
Community-Based Disaster Risk Management in Flood and Landslide-Prone Areas: Exploring the Lived Experiences of Residents in Bukidnon

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Abstract

Appropriate implementation of community-based disaster risk management is desirable as flooding and landslide in Bukidnon is becoming more hazardous intensified by climate change, poor drainage, and expanding agricultural industries. The lived experiences of the residents in flood and landslide-prone areas in the province during the year 2017-2018 provides the empirical basis for strategies to enhance the implementation of Community-Based Disaster Risk Management (CBDRM). The study utilized an interpretive phenomenological research method. The instruments used in the study were the motive questions for the focus group discussion (FGD) and key informant interview (KII) guide questions. There were one hundred fifty (150) participants coming from the six (6) barangays of the (5) five municipalities identified as prone to flooding and landslide. Findings showed that the existing risk management practiced by the residents and the local government unit (LGU) is the top-bottom approach. The coping strategies used were risk communication and relief assistance from LGU. A comparison of the existing approach to the Community-Based Disaster Risk Management (CBDRM) approach revealed that in CBDRM, a community can be organized to experience a 'real community' participation to avoid and reduce the damage caused by flooding and landslide. The involvement of vulnerable people with the determination of roles and responsibilities before, during, and after flooding and landslides would make them realize the significance of their active participation for resiliency. Thus, a CBDRM model was developed so that at-risk communities can actively engage in the identification, planning, analysis, monitoring, and evaluation of disaster risks to reduce their vulnerabilities and enhance their capacities. An extension activity is proposed to implement the CBDRM model.

Keywords and phrases: Community-based disaster risk management, flood, landslide, interpretive phenomenology, CBDRM Model, extension activity

Introduction

Community-based disaster management is a risk reduction program that can be designed with the local people in disaster-prone areas. Using government interventions alone in mitigating disaster is often insufficient due to the lack of recognition of the community's vulnerabilities and capacities. Involving the

people in managing the risk would make them realize their respective role to play in facing the disaster.

Another important realization for having the community-based approach is that communities are knowledgeable enough about

the hazards happening in their environment. Residents can even anticipate the occurrence of the disaster. They might not have scientific bases, but the richness of their experience and indigenous knowledge are resources to be considered. In some cases, it is a common knowledge that with proper training and information, the communities can safeguard and minimize the disaster risks. Local capacities could be strengthened to assess risks and develop mitigation strategies that are based on the communities' human, financial and material resources. It is at the local level that the physical, economic, political, and social risks faced by the poor can be adequately managed. Though people in the community know the risks present in their environment, most of them do not have the choice but to live in hazardous areas because of economic, environmental, and demographic reasons and just wait for the occurrence of common disasters like floods and landslides.

Flood risk is the potential that flooding causes danger, including stress, social disruption, property damage, and financial impacts. It can be measured by determining the likelihood of a hazardous flood and the nature and severity of its consequences, like the location that flooding is most likely to occur, the impacts it would have, and the damage it would cause. Even though floods are a natural and inevitable event, it is very crucial to find ways of managing the risks they pose to public health, safety, property, and infrastructure. Puno et al. (2019) determined the amount of flood exposed building features and agricultural resources to different flood scenarios in the flood plains of Bukidnon using the Hydrologic Engineering Center's modelling system and river analysis system found that of the twelve (12) flood-prone barangays, four (4) were most exposed to flood hazards when it comes to the count affecting building features and area of flood-exposed agricultural cultivations. Residential buildings account for 94% of the total affected building features exposed to flood hazard, while rice plantation constitute 66% exposed agricultural land to flood hazard.

Landslides, though often initiated by other significant weather events, like volcanic eruptions, earthquakes, typhoons and increased monsoon rainfall, are also a major hazard in Bukidnon. Bukidnon, a province situated at the central part of Mindanao and southern part of the Philippines, is characterized by rolling grassland plateau with rolling uplands, deep canyons, and valleys alternating with the low plains. Its terrain is characterized by deep ravines and dense forest mountains that protect the province from storms and typhoons but fail to prevent flash floods and landslides. In fact in 2017, the Philippine Institute of Volcanology and Seismology (PHIVOLCS) issued an alert 3 deep-seated landslide site in Barangay Magsaysay, Kibawe, Bukidnon for an emergency evacuation of residents due to ground movements. Veracruz (2017) conducted an assessment of this landslide event and found that ground movements were observed following more or less three weeks after a magnitude of 6.0 earthquake that happened in Cotabato. Data on the community and LGUs preparedness and response before, during, and after the landslide event revealed that the MDRRM was not that well prepared for the emergency.

