

CHAPTER 8

Community-based Flood-risk Communication Management Framework and theory towards Risk Reduction

Towards a more integrated flood risk communication management approach

Utilizing the context of the Davao City's flood vulnerable communities (Basa, 2017; Boquiren, 2017; Bustillo, 2017; Carillo, 2015; DRRMO reports, n.d.; Figureoa, 2019; Revita, 2018), the approach to its risk communication must consider the integration of flood risk communication with the disaster management cycle. This approach reinforces various studies which revealed that flood risk management is greatly affected by different factors (Kreibich et al. 2005; Kreibich et al., 2011b) and the responses to flooding incidences are affected by changes in preparedness practices (Kreibich et al., 2011a; Helsloot & Ruitenber, 2004; Howard et al., 2017; Kerstholt et

al., 2017), the flood vulnerable communities' adaptation practices to flooding are developed through time (Kreibich et al., 2017; Kreibich et al., 2007; Kreibich & Thielen, 2009). Moreover, Thielen (2016) emphasized that: (1) flood risk awareness leads to precautionary actions if effective risk communication and management is implemented; (2) flood hazard information, precautionary measures and coping possibilities should be linked more effectively to provide a more context-specific approach; (3) timely and reliable warnings especially to low-lying areas should be given in the event of rainfall in the higher areas; and, (4) training of communities to ensure alertness and precision of flood responses should be encouraged.

In the current set-up of Davao City, the risk communication system is greatly influenced by the existing policies and frameworks in compliance to the RA 10121. Despite the fact that after the 2011 flashflood, the flooding incidents of 2013, 2017 and 2018 revealed that communities and agencies involved are better prepared and interoperability among agencies have been observed (Boquiren, 2017), the residents of the flood vulnerable communities expressed that they would be more confident and secured if they can participate in the planning and operationalization of risk reduction strategies. Thus, there seems to be a gap in the implementation at the community level in terms of the lack of

a “community-based” approach to empower the communities to practice “self-protection” and “independent coping strategies” (Thieken et al., 2016; Tselios & Tompkins, 2017). Moreover, survey respondents and FGD participants have expressed that they are willing to participate and provide inputs in the crafting of appropriate risk reduction strategies that will help them in improving their awareness, preparation and response to flooding incidences in their communities.

To address this, the following insights were derived from the results of the study as the guiding parameters in the proposed framework:

(1) Balanced and coordinated strategies for reducing risk and coping with impacts of flooding should emanate from the community levels towards the different agencies involved, involving a simultaneous approach of “top-down”, “bottom-up” as well as horizontal communication flow to encourage a transactional communication process among all the involved sectors.

(2) Transboundary and cross-sectional cooperation should be encouraged. Risk reduction and disaster response must be coordinated among various stakeholders and concerns must be systematically identified and anchored in flood-risk management plans that clearly defines the context-specific concerns of the communities.

(3) A localized and participatory approach must encourage the involvement of the communities, in particular, encourage risk dialogue to enable local interests, experiences and knowledge to be integrated into locally adapted risk management strategies.

(4) Formulation of binding regulations or policies for incorporating the community concerns in the planning process to enhance coping mechanisms and capacities.

The findings of this study are consistent with findings from other disaster studies which emphasized the significant role of risk communication (Comfort et al., 2007; Mercado, 2016; Pidgeon et al., 2003; Kaspersen et al., 1988; Terpstra et al., 2009; Lindell & Perry, 2012; Duckett & Busby, 2013). Disaster risk reduction (DRR) strategies in this context can be enhanced through proper knowledge development and dissemination of flood-risk communication from the different stakeholders that would eventually implement the strategies presented therein. Consequently, focusing on how the communication tools and messages can be made more relevant to the target recipients. Effective communicative processes and practices are widely regarded as core to disaster and risk management (Howard et al., 2017; Bradley & Clarke, 2014; Clerveaux et al., 2009; Cole & Fellows, 2008), however, the need for coordination and integration play a significant role (Comfort & Kapucu, 2006; Kubicek et al., 2011). Thus, a

community-based intervention is necessary whereby community perception, attitudes and behavior towards flooding as a result of their past experiences should be documented and highlighted as the major outcome from interaction between legislation, organizational policies and practice, collaborative and participatory actions that can be transformed into a community norm towards flooding incidences.

As various studies in the literature presented that coupled systems of humans and nature are complex in terms of how they anticipate and respond to natural disasters, the complexities present great uncertainties for many facets of society. The capacity to deal with the types of uncertainty and surprises will require novel approaches, creative combinations of strategies, and the ability to adapt in a changing environment. Accelerating learning and supporting novel approaches that limit vulnerability and expand our understanding of the occurrence and impacts of natural disasters seem to be critical components of building community resilience. Hence, the risk communication approach must be tailored-fit according to the context of the specific community and encourage the sharing of experiences and adaptive measures across the flood-vulnerable communities so as to document and select appropriately the messages and tools for the communication.

Results of the study revealed that Davao City's flood vulnerable communities are resilient since the communities have the capacity to "bounce forward" following an adverse event such as a flooding disaster or crisis (Houston, 2018; Maxey et al., 2013; Rufat et al., 2015). This is proven by the residents' decision to stay in the flood vulnerable areas despite the impact of flooding occurrences that they have experienced over the years. They have resorted to using adaptive strategies instead. However, majority of the respondents are hopeful that they can improve their strategies if they are properly guided and educated about flooding, the risks involved and the appropriate preparation steps that they need to know. Norris et al. (2007) states that as different models of community resilience have emphasized various adaptive capacities that contribute to collective recovery, capacities of information and communication, community competence and social capital as crucial to community resilience (Australian Red Cross, 2013; Daniel & Meyer, 2015). Ultimately, due to the collective nature of community resilience, communication is a core concept that cuts across other components or elements of the complex adaptive systems (Comfort et al. 1999; Dickens, 2012). O'Neill (2004) argues that from a risk communication perspective, both individual and community concerns must be recognized as components of community resilience. As such, it also recognizes that communities and organizations operate as

networks and groups rather than as discrete individuals. Thus, instead of focusing only on the implementation of the disaster risk management through the agencies involved, a risk communication on a localized and participatory approach is being envisioned by the flood vulnerable communities. Results also revealed that they have expressed the willingness to cooperate and participate which gives them the ownership and accountability for their own safety against flooding occurrences.

