

Disaster Risk Reduction Management in High Risk Barangays of Baguio City: Level of Implementation and Challenges

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Abstract

Disasters occur all around the world, with varying degrees of impact and severity. By implementing risk reduction strategies, communities can become less vulnerable to the effects of disasters. In the Philippines, RA 10121 created the Barangay Disaster Risk Reduction and Management Committee (BDRRMC), but still lacks resiliency. Triangulation method was utilized in the research to evaluate the BDRRMC's level of implementation and challenges using a reliability- and validity-tested questionnaire to the respondents from the high-risk barangays in Baguio City, Philippines. Based on the results of the weighted mean Section 12, RA 10121 is being implemented in the barangay level. Single-factor ANOVA results showed that length of service and age are two key attributes that shows significant difference based on the p-value result. In terms of challenges encountered, despite help from the local government unit, it is constrained by inefficient mobilization and dispatch of rescue teams during disaster response which is basically rooted from lack of manpower and cooperation in disaster management. To summarize, there is a need for planning and effective budget allocation with enhanced community engagement to improve the implementation of the law's provisions and achieve its goal of developing safer and resilient communities.

Index Terms— Barangay, Challenges, Disaster Management, Implementation.

Introduction

Catastrophic occurrences are a normal part of life, affecting society on a local and global scale. Enhancing citizens' and communities' resilience is crucial for communities to successfully adjust to recurring problems. While considerable progress has been made in this field, there are still significant practice and research gaps. The degree of a community's susceptibility to a hazard determines the effects of a disaster. This

vulnerability is not a result of natural occurrences; rather, it is the product of a wide range of dynamic physical, social, economic, cultural, political, and even psychological aspects that influence people's lives and the surroundings in which they live. The Philippines socioeconomic, political, and environmental background, particularly its pervasive poverty, make it extremely vulnerable to natural disasters (Luna, 2001). To strengthen Philippine disaster management, Republic Act (RA) No. 10121, or the Philippine Disaster Risk Reduction and Management Act of 2010, was signed into law, and the BDRRMC was established (RA 10121, 2010). However, the current sentiment is that policy makers give poverty reduction, education, and public health much higher priority than DRR, despite the fact that these three areas do not have as high of a priority. There is a lack of coordination, which is worsened by legislative discrepancies, resulting in an ambiguous role for stakeholders in Disaster Risk Management (DRM) implementation, which is exacerbated by human and technology restrictions, which are frequently addressed as individual concerns (United Nation, 2014). Policymakers prioritize poverty alleviation, education, and public health over disaster risk reduction. In relation to the study of Coppola (2021), findings revealed that community leaders must first identify all of the risks that the community has faced in the past and may face in the future to begin the process of risk analysis and risk assessment. Regarding these, the barangays' (or, "villages" in English) responsibility in disaster management is acknowledged and described. RA 10121 requires BDRRMCs to "establish the direction, create, administer, and coordinate disaster risk management programs within their territorial jurisdictions" (Florano, 2013).

The rationale for the establishment of the BDRRMC is that they are in a much better position to identify disaster prone areas because they are more familiar in the area and are already aware of the barangay's strengths and weaknesses. In addition to acting as the first responder during rescue operations, the BDRRMC is essential to the DRRM program at every level because of their existence. The efficacy of the law is measured by how well the barangays implement the requirements as the country's smallest political entity because they have a smaller area of responsibility that is more manageable. Additionally, the existence of BDRRMC offers a beneficial channel of communication and task division for the advancement.

In the lone district of Benguet Province, Baguio, with 128 barangays, was identified by the World Bank as one of Asia's seven risk-prone cities, with 90% of the city vulnerable to natural hazards due to its topography. The city lacks a comprehensive disaster management program and has failed to enforce environmental regulations that could mitigate disasters on repeated occasions (Amor, 2011).

With these, the study's goal is to determine the level of implementation and challenges encountered, as well as to offer information on the need to understand the relevance of the law and to enable DRM more proactive.