In like manner, Acuevas (2016) assessed the level of implementation and effectiveness of disaster preparedness activities in Valencia City, Bukidnon, and found that people lack awareness of disaster preparedness and even experienced no immediate response during disasters. Despite the developments in response to the implementation of disaster management law in 2010 (National Disaster Risk Reduction and Management Council Philippines, 2016) that officially adopted the CBDRM as a model to engage communities in disaster risk reduction (Fernandez, et al. 2012, Shaw, 2009) its implementation experienced shortcomings (Matthies, 2017) as they are based in communities but run by numerous top external officials. As indicated in the Sendai Framework for Disaster Risk Reduction (2015-2030), the development of indicator systems

for disaster risk and vulnerability is one of the significant activities of the decision-makers to save lives and alleviate human suffering by connecting people, improving coordination and building capacity. The framework also articulates the need for improved understanding of disaster risk in all its dimensions of exposure, vulnerability and hazard characteristics, recognition of stakeholders and their roles, and resilience of health infrastructure.

Thus, this present exploration of the lived experiences of residents in the flood and landslide-prone areas serves as the springboard for action to transform vulnerable or at risk residents into a disaster resilient communities in partnership with the academe and LGU. It is expected to motivate the government of Bukidnon and the residents along the hazardous areas to enhance their way of implementing CBDRM that would develop a culture of safety to reduce the risk of losing lives, their livelihoods and assist them in safeguarding their families and assets in times of emergency.

Objectives

The main objective of this study was to explore the lived experiences of residents in the identified flood and landslide-prone areas in the province of Bukidnon. Specifically, the study aimed to:

1. determine the existing risk management approach practiced in the flood and landslide-prone areas;
2. explore the coping strategies and risk reduction measures implemented in the areas identified;
3. explore the benefits of a community-based disaster risk management;
4. develop a model of a community-based disaster risk management framework using the community-based approach; and,
5. design an extension program to capacitate resiliency of residents to the flood and landslide risks.

Hypothesis of the Study

This research study hypothesized that the participation and involvement of the community in the disaster risk management by relating their lived experiences could reduce hazards and vulnerabilities. It can also create the right platform to build its resilience associated with the flood and landslides in the province of Bukidnon.

Expected Output

1. Data on the existing risk management approach practiced in flood and landslide-prone areas in the province of Bukidnon
2. Information on the coping strategies and risk reduction measures implemented in the areas identified
3. A model of an effective community-based risk reduction management using the community-based approach
4. Extension program to capacitate resiliency of residents to the flood and landslide risks

Significance of the Study

The results of the study could be used to assist in building a disaster-resilient community by sharing knowledge and raising awareness of the inherent hazards in flood and landslide-prone areas in the province of Bukidnon. The hazard and vulnerability analysis, as well as the capacity analysis within the community, would provide the Provincial Disaster Risk Reduction Management (PDRRM) with the data as a basis for the logical step for prioritization of hazard mitigation initiatives and the implementation of the risk reduction project. The developed CBDRM model could serve as guide of the communities in mitigating hazards and vulnerabilities. The extension program that can be culled out from the results of the study would be of great help to the residents and the whole community in the province of Bukidnon for a proper understanding of the risks and how to avoid them.

Review of Literature

Mendoza et al. (2016) investigated the existing initiatives and assesses their capacity needs for resiliency and explores the socio-political issues as well as its geographical conditions on DRRM of LGUs in Pablo (Bopha) affected areas in the provinces of Davao Oriental and Compostela Valley, Philippines. Findings revealed that lack of a more comprehensive DRRMC plan limits the implementation of concrete and wide-ranging initiatives to address the issues by mobilizing and optimizing resources. To explore how social capital shapes the post-disaster conditions in the 2011 Typhoon Washi-affected communities of Cagayan de Oro City and Iligan City, Region X, Philippines, a qualitative study was conducted by Jovita et al. (2018). It was revealed that the solidarity among typhoon affected communities contributed to the recovery of the survivors. Even with the shortcomings experienced by the survivors, they remain to believe that the local officials can be trusted as they tried to provide help in times of needs.

Finding the cause of frequent flooding in selected communities near the Pulangui river in Bukidnon, Philippines, Medina et al. (2015) conducted a study on the value of flood risk reduction and found that these phenomena were all attributed to both global (climate change) as well as local (deforestation, improper land use among others) environmental crisis.

Thinda (2009) conducted a case study in Lusaka Informal Settlement, city of Tshwane, Africa on community-based hazard and vulnerability assessment in developing a community-based hazard and vulnerability framework using the progression on vulnerability model. Findings revealed that the possibility of reducing hazard risks and vulnerability could be done through the implementation of the development of safety model and the participation of the community in disaster risk management activities. He recommended that disaster risk reduction measures must be enforced within communities through the use of excellent

community-based hazard and vulnerability assessment and mitigation strategies.

In the Philippines, the National Disaster Risk Reduction (NDCC, 2008), through the Office of Civil Defense (OCD), initiated the hazards mapping and assessment for Effective community-based disaster risk management (READY) project on 2005-2011. READY aimed to institutionalize disaster risk management at all levels of governance by developing a systematic approach to community-based disaster risk management. At the national level, READY proposed to establish and standardize disaster risk management measures and processes. In contrast, at the local and community levels, it sought to empower the most vulnerable municipalities and cities in the country and enable them to prepare disaster risk management plan. Based on the report, five main gaps were identified by the Department of Interior and Local Government in disaster preparedness and mitigation activities of the Local Government Units. These gaps were on the areas of political commitment and institutional arrangements of LGUs; risk identification, assessments, monitoring, and early warning; knowledge management; risk reduction; and risk transfer.