The RP Gazette (2012) discussed that the Philippine Disaster Reduction and Management Act (RA 10121) provides a comprehensive, all-hazard, multi-sectoral, inter-agency and community-based approach to disaster risk management through a framework that promotes the development of capacities in disaster management at the individual, organizational and institutional levels. It also recognizes local risk patterns and trends and decentralization of resources and responsibilities and thus encourages the participation of NGOs, private sectors, community-based organizations and community members in disaster management. The barangays involved in this study have admitted that they are still dependent on the city level DRRMO due to its lack of manpower and insufficiency of funds. Hence, there is a need to review the community level implementation of the DRRM and encourage a more proactive approach by institutionalizing

a uniform attention on this matter across the flood vulnerable communities. To address the centrality of risk communication towards a more context-specific and community-based approach, the following should be the underlying principles of the proposed framework:

Institutional Mechanisms. This includes the policies or legal basis of the agencies task/function, the communication protocols or procedures, and the flow of communication and the expectations of both the organization and the community. Institutional structures and mechanisms for inclusive disaster risk governance can be achieved through participatory processes that can lead to a participatory and collaborative policy making which involves the government institutions, stakeholders and the affected communities.

Thus, in relation to the national policies, the local government units, specifically, the barangays can be empowered by initiating participatory approach in developing the awareness, preparedness and mitigation strategies of the community. The inputs based from the experiences and local knowledge of the communities can be integrated into the DRR plans. Thereby capturing the specific contexts of the different areas on disaster-related communication intervention tools. Capturing a paradigm shift on disseminating polices from a top-down to a localized participatory approach.

Based on the results of this study, Davao City has been compliant and very active on DRR and CC related programs, however, they admit that there is still no City Ordinance that captures the de-centralization of communication tools that will encourage the barangays to “localize” the materials as distributed by the national and LGU levels. There are some barangays that initiated this approach, but, since it is not mandatory, majority of the barangays utilize the materials from the national level. Hence, capturing this initiative into a City Ordinance will be a point of consideration for a policy alternative. Thus, empowering the communities and ensuring the sustainability of the knowledge transfer. A community-based approach will be more appreciated by the communities since it can now be a contextual approach, catering to their specific concerns and interests. Continued development in lowlands and the increase in population in the next years is expected to also increase in disaster-related damages. Thus, there is a need to shift from the response-oriented to a proactive DRR interventions at the local levels. Modifications from a decentralized to a localized DRR communication tools can be one strategy that would help increase the effectivity of the awareness, mitigation and preparedness at the level of the local communities.

The case of flooding in Davao City challenges the national policies on DRR and CCA and reflects that it should

not only be approached within the confines of Davao City geographical boundaries. It is multi-dynamics, and cross boundary issues. In this light, it is recommended for stakeholders to harmonize efforts and initiatives and find areas to work together given their varying interests – be it political, economic and environmental. It is also best to explore the ecosystem based and community-based adaptation measures. The latter will have significant contribution to building more resilient communities as it is ‘a community-led process, based on communities’ priorities, needs, knowledge and capacities, which should empower people to plan for and cope with the impacts of climate change’ (Reid, 2015). Furthermore, it builds on human rights-based approaches to development that target the most vulnerable people and fully includes them in all levels of adaptation planning and implementation. In recent years, CBA has shown that it can also operate at scale but with communities remaining central to planning and action, for example through mainstreaming into government processes.

Alternative Policy Recommendations. Three major areas for policy recommendation in line with the institutionalization of a “localized” DRR communication intervention may include the following:

- 1) Create a working group that will integrate disaster communication protocols from the community-level for integration with the plans of the different agencies involved,

emphasizing the following concerns: inclusion of the 63 flood vulnerable communities; examine the risk perception and local knowledge and practices in risk reduction and evaluate the community's perception and reception of the current risk communication system as well as their assessment of the LGUs efforts on risk reduction.

2) Craft a Manual of Protocols for guidance of appropriate responses and actions from the different agencies, highlighting the significant role of the institutional frameworks, interoperability mechanisms vis-à-vis the integration of the community's varied contexts on disaster incidence, as follows: identify the specific agencies and provide plans for a community-based and participatory communication plan and present to stakeholders for comments and inputs from both the communities and the agencies.

3) Specify a period of implementation and the corresponding evaluation after an appropriate timeframe in the conduct of reception analysis, development of "localized" materials and implementation of community-based trainings and seminars.

Creating a community-based disaster reduction approaches is of significance at times where local knowledge, experience, communication networks and social capital are needed to capitalize on reduction of vulnerability and ensure

collective response to disasters. The effectiveness of “localized” and participatory risk communication is closely associated with internal factors that affect an individual’s capacity to access and use information, with external factors related to entitlement properties of communities or individuals at risk and their ability to communicate effectively within a socio-political context (Mayhura, ND). Thus, a City Ordinance to this effect will benefit a total of 182 barangays of Davao City once approved and adopted.

