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Innovative Public Management, Disaster Risk Reduction Management, and Resilience for Development

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ABSTRACT. Several practical and theoretical controversies in the current public management approach (PMA) of the local government in the Philippines significantly affect the practice of disaster risk reduction and directly affect the resiliency level of local communities. Thus, this study sought to explore "what innovative PMA is more relevant and effective in the practice of disaster risk reduction management (DRRM) to strengthen disaster resilience within the context of local government." Data were gathered through survey and focus group discussions and analyzed quantitatively and qualitatively. Results describe the PMA and the various DRRM practices of Legazpi City, Philippines as well as the City's disaster resilience level. An average score of 4.1 indicates that Legazpi City can be considered as a disaster-resilient community, having applied innovative practices that worked in its context. This was supported by the results of the correlation and regression analyses, showing that the City's PMA has a significant relationship with its DRRM practices and resilience level. A balance of participative-democracy and bureaucracy governance, complementation of scientific and local knowledge, combination of centralized and decentralized arrangement, and top-down and bottom-up approaches in public management are more practical and relevant in the practice of DRRM leading to more resilient communities. A model that can guide local government units toward a more effective, practical, and efficient approach to DRRM is proposed.

Keywords: *Disaster resilience, innovative public management approach, local government units, decentralized government system*

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INTRODUCTION

Governments today are confronted by a complex array of interconnected problems, including disaster. A changing society and environment fraught with existing and potential societal problems demand that local government units (LGUs) adapt and develop innovative approaches to deal with these challenges (Daglio et al., 2015). Innovativeness is necessary in public management especially in disaster management as it improves the quality of public services and enhances the problem-solving capacity of government organizations in dealing with societal challenges (Damanpour et al., 2009; Walker et al., 2011). Public sector innovation, according to Organisation for Economic Co-operation and Development (OECD), is about overcoming old approaches and embracing new strategies and ideas, or incorporating new elements to improve public services and efficiently and effectively accomplish desired goals (Daglio et al., 2015).

Disaster is a challenge worldwide and a serious threat to community development. It wreaks devastating impact on development, and economic losses are out of control (United Nations International Strategy for Disaster Reduction, 2010). The loss of lives, properties, and resources hinder the aims of community development. Hence, disaster is a complex issue that necessitates a priority concern of governance and development (Centre for Research on the Epidemiology of Disasters [CRED] & United Nations Office for Disaster Risk Reduction [UNISDR], 2018).

Highly exposed to different forms of hazards because of its geographic location is the Philippines (Global Facility for Disaster Reduction and Recovery, 2017; Center for Excellence in Disaster Management and Humanitarian Assistance, 2018; Go Green SOCCSKSARGEN, 2012). Thus, local communities need to strengthen their resilience to disasters. Strengthening local communities is the best way to protect lives, properties, and resources because resilient communities have the ability to anticipate, adapt to, absorb, and recover from the impacts of disaster (Matyas & Pelling, 2012). In line with this, disaster risk reduction management (DRRM) contributes significantly to strengthening disaster resilience because it entails managing disaster and reducing the risks as well as the negative impacts of hazards through the systematic development and application of policies and strategies (United Nations Economic and Social Commission for Asia and the Pacific & UNISDR, 2012). As Renn et al. (2011) summed it: proper adoption of disaster risk reduction (DRR) strategies strengthens community disaster resilience. In turn, disaster risk reduction is influenced by public

management and governance (CRED & UNISDR, 2018; Ahrens & Rudolph, 2006) since the latter is an umbrella term under which DRR takes place. The existence of good governance and effective management approach are keys to making DRRM efficient and effective (United Nations Development Programme [UNDP] and European Commission Humanitarian Office [ECHO], 2010).

Strengthening community disaster resilience through an effective DRRM and public management is a complex undertaking. Thus, LGUs in the Philippines need to be innovative in managing public realms (Sihombing, 2016) in terms of organizational structure, approaches, and procedures on how LGUs could mobilize, deploy, and utilize different resources for public service delivery (Hartley, 2008; United Nations Department of Economic and Social Affairs, 2006). Innovation in public management is an effective and inventive solution to problems and obstacles in local government (Girishankar, 2001).

While LGUs in the Philippines face challenges in strengthening community disaster resilience, DRRM practices remain to be inefficient and ineffective (Teng-Calleja et al., 2017; Mendoza et al., 2016; Jovita et al., 2018; Commission on Audit, 2014; Senate Economic Planning Office, 2017). This situation is affected by the theoretical and practical controversies of public management. In question is the relevance and applicability of public management approach (PMA) to DRRM. Hence, despite the series of public management reforms and transformation, several LGUs are still inefficient, ineffective, and confront myriad of problems (Brillantes & Fernandez, 2013). These lead to the question: "what PMA works in DRRM to improve resiliency?"

This study identified several practical and theoretical issues in public management within the context of LGUs such as the following: 1. "What is more efficient and effective: participatory-democracy or bureaucracy?" According to several studies, while DRRM requires immediate and efficient response, the bureaucratic armature seems particularly ill-suited for DRRM's intended functions (Pongan, 2015; Saundra, 1992; Takeda & Helms, 2006; Jung et al., 2018; Neal & Phillips, 1995). Other literatures argue that despite the critiques, bureaucratic structures and hierarchies remain part and essential in local government organization (Ejersbo & Svara, 2012; Labolo, 2013). Several studies also emphasize the importance of participatory and democratic approach in disaster management (Yodmani, 2001; Allen, 2006; Chen et al., 2006; Gaillard et al., 2019). However, despite its well-accepted concept, participatory-democracy and consultative management have their limitations and weaknesses that may be a challenge in disaster management (Lima, 2019).

2. "What is more practical: bottom-up or top-down planning?" Several literatures argue that the use of top-down arrangement in local government makes DRRM efficient and effective because it is not time consuming and the process is handled by professional experts (Cooksey & Kikula, 2005; Isidiho & Sabran, 2016; Pissourios, 2014). On the other hand, UNDP and ECHO (2010) and Sim et al. (2017) argue that the use of bottom-up approach in DRRM reduces community vulnerabilities and enhance their resilience capacities.

3. "What should be utilized: scientific knowledge or local knowledge?" Molina and Neef (2016) and Dalisay (2014) argue that using local knowledge in planning makes DRRM effective. Whereas, Ngwese et al. (2018) and Aitsi-Selmi et al. (2015) counter that "scientific" knowledge is also essential to DRRM practice.

4. "What arrangement is more efficient: centralized or decentralized?" Several studies show that decentralization contributes to efficient and effective disaster management. It enhances DRRM because it facilitates participation and empowerment of local participants (Hermansson, 2019; Scott & Tarazona, 2011). However, other reports as cited by Hermansson (2019) question the efficiency and effectiveness of relying primarily on local governments for disaster management; concern had been raised that decentralized local governments of developing countries experience numerous challenges. The choice of what PMA may be utilized in DRRM practice to strengthen resilience level of local communities is essential to LGUs.

To attain the aims of DRRM, PMA and governance should be considered in research and policy making. Despite the numerous studies related to disaster management, a gap remains as long as PMA is not related to DRRM. These studies fail to provide a full picture of the effect of PMA to DRRM practice and resilience. It is also important to note that measuring and understanding disaster resilience at the community level is advantageous for national and local planning and policy formulation (Alcayna et al., 2016). However, there are limited studies to measure this at the local and national levels (Uy et al., 2012; Estoque & Murayana, 2014).

In the Philippines, Legazpi City is among the most disaster vulnerable cities, having survived several disasters through the decades. Because of this challenge, the City has been compelled to formulate an innovative public management and DRR strategy to strengthen community resilience.

The Legazpi LGU has done several exceptional efforts to reduce risk and strengthen community resilience over the last decade. While there are common approaches and practices across all LGUs in the country, Legazpi City's unique and innovative approaches and practices are worth investigating. In other words, the effects of innovative public management to DRRM practices, disaster resilience, and use of approaches and strategies need to be documented and investigated.

This study determined the level of community resiliency in Legazpi City; how the LGU carried out DRR; the City's PMA and DRRM practices, especially the innovative public management and DRRM best practices; the challenges that the LGU faced; and how resiliency is influenced by the City's innovative PMA. Specifically, the relationship and effects of PMA to DRRM practices as well as of DRRM practices to the disaster resilience of the city were analyzed.

From this study, an alternative model of innovative public management approaches and DRRM to achieve community resiliency for local government was crafted. This study is anchored on the innovative, flexible, and integrated DRRM model, which is crafted from the workable features of the UN's disaster management model, community development perspectives, classical public management theories, and the new public management theory.

METHODOLOGY

The study was conducted in Legazpi City, the capital of the Province of Albay in Bicol Region, Philippines. It is a component city with a total land area of 16,165.43 ha (Legazpi City, n.d.). Situated along the country's typhoon belt, Legazpi City experiences on the average, three to five cyclones every year, which greatly affect its low-lying coastal areas (Salceda, 2010). For instance, three typhoons (i.e., Milenyo, Reming, and Seniang) in 2006 caused hundreds of deaths and about PhP8 billion worth of damages. In addition, earthquakes, tsunamis, and the eruption of Mount Mayon volcano continue to pose risks to human lives and properties.

Using a case study research design, the study utilized quantitative and qualitative methods such as a survey, semi-structured interviews, focus group discussions, and a review of necessary documents. A case study, which is regarded as a small step toward a grand generalization

(Stake, 2008), examines questions such as "why," "how," and "what" (Yin, 2003). The case study approach was applied to describe and analyze the PMA and DRRM of Legazpi City. It was also used to investigate how PMA affected the DRR practices and disaster resilience of the City.

For the survey, the study applied purposive sampling technique to identify the respondents. The steps employed were as follows: (1) the 70 *barangays* (villages) were categorized and clustered into urban and rural areas, and based on the Department of the Interior and Local Government classification, there were 45 urban *barangays* and 25 rural; (2) three *barangays* in each cluster were randomly selected as cluster representatives; (3) from the total population of the selected *barangays*, the sample was determined using Slovin's formula; (4) the sample was distributed and selected in proportion to the households' population of the respective *barangay*.

