Understanding Local Government Resilience: A Case Study on how the Local Government of Marikina City Reacted to the Flood in September 2009

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Abstract In the face of climate change and its impacts, the best response of cities is to improve their resiliency. However, it is interesting to view an organization such as a local government, as one of the means to improve resilience of a city. This study aims to understand organizational resilience, i.e. a resilient local government, as a response to the impacts of climate change. In September 2009, the local government of Marikina City experienced a significant amount of stress when Tropical Storm Ketsana hit the country and devastated not only Marikina, but cities and municipalities in the metro and in the northern parts of the Philippines. The study area was one of the hardest hit by the heavy flood caused by the tropical storm. This sudden shock, which was considered by Philippine scientists as an extreme rainfall event, affected almost all inhabitants of Marikina, damaged houses and interrupted local businesses. This chapter is part of a much broader case study under the Alexander von Humboldt Foundation's International Climate Protection Fellowship Programme.

Keywords Climate change · Resilience · Local Government

1 Introduction

Climate change is a reality and its impacts pose a huge challenge to society. Disasters and disturbances such as flood events have "highlighted the need for urban systems to cope with unexpected shocks" (Resilience Alliance 2007, p. 7).

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Building resilience, therefore, is crucial particularly in areas like cities where presence of humans is abundant (Resilience Alliance 2007).

Local governments hold an important role in both climate change adaptation and mitigation (UNDP and UNEP 2010). In adaptation, the goals are to reduce vulnerability and improve resilience. Resilience is best viewed in a developmental perspective where it builds in time from continuously facing pressures or stress (Sutcliffe and Vogus 2003).

This study aims to understand organizational resilience as a response to the impacts of climate change. The focus of this chapter is on organizational resilience and actions, reactions and response of local government of Marikina, after experiencing Tropical Storm Ketsana. This study is part of a much broader case study of Marikina City that is currently that is being undertaken.

This chapter contains the following sections. Section 2 provides a discussion and description of climate change and organizational resilience. It also describes the resilience approach. Section 3 presents the objectives and methodology of the study. Section 4 describes Tropical Storm Ketsana, the sudden shock that surprised not only Marikina City but the whole country. The effects of Ketsana both at the national and local levels are presented. The local government of Marikina's arrangement on disaster preparedness, management and response before and during Ketsana is described in Sect. 5, and post-Ketsana issues in Sect. 6. Section 7 contemplates on one of the responses or actions made by the local government after experiencing the sudden shock. Section 8 provides a conclusion of the study.

2 Understanding Climate Change and Resilience

2.1 Climate Change and Flood

Studies have tracked the recent historical changes in climate which includes observed increase in global average air and ocean temperature, melting of snow and ice, and rising global average sea levels and occurrence of heavy precipitation in most areas (IPCC 2007). With climate change, comes the occurrence of hazards. Cities can be highly affected wherein their immobility makes them vulnerable to the impacts of climate change (IBRD and WB 2010). Therefore, being a healthy and robust city is really a challenge in these changing times. Local governments have important roles in addressing the complex impacts of climate change by creating the appropriate plans for their services and communities (Lee 2011). City level actors are aware of the importance of their roles and are actively participating in various climate strategies, projects and programs even though the Kyoto Protocol does not explicitly mention their roles and responsibilities (UNHSP 2011).

With the increase in probability of occurrence of intense typhoons is a higher likelihood of flood events. Flooding is a natural phenomenon and if not properly

managed and reduced, they can lead to worsening of problems (LGA 2011). The effects of floods in cities are particularly strong because of its population and its immobility (IBRD and WB 2010). According to a study made by World Meteorological Organization (WMO) and the Global Water Partnership (GWP), there are different types of losses due to flood. The first type is tangible direct losses which comprise of loss of things with monetary value, which results from direct contact with flood water. The second type is the tangible indirect losses, which are losses of things which cannot be bought or sold, which resulted from the event but not from direct impact, e.g. loss or disruption of agricultural and industrial productions. The third type of loss is the intangible human and other losses such as loss of life, physical injury and loss of heritage (WMO and GWP 2008).