Within the above broader framework, local authorities can play a pivotal role in facilitating community action through the following interventions which are similar to Kafle and Murshed (2006):

- Establish policies as per the local needs
- Identify and prioritize most vulnerable communities
- Conduct local and community level risk assessment
- Document local coping mechanisms and expertise
- Development of local disaster preparedness plans
- Facilitation of community level preparedness planning
- Establish local and community level Early Warning Systems (EWS)
- Capacity enhancement of community volunteers and groups; e.g. training on search and rescue, extrication

of the trapped from buildings, first aid, firefighting, swimming, evacuation drills and risk assessment, etc.

- Regular upgrading of disaster preparedness and mitigation plan
- Providing resources to community volunteers and groups; e.g. medicine kits, rescue equipment, survival kits, warning equipment, firefighting equipment, evacuation equipment (boats, transport) etc.
- Establish safe storage of essential items near vulnerable locations; e.g. food, medicine, rescue equipment, earth moving machinery etc.
- Establishment of temporary shelters at vulnerable locations to host affected people; local level emergency response teams comprised of the residents and local relief distribution teams
- Coordination and networking among all stakeholders

Flood-Risk Amplification Communication Theory

A critical prerequisite to effective disaster management is the minimization of related impacts through communication of risk information in a timely manner and in a format that all stakeholders can understand. Attaining this mandate can be a major challenge for disaster managers, especially in an increasingly globalized world characterized by higher levels of multi-culturalism as increasing numbers of people migrate to

locations outside their culture-zones where, not only language differs, but also perceptions of and attitude towards hazard/disaster risk (Martin, 2003). The challenge for disaster managers is therefore to design effective tools/strategies that not only span language differences, but also take into consideration cultural perceptions and attitudes so that the objectives of disaster risk-reduction can be achieved. Moreover, it is also best to explore the community based adaptation measures to building more resilient communities as it is “a community-led process, based on communities’ priorities, needs, knowledge and capacities, which should empower people to plan for and cope with the impacts of climate change” (Reid, 2015) and ultimately makes community more resilient to natural disasters and enable them to pursue dynamic future despite the challenges of these disasters.

Results of the study show that the flood vulnerable communities are composed of individuals from different cultures due to the migration of populations towards the urban communities. Alexander (2012) emphasized that culture is a set of nested phenomena, thus, people respond to different cultures related to national, regional and local settings; peer groups, families and workplaces; ethnic and social groups; gender and race; and interest groups. Moreover, culture undergoes a constant process of metamorphosis as it adapts to the changing circumstances of the modern world and how we

are able to interpret it. As a result, there are very few reliable measures of culture. If one wants to promote change, success is more likely if it is compatible with the prevailing culture, while if it runs against the culture, the adaptive process is likely to be blocked for apparently illogical reasons. Moreover, Simon (as cited in Alexander, 2012) viewed that culture is dynamic, thus, a lot of factors can still be utilized to explain the relationships of man, environment and the institutions. These factors are important sources of cultural uniformity that would allow the community-based comprehension, appreciation and response to disaster situations. Hence, it encourages the idea that communities can help develop participative approaches in building localized and participatory strategies for disaster resilience (O'Neill, 2004; De los Reyes & Francisco, 2015; Kafle & Murshed, 2006).

Similarly, social vulnerability models (Wisner et al., 2012; Gall, 2013; Abramson et al., 2010) to disaster can be utilized for future disaster resilience studies that can further examine the relationship between man and environment towards a human-ecological dimension. In the process, the Systems approach can better explain and show the inter-relationship and integration of man, environment and the institutions, showing that the existing approaches in disaster studies are linear, thus, fails to look at the human ecology aspect of the situation (Stokols et al., 2013). Consequently, Alexander (2012)

proposed an alternative approach to the study of disaster resilience to address this gap in the area of disaster and resilience studies showing the possibility of evolution of human ecological models of disaster from a linear to a transactional approach, incorporating culture as part of the equation, thereby, contextualizing the study of disaster and its impact to humans and environment. Increasing knowledge of disasters and the social processes involved, and the complexity of life in the early 21st century, suggest that a new model ought to be formulated which reflects the vulnerability of human socio-economic systems as acted upon by physical hazards (whether natural or anthropogenic), as well as cultural and historical factors. Thus, a social-ecological approach provides a deeper understanding of the complex, trans-disciplinary and dynamic processes of adaptation and counter-adaptation highlighting the interplay of human and ecological systems integrating the scientific-physical systems knowledge, symbolic-experiential and socio-cultural systems (Stokols et al., 2013).

Utilizing the results of this research from the concerned agencies and the communities' awareness and assessment of the communication systems and the perception, behavior and experiences of the flood-vulnerable communities provided the inputs on how to design and develop a risk communication management appropriate for the context of Davao City.

The following significant gaps were considered in the proposed framework:

- (1) The current communication systems implement a “top-down” approach and the feedback mechanism is weak or very limited.
- (2) The concerned agencies, which, may serve as the “amplification channels” can tailor-fit the risk messages according to the context of its target recipients.
- (3) The ripple effect as presented by SARF shows that the extent of reach does not transcend towards the household levels.
- (4) Risk perception and awareness of risk messages may be present, but the preparedness level of the communities can be attributed to the experiences that they had on flooding.
- (5) Assessment of the risk communication systems was significantly based on their familiarity of the communication tools as sources of information on flooding.