The sample population was determined using the Slovin (1984) formula:

$$n = \frac{N}{1+Ne}$$

Where n = sample size
N = total population
e = confidence interval/desired margin of error of (5%)

There were 1,194 total households in the six selected *barangays*. Using a 5% margin of error, the sample size was computed as follows:

$$n1 = \frac{1194}{1 + (1194 \times 0.5)\ 2} \longrightarrow n1 = \frac{1194}{3.98} = 300$$

A total of six *barangays* were selected. Of the total 1194 total households, 300 were chosen as respondents. Survey questionnaires were distributed to the 300 identified household heads, and a 99% return rate (299 out of 300) was obtained (Table 1).

The Statistical Package for Social Science (SPSS) was used to compute the Pearson Moment Correlation and linear regression to determine the relationships and effects of (a) PMA and DRRM, and (b) DRRM and community resilience.

Table 1
Total Number of Respondents per Barangay

Cluster/Barangay	No. of households	%	n	%
Urban				
Ilawod West	132	11	33	11
Imperial Court Subdivision	162	14	42	14
Tinago	121	10	30	10
Rural				
Lamba	216	18	54	18
Dap-dap	306	26	78	26
Buenavista	257	21	64	21
Total	1194	100	299	100

Meanwhile, a semi-structured interview was conducted with 22 key officials and staff of the Provincial, City and *barangay* LGUs. Likewise, a focus group discussion (FGD) was participated in by LGU officials and other key players of the community (e.g., senior citizens, youth, mothers, fathers). The FGD aimed to analyze qualitatively the LGU's DRRM and public management practices and their effects on the LGU's resilience.

Another FGD with 17 participants, representing different sectors of the LGU, was organized to determine the disaster resilience level of the community using the GOAL (2015) resilience toolkit. The GOAL Toolkit for Measuring Community Disaster Resilience was developed as a concise and user-friendly tool to measure the level of disaster resilience at the community level through the assessment of a broad range of resilience components. The application of this toolkit as part of a wider framework of stakeholder consultations and risk assessments is recommended to fully understand all the context-specific and complex aspects of disaster resilience at the community level.

To facilitate the discussion, the facilitator used 30 key questions, each exploring a particular resilience component, grouped under five thematic areas—namely: (1) Governance, (2) Risk Assessment, (3) Knowledge and Education, (4) Risk Management, and (5) Vulnerability Reduction and Preparedness. Each component was thoroughly explored and discussed with the group, through the use of stimulating discussion questions ("Suggested Guiding Questions") and suggested means of verification. At the end of the discussion for each component, the

facilitator made an informed judgment call on the community's resilience level and characteristic (from 1 to 5). The facilitator paraphrased the description of the chosen characteristic as it appeared in the survey (in non-technical language) or, alternatively (if not an exact fit), summarized the discussion they just completed regarding that component. The focus group then validated the facilitator's take on their situation by confirming or contradicting the latter. The facilitator probed further until consensus with the group was reached; the selected levels were assigned the corresponding value (1-5) in points, making up the community's total "disaster resilience score."

Finally, latent level content analysis and indexing and reflective analysis were used to analyze the qualitative data collected. Latent level content analysis is more interpretive and concerned with the response as well as what may have been inferred or implied. Content analysis also referred to as categorizing and indexing, involves coding and classifying data. Context analysis, on the other hand, makes sense of the data collected and highlights important messages, features, or findings. The latter approach was used to analyze data collected from the documentation review, including minutes of meetings, organizational structure, policies, plans, advisory, and others.

RESULTS AND DISCUSSION

Description of Legazpi City's PMA and DRRM

Planning. The Legazpi City government believes that planning is an institution-wide effort through which a local government authority establishes directions and creates strategic initiatives that mobilize resources to fulfill the local government's mission and achieve its goals. In Philippine LGUs, the city or municipal planning and development office usually undertakes all planning including disaster management. However, it is a unique practice in Legazpi City that the City Disaster Risk Reduction and Management Office (CDRRMO) is empowered to design and formulate DRRM plans through the help of a technical working group (TWG). The TWG is composed of several departments of the LGU, and the plan is subject to the approval of the City Disaster Risk Reduction and Management Council (CDRRMC). The DRRM planning process is undertaken in a collaborative and participatory approach. A combination of bottom-up and top-down approach in planning is also utilized in the LGU's management approach. The local government uses a combination of centralized and decentralized arrangement in DRRM

specifically in decision-making, planning, and monitoring and evaluation. This means that the city government remains to be the central authority, while local *barangays* are empowered with specific responsibilities. As such, the *Barangay* Disaster Risk Reduction and Management Council is empowered to formulate plans, execute DRRM programs, and implement laws and policies and other necessary actions in harmony with the provincial and City DRRM plan. The City government, however, maintains control, supervision, and responsibilities on DRRM.

Leading. The Legazpi City LGU utilizes a balanced consultative, participative, and democratic style of leadership with the exercise of bureaucratic power, control, and authority in the management process. Allowing people to participate in the process promotes a sense of responsibility and commitment toward the job. Participation enhances their creativity and productivity. On the other hand, respondents believe that bureaucracy remains essential in local governance. According to them, following systematic procedures and compliance to the laws and regulations would ensure order and minimize error and failure in the DRRM's operation. Further, having a hierarchy of command and control in the organization ensures accountability, clarifies roles and responsibilities, and guarantees consistency in work performance. However, the respondents also point out that too many bureaucratic procedures can cause inordinate delays and frustration in the performance of tasks. Too many processes, they explain, hamper the achievement of results in time resulting to inefficiency in public service. To avoid or eliminate red tape or reduce bureaucracy, they have tried to simplifying the process, which they are still implementing to date. A balanced bureaucracy and democracy in public management is the aim of Legazpi City's leadership. Though a bureaucratic setup is observed in their public management, they nonetheless value democracy and consultative and participative principles as vital in the stability and effectiveness of public management.

Organizing. In terms of organization, the LGU ensures clear organizational structure and hierarchy of command and authority. They believe that having a clear, consolidated, well-organized, well-managed organizational structure enables them to execute timely responses to the demands and needs of the community for services. Respondents confirm that having a clear organizational structure helps to determine how things would be done; eliminates overlapping of duties and responsibilities, and promotes accountability and harmonization in public management and services. The LGU practices standardized and scientific staffing of personnel in its organizational structure. They want to ensure that roles within the structure are based on areas of specialization, hence they apply the management principle of having the "right person in the right job".

Further, while they may delegate responsibility and authority, they do it with caution and limitations to minimize the risk of failure in the DRRM operation. The City officials argue that delegation must be done carefully and that authority and responsibility must be delegated according to capabilities, skills, and abilities of the person being delegated. They stress that delegation is good if authority and responsibility are assigned to the right individual(s) and in the right way. Further, they point out that not all responsibilities and authority can be delegated. There are specific limitations on the delegation of power because it is the City officials who are directly accountable to the public. Most importantly, there are duties and responsibilities bounded by laws that cannot be delegated to anybody.

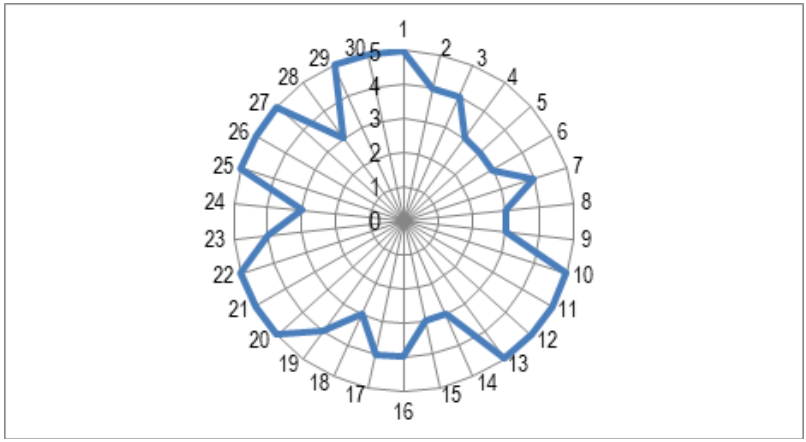
Control. The City government values competence in public service. It wants to ensure that personnel serving in the LGU must possess qualifications that fit the demand and vision of the City government. Thus, the LGU practices a standardized management system in the hiring of personnel. The LGU values specialized and professional knowledge in human resource management as they are proven to be essential in the stability and success of a public organization. With this principle, the City government has invested in wide retooling and knowledge and skills upgrading programs. Because the LGU values competency in public service, it has a strategic performance management system to monitor and evaluate the work performance of employees. The LGU uses a standardized performance evaluation every semester and practices a standardized and hierarchal supervision and monitoring system. In terms of financial control, the LGU uses a bureaucratic management approach since financial transparency and accountability are critical in public management.

Application of PMA in DRRM. The LGU has a specific DRRM approach in each of the identified major hazards in the locality. Thus, the application of PMA and its significance are also presented per hazard. This is illustrated in Appendix 1.

Legazpi City's Disaster Resilience Level

The GOAL resilience toolkit dashboard (Figure 1) illustrates the level of disaster resilience achieved by the Legazpi City LGU. The numbers outside the circle are the 30 resilience components of the GOAL resilience toolkit questionnaires, while the numbers inside and the line are the resilience level scores of Legazpi City in each of the components.

Figure 1
Legazpi City Disaster Resilience Dashboard



The dashboard shows that Legazpi City has 13 out of 30 resilience components with a score level of 5 that characterizes a high resilience community. Seven components have a score level of 4, which indicates a resilient community, and 10 components have a score level of 3, which characterizes a medium resilient community. Results further show that 43% of the components are at high resilient level, 33% at medium resilient level, and 23% at a resilient level (Table 2).