The DILG also discovered that LGUs experience difficulty in implementing existing laws related to disaster risk reduction (DRR), such as building codes, land use, and zoning because of the lack of appreciation of DRR. Similarly, there is no compendium of norms or standards for specific natural hazards for the use of LGUs.

Additionally, Blanco et al. (2015) conducted a study on the nationwide mapping through the Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program of the University of the Philippines and the Department of Science and Technology (DOST). They used the derived accurate digital terrain models (DTMs) to generate risk maps and early warning systems. Using the Phil-LiDAR 2 Program, it mapped the agricultural, forest,

coastal, water, and renewable energy resources for the entire Philippines. It also developed a mechanism to facilitate data gathering, data processing, quality check, and coordination at different levels. Another Phil-LiDAR project is the “LiDAR Data Processing and Validation in Mindanao: Caraga Region, and Bukidnon.” It is an extension of the UP DREAM program with SUCs undertaking researches on the utilization of LiDAR technology to generate flood hazard maps of their assigned project areas.

The literature reviewed provided the researchers the background activities and programs related to the hazard, exposure, vulnerability, and capacity of the residents in flood and land slide-prone areas. It also explained the importance of community based disaster risk management full implementation.

Conceptual Framework of the Study

Disaster risks unfold through the economic activities of people in areas exposed to hazards and vulnerability of the communities understood in terms of capacity to absorb and recover from hazard impacts (UN, 2007). It is a grave disruption of the functioning of a society causing extensive human, material, economic or environmental damages which surpass the capacity of the distressed community to cope using its resources. It results from the combination of hazards, exposure, vulnerability, and insufficient capacity or measures to reduce the potential negative consequences of risk. It can be illustrated, as shown in Figure 1.

The possibility that a disaster might or might not occur depends on whether those risks are adequately managed or not. It was stressed in ADPC (2001) that the community should be able to directly gain, resulting from improved disaster risk management. Thus, in turn, it will contribute to a progression towards safer conditions, security of livelihood, and sustainable development.

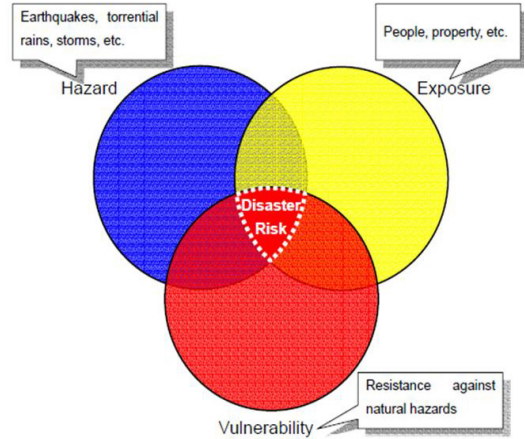


Figure 1. The concept of disaster risk designed in this study

The concept can be formulated as:

Where: H is Hazard

E is exposure

V is vulnerability

C is Capacity

This proves that the community is not only the primary performer but also the beneficiary of the risk reduction and development process. Pearce (2000) added that risk is manifested when disasters occur. Risk reduction begins with risk identification, assessment, and early warning system. Hazards, exposure, vulnerability, and capacity assessments are necessary to support assistance and protection.

Methodology

The study was conducted on the identified flood and landslide-prone areas in the province of Bukidnon. Bukidnon is a landlocked province located in the northern Mindanao Region. Its capital is Malaybalay city. The province has a total land area of 829,378 hectares. (8,293.78 sq. km.). It has a total population of 1,415,226. It is the home of Mt. Kitanglad Range Natural Park (MKRNP) that hosts the country's second-highest peak. MKRNP has been identified as

one of the ASEAN Heritage Parks on October 2009 by the Department of Environment and Natural Resources.

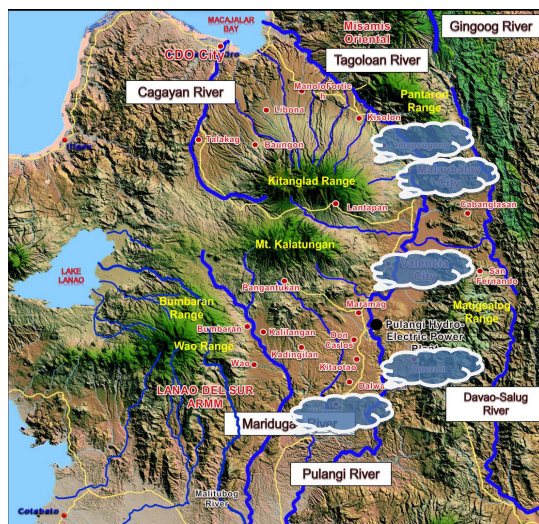
The cities of Malaybalay and Valencia and the municipalities of Kibawe, Quezon, and Impasug-ong were among the areas identified as “at-risk” to flood hazards, particularly barangays near the banks of the Pulangi River. Some portions of these barangays were inundated, especially those that are 10 meters to one-kilometer distance to Pulangi River and its tributaries.

