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Reducing and Managing Disaster Risk through Coastal Resource Management: A Philippine Case

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Abstract

Recently, disaster risk reduction and management was adopted by the national and local governments in the Philippines to prevent or mitigate the impacts of hazards. As a consequence, the Local Government Units of the coastal municipalities of Guimbal and Tigbauan, Iloilo Province, initiated disaster risk reduction and management activities. It is contended in this article that the condition of coastal and marine resources is fundamental in fostering community resilience to hazards, as exemplified by activities in Guimbal and Tigbauan. However, five major issues that remain to be addressed by the Local Government Units were identified through Key Informant Interviews and Focus Group Discussions. These include the overlapping roles of personnel, poor data management, weak coordination between Local Government Units and communities, lack of comprehensive plans, and a failure to understand the connection between disasters and the management of coastal and marine resources. Policy recommendations are made for amending the disaster risk reduction and management and coastal and marine resources programmes of municipalities.

Introduction

Disasters seriously disrupt the functioning of a society when human, material, and environmental damage exceeds the capacity of a population to cope using its own resources. Because the magnitude of disasters is determined by both the intensity of the hazards and the vulnerability of the affected population, based on social, economic, and environmental conditions, the impact of disasters varies by region, community, sector, and household (Cannon 1994; FAO and ADPC 2003; IPCC 2012). Ideally, disaster management requires an integrated approach, since numerous factors contribute to its occurrence, and the groups and sectors affected are diverse.

In the Philippines, weather-related disturbances like typhoons, earthquakes and volcanic eruptions are constant threats, with typhoons being the most common. Of the 190 tropical cyclones that entered the Philippine Area of Responsibility during the period 2003-2012, 88 were categorised as being “disastrous” (CRED 2009).

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Five of the most devastating typhoons occurred between 2008 and 2012 and resulted in damage equivalent to USD 2.3 billion (NDCC 2008; NDCC 2009; NDRRMC 2011; NDRRMC 2012). To address the impacts of both recurrent and extreme events, Republic Act 10121 ("Philippine Disaster Risk Reduction and Management Act, DRRM Act of 2010") was passed. In theory at least, this Act has established strategies to strengthen the institutional capacity for managing disasters, enhance community resilience, foster the participation of all sectors and stakeholders in DRRM and "mainstream" disaster risk reduction (DRR) in national and local development plans. The Local Government Units (LGUs) of Guimbal and Tigbauan adopted this new national policy, however, there remain major impediments to adopting and implementing efficient and cost-effective measures, and in particular to using existing local development plans to strengthen the DRRM programme of the LGUs.

Based on the premise that the condition of coastal and marine resources is a major factor in promoting community resilience to hazards, this paper examines the results of a study conducted to characterize and analyse the DRRM and coastal resource management (CRM) activities initiated by the municipalities, to identify reference measures for amending municipal DRRM and CRM programmes. Although both municipalities studied face numerous hazards, the focus here is limited to recurrent weather-related disturbances.

Materials and Methods

Key informant interviews and focus group discussions (FGDs)[1] were used to identify the activities of the local institutions, communities and households in managing disasters and the coastal and marine resources of Guimbal and Tigbauan. The key informants comprised leading members of the DRRM and CRM programmes of the LGUs, members of the *barangay* (village) councils, and heads of the municipal offices. A semi-structured questionnaire covering topics on the activities undertaken by the LGUs at different phases of disaster management was used. For the FGD, 51 residents of Bongol San Vicente and Parara Norte coastal *barangays* in Guimbal and Tigbauan, consisting of fishers, women, youth, and the elderly participated. These two communities were selected for analysis because they felt the brunt of the 2008 flood and are also vulnerable to recurrent hazards. The FGD was categorised into three themes; the previous disaster experiences of the communities, coping strategies of households, and disaster and resource management activities of the LGUs.