The mean of the disaster resilience level score is 4.1 (Table 2), which is within the range of 61-80% of disaster resilience score and categorized as a resilient community. The results show that Legazpi City is a resilient community. This means that the LGU practices consistency and integration in planning and implementation of resiliency measures; implements interventions that are widespread; ensures that solutions cover all main aspects of the problem; and lastly, the LGU strategies are linked within comprehensible enduring strategies (GOAL, 2015).

Public Management Challenges to Achieve Disaster Resilience

The current national structure of DRRM system in the Philippines is a challenge in attaining a high-level of disaster resilience in Legazpi City. First, a decentralized organizational set-up loads local government with tasks and responsibilities, hence the LGU must generate enough funds to meet the demands of disaster management and resilience. The local government leaders of Legazpi City believe that they have a good disaster management program, plans, and capability, but they

Table 2
Measurement of Community Disaster Resilience

%	Score level	Adjective rating	No. (30)	%	Description
81-100	5	High Resilient	13	43	A culture of safety exists among all stakeholders, where DRR is embedded in all relevant policy, planning, practice, attitudes, and behavior.
61-80	4	Resilient	7	23	Coherence and integration. Interventions are extensive, covering all main aspects of the problem, and they are linked within a coherent long-term strategy.
41-60	3	Medium Resilient	10	33	Development and implementation of solutions. Capacity to act is improved and substantial. Interventions are more numerous and long-term.
21-40	2	Low Resilience	0	0	Awareness of the issue(s) and willingness to address them. Capacity to act remains limited. Interventions tend to be one-off, piecemeal, and short-term.
0-20	1	Minimal Resilience	0	0	Little awareness of the issue(s) or motivation to address them. Actions limited to disaster response.
Total Mean					4.1

lack financial support to hire enough personnel, procure equipment, and establish infrastructures that will strengthen the city's resilience to disaster. As one respondent states: "*Decentralization is good, but it must be supported with enough resources*."The respondents suggest more funds pointing out that "*to empower LGU in disaster management, it must be equipped with enough funds*."

For instance, they lack funds to construct additional evacuation centers. Their three existing evacuation centers are no longer enough to house the affected community during disasters.

Sourcing of funds to meet the challenges of calamities in local DRRM poses a problem since most of the local revenues go to the national treasury. Some respondents even surmise that LGUs in the country may not yet be ready for the proposed Federal Government System because they still need to strengthen their financial capacity to withstand a fully decentralized government system.

Another challenge of the current decentralized government set-up is that though the functions and responsibilities are decentralized, funds remain centralized. Disaster funds still come from the national government. Hence, the LGU may plan, but it is still the central government that decides. As such, delays in the implementation of disaster preparedness, mitigation, and rehabilitation measures are encountered. For instance, dependence on the national government slows down the rehabilitation of damaged infrastructures. One respondent states: "*We have no total control over the rehabilitation process since we are just dependent on national government funding*." Other respondents point out that the rehabilitation in local government relies on the priorities and budget appropriation of the national government. This condition makes it difficult for LGUs and local communities to deliver efficient and timely rehabilitation to lessen the impact of disaster and strengthen resiliency. This is a challenge to the local government of Legazpi City.

Moreover, it has been observed that third to sixth-class municipalities experience inequitable fund distribution (Campanero & Egargo, 2017). Since the Local Disaster Risk Reduction Management Fund is based on local revenue, poorer communities that are usually more exposed and vulnerable to hazards, get less funding. The respondents have observed that the funding in Republic Act 10121 (Philippine Disaster Reduction and Management Act) is not enough to support the task of local DRRM. As one states: "*The LGU's are loaded with tasks and responsibilities, but the financial resources do not match with what the local DRRM necessitates*."

The recurrence of disasters and intensified impact of calamities are scaling over the years, thus there is a demand for LGUs to have enough resources and facilities to lessen the impact of disasters. This is also the challenge to Legazpi City as it aims to attain high disaster resiliency level.

Relationship and Effects of PMA to DRRM Practices of Legazpi City

Correlation results reveal a significant relationship between PMA and DRRM practices in Legazpi City ($r(299) = 0.73$, $p < 0.05$) (Table 3). The obtained correlation is 0.731, which means that the nature of relationship is strong. PMA relates with the DRRM practice of the LGU. This confirms Aysan and Lavell's (2014) and Blanco's (2015) views that PMA influences DRR, and it could make a significant contribution to DRRM.

Table 3
Summary of Public Management Approach (PMA) and Disaster Risk Reduction Management (DRRM) score

Variable	N	Mean	SD	Sig.	Pearson Correlation
DRRM	299	4.0282	0.52197	0.000	0.731
PMA	299	4.0121	0.49206		

Correlation is significant at the 0.05 level

Table 4 shows the results of the predictive variables of simple linear regression analysis. A total of 53.5% of the variance is explained in the predictors of the variables (R Square 0.535 x 100 = 53.5; 46.5 + 53.5 = 100%). It also means that 46.5% of the variation is still unexplained, so adding other independent variables could improve the fit of the model. The correlation coefficient, R, is 0.731, which indicates that the PMA is positively correlated with DRRM practices and the relationship is strong (R is positive and is close to 1.0) (Ratner, 2009). Therefore, it can be concluded that PMA influences and affects DRRM practices of Legazpi City. This supports the findings of CRED and UNISDR (2018) and Ahrens and Rudolph (2006) that public management influences DRR practice. Likewise, this corroborates UNDP's (2015) view that good governance and an effective management approach are the keys to making DRR efficient and effective.

Table 4
Regression Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	0.731a	0.535	0.533	0.35666

Predictors (constant): public management approach

Results of the regression analysis (Table 5) indicate that the PMA of the City government can significantly predict the state of its DRRM program. That is, coefficient B score of 0.916 can predict that for every 1-point evaluation score in the effectiveness of PMA, DRRM practices score is expected to increase by 1.69 (Y=0.92+0.77 (1) =1.69). This implies that if the City Government of Legazpi strives for efficient and relevant PMA, its DRRM program would be more effective and efficient.

Table 5
Coefficient Summary

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. error	Beta		
1(Constant)	0.92	0.17	-	5.4	0.00
Public management approach	0.78	0.04	0.73	18.5	0.00

Dependent Variable: Disaster risk reduction management

To deeply understand how PMA helps improve the DRRM practices of Legazpi City, qualitative data were analyzed and illustrated in Figure 2.

Relationship and Effects of DRRM on Community Disaster Resilience

The correlation analysis reveals a significant relationship between DRRM practices and community disaster resilience in Legazpi City ($r (299) = 0.772$, $p < 0.05$) (Table 6). The obtained correlation is 0.772, indicating a strong relationship. It means that DRRM practices are related with the disaster resilience of the community. This corroborates UNISDR's (2018) view that DRRM offers a major contribution in building safer and resilient communities.

Figure 2
Logical Diagram of the Effects of Public Management Approach to Disaster Risk Reduction Management Practice of Legazpi City