Review of Related Literature

The underpinning concept of the law is to seek “a disaster risk reduction management approach that is holistic, comprehensive, integrated and proactive in lessening the socio-economic and environmental impacts of disaster, including climate change, and promoting the involvement and participation of all sectors and stakeholders concerned at all levels, especially the local community.” As defined in RA 10121 (2010), “Disaster Risk Reduction and Management” refers to the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Despite the enactment of the law in 2010, the system is still stressed because national and local agencies do not have clear duties and responsibilities. Some municipalities lack the capacity, commitment, and consistency to incorporate disaster risk reduction into their development strategies and budgets (United Nations, 2014). These challenges are existing because local and national governments are burdened by population growth despite policies to provide a reliable source of DRM funding (Barbon, 2012). In LGUs, disaster incidence and severity affect disaster-related expenditure demands and revenue-raising capacity, which may not be considered when allocating resources, creating a resource-risk imbalance. Commission of Audit (2013) assessment of budget shows that higher percentage is allotted to response and rehabilitation as compared to prevention and mitigation. In terms of structure, data from the Department of Interior Local Government (DILG) (2011) revealed that local level structures are poor in terms of organization, equipment, and emergency management plans.

In addition, the management of hazards depends greatly in understanding the phenomenon. Disaster is not the hazard but the result due to hazard interacting with vulnerability condition. Hazard may occur in an area without creating disaster if this area is not populated, and where there are no critical resources. The whole population is affected for example by a strong typhoon but not all people suffer seriously a disaster situation (Daep, 2014). Also, increased vulnerability and wrongdoing by government officials make natural disasters into social disasters, and state-to-local capacity is overwhelmed (Cutter & Gall, 2006).

In the face of these complexities, “community resilience” is an unviable, externally defined, and engineered goal, often at odds with the power discrepancies and heterogeneity found within actual communities (Shrestha, 2019). Communities can effectively mitigate hazards because they know how to withstand, absorb, and recover from disturbances and threats.

In the Philippines, community-based disaster preparedness (CBDP) strategies, like the Bayanihan culture of community cooperation, are crucial components of vulnerability reduction and disaster strategies ((“Community Based Disaster Risk Reduction,” n.d.). In relation to community based disaster management, purok system a self-organizing Filipino sub-village was created. Matthies (2017) added that purok system can strengthen the resilience of disaster-prone areas. However, low literacy, inability to act quickly, and cultural taboos contribute to residents' reluctance to evacuate due to attachment to their native lands, which impacts DRRM. Morshed and Huda (2011) added that during disaster response, majority of the people prefer to stay in vulnerable areas which creates extra risks for themselves as well as to the rescue workers. This is shown also in the study of Walch (2017) suggesting that the resilience discourse and framework at the national level do not translate into programs that help lift people out of poverty, particularly landless people.

Moreover, the ability of individuals to protect themselves from a hazard , and to cope with a disaster effectively , mainly resistance and resilience which relates to an entity's lack of capacity to mitigate, prepare for, respond to , and recover from a disaster (Pinkowski, 2008). To add that a full picture of who is doing what, how, where and when on resilience and disaster preparedness does not exist (Bolletino et al., 2016). This was also experienced during the onslaught of Super Typhoon Yolanda resulting to a worldwide relief operation showing despite a legal framework found uncontrolled growth, overpopulation, competing interests, and political tensions as obstacles (COA, 2013). In a similar study, the national resilience and government preparedness efforts to reduce the impact of natural disasters were insufficient, and that the authorities, either through lack of capacity or lack of will, experienced reaction shortcomings in Myanmar and Philippines (Howe and Bang, 2017).

To address this, there is a need to change the decision making structure of the proposed integrated system like addressing underlying factors of vulnerability, integrated policy objective, inclusion of informal responses, and taking into account future uncertain climate conditions and pending impacts (De Leon & Pittock, 2017).

Overall, disaster management at the local level is crucial since it aids in community resilience and adaptation; however, it must be supported by the creation of livable communities. The effectiveness of the legal and

regulatory frameworks that guide local disaster management is impeded by challenges that prevent it from fully developing. Understanding implementers' perspectives allows for the creation of a safe, resilient community, which may necessitate specialized abilities.

