarines Sur; orientation of the workforce in all institutions both public and private sectors, students and community members on the warning signals, the use and functions of gadgets and equipment by the LDRRMC so that they will be fully equipped on how to use them. This undertaking should be conducted in the regular drills on DRRM by various line agencies like PAG-ASA, OCD, or any safety management agencies.
- A mandate of the LGU through the LDRRMO/DRRM Head to include in the target outputs of all workforces in public and private sectors their attendance on disaster preparedness training and seminars so that the workforce will be obliged to accomplish their targets; hence, it should be validated by each department head upon submission of individual performance evaluation/semi-annual accomplishment report.
- The LDRRMO should identify disaster communication systems; install and improve communication lines and equipment; create a database or directory of households who are in flood-prone areas or disaster-prone areas so that there will be a clear identification of residents. The LDRRMO should give typhoon updates through text messages so that they could identify precautionary measures.
- The LDRRMO should hold regular multi-stakeholder dialogues to freely air their sentiments, issues, and concerns.
- The LDRRMC/MDRRMC should formulate a standard operation manual on DRRM; reproduce and circulate the manual, particularly in all academic institutions, all other agencies, and community residents of the province of Camarines Sur.

On Disaster Response

- The Local Disaster Risk Reduction and Management Council (LDRRMC) should modify a set of policies on the evacuation system; specifically, there should be a local ordinance for the forced evacuation of community residents in high-risk areas once typhoon signal no.1 in the province is raised to minimize casualties.
- The LDRRMO should include and distribute relief supplies that are gender-responsive such as sanitary napkins and necessities for women.
- The LGUs should provide separate-safe comfort rooms in evacuation centers for males and females to maintain privacy and avoid the possibility of obscene

situations and sexual abuses in the evacuation areas; and

- The LGUs should have a mandatory provision of rescue vehicles/vessels and equipment in each municipality so that residents who are in danger can be easily brought to the hospital.

On Disaster Rehabilitation and Recovery

- The LDRRMC should have an immediate mandatory post-disaster need assessment on the basic needs specifically to the most affected families so that their immediate needs be addressed.
- The LGUs/LDRRMC and other Government Organizations (GOs) and Non-Government Organizations (NGOs) should provide psychological/medical assistance to most-affected families to bring them back to normal condition.
- Provision of sustainable livelihood projects through the NEDA, DTI, LGU, and other line agencies to affected families.

Moreover, on serious problems encountered along with the implementation of DRRM programs in four (4) thematic areas, the following policy recommendations are suggested:

Disaster Prevention and Mitigation

- Increase actual community drills for the community residents so that they will be more equipped on what to do when actual disasters occur.
- Strict implementation of DRRM Laws to the public and appropriate sanctions be implemented to the offenders to avoid possible abuses and maintain consistency in the observance of DRRM Laws.
- Massive and mandatory evacuation of the residents in highly affected areas to avoid casualties; and
- Consistent disaster management orientation to the community residents to be fully equipped with DRRM preventive measures.

Disaster Preparedness

- Provision and wide dissemination/circulation of disaster operations manual to each household in Camarines Sur because residents need to be equipped

with principles and theories aside from regular drills and training.

- Provision of a community warning system in municipalities and cities in Camarines Sur and orientation/training of the community residents on the use of it so that they do not just know its uses, but how they use it;
- Mandatory provision of preparedness equipment and strict monitoring of its availability, uses, and functions by the LDRRMO.

Disaster Response

- Strict monitoring of the provision of transportation equipment/vessels of LCE in each city or municipality in Camarines Sur.
- Local ordinance on the forced evacuation of community residents in most flood-prone areas when typhoon signal no.1 is raised.

Disaster Rehabilitation and Recovery

- Mandatory post-disaster psychological needs assessment immediately after the typhoon and religious counseling of victims.
- Immediate cleaning of debris on the main streets spearheaded by the local officials and other civic organizations and community residents.

REFERENCES

- [1] The 1987 Philippine Constitution
- [2] The 1991 Local Government Code of the Philippines
- [3] The Philippine Disaster Risk Reduction and Management Act of 2010
- [4] Arcaya, R.C. & Dillo, L.R. (2019). Disaster Risk Reduction and Management Program for Higher Education Institution. Retrieved from <https://www.ijisrt.com/disaster-risk-reduction-management-drrm-program-for-higher-education-institutions-https://typhoon2000.ph/>
- [5] http://www.coa.gov.ph/disaster_audit/doc/National.pdf.
- [6] <https://www.adb.org/sites/default/files/publication/408351/adbi-wp817.pdf>
- [7] The 1987 Philippine Constitution
- [8] The 1991 Local Government Code of the Philippines
- [9] The Philippine Disaster Risk Reduction and Management Act of 2010
- [10] Tolentino, Pimeh C. (2015). Disaster Risk Reduction and Management of Hazard-Prone Areas in Camarines Norte