A community-based adaptation could be in the form of a flood-risk communication management at the community level and making it the central source of the amplification to address the dynamic, transactional and localized approach. Thereby synchronizing the DRR approach at the community levels. Specifically, focusing on the following major key areas:

- (1) Strong community-participatory focus – encourage collective mitigation and response strategies
- (2) Empower the communities to establish DRR strategies that are context-specific to their situations and experiences --- enhance indigenous/local DRR knowledge
- (3) Provide capacity-building trainings to the community
- (4) Encourage effective and appropriate use of the communication channels and tools

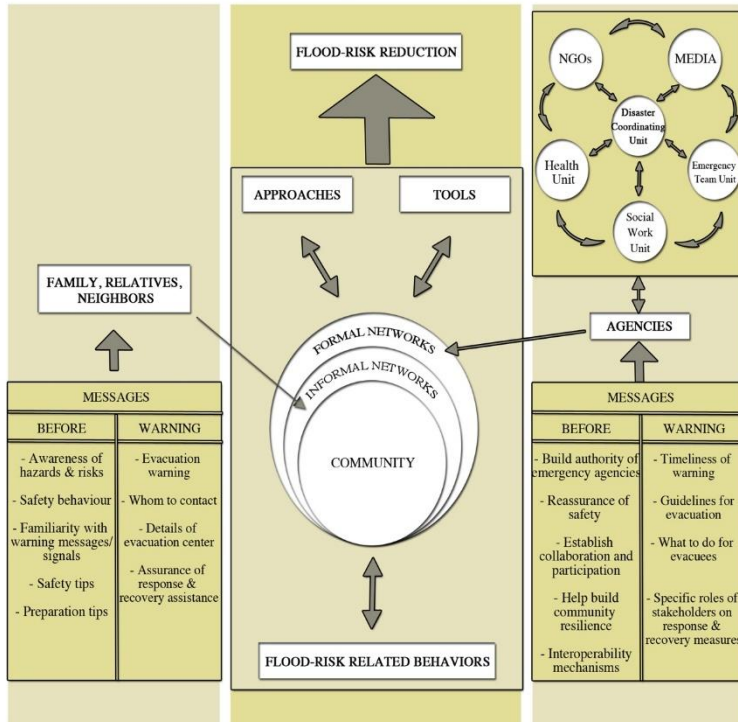
Figure 26 shows the community-based flood risk communication management framework, adopting the SARF model to highlight the different stages of the process. The modification in the SARF is the integration of the community-based inputs like the community’s perception of risk, experiences on flooding, awareness of the communication systems, their attitude and assessment and their practices. As the results of the study show that the extent of reach as to the barangay level only covers level of officials of the barangay, it should be part of the proposed theoretical framework that the community level should be considered as the sources of information as regards their experiences and adaptation practices on flooding incidences. The central element, then, would be the individuals at the community level who amplify the experience through an integrated amplification system which integrates the amplification stations with the “ripple

effect” or reach of the community’s flood experiences and practices to include the informal social networks (family, relatives, neighbors) as well as the formal social networks (opinion leaders, different volunteer groups, media and non-government agencies). From this, a strategic triad for risk communication would determine the appropriate messages that are context-specific to the different vulnerable communities reflecting the lessons based on the experiences and its role in the communication planning that would account for the selection of the approaches and tools. The information mechanisms involved shall be coupled with the selection of the appropriate communication messages that will be utilized in the communication materials. This, however should be guided by the institutional mechanisms that have been crafted integrating the local communities’ context, dynamics and capacities. The strategic risk communication can be utilized for the risk reduction and management at the community levels, utilizing the interoperability of the agencies involved and inclusion of the BDRRMCs who implements the strategies, monitor its outcomes and gather feedbacks at the level of the communities. Compared to the original SARF which has a linear “top-down” communication system, the proposed theoretical framework will generate its information system from the community’s inputs as to their reception of the risk

messages, awareness of risk, their flooding experiences and their level of preparedness.

Figure 26

Community-based flood risk communication management (CBFRCM) framework



Since results of this study revealed that the practice of the communication systems on flood risk is top-down approach and have some areas that can be improved by engaging the communities, a localized and participatory strategy is encouraged. Respondents of this study expressed that sharing of best practices and their experience in flooding

can be on strategy to strengthen the awareness and preparedness level among them. Hence, the same strategy as espoused by the Canadian guide to effective flood risk communication (Mackinnon et al., 2018) can be adopted to address the SARF model's integration of the community as the amplifier or attenuator of the risk messages instead of the concerned agencies. It is hoped that an interactive collaboration would translate into a more appropriate and effective flood-risk communication management for Davao City.

The Elements of the Flood-Risk Amplification Communication Theory (FRACT)

The **Flood Risk Amplification Communication Theory** as a proposed framework reflected in Figures 26 and 27 recommends that the community becomes the main actor in the amplification of risk. Hence, a shift from event centered to people centered approach. The flood-risk behaviors of the communities serve as the major source of the messages involving the integration of all the stakeholders into a strategic risk communication approach towards flood-risk reduction. Moreover, it also involves the interdependent transactional process among the following elements:

Strategic Risk Communication

The US Food and Drug Administration (2009) and the Ministry of Health in Canada (2006) both defined strategic risk communication as a “purposeful process of skillful interaction with stakeholders supported by appropriate information” as an essential component of integrated risk management. It can help decision-makers and stakeholders make well-informed decisions leading to effective risk management.

Results of the study show that interoperability among agencies is the focal emphasis on disaster management, however, there is still a lack of risk communication management which aims to address the integration of risk communication with disaster management.