Statement of the Problem

This study aimed to identify level of implementation and challenges encountered by the BDRRMC. Additionally if there is a significant difference in terms of length of service and age. In light of this, the study seeks to answer this research question::

1. What is the perceived level of implementation of BDRRMC during disaster response in terms of :
 - a. Administrative directives
 - b. organization
 - c. Operational Skill
 - D. Capacity to Implement Strategies and Policies
 - E. Coping Capacity
2. What is the difference in the perceived level of implementation of BDRRMC during disaster response according to:
 - a. Age
 - b. Length of service

Hypotheses

There is no significant difference on the level of implementation of BDRRMC during disaster response when grouped according to age and length of service.

Research design and methodology

A. Research Design

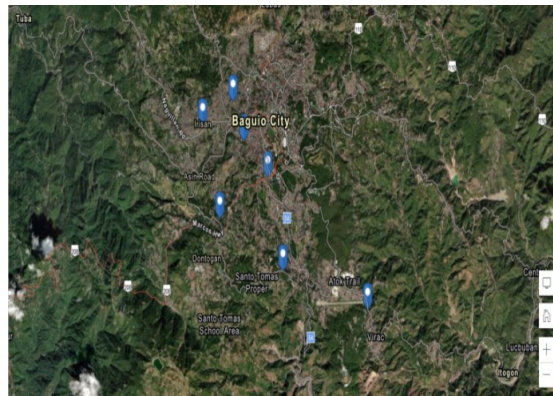
The study used a quantitative technique, specifically the triangulation method. This method is used to broaden or validate quantitative findings using qualitative data. The Triangulation Design is a one-phase design in which researchers implement quantitative and qualitative approaches concurrently and with equal weight (Creswell, D.,2006). The study focuses on the BDRRMC's level of implementation and challenges.

B. Population and Locale of Study

The study used total enumeration composed of barangay officials and volunteers who were chosen based on their knowledge and direct experience in dealing disaster management from the identified high risks barangays of Baguio City (See Fig. 1). The table below indicates the population of the study(See Table I).

Table 1. Respondents' Profile

<i>RESPONDENTS</i>	<i>Barangay Officials</i>	<i>Volunteers</i>	<i>Total</i>
BGH Compound	8	3	11
Camp 7	8	5	13
Fairview	8	5	13
Bakakeng Norte	8	2	10
Irisan	8	1	9
Kias	8	5	13
City Camp	8	3	11
TOTAL			80

Fig 1. Locale of the study

The study was conducted in Baguio City, which is located 250 kilometers north of Manila and is surrounded by the municipalities of La Trinidad, Itogon, and Tuba (About Baguio City | City Government of Baguio, n.d.). The locations of the seven barangays are represented with a blue pin as a legend (Esri 2019). The high-risk barangays in Baguio City was based from City Disaster Risk Reduction Management Committee (CDRRMC) with high incident reports during calamities 2010-2021, for the reason that the enactment of RA 10121 was year 2010. Kias, Camp 7, Central Fairview, BGH Compound, Irisan, Bakakeng Central, and City Camp are among the locations.

C. Research Instrument

The study used a questionnaire to collect data and was based on the selected provisions of the RA 10121, specifically Section 12 which includes the functions of the BDRRMC. The questionnaire was subjected to validity and reliability testing using the Spearman Brown Prophecy Formula, which resulted in high reliability with a computed value of 0.85.

D. Data Gathering Procedure

Before conducting the study, the researcher respectfully obtained permission and proper endorsement. Followed by a letter to respondents before survey administration. Consequently, the data gathered were subjected to statistical analysis and interpretation with the help of a statistician. A single factor Analysis of Variance (ANOVA) was used to test the significance of length of service and age to BDRRMC level of implementation. ANOVA is used to compare the means of three or more independent (unrelated) groups ("SPSS Statistics Tutorials and Statistical Guides | Laerd Statistics," n.d.). Equation 1 is F stands for coefficient of ANOVA. MSB stands for mean sum of squares between groups. MSW stands for means sum of squares within groups. The formula is shown below :

$$F = MSB / MSW$$

E. Ethical Consideration

To protect the respondents' confidentiality, informed consent was obtained by explaining the purpose of the research. Personal information was not asked. The collected data was permanently deleted after data processing.