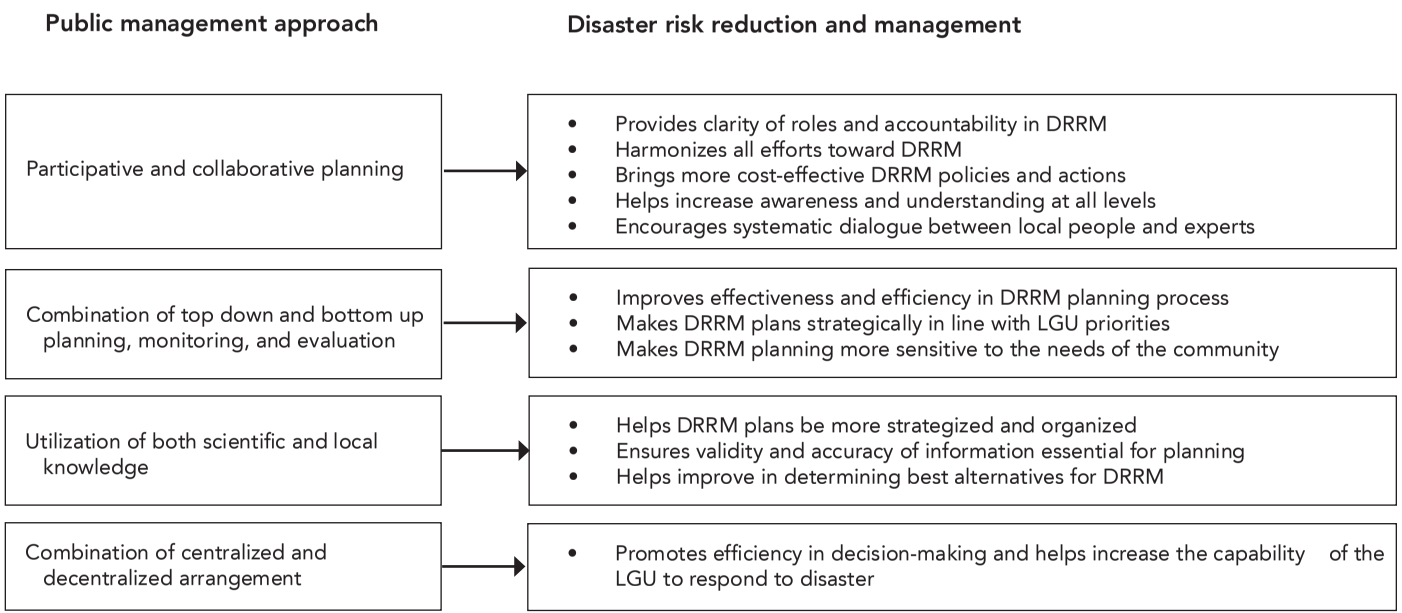


Figure 2
Continued

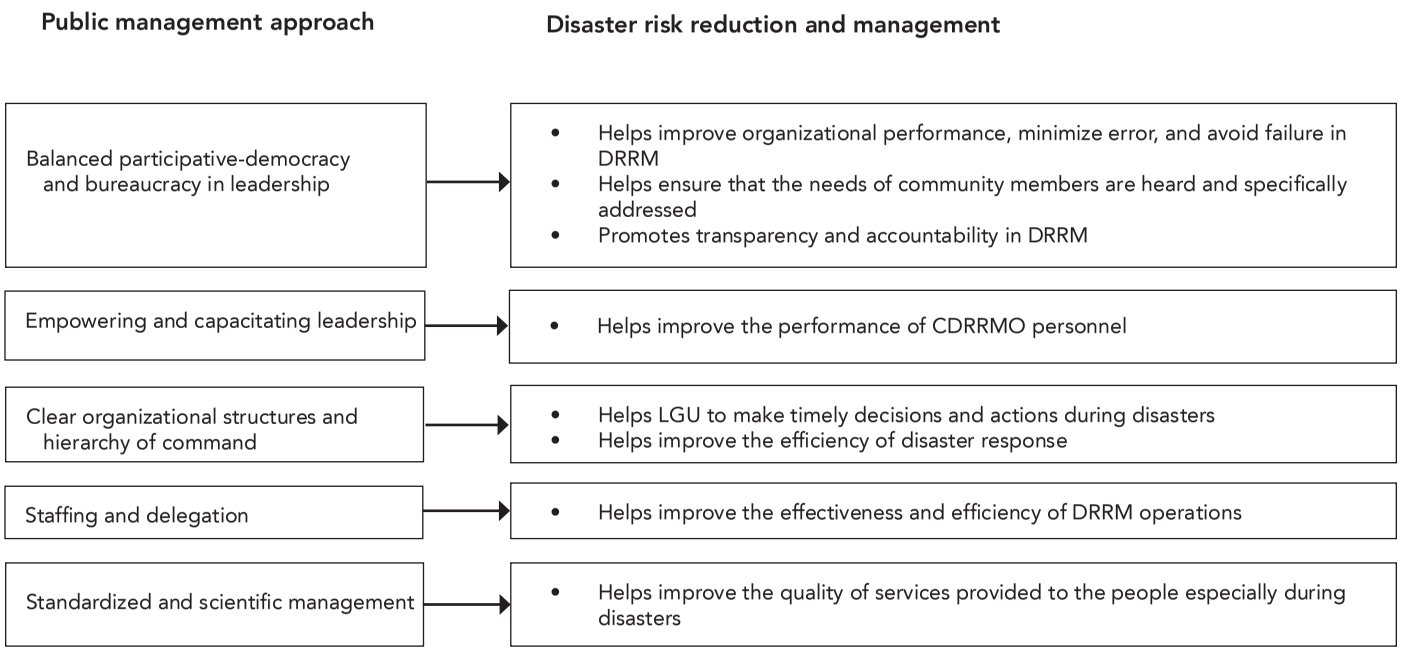


Table 6
Summary of Disaster Risk Reduction Management (DRRM) and Community Disaster Resilience (CDR) score

Variable	N	Mean	SD	Sig.	Pearson Correlation
DRRM	299	4.0282	0.52197	0.00	0.772
CDR	299	4.0517	0.41934	-	-

Correlation is significant at the 0.05 level

Regression analysis determined the relationship between DRRM and the community disaster resilience of Legazpi City. Table 7 shows the results of the predictive variables of simple linear regression analysis. A total of 59.6% of the variance is explained in the predictors of the variables (R Square 0.596 x 100 = 59.6; 40.4 + 59.6 = 100%). It means that 40.4% of the variation is still unexplained, so adding other independent variables could improve the fit of the model. The correlation coefficient, R, is 0.772, showing that DRRM is positively correlated with community disaster resilience and the relationship is strong (R is positive and is close to 1) (Ratner, 2009). Therefore, it can be concluded that DRRM influences and affects the community disaster resilience of Legazpi City. This confirms the statement of UNISDR (2018) that DRRM offers a significant contribution in strengthening the resilience of local communities. Further, this corroborates Benson's (2016) view that DRRM can potentially strengthen disaster resilience and enable local communities to attain economic development.

Table 7
Regression Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	0.772a	0.596	0.595	0.26699

Predictor (Constant): Disaster risk reduction management

Table 8 shows that the p-value 0.00 is less than 0.05. This indicates that DRRM is significant in predicting community disaster resilience. Coefficient B score also shows that for every 1-point increase of the evaluation score in the effectiveness of DRRM, community disaster resilience score is expected to increase by 2.17 (Y=1.55+0.620 (1) =2.17).

Table 8
Coefficient Summary

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. error	Beta		
1(Constant)	1.55	0.12	-	12.9	0.00
Public management approach	0.62	0.03	0.772	20.9	0.00

Dependent Variable: Disaster risk reduction management

This implies that community disaster resilience can be strengthened through an effective DRRM intervention by the LGU.

To clearly understand how DRRM affects community disaster resilience of Legazpi City, qualitative data were analyzed. The illustration in Figure 3 shows how DRRM practices help strengthen the disaster resilience of the local community.

Innovative PMA and DRRM of Legazpi City

From the data gathered through interviews, focus group discussions, and document review, the following are identified as Legazpi City's innovative PMA and DRRM practices.

Combination of Bottom-up and Top-down Arrangements in DRRM. The LGU of Legazpi City attests that the combination of the two planning approaches – top-down and bottom-up - is more efficient and practical. In the top-down approach, they experience efficiency in the planning process because the initiative and methods of planning are from the top authorities where professional and experts do the actual planning. This strategically aligns the DRRM plan with the LGU's priorities and goals and makes budget allocation more efficient. On the other hand, respondents believe that the integration of bottom-up approach in DRRM planning helps improve the effectiveness of DRR practices. Because the local community members provide important information, and they are involved in problem identification and needs analysis, the DRRM plan becomes more sensitive to the needs of the local community. This ensures that the LGU's DRRM initiatives do not neglect any sector of the locality.

Figure 3
Logical diagram of the Effects of Disaster Risk Reduction Management Practice on the Community Disaster Resilience of Legazpi City

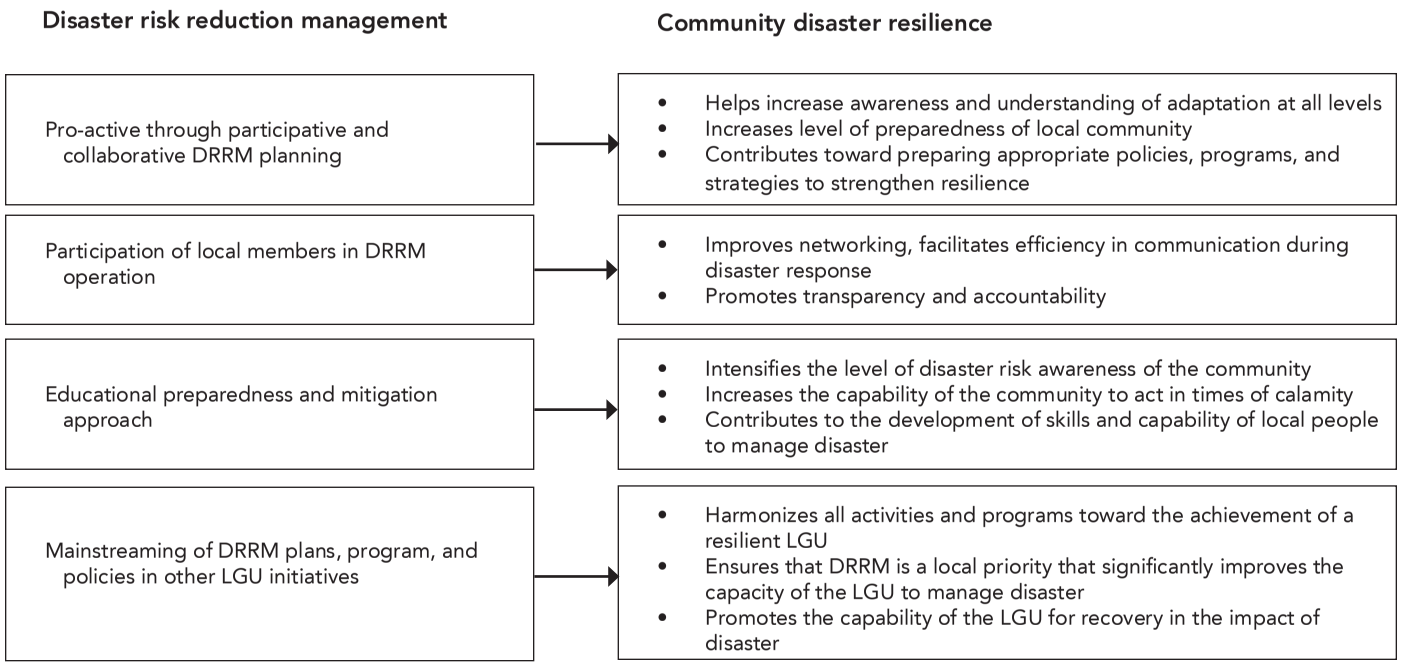
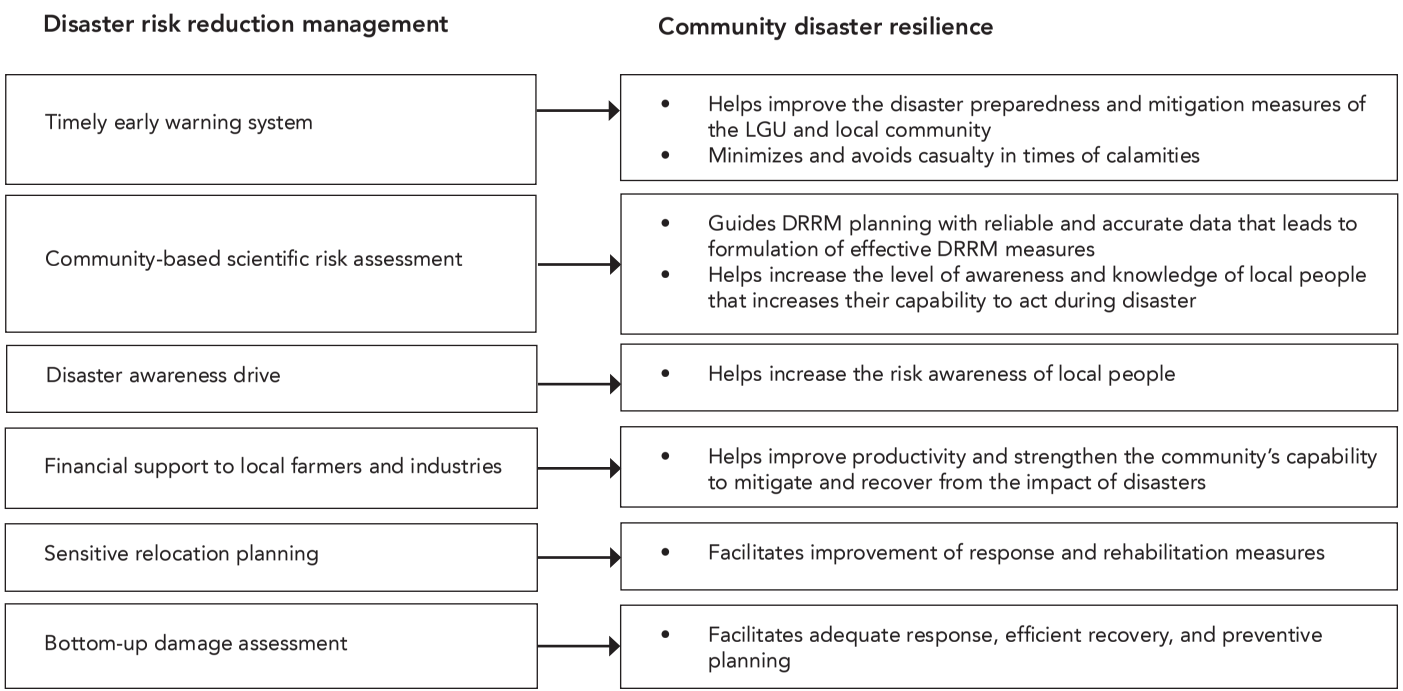