Since risk communication is described as “an interactive process of exchange of information and opinion among individuals, groups and institutions about the nature of risk, people’s perceptions, and actions that can be taken to deal with the risks” (Rafle & Murshed, 2006), it would be beneficial if this can be a replicated approach in all the stages of the disaster management cycle. In this context, the dynamic interconnections between and among the “amplification stations” involved as well as their specific role in the communication process and organizational linkages will be considered central to the implementation of the strategic triad which would consider both the reach of the information and

the appropriate approach and tools to be used including the channels and messages therein. The conceptualization, planning and designing of the risk communication system would involve the integration of the amplification and reach as the core element of the risk communication and framed accordingly within the strategic triad of communication. Thus, the crafting of the risk communication at the community level would involve a participatory approach which is guided by the appropriate institutional mechanisms and can provide a risk management approach for implementation of the different agencies involved in an interoperability mechanism which include the community engagement and individual inputs.

Results of the study also reflect Kasperson et al. (1988)'s view that amplification occurs at two stages the in the transfer of information about the risk and in the response mechanisms of society. Social amplification of risk denotes the phenomenon by which information processes, institutional structures, social group behavior and individual responses shape the social experience of risk, thereby contributing to risk consequences. The amplification stations or the "filtering of signals" involve the information systems and the communication channels to determine the reach or the "ripple effect" of the information. This process involved that the individual is a separate component from the social amplification stations, this framework, however, proposes that

the amplification starts from the individual and integrates the amplification stations with its reach to have a dynamic and transactional process of direct and indirect effects that can influence the strategic planning of the communication system.

The individual's risk perception revealed in this study is influenced by the experiences in flooding and therefore creates self-imposed behaviors and responses to flooding incidences. Cantrill (2011) emphasized that the role of individual perceptions is the result of overlapping sets of cognitions, both arising from experience that create the person's personal vision of their role and connection to the environment. This can provide dynamic and integrative perspective for understanding the relationship between psychological predispositions, social interactions and the perception on a local level. Thus, it can serve the value of consciousness of local citizens to cooperate with others to achieve desired outcomes. Moreover, Weinstein (1989) viewed that personal experience is widely believed to have a powerful impact on the recognition of risk and the willingness to take extra precautions. The interest in prevention that seem to follow disasters is viewed as evidence of the effects of experience. O'Neill (2004) has also noted that several studies have highlighted the role of personal experience of disasters as a driver of heightened risk perception, thus, creates self-protective behaviors. This is also supported by scholars like Krimsky and Plough (1988) who observed that

the perception of threats must be viewed as social construction and the social amplification of risk (Kasperson, 2001; Pidgeon et al., 2003) and suggested that individuals encounter interpersonal or mass-mediated account that heighten or diminish the significance of an issue.

Goal towards Flood-risk Reduction

A community-based approach accounts for the implementation stage utilizing a multi-lateral knowledge development approach combined with the interoperability or the dynamic interconnections between and among the agencies involved as well as the inclusion of the community and individuals in the process.

The findings of this study revealed that local residents of the flood-vulnerable communities had experiential knowledge on flooding that has helped them create practices to reduce vulnerabilities, it can become a useful tool in crafting the risk communication appropriate in the context of the flood-vulnerable communities. An effective output that can be developed from a multi-lateral knowledge development is the creation of an integrated Early Warning System (EWS) at the community levels. The risk communication infrastructure would address the appropriate tools for specific audiences and identify the effective interaction among the main actors such as the scientific community, decision makers, stakeholders, the

public and the media. Close coordination between the community, the experts and other concerned groups should work towards a “tailor-fit” and specific approach using the multi-lateral knowledge development approach.

Stakeholders

Stakeholders can be viewed as any individual, group, or organization that may affect, be affected by or perceive itself to be affected by potential risk. In the context of this study, the stakeholders include: the community, the informal networks (family, relatives, neighbors), formal networks (the decision-makers of the concerned agencies, particularly, coordinating unit, the health partners, the emergency teams, the NGOs, the media, among others).

Community. Results of the study also show that a review of the past flooding incidences allowed local authorities to identify the vulnerabilities, experiences and coping mechanisms of the community. However, the gathering and documenting of this information in close coordination and consultation with the involved communities has been disregarded. Thus, it lacks recognition on the community inputs that would help analyze the impact of flooding to the individuals and communities at large, reduce their vulnerabilities, timeframe of recovery as well as identify the appropriate resources and capacities necessary to build

community resilience as well as find out their expectations in terms of mitigation and preparedness levels. Respondents expressed that a more effective risk communication strategy and risk reduction and management can be crafted that would address a “tailor-fit” mechanism to address their sentiments and concerns.

This finding is reinforced by the idea that the key aspect of community involvement is the sustainability of the community level initiatives for risk reduction and management. External agencies like government, non-government organizations and other volunteer groups may initiate and implement community level programs for awareness and preparedness, however, if it does not reflect the “realities” of the community, sustainability is threatened by the lack of partnership, participation, empowerment and ownership of local communities (Kafle & Murshed, 2006). Individuals and communities have some vitally important assets to deal with disasters like flooding. The top-down approach fails to address specific local resources and capacities and may even increase their vulnerabilities. A bottom-up approach includes the following general elements which can be adopted for the Davao City context:

- Local people are capable of initiating and sustaining their own community development

- While role of local government, private sector and NGOs is important, the primary requirement for grassroots development is with local leadership
- A successful “localized” strategy will include broad-based local participation in comprehensive planning and decision-making activities that promote motivation
- Educational opportunities should correspond to identified local needs
- Emphasis is on improving the utilization and management of local resources
- Responsible utilization of outside financial assistance is required
- Replication of a community’s success is a powerful factor in continuing local initiative
- Responsibility for change rests with those living in the local community
- Various community members and groups in the community may have different perceptions of risk and varying vulnerabilities