Results and discussion

Level of Implementation of the BDRRMC

Table 2 indicates the level of implementation of the BDRRMC's with a overall weighted mean of 2.79, implying that the selected barangays are implementing BDRRMC mandates in conformity with RA 10121.

Level of Implementation of the BDRRMC		
Constructs	Weighted Mean	Interpretation
Administrative directives	3.00	Implemented
Organization	2.75	Implemented
Operational Skills	2.85	Implemented
Capacity to Implement Strategies and Policies	2.76	Implemented
Coping Capacity	2.60	Implemented
General weighted mean	2.79	Implemented

The findings indicate that there is a collaboration with the higher authorities since they were able to follow and submit the required paperwork in terms of administrative directives, with a weighted mean of 3.00. In a similar study, result reveals that there was a high level of performance of the BDRRMC in the implementation of the disaster risk reduction management plan due to the sustained efforts of the local officials and the community residents in barangay San Miguel. This further shows that disaster preparedness' culture should be sustained through regular and strict monitoring of the DRRM plan's

implementation and the development of further disaster preparedness contingency plans and actions (Matunhay et.al, 2019).

In terms of organization, with a weighted mean of 2.75, indicating that selected barangays have followed the mandate of RA 10121 and are serving as the primary implementers of disaster preparedness initiatives as well as front-liners during disaster response. The results back up Rillorta (2013) findings that barangays were able to implement City Council Resolution No. 330, that required barangays to establish their own BDRRMC. The same must also create a barangay disaster preparedness strategy so that there will be options available when disasters strike. The city government has also given village heads the job of determining actual or potential disaster-prone locations and putting a disaster preparedness strategy into action. In connection to Evasco, 2010, findings revealed that there is an established organizational system within the province that responds to disasters from the provincial level down to the barangay level however the majority do not have connections except for Department of Social Welfare and Development. This is also observed in the selected barangays because they are having difficulties in establishing and maintaining relationships with the corporate sector because fewer organizations today are interested in DRM. The reduction of poverty, public education, and health care are more the focus of the private sectors.

The weighted mean for operational skills is 2.85, which suggests that the respondents have the skills and knowledge required in their specific barangay. With the participation of the LGUs, several trainings and knowledge management training have been conducted with the selected barangays. However, Participant 8 stated that, *"We invite our supporters to the seminars, but few show up and only the barangay officials attend to the seminar". The fact that constituents are reluctant and uncooperative to the basic skills and trainings offered further exemplifies the difficulty in enhancing the abilities of BDRRMC members.* For example, despite the fact that trainings are freely provided by the BFP, PNP, CDRRMC, DSWD, and Red Cross, the problem lies in the lack of participation by constituents, not to mention that lack of volunteers is one of the most serious problems encountered in the implementation of RA 10121 in the barangay.

The weighted mean for the capacity to put strategies and policies into action is 2.76. This indicates that the selected barangays have the capability to create strategies and policies that are focused on the DRR. The BDRRMC members, however, have minimal control over the constituency. Despite members' tolerance and empathy prevent them from forcing the informal settlers to leave the dangerous area since some of the informal settlers place the burden of relocating them on the barangay officials. The simple identifying of hazard regions is useless if people continue to live in the area. This poses an additional risk to constituents who are also volunteers during the rescue effort. In this

line, Kelman (2014) identified a reason why DRR reductions are not always implemented: political support is rarely gained through cost-effective DRR solutions. They like visible and measurable consequences for their spending, where they can point to something concrete that they have accomplished for their constituents. They earn more political capital from post-disaster relief than from less visible, longer-term catastrophe risk reduction strategies.

In terms of coping capacity, the weighted mean is 2.60, suggesting that the BDRRMC prioritizes the demands of the constituents based on their needs. In relation to the study of Raganas, 2019 in CARAGA region, Philippines key findings show that communities were able to show disaster resilience through their coping, adapting, and transformative capacities as a result of their repeated experiences with natural catastrophes. Their coping techniques included disaster preparedness procedures, monitoring forecasts of imminent natural hazards, participation in DRRM-related activities, and even social cohesion building. Nevertheless, preventing dangers from becoming disasters is critical to ensuring that local communities have a more stable and sustainable future (Willison et. Al, 2022).