Figure 3
Continued



Combination of Scientific Knowledge and Local Knowledge in Planning. The respondents believe that using scientific and professionalized planning has provided the LGU of Legazpi with a more strategized and organized action toward disaster management. Having experts and skilled professionals do the planning has improved the DRRM planning, with the following advantages: (a) data were collected in a rigorous process, hence ensuring validity and accuracy; (b) data and all information gathered were analyzed through an appropriate method and tool that provided valid analysis; (c) scientific research and evidences were used as basis for planning, hence innovative knowledge and technology were useful tools in dealing with disaster challenges; and (d) expert and professional knowledge helped improve the determination of best alternatives suited to the strength, weaknesses, needs, threats, and opportunities of the community. All these support the recommendations of UNDP (2015) to use scientific data and information and to apply technology to DRRM. Moreover, the respondents attest that utilizing local knowledge as supplement in planning, promotes participation, cooperation, and the community's sense of ownership.

Balanced Participative-democratic and Bureaucratic PMA. Respondents acknowledge the importance of participation and democracy in public management. However, they also believe that bureaucracy remains essential in maintaining the stability of the organization/ entity and in ensuring that all plans and policies are properly implemented. Thus, the LGU adopts a balanced participative-democracy and bureaucracy in its current PMA. Respondents confirm that though consultation and participation are practiced, power and control still reside in the top authorities for the monitoring and evaluation of processes. According to the respondents, this approach helps the LGU improve its DRR practices and avoid any failure in governance.

Combination of Centralized and Decentralized Arrangement in DRRM and Clear Understanding of Roles and Responsibilities. Respondents argue that within the local government setting, a flexible organizational arrangement is more applicable and efficient. The Legazpi LGU uses a combination of centralized and decentralized arrangement in DRRM, which the respondents perceive to increase their capability in responding to disaster, because it promotes efficiency in decision-making and implementation. This means that though the *barangays* are delegated with responsibilities and afforded empowerment, the City government as a central authority, still remains to be in overall control of disaster management processes. This implies flexibility in organizational arrangements because of compelling reasons and conditions.

Respondents believe for instance that in emergency situations, they can make timely decisions because the local *barangay* is empowered to make necessary actions in the absence of the City government. In the same vein, the City government can perform its function in case the local *barangay* cannot respond in times of calamities.

Empowered CDRRMO. The City Disaster Risk Reduction Management Office (CDRRMO) is empowered to make necessary actions and decisions. The office initiates and facilitates planning, implements programs and policies, spearheads monitoring and evaluation, and it can order for evacuation and other necessary actions to ensure public safety. This facilitates efficiency in DRRM processes. Respondents explain that empowerment significantly improves the performance of the staff and other personnel related to disasters because they feel more motivated when they are valued and recognized. They also stress that when they are trusted and their contributions are acknowledged, they have more enthusiasm in fulfilling their duties. Most of the respondents believe that because the CDRRMO is empowered, this significantly improves the performance and operation of the DRRMO.

Flexibility in Disaster Management Priorities. Despite the lack of funds in acquiring essential equipment, technology, and facilities, the Legazpi LGU has focused on strengthening the local people's readiness and capability through education, training, and other preparedness campaigns. While many LGUs commonly put up facilities and acquire equipment and other advanced technologies to prepare for disasters, Legazpi City focuses on allocating more funds for programs that would strengthen people's capability to act in times of calamities.

Best Practices of Legazpi City's PMA and DRRM

The interviews, focus group discussions, and document review show the following best practices of Legazpi City's PMA and DRRM:

Institutional Framework. Legazpi's LGU ensures strong and clear institutional framework from the provincial level down to the local *barangay*. The city's DRRM and Climate Change Adaptation Management (CCAM) systems are anchored on the provincial goal of zero casualties, plans, management systems, and principles. Interoperability has been tested for years. The Provincial DRRM official states: "In Albay, we work as one. We ensure vertical, horizontal, and lateral coordination as an institution."

Good Governance. Legazpi City is the Hall of Fame holder for the Seal of Good Governance award for local government in the Philippines for the year 2018. This testifies that the local government leadership and administration exemplifies outstanding performance in the following: a) maintaining proper, efficient and effective allocation of budget and resources; b) setting priorities and achievement of goals; and c) implementing laws and other policies for the betterment of the lives of the local citizens. Respondents pointed out that good governance is a key factor that improves local services especially in the practice of DRRM. This supports the statement of UNDP (2015) that good governance improves public services and DRRM of local governments.

Resourcefulness, Adaptability, and Flexibility of the DRRM Approach. The assessment, plans, and strategies are updated after every disaster event, especially for the most severe and most probable disaster, as the event affects the assumptions or scenarios of the disasters. Resourcefulness and innovativeness in leadership is also essential in DRRM. According to one respondent: "We lack fund and resources while dealing with complex undertakings. It compels us to be innovative and resourceful."

Proactive Mindset of Local People and the Cultivation of the Culture of Safety. For Legazpi City, safety is culture-based. Most of the respondents are aware of the negative effects of disaster. Learning from their experiences, people have shown initiative and proactive mindsets toward risk reduction and mitigation. The "bayanihan spirit", a culture of camaraderie and helping each other, is alive in the community, especially in times of need.

Organizational Commitment. Most of the officials and local people are committed to preventing and reducing the risk of disaster in their locality. The local government is making DRRM a priority agenda as shown in their annual budget allocation and development plans. Local government leadership has strong commitment in strengthening community disaster resilience as shown by the City mayor's hands-on leadership in DRRM.

Pro-active Planning and Timely Early Warning System. The respondents believe that the Legazpi LGU's pro-active DRRM planning through participative and collaborative approach increases awareness and understanding of adaptation and DRR synergies at all levels. According to them, this approach encourages systematic dialogue, information exchange, and joint working between the local people and experts.

The early warning system in the city is well-placed, and drills for tsunami, earthquake, fire, and volcanic eruption are conducted. An early warning system equipment is regularly monitored for functionality. Warnings and pre-event monitoring alerts are delivered over the maximum possible notice period via multiple media: mobile phone calls and text messaging, hand-held radios, radio, social media, web "balangay," as well as sirens. The early detection of hazards through scientific and technical method have improved the community's readiness to disasters and the capability to act early in times of calamities or the LGU's disaster preparedness and mitigation.

Communications Protocol. Legazipi City maintains a communication protocol, which is both a crucial and vital factor in disaster preparedness. *Barangays* have their own sets of VHF radios and accredited volunteers. *Barangay* accredited volunteers regularly monitor upcoming events, for which advisories and bulletins are issued. Depending on the advisory given, the concerned *barangay* and city-based emergency response personnel and committees are then activated. The social connectedness has been further enhanced by existing networks through organizations, like the Liga ng mga *Barangay* (composed of 70 *barangay* captains), the DRRM Councils (city and *barangay*), the Planning and Development Councils (city and *barangay*), as well as the Civil Society Organizations and their equivalents at the provincial level.

Single Point Coordination with Clarity of Roles and Accountability. The single point of coordination rests at the City DRRM Office. This office's function is further supported by the existing coordinative protocols in the City. As to the institutionalization of all of these protocols, the city has conducted a series of contingency planning workshops in the last three years. The outputs of the workshops are the contingency plans per hazard (for all the hazards identified in the City) and equivalent MOUs signed (where structures, roles, and procedures of each stakeholder are defined, per hazard). The mobilization of the stakeholders is embedded in the institutionalized communication protocols existing in the City.

Responsible Expenditures. As mandated, 70% of the DRRM Fund is used for pre-disaster programs, projects, and activities. This fund is supplemented by funds for development projects that also address DRRM and CCAM. According to the respondents, funds are strictly being monitored to prevent cuts and rechanneling of funds for other purposes. Funds for operating expenses are delineated separately. Contingency funds are also available and reserved for "rainy days."