[1]FGD and KII guides available online at
https://docs.google.com/file/d/0B4w2TvtjdYStSzB0aWE0d0ZDOVU/edit?usp=sharing

Results and Discussion

The coastal municipalities of Guimbal and Tigbauan are neighbouring towns in southern Iloilo Province (Fig. 1). Guimbal has 33 component *barangays* 13 of which occupy the 9 km municipal coastline. The total population in 2012 was 33, 271, of whom 40% resided in coastal *barangays* (Local Government of Guimbal 2012). Tigbauan has 52 component *barangays* and a coastline of 8.50 km that includes 10 *barangays* (Local Government of Tigbauan 2009). In 2010, 36% of the 58, 814 population of Tigbauan resided in coastal *barangays* (NSO 2010).

Both municipalities have a climate characterized by dry season from December to May and wet season from June to November. Their economy is mainly agricultural, with 76% and 50% of the total land area of Guimbal and Tigbauan, respectively, devoted to rice, maize and fruits production. Approximately 10% of the coastal population of both towns is engaged in fishing and related activities.

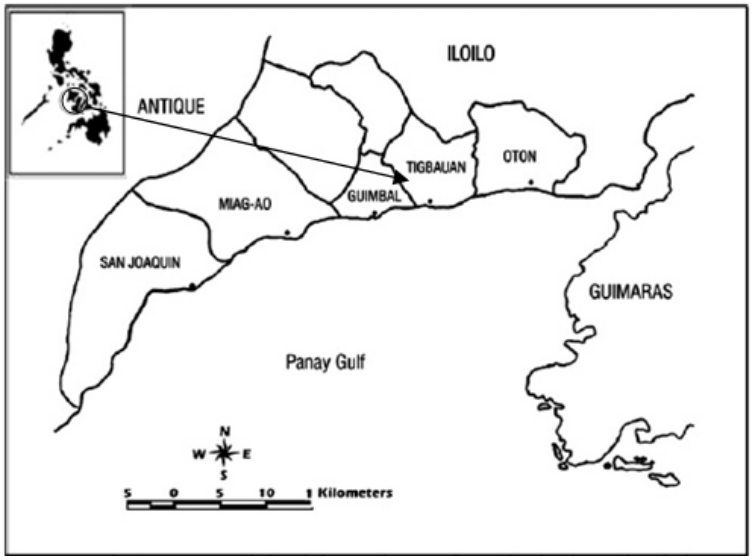

Fig. 1.The geographical location of Guimbal and Tigbauan.
Source: Espectato et al. (2011)

With regards to the socioeconomic profile of the FGD participants, 22 (43%) were men and 29 (57%) women. More than half (57%) were married, 29% were single, and the rest were either widowed (12%) or cohabiting (2%). Their average age was 45 years. Sixty-five percent of the respondents had resided in the two *barangays* since birth, and the average length of stay in the community was 35 years. Most women participants were housewives (31%), and fishing was the most cited income source of the men (20%). There were eight members of the *Barangay* Council and six students. A total of four reported fish vending and the rest were a store owner, a farmer and a teacher. Four percent said they had no income source.

In terms of previous disaster experience, the participants mentioned that typhoons accompanied by torrential rains often caused the inundation of riverine and coastal *barangays*. These events resulted in damage to and destruction of dwellings, fishing gear and boats, livelihood assets and household properties, as well as displacing families, causing power cuts, and leading to water-borne diseases. Typhoon Frank (Fengshen) and the ensuing flood of 2008 was identified as the locally most devastating disaster which led to approximately 33% of the *barangays* in Guimbal and 52% in Tigbauan being inundated causing the relocation of 2,463 families. Based on the damaged assessment report of the Provincial Government of Iloilo (2008), 708 houses were damaged and 16 people were killed in Tigbauan. The estimated economic losses in the municipality of Guimbal alone were equivalent to USD 271,002.71[2].

Apart from extreme events, the municipalities are also at risk to recurring hazards. A "geohazard" assessment conducted by the Mines and Geosciences Bureau of the Department of Environment and Natural Resources in 2012 (DENR-MGB Region 6 2012) showed that both towns are vulnerable to storm surge, landslide and flooding. Forty eight percent of the villages in Guimbal and 95% of those in Tigbauan were identified as flood-prone. Riverbank erosion was also observed in both municipalities. According to the participants, flooding often results from prolonged and excessive rainfall while erosion is caused by the loose quality of soil and lack of riverside vegetation.