In the city of Valencia, the Barangay Batangan suffers the most damage when the Pulangi River overflows. Flood water height ranges from half a meter to five meters during strong rain showers in the upstream areas aggravated by inadequate canal lining, dikes and box culverts. Likewise, in the city of Malaybalay, Aglayan area along the tributaries is also “at risk” to flood hazard. In the municipality of Kibawe, Sampaguita and Maligaya are the areas identified as prone to flooding and landslide, while Palacapao in Quezon, Bukidnon and Guihean in Impasugong, Bukidnon also experience frequent landslide and flooding. Some portions of these municipalities are inundated especially those that are 10 meters to one-kilometer distance to any of the mentioned rivers and their tributaries. Figure 2 shows the map of Bukidnon province with the vast river systems.

Research Instrument

A validated researcher-made survey questionnaire, motive questions for focus group discussion (FGD) and guide questions for key informant interview/semi-structured interview were used in gathering the data necessary to answer the problems of the study in the conduct of hazards, vulnerabilities, and capacities assessments of the identified participants of the study. These instruments were validated by experts who are teaching advanced methods of research and data analysis courses in the graduate program of the university to ensure

that the questions could capture significant statements from participants.



Legend:

 - Locale of the Study

Figure 2. Map of Bukidnon
(Map downloaded from Google Map)

A semi-structured interview guide questions were prepared in conducting face-to-face interviews with the participants who consented to be interviewed. It unfolds the experiences of the residents during the catastrophes. At times, the researchers used additional follow-up or probing questions to clarify or expand the participants' responses. The interviews took about one hour for each participant to complete. They were recorded with permission from the participants.

The motive questions for the focus group discussion served as a guide in capturing the rich information and data on the experiences of the residents during flooding and landslide. This was conducted to validate the individual experiences of the participants.

Unit of Analysis / Respondents of the Study

Purposive sampling is a conventional method used in choosing the participants in phenomenological research. There were a total

of 150 participants from the different identified barangays. There were 30 residents, including their respective barangay officials coming from the identified flood and landslide-prone areas who had resided in the place for a period of five (5) years or longer and whose ages ranged from 25 to 60 years old. The said sampling is a reputational technique used to identify the participants who possessed the characteristics of individuals who can give the necessary information based on their experiences.

Research Design and Data Collection

Hermeneutic (interpretive) phenomenology was used where the researchers interpret the narratives provided by the participants related to their individual contexts to illuminate the fundamental structures of their understanding of the phenomena. The researchers also utilized their past experiences and knowledge on the disasters and the involvement of the DRRM in facing the disaster.

During the data collection, participants were given instructions and notified of their voluntary participation in the research and the right to refusal. Each of them received the general directions, study descriptions and intent, and an informed consent form. Participants were then requested to sign the informed consent before interviews were conducted. All data collection took place during a month's time frame.

Data Analysis

Data analysis in hermeneutic (interpretive) phenomenology is characterized by constant critical self-reflection. The first step was data preparation. The researchers read the whole data set to get the whole picture of the studied phenomena. In analyzing the data, the emphasis was on the essence of the common experiences and the significance of such experiences during the floods and landslides. It is vital to accurately note down the responses of the participants. The grouping and categorization of the significant statements and meaning units that were verbalized by the participants served as the key to the data analysis process.

Based on the phenomenological process in data analysis of Colaizzi (1978) as cited by Morrow and King (2015), the following processes were utilized by the researchers:

- Reading and re-reading of the transcribed interviews to get the thought and sense of the whole content shared by the participants.
- Extraction of significant statements of the participants that directly answer the research questions from the transcript.
- Formulation of meanings on every significant statement of the participants after rereading the transcription to ensure that key statements were captured and accurate meanings were framed.
- Formulated meaning was analyzed to determine and group its theme cluster and emergent theme.
- Identified emergent themes were exhaustively described to uncover the phenomenon of the study.
- Findings were validated by the participants to compare the descriptive results constructed by the researchers with their experiences to finalize the descriptions of the phenomenon.

Finally, the data were subjected to NVIVO software to check if the analysis is in the right direction.

Discussion of Results

The presentation of the discussion of results is based on the problem set for this study.

Existing risk management approach practiced in the flood and landslide-prone areas in the province of Bukidnon

The purpose of problem one was to gain an in-depth understanding of the lived experiences of the residents in flood and landslide-prone areas related to the existing risk management approach. Matrix 1 presents the data gathered.