2.2 Understanding Organizational Resilience

Studies have described resilience in an ecological, sociological, the combined aspects as well as organizational context. This research chapter is geared more on the latter. Weick et al. (1999) and Sutcliffe and Vogus (2003) state that it is not easy to grasp the meaning of social resilience in organizational studies (Hutter 2011). Organizational resilience is a term often used in a wide range of concepts that includes adaptation, capability, competence, and learning concept (Hutter 2011). However, it is often unclear and hard to define (Braes and Brooks 2010). What is even more challenging is using (social) resilience in the context of natural hazards. In his research note, Hutter (2011, p. 2) concludes "only systematic theoretical work and rigorous empirical analysis in the future can provide sufficient certainty about the usefulness of social resilience as understood in organizational studies."

Sutcliffe and Vogus (2003) gave an optimistic view on defining resilience in the context of organizing in the face of adversity. They made an effort to reverse the usual interpretations done in other studies wherein authors see organizational (as well as individual) failures as threat rigidity that when faced with threat, leaders and members of a group respond rigidly and are inflexible. According to the authors, when there is the presence of enabling conditions such as competence, growth and efficacy, then the likelihood of a resilient response, which eventually leads to positive adjustment, is very high.

A positive definition of resilience is when it is utilized in the aspect of development. This is different from another concept of resilience where it is seen as a super entity or otherwise having the ability of a group that can absorb damages and still retain its form (Porac 2002; Sutcliffe and Vogus 2003). Although observed in the context of megacities, Klein et al. (2003) discussed that bouncing back to the original form is undesirable since the entity would be just as vulnerable to the next disaster. Indeed, why should one go back to its original state when improvement is a better option.

Viewing resilience in a development perspective is looking at something that improves "over time from continually handling stress or risks" (Sutcliffe and

Vogus 2003, p. 96). The beauty in this perspective is that it does not promise that groups or organizations (or even individuals) to be perfect. It recognizes both the "possibility of fallibility and the probability of successful coping" (Sutcliffe and Vogus 2003, p. 97). Organizational resilience is defined as "anchored in organizational processes aimed at enhancing an organization's overall competence and growth (especially the ability to learn and to learn from mistakes), and restoring efficacy through enhancing the ability to quickly process feedback and flexibly rearrange or transfer knowledge and resources to deal with situations as they arise" (Sutcliffe and Vogus 2003, p. 104).

Wildavsky (1988) cited in Sutcliffe and Vogus (2003, p. 97) views resilience as adaptability, where it refers to "improvement in overall capability, i.e., a generalized capacity to investigate, to learn, and to act, without knowing in advance what one will be called to act upon". There is the concept of improvement, change, adaptation and of learning from mistakes.

Resilience is also important in the context of sustainability (Brand and Jax 2007). The local government's role for rebounding by learning from its failures and limitations brought by disasters is highly expected by its local constituents. Indeed, the public wants to have a government that is operational and provides service after a catastrophic event such as flood.

2.3 Resilience Defined in the Study

With all the definitions and components mentioned on resilience, this research chapter would envision the term in a developmental perspective as well. Thereby, based on the definitions of Wildavsky (1988), Sutcliffe and Vogus (2003), resilience would be defined in the study as the ability of the local government to rebound from uncertainty by adapting from recurrent disasters such as flood hazards. A resilient local government would now pertain to having the ability to react to changes brought by flood hazards that can be caused by climate change. It also has the ability to rebound and maintain its basic functions.

2.4 Resilience of What and to What Approach

It is quite practical to apply a *resilience of what to what* approach to empirical studies that work with resilience, since the concept gets diluted and increasingly unclear due to many different intentions and wide extensions (Brand and Jax 2007). As the concept is broad, it is important to define resilience in terms of what to what (Müller 2010). A resilience approach calls for assessing both specified and general resilience (Resilience Alliance 2010). For this study, the focus is on the specified resilience where Resilience Alliance (2010) refers it as the resilience of what, to what. It pertains to controlling variables that may have threshold effects

which lead to either unwanted or permanent changes in the system state (Resilience Alliance 2010).