DRRM-related activities were conducted at both municipal and household levels to prevent or mitigate the impacts of future hazards. Both LGUs have a legal framework in compliance with RA 10121 to form DRRM Councils and to formulate DRRM plans (Table 1) and have outlined specific activities to be conducted at various phases of DRRM (Table 2). At the community and household levels, the strategies employed by the participants were securing belongings, particularly fishing gear and boats and important documents, tying of houses to tree or lamp posts using ropes and construction of temporary defence against storm surge. Other strategies mentioned were preparing flashlights and improvised flotation devices, being attentive to updates and relocation to safer areas.

[2]Converted at USD 1 = Philippine *Peso* 44.28, the exchange rate in June 2008

Table 1. DRRM-related policies of Guimbal and Tigbauan.

Guimbal
• **Executive Order 2009-8(A)** (An order reorganizing the Municipal Disaster Coordinating Council.) • **Resolution No. 16-2009** (A resolution allowing the incumbent Mayor to enter into a Memorandum of Agreement (MOA) on behalf of the Municipality with the National Food Authority for rice on credit in times of emergency and calamity.) • **Executive Order 39(A)-2008** (An order designating permanent staff of the Disaster Management Office.) • **Resolution No. 107(A)-2008** (A resolution adopting the G.R.E.A.T Plan, a Disaster Risk Management Plan of the Municipality.) • **Resolution No. 126-2008** (A resolution authorizing the incumbent Mayor to enter into a MOA on behalf of the municipality with a local bank to obtain a loan in times of disaster.) • **Executive Order 22-2007** (An order to designate the Municipal Civil Defense Coordinator.)
Tigbauan
• **Executive Order 2011-009** An order reconstituting and revitalizing the Municipal Disaster Coordinating Council and renaming them Municipal DRRM Council.

Table 2. DRRM-related activities of Guimbal and Tigbauan, Iloilo.

DRRM Phase	Guimbal	Tigbauan
Preparedness	• Stockpiling emergency and relief items • Formulation of DRRM plan and Contingency Plan for relocation of affected residents • Conduct of training, lectures and seminars, and capacity-building activities • Formation of Local DRRM Councils • Annual evaluation of the status of *Barangay* DRRM Councils	• Stockpiling emergency and relief items • Formation of Local DRRM Councils • Conduct of training, lectures and seminars, and capacity-building activities
Response	• Establishment of an early warning system (EWS) and communication links within the municipality and with other municipalities • Formation of local rescue groups • Evacuation of affected households to selected relocation sites	• Establishment of an EWS and communication links within the municipality and with other municipalities • Formation of local rescue groups • Evacuation of affected households to selected relocation sites and provision of medical assistance
Reconstruction & Rehabilitation	• Conduct of Damage Assessment and Needs Analysis 24 hours after the occurrence of the disaster	• Formation of a Relief and Rehabilitation Committee to provide assistance to displaced households and manage distribution of relief goods

Mitigation	• Development of Vulnerability, Hazard, Risk and Capacity resources maps • Construction of structural mitigation measures, i.e. groynes, evacuation routes • Conduct of clean-up and tree planting activities • Making agreements with cooperatives and micro-finance institutions to provide assistance to those affected by disasters

Various resource management activities have also been undertaken by the LGUs to re-establish the ecological function of the coastal and marine resources of their towns. Table 3 shows the CRM-related activities of the two municipalities which mostly aim at preventing illegal activities and enhancing fisheries resources.

Table 3.CRM-related initiatives of the municipalities.