Matrix 1. Lived Experiences of Residents on the Existing Risk Management Approach

Themes	Related Activities
Early warning advisory	Watched out for any news from the neighborhood
	Waited for announcement and instruction from barangay officials
	Waited for instruction from municipal officials
	Listened for news advisory from local radio
Disaster Self-Preparedness	Watched news advisory from TV
	Packed clothing, mats, utensils for evacuation
	Prepared important things ready for evacuation
	Kept personal belongings in a safe place
	Kept valuable things safe
	Prepared food ready for evacuation
Keep at bay from Danger zones	Elevated things that may be damaged when flooded
	Residents kept away from the swelling river
	Residents moved to higher ground during flood
	Livestock moved away from the flood
	Children restricted from going into danger areas
Evacuation to designated areas of barangay and LGU	Local farmers warned going to their farm near landslide prone area
	Local officials facilitated evacuation of affected residents to barangay hall
	Residents evacuated to high school or elementary building near them
	Preemptive evacuation of residents located in high risk areas

The understanding of the lived experiences of residents in flood/landslide-prone areas under study is based on the hermeneutic analysis of the participants' narratives. Initially, 32 codes transpired from the analysis of the transcripts. From these, four themes emerged. The first

theme, *early warning advisory*, manifests how residents were informed of the impending hazard. Based on their responses, they waited from outside sources of information. They thought that their vulnerability to hazard depends upon the advisory they received from the different sources of information, such as from the neighborhood, television or radio, as well the local officials.

The usual scenarios in places vulnerable to catastrophes are those who wait for information from the national level when the happening is at the local level (Thinda, 2009; Blakie et al., 2004; Wisner, 2003). They added that in this case, vulnerability is rooted in social processes and underlying causes, which could ultimately be quite remote from the disaster itself. Noteworthy to mention is the recognition of the increase of vulnerable people to the situation.

The second theme, *disaster self-preparedness*, indicates how they prepared for the coming catastrophe. In the incident that the residents had to evacuate from their houses, they were aware of what essential things to bring like clothes, mats, utensils, food, and other valuable belongings. They placed their other personal valuable property to a safe place. Their preparation focused on their basic needs while in the evacuation centers and place their other things in safety. Self-preparedness was one of the mitigation strategies the residents thought of to reduce the flood damages. They tried to identify their hazards and vulnerabilities and came up with the reduction measures to prevent or reduce disaster risks.

UNISDR (2011) supported the idea that reducing disaster risks can be done through systematic efforts to analyze and manage the causal factors of disasters. This action could lead to address institutional frameworks and develop policies supporting technical personnel who could actively carry out disaster risk reduction activities.

Keep away from Danger zones is the third emerging theme. It shows that they tried to be resilient against the hazards at hand.

Furthermore, it indicated that they were already familiar with the intricacies of these risks.

The fourth theme, *evacuation to designated areas of the barangay and LGU* is a manifestation that the LGUs had the necessary preparations for the safety of their constituents in the community. It is part of the disaster management practiced in the locality. This action was their systematic process of using their skills and capacities to implement strategies that could diminish the adverse impacts of the hazards.

In essence, communities remain to be the most significant element in understanding how disaster risk and vulnerability are created and how it can be reduced as they are the ones most affected, (Van Niekerk et al. 2017; Van Niekerk & Coetzee, 2012). Additionally, limited resources, capacities, and technical abilities could still subject them to vulnerabilities.

The responses of the participants were further analyzed using NVivo software to determine the key words they used and how often they used them. The word frequency result is displayed through a word cloud with varied word fonts depicting the number of times the words were utilized by the participants.



Figure 3. Sample Word Cloud for Problem 1

This theme resonates throughout the participant interviews as they shared how they heeded the early warning advisories on the impending disaster. Most of them spoke about how they attentively watched out from any news coming from their neighborhood, barangay and municipal officials, local radio, and TV broadcast and waited for further instruction.

From the constant monitoring on the news advisories, they were able to better plan and prepare for the possible actions in the event that the situation escalates to the danger level.

Coping strategies and risk reduction measures implemented in the areas identified

The second problem explored the coping strategies and risk reduction measures implemented in the areas exposed to flood and landslide hazards. The results are presented in Matrix 2.

Matrix 2.
Lived Experiences of Residents on Coping Strategies and Risk Reduction Measures

Themes	Related Activities
Risk Communication	Conducted orientation on flood/landslide preparedness
	Conducted environmental awareness seminar on illegal logging and waste disposal management
	Conducted training on risk reduction management for local officials
	Conducted information drive campaign to identified high risk areas
Flood hazard and risk mapping	Provided map on high risk areas
	Map posted on high risk areas by local officials
Early warning systems	Placed warning signs to flood/landslide prone areas
	Warning to residents of coming flood facilitated by local officials
Infrastructure management	Improved drainage system
	Provided proper waste disposal facility
	Improved flood control measure/structure
	Placed ripraps on eroded slopes to prevent landslide
Emergency planning and management	Provided evacuation plan and systematic implementation
	Identified relocation of residents in high risk areas
Tree Growing	Outsourced from Department of Agriculture seedlings for affected barangays
	Conducted reforestation and tree planting in areas affected by flood/landslide
Relief Assistance from LGU	Provided assistance and livelihood program to flood/landslide victims
	Provide assistance (food, basic needs)
	Provided farmers free seeds and fertilizer to damaged crops

A hermeneutic analysis was used to analyze the coping strategies and risk reduction measures

implemented in the areas exposed to flood and landslide hazards based on the participants' narratives. There were 73 codes that transpired from the analysis of the transcripts. From these, seven themes emerged.