Informal social networks. The acceptability of the respondents of the vital role of the informal social networks (in the context of this study included the family, relatives, neighbors, among others) in their motivation to respond to flooding is also considered. The roots of social amplification

lie in the social experience and an indirect or secondary experience, through information received about the risk, risk events and management systems. Many risks are not experienced directly, when direct experience is lacking or minimal, the social amplification stations take its role. The informal social networks account for the informal communication networks formed through the linkages that exist among families, relatives, neighbors and within co-workers in the workplace (Kasperson et al., 1988). Social and informal networks can provide the information that may work best in raising awareness of the hazard and the associated risks. Moreover, O'Neill (2004) emphasized studies have shown that people make decisions about their response a severe risk in consultation with their family and in the context of the community climate. Communities take a variety of forms based on a sense of cohesion and mutual interest and include spiritual, ethnic, political or through their locality. Thus, communities should be considered as systems: interconnected networks of individuals and groups linked by shared experiences, values, norms and beliefs and these systems can enable or disable a community's response to disaster (O'Neill, 2004). This is revealed in the 2011 Davao City flashflood incident, where the social networks have been the contributory factor in the community's response to the disaster (Cayamanda & Lopez, 2018).

In terms of influence of the informal social networks on the response of individuals to flooding, the results of this study highlight that actions taken by individuals and households are greatly affected by the social networks (Haer et al., 2016). People's tendency to implement protective measures increases when they see their relatives, friends and neighbors implementing measures, either through observations of their actions or by verbal persuasion which confirms Kasperson's idea of amplification of risk perception is largely affected by the transfer of information through the interpersonal networks. In addition, Scherer and Cho (2003) confirmed that social linkages in communities play an important role in focusing risk perceptions and build "groups or communities of like-minded" individuals.

Formal social networks. Evidently, flood vulnerable communities in Davao are aware that formal social networks also play a significant role in disaster mitigation, preparedness, and response. This is similar to Allen's (2006) view that barangay communities are the appropriate level for community-based disaster preparedness intervention since it has the capacity to collectively identify problems, take decisions and act on them. Moreover, the presence of an administrative identity and formal leadership structure comprising an elected captain and appointed councilors and purok (zonal) leaders form the decentralized local government

system that provide firm foundation for community mobilization. As such, building local coping and adaptive capacity can be enhanced through various mechanisms highlighting the local-specific experience and impacts as the core of the process of identifying, planning and implementing interventions. However, the role of existing structures and community institutions may be overlooked by external agencies engaged in local capacity building due to the multiple functions or inconsistencies with “institutionalized” formats. Thus, there is a need to empower the community by enhancing the capacity of local institutions to access and maintain control of funds, but, performs as part of a wider network. Hence, take decisions and acts independently but operates in collaboration with a bigger network. Integration in formal social networks can increase the potential ability to share knowledge, accountability and empowered decision-making at community levels as well as encourage strategic thinking in a more long-term capacity.

Flood-Risk Related Behaviors

The communities have expressed that there are concerns that needs to be addressed as to the politics, policies and communication system at their level. It was shown that their assessment of the barangay efforts was influenced by their familiarity of the communication tools as sources of

information, however, their preparedness and response on flooding was based on their experiences with flooding. This represents the lessons which account for the listening to what the flood vulnerable communities have to share and say, their understanding of risk, barriers to communication reception and socio-demographic factors as well as elicit from them stories that may help formulate the localized or contextual approach of the communication. This translates into consultation and public dialogues between the agencies and the affected communities. A more defined structure and regular interaction among the communities can be done to establish linkage and mutual trust. It would also allow the communities to take responsibility with appropriate assistance from the different sectors considered as experts. Dynamic, transactional and two-way communication is necessary. Finally, close monitoring and coordination should be done to document best practices and strategies that would work best for the communities. This would be an opportunity to document feedback and suggestions from the communities that can be used for the improvement of the risk communication system. Moreover, results of the study revealed that the communication networks and flow of communication is usually “top-down” and lacks opportunity for feedback which is not reflective of communication as a dynamic process with a twofold purpose that can foster learning, positive change and

empowerment and that context plays a key role in communication for risk reduction (Abarquez & Murshed, 2004). Thus, the sociocultural context of the flood-vulnerable communities as well as gender perspectives and scale of community (rural, small or mega) does not determine how communication is implemented and often leads to non-cooperation or non-participation of some individuals. As communication planning occurs in an organizational context and is embedded in institutional cultures with specific agendas, it must take place in a context of risk assessment, risk intervention and risk evaluation, making it a strategy that is executed within disaster risk management and reflective of the community's needs and expectations in most times. Also, social vulnerability is key to determining the methods of communication and therefore people, complex social systems and non-structural solutions should be analyzed. As results of the study revealed that respondents are aware of their vulnerability to flooding, they also accept the fact that they should do something about their situations but lacks the opportunity to do so.

Approaches

This would account for the integration of the lessons from the community-based interaction and the strategies for implementation of the communication plan which includes the

information flow, multi-lateral knowledge development and the interoperability mechanisms. Strategically, it would be beneficial that the community's perception, experience and best practices on flooding be made as part of the "technical" communication coming from the concerned agencies, highlighting the gaps and addressing the misconceptions if there are any. This would show how much is their awareness and perception of risk as well as their personal preparedness level on flooding. This however, should be done based on consultative and interactive process, thereby engaging the community in the crafting of the flood-risk messages and risk reduction management.