Activities	Guimbal	Tigbauan
Formulation and adoption of the CRM Plan (CRMP)	**X**	√
Implementation of local fisheries ordinance/Philippine Fisheries Code (RA 8550)		
1. Establishment of fisheries management councils/Fishers' organizations	√	√
2. Implementation of the *Bantay Dagat* programme to enhance local fisher's capability in monitoring their fishing grounds	√	√
3. Registration of fishers, fishing boats and gears	√	√
4. Formulation of Municipal Fisheries profile	√	√
5. Conduct of fish catch monitoring	√	√
6. Conduct of awareness campaigns on responsible fisheries	√	√
7. Deployment of artificial reefs/fish aggregating device	√	√
8. Establishment of Marine Protected Areas	√	**X**
Mangrove reforestation/coastal clean up	√	√
Inter-LGU endeavours (i.e. Southern Iloilo Coastal Resource Management Council)	√	√

From discussions with residents and key informants, the following issues that impede the effective and efficient management of hazards were identified:

Weak coordination between local institutions and communities

A multi-stakeholder approach is considered essential in disaster management (UNISDR 2004; Baas et al. 2008; Sudmeier-Rieux and Ash 2009; UNISDR 2010) because damages and losses are most likely to be enormous when individuals, organizations and local institutions interact in an uninformed manner (Comfort et al. 1999; Twigg 2007). This approach is also promoted by the "DRRM Act of 2010" (Republic of the Philippines 2010), however, DRRM remains largely the responsibility of local institutions. Insofar as collaboration is concerned, the most that the LGUs had done was to engage selected residents in the conduct of disaster emergency response exercises and present the DRRM-related activities conducted to communities. Disaster management trainings were

mostly attended by selected local officials and there was no uniform transfer of information acquired during the training to the households.

Community involvement in decision-making and purchase of DRRM-related equipment was also lacking. Engaging communities in planning and implementation is a challenging task but should be adopted to have an effective DRRM programme (Sudmeier-Rieux and Ash 2009).

Lack of a comprehensive DRRM plan

Section 12 (6) of RA 10121 states that the DRRM Councils of municipalities should have their local DRRM plans that stipulate the responsibilities of various sectors at different phases of DRRM. The LGU of Guimbal already has a DRRM plan but according to the key informants and participants, most of the activities conducted were for disaster preparedness and response. Although these are very important aspects of DRRM, long-term rehabilitation and recovery measures must also be considered as these promote resilience to future hazards (Baas et al. 2008). The LGU of Tigbauan, is still in the process of formulating its DRRM plan. A workshop was arranged by the LGU in 2012 as one of the municipality's preliminary activities towards the formulation of its DRRM plan.

Poorly-defined roles and shortage of personnel

In the Philippines, hiring of additional personnel by the LGUs is determined by the service requirements and financial capability of local governments (Republic of the Philippines 1991). The passage of RA 10121 prompted some LGUs, like Guimbal and Tigbauan, to add DRRM-related responsibilities to the existing workload of its personnel and assign vague responsibilities to committees that comprise its local DRRM Councils. According to the key informants, these are the long-standing problems of the local governments that impede effective implementation of projects not only in DRRM but in management of coastal and marine resources as well. The lack of logistic and technical support from implementing agencies and top officials was identified as one of the major causes of this problem. According to a UNISDR (2010) report, local governments act as a catalyst in effective DRRM programme implementation, hence, the lack of staff and sufficient knowledge and skills about disaster management may adversely affect the capacities of local governments in managing risks and vulnerabilities and in sustaining its other programmes.

Poor or inadequate data management

The authors observed that the data integral to the DRRM and CRM programmes of the municipalities were either unavailable, deficient or unconsolidated. This was linked to the lack of a comprehensive system for creating, storing and maintaining records for safeguarding data. For the DRRM programmes of the towns, the following data were either lacking or scarce: damage report on previous disasters, documentation of household-level disaster management initiatives and

vulnerability profile of communities. Both LGUs have yet to formulate a monitoring scheme essential to planning rehabilitation activities and for institutional research. The lack of a standardized format for reporting and analysis also contributes to this problem. Badjeck et al. (2010) said that accurate and substantial data are important in the review of previous practices and decisions related to managing disasters. Proper data management also promotes accountability and transparency especially with regards to the utilization of funds and assistance received during disasters, thereby protecting both the rights and interests of local governments and communities.

Failure to recognise the linkage between disaster and natural resources management

Ecosystems have the adaptive capacity to absorb sudden shifts in the climatic, geological and biological components, which is a key feature in disaster resilience (UNISDR 2004). Coastal and marine resources, like mangroves and corals, help protect the lives and properties of communities, the monetary equivalent of which, may amount to millions of dollars (Emerton and Bos 2004; Emerton et al. 2009). But proper management of natural resources is needed since disasters may also cause direct damage to the environment (Tran and Shaw 2007; Badjeck et al. 2010).