The first theme, *risk communication*, is composed of four related activities. These activities recount to the necessary information and advance risk evaluation feedback expected from the DRR experts, regulatory practitioners, interest groups, and even the general public. As stressed by Demeritt and Nobert (2014), flood risk communication is significant for the analysis of risk-based management. Recognizing the very idea and purpose of risk communication is one best practice that should be included in the coping strategies (Kellens et al., 2013; Parker et al., 2009; Van Alphen et al. 2009; Wachinger et al., 2013).

The second theme, *flood hazard and risk mapping*, is considered as the coping strategy by the respondents as they could simply identify the extent of flooding and landslide possibilities. As stressed by some of the participants during the focus group discussion, knowledge of the severity of the risks could more or less provide them the information about the necessary preparations that they are going to do.

Early warning systems, infrastructure management, emergency planning and management, and tree growing were the other coping strategies perceived by the participants of the study as useful. These were believed to be helpful tools to mitigate risks caused by floods and landslides. These actions could motivate people to become prepared at the community level, and these might lead to a lasting adoption of sustainable behavior in the community.

The narrative of the participants was further analyzed using NVivo to determine the key words they used and how often they used them. The word frequency result is displayed through a word cloud with varied word fonts depicting the number of times the words were utilized by the participants.



Figure 4. Sample Word Cloud on Coping Strategies

Most of the participants expressed that they were aware of the activities conducted by their local officials and local government units. The programs conducted were the following: orientation on flood/landslide preparedness, environmental awareness seminar on illegal logging, waste disposal management, training on risk reduction management, and information drive campaign to identified high risk areas. However, only a few actively participated in the said activities due to some personal reasons.

The participants recognized the importance of flood hazard and high-risk maps as essential tools to keep them aware of their location and also to the general public who might be affected. They observed local offices posted maps on flood/landslide risk areas but not widely disseminated.

Flood and landslide early warning systems are widely accepted as one component to manage disaster risk. The local officials placed warning signs to flood and landslide prone areas and facilitated in giving warning to residents of coming disaster. The participants observed that stricter implementation of the forewarnings is must be implemented to avoid potential disaster.

As observed by the participants, garbage thrown in drainage blocked the flow of water which caused flooding. A proper waste disposal facility is not available in some of the affected localities to reduce the risk of floods. However, the local government is continuously improving

the drainage system and building flood control structures along the riverbanks of populated areas. Riprap structures were constructed on eroded slopes to prevent landslide.

Past disasters showed that having well-defined preventive procedures and decisions is a critical element that lessens evacuation risks and ensures quick and successful progress of evacuation plans. The participants experienced that the local government had to establish a more organized emergency planning and management to address efficiently the issues involved during flood or landslide. The relocation of residents in high-risk areas is still a concern since it requires sufficient funding from the government.

The forest resources deteriorated because of immense logging activities, use of wood fuel and charcoal making, and permanent agriculture. As narrated by the participants over the past decades, they did not experience flooding, not until trees were cut down massively in their locality. With continued deforestation, flooding and landslide have become a recurring phenomenon. To mitigate this crisis, the Department of Agriculture provided seedlings to affected barangays. The community led by local officials together with private partner organizations conducted tree planting in areas affected by flood/landslide-prone areas.

The residents who were flood or landslide victims received assistance from local government units. They were provided with food, clothes, and other basic needs. They also received financial aid. The amount given to them was based on the assessed damaged property. Livelihood program was set up for the victims' sustainability. The affected farmers were given free seeds and fertilizer to recover from their damaged crops.

Benefits of a Community-Based Disaster Risk Management

From the review of literature, APDC (2002) compared the traditional approach (existing approach) to the Community-Based Disaster

Risk Management approach as shown in Matrix 3.

Matrix 3.