Information Flow. Results of the study show that the current implementation of the risk communication system in Davao City reflects a top-down approach wherein the policies and actions in DRR are formulated and designed consistent with the command-and-control and technocratic strategies which involve structures to mitigate hazards, warning systems that are technology-based and one-sided risk awareness campaigns. Frameworks for a top-down approach are dependent on transmission of information and knowledge that initiates from the practitioners, policy-makers or disaster managers. This approach, however, as the respondents confirm, does not address the gaps that may be provided by the local communities since they are the ones affected directly

by the disasters. Hence, a bottom-up approach is being recommended to pave the way for the increasing demand for a community-based disaster risk reduction and management approaches which advances and promotes involvement of the highly vulnerable populations in evaluating their own vulnerabilities, risks and the practices to reduce it. Moreover, it can empower the flood vulnerable communities to be adaptive utilizing their own local resources. However, the dichotomy between the top-down and bottom-up approaches is vital in recognizing that both should be utilized to ensure a more effective, participatory and transactional DRR approach. Similarly, the risk communication system in this framework encourages the integration of the top-down, bottom-up and horizontal communication flow as its structure to encourage the localized, participatory and inclusive approach.

Multi-lateral knowledge development. Although specified in the NDRMP that there should be an integration of the scientific/technical and local knowledge in the disaster risk reduction and management approach, results of this study revealed that the Davao City DRRM practices are implemented using the information designed and crafted by the “experts”, usually relayed through a top-down approach and has little room for feedback from the local communities. This framework highlights the need for the adjustment of technical/scientific information according to the local

knowledge and practices in developing strategies for a community-based risk communication system. It is imperative that the scientific community, decision-makers and the local community should work together to ensure that local knowledge and practices be incorporated with the existing scientific/technical knowledge for a context-specific information which is similar to Okada, Norio and Yoko Matsuda (2005)'s emphasis on a multi-lateral knowledge development can be a perspective for risk communication to increase disaster preparedness at the community level. Creating a community-based disaster reduction approaches is of significance at times where local knowledge, experience, communication networks and social capital are needed to capitalize on reduction of vulnerability and ensure collective response to disasters (Cutter, 1996). The effectiveness of "localized" risk communication is closely associated with internal factors that affect an individual's capacity to access and use information, with external factors related to entitlement properties of communities or individuals at risk and their ability to communicate effectively within a socio-political context. In addition, Allen (2006) stressed that various mechanisms can be employed to build local coping and adaptive capacities which include close coordination with technical experts to understand technical information and work with disaster managers for awareness of risk and

vulnerability as well as trainings for preparedness and disaster response. Mobilizing local people of the community can be strengthened if they are knowledgeable and informed of the risk information associated with the disaster. Moreover, Christoplos et al. (2001) viewed that understanding the complexities of risk and its communication to the public at large is dependent on the significant role of actors and their contribution to create a multi-sectoral operational priorities and programs. There should be a harmonized understanding among the scientific community, government agencies, local institutions, the NGOs and the community. Working on standardization of concepts and information messages that are understandable by all the sectors would motivate for a better and more effective collaboration and collective action at times of disaster preparedness and response.

Interoperability Mechanisms. The results of this study revealed that there is an interoperability of agencies that helped manage risk and disaster communication, however, this is only clear and defined at the higher-level agencies. This finding was affirmed at the community levels, particularly, the flood-vulnerable communities. The integration of the different forms of knowledge, experiences and actions in the practice of a community-based approach can only be possible when all the stakeholders participate and interact in the process. Thus, there is a need to include all sectors concerned from the individual

to the community level up to the national level. This is in keeping with the general considerations in the ‘priorities for action’ within the Sendai framework for 2015-2030 (UNDRR, 2019b) where there is the expected interoperability of the implementation of the policies to address collaboration among agencies for disaster awareness and preparedness through aggressive risk communication strategies, the need to strengthen disaster risk governance and management and the enhancement of disaster preparedness for effective response.

This proposed theoretical framework recommends that the approach be modified to consider communication, coordination and control which is very significant for inter-governmental specifically on risk management (Comfort, 2007; Comfort, Go & Zagorecki, 2004; Comfort et al., 2004) be extended at the level of the communities.

Similar to the findings on lack of appropriate community-based management and interoperability is contrary to an ideal set-up similar to Comfort (2007)’s view that there should be a “common operating picture” so as to encourage clear communication and effective coordination among agencies and interoperability across the multi-sectoral approach is achieved. Moreover, Christoplos et al. (2001) emphasized the role of a multi-sectoral and harmonized approach to disaster preparedness and response can be enhanced through an information system that has been

developed through participatory and collaborative approach and diverse approaches from different actors in the process have been harmonized and standardized.

Coordination has always been the major objective of all disaster management approaches. It means aligning one's actions with those of other relevant actors and organizations to achieve a shared goal and this is dependent on the effective communication process. Control, on the other hand, in the context of disaster operations, refers to the capacity to focus actions on the shared goal of protecting lives, property and maintaining continuity of operations. Such that this is achieved through shared knowledge, commonly acquired skills and reciprocal adjustment of actions to fit the requirements of the situation. Thus, interoperability plays a significant role in disaster risk management at all stages of the disaster cycle. It can be re-framed as a complex, adaptive system that adjusts to the situation which is dependent on the information infrastructure that can facilitate the process of communication, coordination and control among the participating actors and organizations (Comfort, 2007).

Communication Tools

Communication is very essential in risk reduction and management and may utilize different channels and tools such as written tools in the form of posters, brochures and flyers;

visual tools such as signage, billboards and directional signage; technology-based tools like GIS, internet, and mobile phones; mass media to include television and radio as well as face-to-face communication through trainings, seminars, drills and word-of-mouth. Comfort (2007) states that in emergency management practice, it has focused on the interoperability of mechanical devices such as hand-held radios, cellular phones and landline or telephone networks. However, Clerveaux et al. (2009) mentioned that in some situations, electronic devices may not be appropriate, thus, relay of messages during disaster response can be disseminated through the use of other devices such as loudspeakers, mobile patrol sirens, or oral communication by word-of-mouth among the residents. It can also be counter-productive since the effective working of these devices would directly be dependent on the common understanding of concepts and information among the communicators involved. Hence, if this aspect is to be given appropriate attention, the message contained therein should be harmonized and clearly understood (Comfort, 2007; Christoplos et al., 2001; Clerveaux et al., 2009; Reynolds & Seeger, 2005).