Updated and Sensitive Financial Planning and Budgeting. The City's financial plan and budget are shown in the 3-year (as mandated by the National Economic Development Authority [NEDA]) Medium-Term Public Investment Plan and Annual Investment Plan (MTPIP and AIP). Both are updated annually and regularly submitted to NEDA. In this plan, all programs, projects, and activities are described in terms of spatial coverage and targets, beneficiaries, implementation schedule, cost, fund source, and implementing agencies or responsibility centers. The projects are categorized according to economic, social, environment (which includes DRRM and CCAM), and infrastructure sectors. These projects also describe how they address the Millennium Development Goals and the rights addressed. DRRM and CCAM programs and projects are categorized according to the phases of the DRRM/CCAM cycle. The MTPIP and AIP pass through a series of consultations and deliberations with the Legazpi City Planning and Development Council. The plans are later endorsed by the LCPDC to the City Council for approval. The city sees to it that all other plans (area, thematic, or system plans) are integrated in the MTPIP and AIP.

Integration of Disaster Resilience with Other Initiatives. With DRRM and CCAM integrated in the city's Comprehensive Land Use and Development Plans, disaster resilience is widely considered, especially in its implementing arm, the Zoning Ordinance, together with other ordinances and resolutions issued by the City Council for implementation. An example is the limitation of development in high volcanic risk areas, the utilization of solar powered streetlights, the upgrading of the city's drainage system, and the segregation of wastes at source, among others. DRRM and CCAM are extensively considered in the project proposals being prepared by the city for funding. Project proposals that have high impacts on DRR and CCAM, aside from the usual socio-economic impacts, get prioritized. Mainstreaming of DRRM/CCAM policies, plans, and systems in the existing development plans of the LGU is perceived by the respondents to harmonize all activities and programs toward the achievement of a resilient LGU.

Empowerment of Barangay DRRM. The organization addressing the disaster resilience role in the *barangays, puroks*, or *sitios* is the *Barangay* DRRM Committee, which also acts as the barangay emergency response unit. It is a committee under the Barangay Development Council, whose membership consists of multi-sector organizations present in the *barangay*. The Council is considered by the city government as its first line of defense in case of disaster events

Financial Support System. The CDRRM council has made representation with insurance companies and financing institutions to provide loans coverage for families and businesses especially for rehabilitation and recovery. Legazpeños and the business community are enjoined to invest in DRRM starting at their own turf. The Council has also partnered with some private sectors in disaster reduction and management activities in line with their corporate social responsibility. It presently bestows the zeal of Disaster Preparedness to schools, establishments, and organizations that meet the City DRRMC's criteria for excellence in DRRM and CCAM.

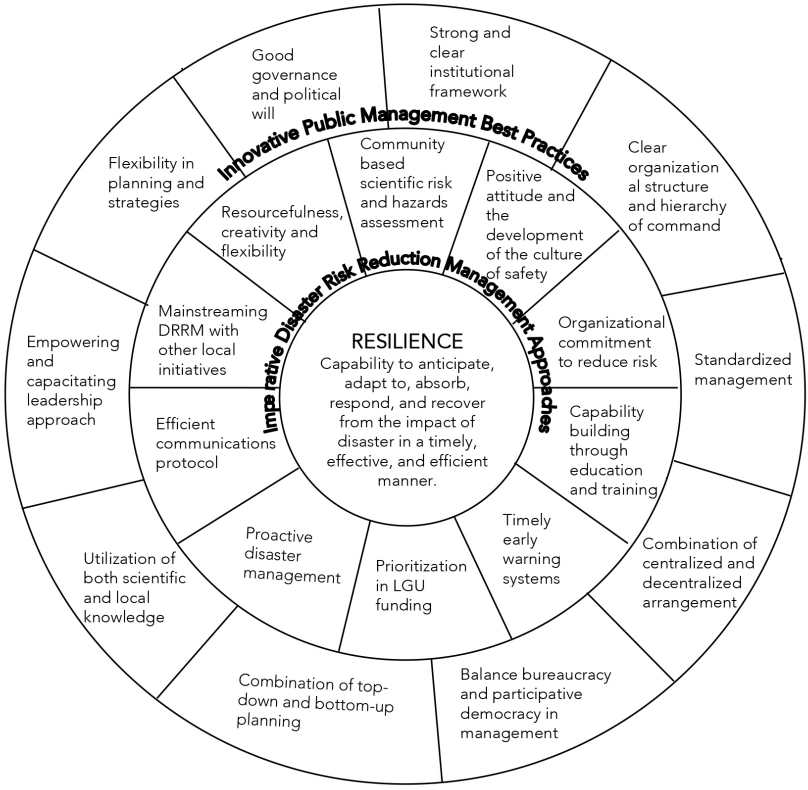
Information, Education, and Communication Campaign. The City government uses the following for its education and awareness campaign: print in the city hall publication, newspapers, leaflets, and flyers; school and college teaching materials and inclusion of DRR and CCA in lessons; TV advertisements and news features; radio advertisements, bulletins and news features; web through content, advisories and bulletins on the City website; mobile advisories; Facebook news and announcements; and posters in the city hall premises, *barangay* halls, schools, and public areas. Brochures, flyers, and posters come from national warning agencies that are also used by the City for its early warning system.

This multi-media and educational approach has intensified the level of disaster risk awareness of the community. Respondents point out that Legazpi City's low to zero casualty records for the last 17 years is the result of an intensive educational drive of the local government. The drives have contributed to the development of skills and capacity of every *barangay* to manage the impact of disaster. Hence, most people are aware of the nature and impact of disaster, and they know what to do and where to go in times of calamities. This also implies that disaster education significantly increases the resilience level of the community.

Integrated, Flexible, and Innovative Public Management and DRRM Model for Local Government

Due to the pressing challenge of calamities, this study realizes the need to explore and discover a more practical and efficient approach in dealing with the negative impact of disasters. Based on the experiences and practices of Legazpi City and on relevant literatures, an alternative PMA and DRRM model is shown in Figure 4. This model can guide the LGU in policy making and planning toward a more effective, practical, and efficient approach to DRRM.

Figure 4
Integrated, Flexible, and Innovative Public Management and Disaster Risk Reduction Management Model for Local Government



The model demonstrates that disaster resilience of the local communities can be strengthened through parallel and attuned innovative public management approaches and DRRM practices. These approaches and practices have been proven relevant and workable in the context of Legazpi City's DRRM.

CONCLUSIONS

Legazpi City can be considered to be a resilient community because of the major contributions of DRRM practices and innovative public management approaches. From the City's experiences and practices, this study affirms the following assumption and hypotheses:

1. PMA has a significant relationship with DRRM practice. This implies that an appropriate PMA helps improve the effectiveness and efficiency of DRRM practices. Innovation in public management is necessary in order to address the complexity of DRRM especially in the local government.

A combination of centralized and decentralized arrangement is more practical in the context of local government, and the combination of top-down and bottom-up planning and decision making is more efficient in DRRM. The complementation of both scientific and local knowledge produces effective DRRM planning outcomes, and the application of balanced participative-democracy and bureaucracy in local governance promotes empowerment, transparency, and accountability.

2. Effective DRRM practice is significant and essential in strengthening community disaster resilience. Investing in capacity building in DRRM is far more cost-effective than funding disaster response after a disaster. Investing on people's capability must be the priority of DRRM. Community-based scientific risk assessment, hazard-mapping, and monitoring strengthen disaster preparedness and mitigation capability of the local community.

From the experiences of Legazpi City, these factors related to public management and DRRM are essential in strengthening community disaster resilience: (1) strong and clear institutional framework; (2) good governance; (3) positive attitude of local people as exemplified by their initiative, participation, and mutual support; (4) organizational commitment; (5) flexibility and adaptability of DRRM approaches; (6) sensitive financial management and responsible expenditures; (7) mainstreaming of DRRM in other development initiatives; (8) pro-active planning and timely early warning system;, (9) capacity building through a massive education and awareness campaign; and (10) clear and efficient coordination protocol.

Sufficient funding is found to be vital in complex DRRM undertakings. In the current decentralized arrangement, planning and implementation of DRRM program are decentralized while funding remains centralized. The Legazpi LGU realizes that financial support from the national government is essential in supplementing local funds. This is because while the LGU is loaded with tasks and responsibilities, it lacks financial support from the national government, which affects its DRRM operation.

RECOMMENDATIONS

The experience of Legazpi City shows the need for the national government to revisit the current decentralized structure, especially in the practice of DRRM in LGUs. The decentralized arrangement can be more effective if funding for LGUs is improved. The national budgeting scheme needs to be ratified so that local governments, especially the poorer communities, can have sufficient fund for DRRM initiatives. Though there are evidences that decentralization is effective in DRRM, the experience of Legazpi City shows that the central government still plays a very important role in disaster management.

There is also a need to consider the bureaucratic public management environment in policy making and its effects on DRRM operations. Public management and governance is a critical component in the practice of DRRM as well as in making a community safer and more resilient. However, with fast-paced social and environmental changes, PMA and governance cannot remain the same. The LGUs need to readjust their strategies and be more flexible and innovative. They also need to prioritize DRRM in their public agenda and development planning and budgeting to proactively address the social and economic consequences of disasters.

Despite challenges of disasters, however, the Legazpi City experience bodes optimism as it shows that an innovative PMA can indeed improve the practice of DRRM and strengthen the resilience of local communities.

Starting from Legazpi City, this study can be expanded to cover other LGUs in the Philippines and compile as well as compare their best practices. Aside from PMA and DRRM practices and resilience, future researchers can explore other components or variables related to community development and DRRM.