Comparative Presentation of the Traditional Approach and Community-based Approach

Existing Approach (traditional approach)	Community-Based Disaster Risk Management Approach
Disasters are unanticipated events that cannot be prevented.	Disasters can be prevented. Community can be organized to avoid and reduce damage.
Stress is on emergency response and recovery.	Stress is on disaster risk management activities before the disaster; on prevention, mitigation and preparedness.
People affected by disasters are helpless victims and passive recipients of external aid.	People affected by disasters are active participants in rebuilding their life and livelihood. People's existing capacities are used and strengthened.
Extensive services	Community organizations
Creating dependency	Empowering/Authorizing
Top-down	Bottom-up

As shown in the matrix, community-based disaster risk management (CBDRM) is anchored in the disaster risk reduction framework, which covers a broad range of interventions, measures, activities, projects, and programs to reduce disaster risks. It is an involvement of the vulnerable people in the planning and implementation of disaster risk management measures together with the local government units (LGUs) starting from the barangay level to the municipal, provincial and national entities through partnership. As shown in the matrix, through CBDRM, vulnerable groups in the communities can be transformed into disaster-resilient ones. To enrich the community's involvement in risk reduction, assessment of the community residents is necessary. Even if it is evident that the poor are the most affected in a disaster, it cannot be assumed that they are the only vulnerable groups in the community.

Bollin (2003) stressed that the implementation of CBDRM include the following essential features: focus of attention in the disaster management must be the local community; that vulnerability reduction is its foundation to capacitate the community

and protect its resources and enhanced its coping strategies. Additionally, aside from the community as the main actor, at the same time, it is the beneficiary of disaster risk reduction. Likewise, Heijmans and Victoria (2002) averred that CBDRM is an approach that relies on the capacity of the community to remedy their disaster risk situation themselves and to help each other.

However, there are evidences that most top-down disaster risk management and response programs (the existing approach) fail to address the specific local needs of vulnerable communities and even ignore the potential of local resources and capacities (ADPC, 2003). Similarly, the multitude of actions taken to implement an effective disaster management program requires the participation of the entire community, as they are knowledgeable about the disasters happening in their environment and even anticipate in some cases (Reid, 2000).

Community-Based Disaster Risk Management Process

CBDRM as a framework focuses on reducing threats and potential losses to develop a culture of safety and to create disaster-resilient communities. It is a process in which at-risk communities are actively engaged in the identification, analysis, treatment, monitoring, and evaluation of disaster risks to reduce their vulnerabilities and enhance their capacities (Abarquez & Murshed, 2004).

CBDRM is founded on the belief that local people can and will help themselves to prevent or reduce disaster risks. In evaluating disaster risk, the social factors of vulnerability need to be considered with at least the same degree of importance that is devoted to understanding and addressing natural hazards. This view that the risk faced by people is seen as a cross-cutting combination of vulnerability and hazard as disasters are the results of the interaction of hazard and vulnerability (Heijmans, 2001).

Development of Community-Based Disaster Risk Reduction Management Framework

Twigg (2007) stressed that the community-based disaster risk management (CBDRM) is anchored in the disaster risk reduction framework. It covers a broad range of interventions, measures, activities, projects, and programs to reduce disaster risks that are primarily designed by people in at-risk localities. These are based on the urgent needs and capacities of all the vulnerable residents in the identified communities. He added that through CBDRM, vulnerable groups and communities can be transformed into disaster resilient communities that can withstand and recover from stresses and shocks from the natural, physical, and socio-economic environment.

Community-based disaster risk assessment as a framework focuses on reducing threats and potential losses. It supports the International Strategy for Disaster Reduction (ISDR) that aims at developing a culture of safety and creating disaster-resilient communities. As stated by Abarquez & Murshed (2004), CBDRM is a process in which at-risk communities are actively engaged in the identification, analysis, treatment, monitoring, and evaluation of disaster risks to reduce their vulnerabilities and enhancing their capacities. Figure 5 presents the developed model of the CBDRM to be implemented in the different flood and landslide-prone areas in the province of Bukidnon.

As shown in the figure, community-based disaster risk management will be a participatory process to identify and assess the hazards that threaten the community and its vulnerabilities and capacities. It will involve an understanding of how people in the community perceive and measure disaster risk. It will also include analysis of past patterns of hazards and present threats at the community level (hazard assessment), combined with an understanding of the underlying causes of why hazards become disasters (vulnerability assessment) and of the

available resources an affected community uses or can use to reduce risk (capacity assessment), and how different people perceive and measure risk.

- Regular community simulations and exercises;
- Early warning system; and,
- Disaster Risk reduction fund.

All of these are not, however, prerequisites for CBDRM, but they go a long way in addressing issues of disaster risk in the CBDRM process.

Proposed Design of an Extension Program to Capacitate Resiliency of Residents to the Flood and Landslide Risks through the Implementation of the CBDRM Model

Rationale

Realization from the researchers resulted to an understanding of the dynamics of vulnerabilities, hazardous exposure, and resilience which can be attained if the knowledge creation process is settled within and participated by those who are affected. This proposed extension program will implement the community-based disaster risk management (CBDRM) model developed as the output of the research. CBDRM, as an implementation tool, forms the central argument of this proposal. Gender in CBDRM may also be given particular attention.