Overall, in accordance with the results of the study, the selected barangays in Baguio City are complying to and implementing out the mandates of the law that governs the BDRRMC. This suggests that the role of the BDRRMC is essential in achieving the law's goal. Furthermore, while time-consuming, concentrating on community-based catastrophe mitigation is cost-effective, self-helping, and long-term. As argued by Victoria, 2003, community process and engagement promote confidence, pride in one's ability to make a difference, and the ability to pursue disaster mitigation and preparedness, as well as wider local development obligations.

Single ANOVA Factor

Table 3. Single ANOVA Factor

VARIABLES	F	p
Length of service		
5-10	3.40	0.02*
11-20		
Above 20		
Age		
25-35	2.50	0.03*
36-45		
46-55		
56-65		
65 and above		

A single-factor ANOVA result with a p-value of 0.02 demonstrating a link between respondents' DRRM capacity and length of service is also presented. Respondents perceived that DRRM members with 5-10 years of service have a higher level of implementation. The age difference is likewise significant, with a p-value of 0.03 from 36 to 45 years old, suggesting that under this age bracket DRRM members are more knowledgeable. It is crucial to keep in mind that during disaster response, physically fit volunteers with a high degree of interest are required, as noted by Kumusari et al. in 2010; also, local government entities require expertise in damage assessment, debris removal, and disaster support during recovery.

Challenges encountered in the implementation of BDRRMC

Table 4. Challenges encountered in the implementation of BDRRMC

Indicators	Mean	Description
The mobilization and dispatch of rescue teams	3.37	A
Authorizations and permits from involved offices	3.33	A
Logistics of the operations	3.26	A
Overall situational awareness, including risk analysis and safety assessment	3.27	A
Planning of the teams together with continuous security briefing	3.24	O
Re-searching in one building after removing debris	2.73	O
Drilling and crane lifting on areas greatly damaged (i.e landslide, flood)	2.69	O
Communications and connectivity challenges	3.06	O
Refusal of victims to evacuate during calamities	2.63	O
Lack of capable volunteers.	2.29	O
Limited equipment in rescue operation.	2.27	S
Non implementation of disaster plans during operation	2.10	S
Lack of support from the local government unit.	1.92	S
Empirical-based triage for prioritizing searching is not sufficient in many cases	2.08	S
General weighted mean	2.73	O

The overall weighted mean is 2.73 as shown in the table, indicates that challenges are often encountered. This situation can be linked to a number of things, including financial and economic limitations, a lack of knowledge and abilities, and complacency (Galindo et.al, 2014).

The mobilization and dispatch of rescue teams consistently rank as the highest indicator, with a weighted mean of 3.37, indicating that there is no effective flow in the rescue operation during disasters. As revealed by the study of Luzerne (2014) , a national lack of volunteers persists because not all provinces have permanent staff and DRM offices. It is also a recognized factor that contributes to the lack of volunteers in BDRRMC that respondents are less interested in disaster management activities because hazards or disasters are not experienced on a daily basis, as compared to health and education, which deal with human beings' basic needs.

In terms of rescue operation during calamities, people normally act on their own and do not seek assistance from the BDRRMC. Furthermore, Participant 4 stated that *"Most of the time, the constituents employ their own resources in disaster recovery. The good news is that the "bayanihan system" is still alive in the community"*. This means that the people are not solely reliant on government assistance, but are acting on their own initiative, even though they are grumbling about the barangay's passivity. This has an impact on BDRRMC's efficiency because they were unable to meet all of the constituents' needs.

In terms of the value of coordination, Austin (2012) (as cited by Galindo et al (2014)) added that better coordination during disaster response might contribute to faster recovery from a disaster. The effectiveness of organizational preparedness can be related to catastrophe response. However, there is a lack of collaboration among the stakeholders involved in the designated barangays. This deepens the gap, resulting in a lack of trust, which poses a risk to the BDRRMC in general. This also affects the interests of both parties, which should not be the case regardless of who lacks cooperation.