The study revealed that familiarity of tools of communication like use of brochures, posters, billboards or signage, face-to-face engagements, text messages and mass media has been the primary motivators for the high assessment

of the barangay efforts on risk communication. However, it was also pointed out that constraints on manpower and financial assistance becomes a barrier for the full implementation of the information dissemination campaigns at the household levels. To address this concern, it may be useful to engage the community in designing simple yet affordable communication materials that can be distributed among the households. Specifically, the use of factsheets, information cards, family disaster plan for the old to senior sectors of the community; while engage the youth in information dissemination among children through games and story-telling highlighting the risks of flooding and emphasizing on how to respond and behave during flooding.

Adopting Van Westen and Kingma's (CENN, n.d.) categorization of tools and channels of communication based on the needs of the community would basically cover the areas of early warning or awareness to prepare them for eventualities during flood incidences. This can be useful for the risk communication planners in the designing and planning of the messages that would be relayed to their communities. However, it is imperative that the crafting of the risk messages would be developed from a participatory and multi-sectoral approach incorporating the different levels of understanding and appreciation of the information from the different sectors and users of the communication.

Tools	Flood-Risk Messages	
	Early Warning	Awareness
Mass Media (TV, Radio, Newspaper)	X	X
Electronic media (WWW, SMS, MMS)	X	X
Audio-visual (video, audio, multi-media, animation, photographs, model, map, slide show, artwork, graphs)	X	X
Stand-alone print (billboard, poster, banner, warning sign, flood water level)		X
Face-to-face (meeting, seminar, workshop, conference, march, exhibition, demonstration, training, exchange visit, planning)		X
Distributor print (leaflet, pamphlet, brochure, booklet, guideline, case study, newsletter, journal, research paper, report)		X
Folk media (story, drama, dance, song, puppet, music, street entertainment)		X
People (community leader, volunteer, project worker, head of sectoral groups, i.e. tribe, women, youth)	X	X

Flood-Risk Messages

In the context of the study in Davao City, results show that risk communication has been seen as a system to be implemented ensuring the interoperability of the agencies but disregarded the contribution that may be given by the affected communities based on their experiences. This puts emphasis on the idea that conceptualizing the best way to communicate risk have changed over time, specifically, in regard to the incorporation of the individuals and the community in the risk

communication process. Feldman, et. al. (2016) viewed that previous risk communication was seen mostly as a one-way form of communicating with the public being regarded as the recipient of the information based on the expert's view as the salient point of the risk message. However, studies have also shown that gaps in reception were due to the difference of perception of risk between experts and the public (Okada & Matsuda, 2005; Feldman et al., 2016; Oh et al., 2014 Siegrist & Gutscher, 2006). Thus, it is crucial for a risk communication to consider its audience and encourage a participatory framing of the strategies and tools.

Since some of the concerns raised by the residents is the lack of opportunity for them to discuss and share their perception of flood risks and the best practices on response to flooding, they suggested that more community assemblies be conducted whereby dialogue and participation of all affected residents is encouraged. Open communication that can encourage sharing their inputs based on their experiences would enhance the warning systems that they have improvised, a more in-depth discussion on risk and awareness on flooding can translate moving from awareness level to more effective response to risk. Moreover, some technical information that they need clarification can be simplified and transformed into a more understandable risk messages (some of the respondents

shared that some local terminologies may work best for them than the technical terms).

The messages of the risk communication must place the receiver as the central component, hence, the communities are at the center of the risk reduction strategy. Content and interactions that can influence risk decisions and behavior should be included in the announcements, warnings, and guidance documents. The content may cover information that describe the risk event and associated characteristics as wells as encourage appropriate actions to mitigate or reduce the risks. In the context of this study, the focal point of the proposed theory is the pre-disaster stage which accounts for awareness and warning.

The messages for the informal social networks before flooding is targeted towards the awareness and knowledge about flooding which include: understanding of risks, the appropriate safety behavior and safety tips, familiarity with warning messages and signals and preparation tips. On the other hand, warning messages must specifically target uncertainty reduction, self-efficacy and reassurance which seeks to establish reduction in emotional turmoil. Thus, messages at this stage must cover information about evacuation warning, whom to contact, details about the evacuation centers and assurance of response and recovery assistance.

Likewise, the agencies involved must also be adequately prepared and can address the concerns of the communities. Since the approach is localized and participatory, agencies must build authority of emergency agencies as well as establish collaboration and participation from the residents. There is a need to reassure the communities of safety and help them build resilience. The interoperability mechanism should involve a transactional approach which highlights open communication, control, and coordination. For warning messages, critical is the timeliness of warning information relayed to all the stakeholders; specific guidelines for evacuation of residents when necessary as well as the mechanism to address the needs of the evacuees. It should also be clear what specific roles and expectations from all the stakeholders in terms of the response and recovery measures to standardize and synchronize actions.

To summarize, this study recommends a risk communication management approach which accounts for the integration of the findings of the examination of the current risk communication system as well as the awareness and perception of the flood vulnerable communities toward the risk reduction efforts from the national, regional and local levels. Moreover, the assessment of the flood vulnerable communities of these efforts which reflects the “gap” in terms of the localize and participatory approach.