CBDRM is a participatory process whereby communities are actively engaged in the identification, assessment, planning, and training for hazards, capacities, and vulnerabilities of residents in flood and landslide-prone areas in the province of Bukidnon. The CBDRM aims to enhance skills and capabilities to become resilient to disasters. It will also address local issues, challenges, and problems from the perspective of those who experience the disasters. Community empowerment and ownership of activities and processes are keys to this model as local knowledge is tapped and trust among the citizens is built.

Objectives:

This extension program is designed to capacitate local community on disaster risk

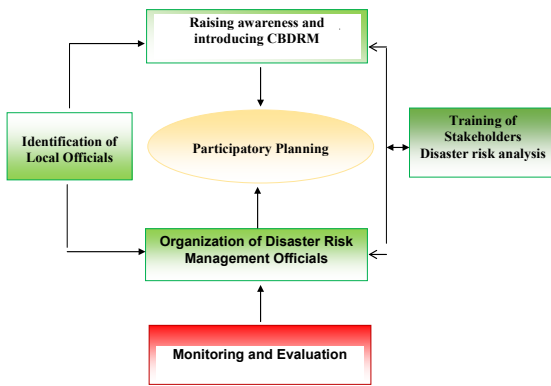


Figure 5. Community-based disaster risk management model.

Hazard assessment will determine the likelihood of experiencing any natural or human-induced hazard or threat in the community caused by flood and landslide. Assessment will include the nature and behavior of each of the hazards the community will be exposed. A vulnerability assessment will identify what elements are at risk and why they are at risk. Capacities assessment will identify the people's coping strategies, resources available for preparedness, mitigation, and emergency response with access to and control over these resources.

Following the UNDP's (2016) proposed elements that would greatly benefit the CBDRM implementation process, would include:

- The existence of the Disaster Risk Management Committee (DRMC);
- Community hazard, vulnerability, and capacity mapping;
- Community disaster risk management plan;
- Training in DRM and community learning system;

reduction management. Specifically, it sought to:

- identify and organize local officials or local Disaster Risk Management Committee;
- conduct community hazard, vulnerability, and capacity mapping;
- introduce CBDRM and participatory planning;
- conduct training of LDRMC members; and,
- conduct monitoring and evaluation.

Expected Participants:

The expected participants are the local officials, and invited PDRRM and CDRRM who are implementers of the CBDRM program and the Extensionists.

Table 1.
Proposed Extension Program for the Implementation of CBDRM

Activity	Objective	Time Frame	Persons Involved
Opening Program/		3 hours	Participants
Orientation			Training Facilitators
Conduct community hazard, vulnerability and capacity mapping	To identify past patterns of hazard, underlying causes of why hazards become disasters, and the available resources to reduce the risk.	1 day	PDRRMO CDRRMO Barangay officials LGU LDRRM- team Extensionists
Introduce CBDRM and participatory planning	To present the CBDRM plan	1 day	PDRRMO CDRRMO Barangay officials LGU LDRRM- team Extensionists
Conduct training of LDRMC members	To capacitate LDRMC members of their role in the community during disaster	1 day	PDRRMO CDRRMO Barangay officials LGU LDRRM- team Extensionists
Conduct monitoring and evaluation	To monitor and evaluate the activities of the LDRMC for sustainability and development.	3 hours	PDRRMO CDRRMO Barangay officials LGU LDRRM-team Extensionists

Conclusions

The prevailing risk management strategy practiced by residents in flood and landslide

prone areas in the province of Bukidnon, Philippines, is the top-down approach. This approach fails to address the needs of vulnerable communities and even ignore local capacities and resources that threaten the quality of life, security and resiliency. With the findings, the researchers concluded the need for the immediate implementation of the CBDRM approach to minimize risks and vulnerabilities in the flood and landslide prone areas. The residents should be allowed to intensify the development process with the community needs as the bases of any development initiative.

For their coping strategies, the challenge on how best to advocate for improved disaster management and implement risk reduction policies and practices is the immediate implementation of CBDRM for this to become integral to sustainable development and social equity in the province. This is an approach that relies on the knowledge, information and capacity of the community to remedy their disaster situation themselves, and to help one another. CBDRM emphasizes the conscious and participatory application of integrated measures in order to achieve identified objectives for the enhancement of the lives of community at risk. The study indicated that it is possible to mitigate the increased disaster risk and vulnerabilities caused by the identified hazards. The developed CBDRM model could provide a more holistic and comprehensive approach to disaster risk management in the province.

Recommendation

Based on the findings where the CBDRM Model is emphasized, an immediate approval and assistance of PDRMC on the implementation, monitoring and evaluation is recommended. Additionally, coordination and networking among LGUs are important to build a strong and sustainable support system especially before, during, and after a disaster. Partnership of the academe, LGUs, and other development oriented organizations has to be strengthened in order to optimize its

resources for CBDRM. Most important is the contextualization of the CBDRM framework appropriate to the conditions, vulnerabilities, needs and capacity of the LGU and the affected communities, all to make CBDRM initiatives become an effective mechanism to transform disaster stricken communities into more resilient ones.

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