In terms of authorizations and permits from relevant offices, 3.33 shows that the processing of paper works burdens the BDRRMC members to act as quickly as feasible. The lack of coordination can also be linked to the BDRRMC's and constituents' lack of responsibility by not informing authorities of their concerns or at the very least to follow up on them.

On the part of BDRRMC , Participant 10 indicated that *" People do not report since the the response is too slow considering they have a lot of workload in the barangay and handling all the concerns in the barangay at the same time are beyond the competence of the barangay"*. As a result, the BDRRMC seeks assistance from higher authorities, but the problem still exists. This has now become a cycle of transferring the problem from one agency to another, with no action taken at times since the government must first balance the necessity or priority level of each concern.

With a weighted mean of 3.26, which always indicates the absence of a plan and execution of budgetary considerations of such to direct the

BDRRMC members, the logistical aspects of the activities are inadequately planned and executed. As Participant 5 stated: *"There is a fund provided, but we must divide it into its allocation, which is why we only acquire some of the rescue equipment. Even if the consequences of a typhoon are severe, the mayor cannot immediately proclaim a state of disaster in order for us to get the additional 30% Quick Response Fund"*. This demonstrates that DRRM officers encounter funding challenges that can be overcome with appropriate allocation of funds. Furthermore, the selected barangays are being tasked to stretch the budget granted to them in four parts, which are for disaster preparedness, prevention, mitigation, and response, because the government must also distribute funds available to the numerous projects and programs that they are undertaking.

Therefore, this suggests that DRM preparations are not viewed as relevant because, during disaster response, the BDRRMC acts on their own choice and the DRM plans are ignored. The plans are considered as a paper to be passed rather than a foundation for action.

In terms of overall situational awareness, including risk analysis and safety assessment, a weighted mean of 3.27 implies that there is always a problem in the follow-up action in order to further assess and analyze the damages for future analysis. It is essential to recognize the importance of risk assessment, which is similar to the study of Tomio et al, 2014, which found insufficient disaster preparedness at both the household and community levels. Furthermore, pre-disaster recovery planning has gained traction as a promising approach to improving disaster preparedness and recovery, though it has yet to be widely used for cultural heritage preservation. (Florentin et al., 2022). When it comes to funding, barangays that don't engage in risk assessment activities rely solely on their own budgets. They don't seek money from financial institutions.

In terms of Early Warning System (EWS), problems are identified as Participant 3 stated that *"There is lack of knowledge in terms of implementing innovative EWS, we solely rely on the mandates of news and Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) before we conduct the usual house to house visitation"*. In relation to the findings Bollettino, Dy & Vincy, 2016 that difficulties in translating pertinent scientific findings on disaster risk into actionable knowledge for local disaster risk reduction and management officials as well as disaster management officials with little professional training prevent the development of disaster-resilient communities. Cuya-Antonio and Antonio (2017) posited that Early Warning System and Risk Assessment activities are present in all barangays, but they are not fully aware of how what they are already doing fits inside these activities.

The prevalence of these challenges has a domino effect on the implementation of disaster management actions in the selected barangays, despite the fact that provisions for resilient communities are still far from being fulfilled. In other words, these issues need to be addressed in order to strengthen and strengthen the BDRRMC and to prioritize prevention over response. Additionally, while time consuming, focusing on community-based disaster mitigation is cost effective, self-help, and sustainable. Community process and engagement promote confidence, pride in one's ability to make a difference, and the ability to pursue disaster mitigation and preparedness, as well as wider local development obligations (Victoria, 2003).

Conclusions

The officials of the selected barangays in Baguio City implement the selected provisions of RA 10121, such as administrative directives, organizations, operational skills, capacity to implement strategies and policies, and coping capacity, showing significant differences in terms of age and length of service, which are factors to be taken into consideration when measuring the effectiveness of the implementation. The provisions of the law are being implemented however the barangay officials still have the potential for improvement. Challenges exist when dealing with disaster management, which result from lack of volunteers and the capacity to create an effective plan.

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