REFERENCES

Ahrens J., & Rudolph, P. M. (2006). The importance of governance in risk reduction and disaster management. *Journal of Contingencies and Crisis Management, 14*(4), 207-220. https://doi.org/10.1111/j.1468-5973.2006.00497.x

Aitsi-Selmi, A., Blanchard, K., Al-Khudhairy, D., Ammann, W., Basabe, P., Johnston, D., Ogallo, L., Onishi, T., Renn, O., Revi, A., Roth, C., Peijun, S., Schneider, J., Wenger, D., & Murray, V. (2015). *UNISDR Science and Technical Advisory Group Report 2015: Science is used for disaster risk reduction*. https://www.unisdr.org/files/42848_stag2015.pdf

Alcayna, T., Bollettino, V., Dy, P., & Vinck, P. (2016). Resilience and disaster trends in the Philippines: Opportunities for national and local capacity building. *PLoS Currents Disasters,* Edition 1. https://doi.org/10.1371/currents.dis.4a0bc960866e53bd6357ac135d740846

Allen, K. M. (2006). Community-based disaster preparedness and climate adaptation: Local capacity-building in the Philippines. *Disasters, 30*(1), 81-101. https://doi.org/10.1111/j.1467-9523.2006.00308.x

Aysan, Y., & Lavell, A. (2014). *Disaster risk governance during the HFA implementation period. UNDP thematic review*. https://www.preventionweb.net/english/hyogo/gar/2015/en/bgdocs/UNDP,%202014a.pdf

Benson, C. (2016). Promoting sustainable development through disaster risk management. *ADB Sustainable Development Working Paper Series No. 41*. https://www.adb.org/sites/default/files/publication/182652/sdwp-041.pdf

Blanco, D. V. (2015). Disaster governance in the Philippines: Issues, lessons learned, and future directions in the post-Yolanda super typhoon aftermath. *International Journal of Public Administration, 38*(10), 743-756. https://doi.org/10.1080/01900692.2014.979198.

Brillantes, A., Jr., & Fernandez M. (2013). Theory and practice of public administration in the Philippines: Concerns for an identity crisis. *Asian Journal of Political Science, 21*(1), 80-101. https://doi.org/10.1080/02185377.2013.793562

Campanero, N. S., & Egargo, V. N. (2017). Correlates of vulnerability: A quantified study of people's vulnerability on the impact of super typhoon Yolanda in Guiuan, Eastern Samar, Philippines. *Imperial Journal of Interdisciplinary Research, 3*(9), 416-432.

Center for Excellence in Disaster Management and Humanitarian Assistance. (2018). *Philippines disaster management reference handbook.* https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines_2018-0318.pdf

Centre for Research on the Epidemiology of Disasters, & United Nations Office for Disaster Risk Reduction. (2018). *Economic losses, poverty and disasters 1998-2017*. https://www.unisdr.org/files/61119_credeconomiclosses.pdf

Chen, D. T., Jones, L., & Gelberg, L. (2006). Ethics of clinical research within a community-academic partnered participatory framework. *Ethnicity & Disease, 16*(1 Suppl 1), S118–S135.

Commission on Audit. (2014). *Assessment of Disaster Risk Reduction and Management (DRRM) at the local level*. https://www.coa.gov.ph/phocadownloadpap/userupload/DRRM/Assessment_of_DRRM_at_the_Local_Level.pdf

Cooksey, B., & Kikula, I. S. (2005). When bottom-up meets top-down: The limits of local participation in local government planning in Tanzania. *REPOA Special Paper, 17*. Mkuki na Nyota Publishers.

Daglio, M., Gerson, D., & Kitchen, H. (2014, November 12-13). *Building organisational capacity for public sector innovation* [background paper]. OECD Conference on Innovating the Public Sector: From Ideas to Impact, Paris. https://www.oecd.org/innovating-the-public-sector/Backgroundreport.pdf

Dalisay, S. M. (2014) Engaging local knowledge for disaster risk reduction. Kasarinlan: *Philippine Journal of Third World Studies, 29*(2), 75–102.

Damanpour, F., Walker, R. M., & Avellaneda, C. N. (2009). Combinative effects of innovation types and organizational performance: A longitudinal study of service organizations. *Journal of Management Studies, 46*(4), 650-675. https://doi.org/10.1111/j.1467-6486.2008.00814.x

Ejersbo, N., & Svara, J. H.. (2012). Bureaucracy and democracy in local government. In P. John, K. Mossberger, & S. E. Clarke (Eds.), *The Oxford handbook of urban politics* (pp. 152–178). http://dx.doi.org/10.1093/oxfordhb/9780195367867.013.0009

Estoque, R. C., & Murayama, Y. (2014). Social–ecological status index: A preliminary study of its structural composition and application, *Ecological Indicators, 43*, 183-194. https://doi.org/10.1016/j.ecolind.2014.02.031

Gaillard, J. C., Cadag, J. R. D., & Rampengan, M. M. F. (2019). People's capacities in facing hazard and disasters: An overview. *Natural Hazards, 95,* 863–876. https://doi.org/10.1007/s11069-018-3519-1

Global Facility for Disaster Reduction and Recovery. (2017). *Philippines.* https://www.gfdrr.org/philippines

Girishankar, N.. (2001). *Evaluating public sector reform: Guidelines for assessing country-level impact of structural reform and capacity building in the public sector*. World Bank Operations Evaluation Department. https://ieg.worldbankgroup.org/sites/default/files/Data/reports/public_sector_reform.pdf

GOAL (2015). *ARC-D toolkit for disaster resilience*. https://www.goalglobal.org/impact-learning/disaster-resilience/

Go Green SOCCSKSARGEN (2012). *Philippine disaster risk profile.* https://gogreenr12.org/philippine-disaster-risk-profile/

Hartley, J. (2008). Does innovation lead to improvement in public services? Lessons from the beacon scheme in the United Kingdom. In S. Borins (Ed.), *Innovations in Government: Research, Recognition and Replication* (pp. 159-187). Brookings Institution.

Hermansson H. (2019). Challenges to decentralization of disaster management in Turkey: The role of political-administrative context. *International Journal of Public Administration, 42*(5), 417-431. https://doi.org/10.1080/01900692.2018.1466898

Isidiho, A. O., & Sabran, M. S. B. (2016). Evaluating the top-bottom and bottom-up community development approaches: Mixed method approach as alternative for rural un-educated communities in developing Countries. *Mediterranean Journal of Social Sciences, 7*(4), 266-273. https://doi.org/10.5901/mjss.2016.v7n4p266

Jovita, H. D., Nurmandi, A., Mutiarin, D., & Purnomo, E. P. (2018). Why does network governance fail in managing post-disaster conditions in the Philippines? *Jamba: Journal of Disaster Risk Studies, 10*(1), a585. https://doi.org/10.4102/jamba.v10i1.585

Jung, K., Song, M., & Park, H. W. (2018). Filling the gap between bureaucratic and adaptive approaches to crisis management: Lessons from the Sewol Ferry sinking in South Korea. *Quality & Quantity, 52*, 277–294. https://doi.org/10.1007/s11135-017-0467-x

Labolo, M. (2013). Characteristic of Weber bureaucracy and its relevance in Indonesia. *Asian Social Science, 9*(2), 163-169. http://dx.doi.org/10.5539/ass.v9n2p163

Legazpi City. (n.d.). *Profile, Tagline and Official Seal*. https://legazpi.gov.ph/about/

Lima, V. (2019). The limits of participatory democracy and the inclusion of social movements in local government. *Social Movement Studies, 18*(6), 667-681. https://doi.org/10.1080/14742837.2019.1629277

Matyas, D. & Pelling, M. (2012). *Disaster vulnerability and resilience: Theory, modelling and prospective*. Government Office of Science. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/287456/12-1298-disaster-vulnerability-resilience-theory.pdf

Mendoza, E. N., Toledo-Bruno, A. G., & Olpenda, A. S. (2016). Local government unit capacity for disaster risk reduction and management: From disaster to resilience. *AES Bioflux, 8*(2), 148-155.

Molina, J. G. J., & Neef, A. (2016). Integration of indigenous knowledge into disaster risk reduction and management (DRRM) policies for sustainable development: The Case of the Agta in Casiguran, Philippines. In J. Uitto & R. Shaw (Eds.) *Sustainable Development and Disaster Risk Reduction: Disaster Risk Reduction (Methods, Approaches and Practices)* (pp. 247-264). Springer. https://doi.org/10.1007/978-4-431-55078-5_16

Neal, D. M., & Phillips, B. D. (1995). Effective emergency management: Reconsidering the bureaucratic approach. *Disasters, 19*(4), 327-337. https://doi.org/10.1111/j.1467-7717.1995.tb00353.x

Ngwese, N. M., Saito, O., Sato, A., Agyeman, B. Y., & Jasaw, G. (2018). Traditional and local knowledge practices for disaster risk reduction in Northern Ghana. *Sustainability, 10*(3), 825. https://doi.org/10.3390/su10030825

Pissourios, I. (2014). Top-down and bottom-up urban and regional planning: Towards a framework for the use of planning standards. *European Spatial Research and Policy, 21*(1), 83-99. https://doi.org/10.2478/esrp-2014-0007

Philippine Disaster Risk Reduction and Management Act of 2010, R.A. No. 10121 (2010). https://www.officialgazette.gov.ph/2010/05/27/republic-act-no-10121/

Pongan, L. M. (2015). *Participatory development and disaster risk reduction and management in the Philippines: The case of Albay Province* [Master's thesis, University of Washington]. https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/33533/Pongan_washington_0250O_14659.pdf?sequence=1&isAllowed=y

Ratner, B. (2009). The correlation coefficient: Its values range between +1/−1, or do they? *Journal of Targeting, Measurement and Analysis for Marketing, 17*, 139–142. https://doi.org/10.1057/jt.2009.5

Renn, O., Ortleb J., Benighaus L., Benighaus C. (2011). Risks. In P. Pechan, O. Renn, A. Watt, & I. Pongratz (Eds.). *Safe or not safe* (pp. 1-40). Springer.

Salceda, J. S. (2010). *DRR practices of Albay towards city resilience.* https://www.preventionweb.net/files/section/230_A2AlbayProvinceSalcedaIndicators.pdf

Saundra S. K. (1992). Governmental response to disasters: The conflict between bureaucratic procedures and emergent norms. *Public Administration Review, 52*(2), 135-145. https://doi.org/10.2307/976467

Scott, Z., & Tarazona, M. (2011). *Study on disaster risk reduction, decentralization and political economy*. https://www.preventionweb.net/english/hyogo/gar/2011/en/bgdocs/Scott_&_Tarazona_2011.pdf

Senate Economic Planning Office (2017). Examining the Philippines' Disaster Risk Reduction and Management System. *Policy Brief,* 17-01. https://legacy.senate.gov.ph/publications/SEPO/PB_Examining%20PH%20DRRM%20System_Revised_27June2017.pdf

Sihombing, T. (2016). Public service innovation and reform towards good local governance. *Global Journal of Politics and Law Research, 4*(1), 64-72.