The interplay of geographical, socio-economic and environmental factors makes coastal communities, like Guimbal and Tigbauan, relatively susceptible to the adverse impacts of hazards (Badjeck et al. 2010; IPCC 2012). In a case study in coastal Bangladesh, fishers were found to be among the most vulnerable sector due to limitations in income, access to alternative livelihood and institutional support (Islam et al. 2013). Households reliant on fishing for livelihood and food can be economically affected by any change in the fishery resource regardless of their socio-economic status as exemplified in a study of Garaway (2005) in Lao PDR.

In Guimbal and Tigbauan, the role of a healthy ecosystem in disaster management is underappreciated based on the types and number of resource management activities reported by the key informants in Table 3. At present, there is a need in both municipalities for a well-formulated CRM programme that will incorporate both disaster and environmental degradation concerns. This strategy is often equally effective and less expensive than human-built structures (UNEP 2007) and may promote resilience to hazards (Sudmeier-Rieux and Ash 2009).

Conclusion and Recommendations

The value of healthy ecosystems in disaster management is highlighted in studies (Tran and Shaw 2007; Badjeck et al. 2010) and publications (Emerton and Bos 2004; UNISDR 2004; UNEP 2007; Emerton et al. 2009; Sudmeier-Rieux and Ash 2009; IPCC 2012) and the crucial role of local institutions in DRRM programme implementation and sustainability is also promoted (UNISDR 2010). The challenges in the management of disasters and coastal and marine resources are interrelated and a responsibility of different sectors, including communities. Working on these

premises, initiatives that would serve as reference for the formulation or revision of DRRM and CRM programmes are presented below.

Forging a joint management scheme in DRRM and CRM

It is imperative that local institutions, organizations and community jointly manage disasters (Comfort et al. 1999) and the coastal zones because of the expected increase in the severity and magnitude of future disasters (IPCC 2012). Involvement at different phases of programme implementation can help strengthen relationships among stakeholders (UNISDR 2004; Baas et al. 2008; Sudmeier-Rieux and Ash 2009; IPCC 2012) and promote effective programme implementation and sustainability (Foster-Fishman et al. 2001).

In the study areas, collaborative approach can be a useful tool in conducting risks and capacities assessment, formulation of vulnerability and capacity maps and may help address problems related to the lack of technical skills and funds. Inter-LGU partnerships through the Southern Iloilo Coastal Resource Management Council (an alliance of municipalities in southern Iloilo Province), for instance, may provide a venue for the LGUs to discuss their DRRM-related concerns and promote coastal resource management as a tool to manage hazards. Joint efforts in the management of hazards and natural resources like mangrove and tree planting, coastal clean-up and awareness campaigns may be carried out through this partnership. Securing continuous commitment to these activities can be challenging, however, the sectors involved should not merely focus on attaining the desired outcome but should also appreciate the lessons learned from working together (El Ansari et al. 2001).

Strengthening institutional capacity to manage disasters and coastal zones:

Formulation of DRRM and CRM plans

Planning is considered an integral aspect of disaster risk reduction and natural resources management (UNISDR 2004; IPCC 2012). DRRM, in particular, encompasses a wide range of disciplines and should therefore have a plan that incorporates various measures relevant to reducing disaster risks. Environmental policies should be integrated in DRR especially in coastal communities because of the protective and economic benefits obtained from the natural resources (UNISDR 2004).

The formulation of local DRRM and CRM plans in the Philippines is mandated by RA 10121 and RA 8550, respectively, as a requisite to the disbursement of funds for disaster and coastal resource management. A systematic review of the plans is scheduled once every 5 years to ensure that it remains responsive to changing circumstances (Republic of the Philippines 1998; Republic of the Philippines 2010). Managing disasters is a shared responsibility, however, it is the government's responsibility to formulate an integrated strategy to prevent or minimize risks and promote

community resilience (UNISDR 2004; UNISDR 2010; IPCC 2012). The provisions of the national strategy on disaster and coastal resource management will remain on paper if not translated into action at the local level. Policy directions lie primarily on the hands of local governments that decide what programmes to prioritize. But since the need to prepare for and respond effectively to disasters is a pressing concern, having a DRRM plan consistent with environment and other local development programmes of the municipality should be regarded with utmost importance.

Development of personnel capability

Capacity development is an important component of a decentralized DRRM (UNISDR 2010) and can be achieved through the exchange of information and skills among stakeholders (UNISDR 2004). Awareness-raising, education and training are activities critical to promoting new knowledge and skills and attitude change (Sudmeier-Rieux and Ash 2009) and may also serve as a venue for promoting conservation and management of coastal resources (Pomeroy et al. 2006). LGUs can partner with and tap experts from external organisations to provide technical assistance to its employees. To have a comprehensive plan that clearly outlines the roles and obligations of responsible sectors may solve the issue on poorly defined responsibilities.

Adoption of a systematic data management system

Having a systematic data management system is necessary in DRRM to identify vulnerabilities, risks and capacities of different sectors which, in turn, are integral to making informed decisions (Baas et al. 2008; IPCC 2012). The lack of data on disasters and DRR strategies is a constraint to vulnerability reduction especially at the local level which is why a standard approach in the "collection, analysis, storage, maintenance and dissemination of data" should be adopted (IPCC 2012).

Data pertinent to DRRM and CRM can be obtained from scientific studies and from knowledge of local residents. Studies and publications suggested the utilization and integration of "local knowledge" with scientific knowledge in disaster risk reduction (UNISDR 2004; Dekens 2007; Mercer et al. 2009; IPCC 2012) and natural resource management (Berkes et al. 2000; Gilchrist et al. 2005). However, there is a need to carefully validate 'local knowledge" to ensure its scientific soundness (Gilchrist et al. 2005; Gilchrist and Mallory 2007; Ruddle and Davis 2011; Ruddle and Davis 2013).

Concerning record-keeping, the Commission on Audit issued a memorandum in 2012 containing the guidelines on the accounting and reporting of DRRM budget and other forms of assistance received by LGUs from local and foreign donors. The memorandum mandates the issuance of receipts for assistance received and submission of reports on its allocation and utilization to deter mismanagement of DRRM funds and equipment (COA 2012).

Local governments may seek support from private organizations and academic institutions in the collection and analysis of data relevant to DRRM and CRM. Participatory methods in risk and capacities and coastal resource assessments may be adopted to encourage community participation. The exchange of information can help promote the culture of safety to different sectors (UNISDR 2004). Local institutions should determine what information is necessary and what IEC methods are appropriate and effective for the communities when disseminating information and conducting trainings (IPCC 2012).

Systematic mainstreaming of CRM in DRRM

The fisheries sector is often heavily affected by disasters and at risk to climate-induced hazards which calls for an integrated approach in disaster risk reduction (IPCC 2012). According to UNISDR (2004), risk reduction strategies should involve environmental management activities. Disaster risk reduction should not be considered as a panacea to minimizing risks but should be treated as one of the multiple strategies to be adopted in order to promote resilience to hazards. Moreover, managing hazards is a responsibility to be shared by local institutions and communities alike (Comfort et al. 1999).

In Guimbal and Tigbauan, the integration of CRM in DRRM is challenged by numerous factors, including, failure to successfully implement CRM programmes, undervaluing of ecosystem services from coastal and marine resources and lack of guidelines regarding conduct of CRM-related activities and the engagement of communities in the process. Working on these premises, it is recommended that the LGUs strictly implement ordinances pertinent to sustainable use of coastal and marine resources and couple these activities with awareness-raising campaigns to ensure that the local population is well-informed about the rationale for compliance. The importance of a judiciously managed environment in securing livelihood, protection against coastal hazards and other benefits should be emphasized to encourage community participation in CRM-related activities and increase compliance to environmental policies. Putting into action the CRM plan will greatly help in the effective implementation of resource management programmes, and this requires the concerted effort and commitment of responsible government agencies, local government units, and the communities.

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