Sim, T, Dominelli, L., & Lau, J. (2017). A pathway to initiate bottom-up community-based disaster risk reduction within a top-down system: The case of China. *International Journal of Safety and Security Engineering, 7*(3), 283–293. https://doi.org/10.2495/SAFE-V7-N3-283-293

Stake, R. E. (2008). Qualitative case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Strategies of qualitative inquiry* (pp. 119–149). Sage Publications, Inc.

Takeda, M. B., & Helms, M. M. (2006). Bureaucracy, meet catastrophe: Analysis of the tsunami disaster relief efforts and their implications for global emergency governance. *International Journal of Public Sector Management, 19*(4), 204-217. https://doi.org/10.1108/09513550610669211

Teng-Calleja, M., Hechanova, M. R. M., Alampay, R. B. A., Canoy, N. C., Franco, E. P., & Alampay, E. A. (2017). Transformation in Philippine local government. *Local Government Studies, 43*(1), 64-88. https://doi.org/10.1080/03003930.2016.1235561

United Nations Department of Economic and Social Affairs (2006). *Innovations in governance and public administration: Replicating what works*. https://publicadministration.un.org/publications/content/PDFs/E-Library%20Archives/2006%20Innovations%20in%20Governance_Replicating%20What%20Works.pdf

United Nations Development Programme and European Commission Humanitarian Office. (2010). *Community-based best practices for disaster risk reduction*. https://www.undp.org/content/dam/mozambique/docs/Community%20based%20BP.pdf

United Nations Economic and Social Commission for Asia and the Pacific, & United Nations Office for Disaster Risk Reduction. (2012). *Reducing vulnerability and exposure to disasters: The Asia–Pacific Disaster Report 2012*. https://www.unescap.org/sites/default/d8files/knowledge-products/Asia-Pacific-Disaster-Report-2012_0.pdf

United Nations International Strategy for Disaster Reduction. (2010). *Local governments and disaster risk reduction: Good practices and lessons learned*. https://www.preventionweb.net/files/13627_LocalGovernmentsandDisasterRiskRedu.pdf

Uy, N., Takeuchi, Y., & Shaw, R. (2012). An ecosystem-based resilience analysis of Infanta, Philippines. *Environmental Hazards, 11*(4), 266-282. https://doi.org/10.1080/17477891.2012.688794

Walker, R. M., Damanpour, F., & Devece, C. A. (2011). Management innovation and organizational performance: The mediating effect of performance management. *Journal of Public Administration Research and Theory, 21*(2), 367-386. https://doi.org/10.1093/jopart/muq043

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Sage Publications, Inc.

Yodmani, S. (2001, February 5-9). *Disaster management and vulnerability reduction: Protecting the poor* [paper presentation]. The Asia and Pacific Forum on Poverty, Asian Development Bank, Manila, Philippines. https://www.adpc.net/V2007/IKM/ONLINE%20DOCUMENTS/downloads/PovertyPaper.pdf

Appendix 1
Summary of the Application of Public Management Approach (PMA) in Disaster Risk Reduction Management (DRRM)

Hazard	PMA	DRRM measures	Role and significance of PMA to DRRM
Agricultural Pests and Diseases	Collaborative and participative planning	• Encourage and involve local farmers in planning • Support and facilitate the development of cooperatives and farmers' organization • Support local farmers in adopting improved farming techniques	• It helps increase awareness and understanding in all levels • It encourages systematic dialogue between local people and experts • It helps prepare appropriate plans, programs, and policies for agriculture • It contributes to the achievement of more stable and efficient agricultural production
	Flexibility in planning	• Update plans and strategies event after event	• Flexibility is necessary because agriculture is vulnerable • It helps safeguard the welfare of local farmers
	Standardized management control	• Establish productions quality assurance system	• Ensures that the requirements for food safety standards are met to protect consumers welfare
	Professional and scientific management	• Provide professional and scientific detection and management of agricultural pest	• Ensures accuracy and credibility of risk reduction inputs and outputs
	Empowering and capacitating leadership approach	• Provide alternative livelihood • Conduct information education campaign	• Contributes to maintain viable farming and sustainable livelihood • Empowers and capacitates farmers

Appendix 1
Continued

Hazard	PMA	DRRM measures	Role and significance of PMA to DRRM
	Flexible and innovative management	• Utilize participative and collaborative planning approach specifically in assessment and problem identification • Utilize bureaucratic implementation of environmental laws, monitoring, and control	• Helps ensure effective implementation of DRRM programs
Disease outbreak	Collaborative and participative approach in planning and implementation	• Strengthen NGO-GO linkages • Encourage and involve both local members and experts in DRRM planning	• Enhances capacity of elements at risk to disease outbreak
	Standardized management control	• Strengthen surveillance system to anticipate and identify possible outbreaks	• Provides means to decrease the vulnerability of the population at risk
	Professional and scientific management	• Provide professional and scientific detection and management of disease outbreak	• Ensures accuracy and credibility of risk reduction inputs and outputs
	Empowering and capacitating leadership approach	• Build capability for the CDRRMC and other concerned stakeholders	• Helps enhance the city's capacity to manage future outbreaks
	Integrated and pro-active management approach	• Implement integrated health programs	• Ensures that diseases are monitored, prevented, and controlled
	Delegation and structural organization	• Delegate and establish four barangays as event case surveillance units	• Ensures efficient surveillance and detection of disease outbreak

Appendix 1
Continued

Hazard	PMA	DRRM measures	Role and significance of PMA to DRRM
Earthquake hazards	Integrated management approach	• Develop an integrated DRRM master plan model • Mainstream DRRM in other initiatives	• Provides relevant and realistic solutions
	Empowering leadership approach	• Empower local stakeholders	• Provides ways for LGU to solve its own disaster risk problems
	Participation and collaboration	• Involve local members and other stakeholders in the DRRM planning process	• It facilitates the development of a consensus plan and DRRM program appropriate to the need of the locality
	Standardized monitoring and evaluation and top-down implementation	• Strictly implement safety standards	• It can minimize the risk to life and property
	Professional management	• Utilize technical experts in DRRM planning, monitoring and evaluation	• It provides a more accurate and reliable approach to DRRM
	Decentralized management	• Capacitate local community or barangay to lead their locality in reducing the risk of earthquake	• It ensures knowledge transfer and long-term sustainability of DRRM initiatives

AAppendix 1
Continued

Hazard	PMA	DRRM measures	Role and significance of PMA to DRRM
Landslide and erosion	Bureaucratic and top-down management approach	• Strictly enforce environmental laws	• It can minimize the risk to life and property
	Empowering and capacitating leadership	• Implement educational program of local community in protecting the environment • Provide necessary financial and equipment support • Capacitate the barangay to formulate a comprehensive land use pan	• It can mitigate the event of erosion • It may increase the capacity of the local community to act in reducing the risk of landslide and erosion
Volcanic Hazards	Scientific management	• Establish community-based scientific DRRM assessment, mapping, monitoring and analysis	• It may improve DRMM plans and strategies
	Strong and clear institutional framework	• Establish joint coordination with provincial government	• It facilitates a well-coordinated DRRM operations
	Delegation and structural organization	• Initiate cluster approach in DRRM	• It strengthens the coordination and response capacity of the LGU

Appendix 1
Continued

Hazard	PMA	DRRM measures	Role and significance of PMA to DRRM
	Participatory approach	• Promote partnership and coordination among key players and stakeholders	• It facilitates harmonization of efforts toward DRMM
	Bottom-up approach	• Utilize bottom-up assessment of damage and needs	• It helps in acquiring adequate response, efficient recovery, and preventive planning
	Responsible and sensitive leadership	• Provide relocation sites that are sensitive to the needs of the dislocated community members	• It promotes a safer and economic-friendly relocation area
Transport Mishaps	Combination of bureaucracy and participatory management	• Strictly implement road safety laws and regulations • Encourage local people to participate in reducing transportation risk	• Helps mitigate and lessen disaster in road, sea, and air transportation
	Capacitating leadership	• Provide extensive and rigorous training and education to drivers	• It increases awareness and reduces the risk
Weather hazards	Integration, innovation, and flexibility in management	• Update plans, strategies and programs every after event of disaster	• Makes DRRM interventions more appropriate and relevant to the condition of the locality

Appendix 1
Continued

Hazard	PMA	DRRM measures	Role and significance of PMA to DRRM
	Combination of top-down and bottom-up planning	• Initiate plan using top- down approach • Assess need using bottom-up approach • Ensure that actual planning is participative but headed by the top authority	• Facilitates efficient and effective DRRM planning
	Centralized and decentralized arrangement	• Retain City government as a central authority • Capacitate and empower local community or barangay to act with specific responsibilities	• Makes disaster response and operation more efficient and effective
	Scientific/ professional knowledge and local knowledge	• Use scientific method in planning, research, monitoring and evaluation • Use local knowledge as supplement	• Provides more credible and accurate information
	Balanced bureaucracy and democracy	• Encourage peoples' participation • Strictly enforce environmental laws and other safety regulations	• It can mitigate the impact of weather-related hazards

Annex 1
List of Acrononyms

AIP	Annual investment plan
CDRRMC	City Disaster Risk Reduction and Management Council
CDRRMO	City Disaster Risk Reduction and Management Office
CCAM	Climate change adaptation management
CRED	Centre for Research on the Epidemiology of Disasters
DRRM	Disaster risk reduction management
LCPDC	Legazpi City Planning and Development Council
LGU	Local government unit
MTIP	Medium-term public investment plan
PMA	Public management approach
UNDP	United Nations Development Programme
UNISDR	United Nations Office for Disaster Risk Reduction