Resilience of what. The "of what" part describes the specific element which supposed to be resilient to the identified disturbance (Brand and Jax 2007). Therefore, to answer the resilience of what, it is the organization particularly the local government of Marikina City.

Resilience to what. Resilience Alliance (2010) describes resilience "to what" as disturbances, disruptions and, uncertainties. Here this pertains to flood, particularly the flood event caused by Tropical Storm Ketsana in 2009.

3 Objectives and Methodology

The main objective of this research chapter is to answer the question "what is one of the responses made by the local government of Marikina City after experiencing flood event caused by Tropical Storm Ketsana?" Specifically, it aims (a) to describe Tropical Storm Ketsana, i.e., the sudden shock, and its effects to Marikina City, and (b) to analyze and compare the local government's set-up on disaster preparedness, management and response. The result of the latter objective would be an identification of one of the responses made by the local government of the city after experiencing the sudden shock. The success or the quality of this response will not be assessed in this chapter.

The methods of the study will include a review of related literature on resilience and a description and analysis on the particular flood event that occurred in 2009, and a comparison of the organizational set-up of the local government of Marikina in disaster preparedness, management and response before, during and after Tropical Storm Ketsana.

4 The Sudden Shock: Tropical Storm Ketsana

Background of the study area. Due to its geophysical location and socio-economic conditions such as low maintenance standards for disaster prevention facilities and poor inhabitants living in disaster-prone areas (Nakasu et al. 2011), the Philippines is considered as one of the most disaster-prone countries in the world (ADPC and FAO 2006). According to the 2009 Mortality Risk Index of the United Nations International Strategy for Disaster Reduction, the nation ranks 12th among the 200 countries most at-risk for tropical cyclones, floods, earthquakes and landslides (GOP 2009). An average total number of 19–20 typhoons cross the county each year. These events frequently occur in the months of July to November. Typhoons strike in all major regions of the country however, the Central and Northern Luzon are the most affected areas (GOP 2009).

Metropolitan Manila or Metro Manila, also known as the National Capital Region, is comprised of 16 cities, including Marikina City and one municipality. The area is a floodplain/tidal basin. Typhoon occurrences often result in gentle flooding in low-lying areas which could last for a long period of time in a significant number of towns. Around 40 % of the annual average rainfall is associated with typhoons (GOP 2009). Annually, the country experiences disastrous rainfall events and flooding. According to the National Disaster Coordinating Council, a total of 158 destructive typhoons that resulted in 13,491 deaths have occurred between 1900 and 2008 (GOP 2009).

The Sudden Shock. Although typhoon occurrences are frequent, the nation was still shocked on 26 September 2009 when Tropical Storm Ketsana, with local name "Ondoy," hit the archipelago. The tropical storm produced floods that resulted in tangible losses, both direct and indirect as well as intangible losses. According to the Post-Disaster Assessment or PDA Report, the tropical storm first developed as a tropical depression three days before the disastrous event. In 24 h, a total of 455 mm of rainfall was recorded in one of the stations of the Philippine Atmospheric Geophysical and Astronomical Services Administration, the country's official weather bureau, where about 343 mm of which fell within 6 h. This clearly exceeded the climatological average total rainfall for September which is 330 mm. This was considered an extremely rare of occurrence (GOP 2009). According to the PDA report, the unusual volume of rain produced by Tropical Storm Ketsana caused widespread flooding particularly in the central part of Luzon where Metropolitan Manila lies. It is equivalent to a Category I storm with maximum winds of up to 147 km per hour (GOP 2009).

4.1 Effects of Tropical Storm Ketsana

Tropical Storm Ketsana affected the southwest monsoon and caused widespread flooding in almost all parts of central Metro Manila and Southern Luzon (north of Metro Manila) and some parts of Visayas and Mindanao regions, located south of Metro Manila. A total of 4,901,234 individuals or 993,227 families were affected during this catastrophic event based from the National Disaster Coordinating Council's final report produced in 2009. Twelve out of the seventeen regions of the country were affected by the storm. A total of 16 cities (including Marikina City, the case study area) and 172 municipalities were distressed. Casualties reached up to 464 deaths with 529 reported injured and 37 individuals missing (NDCC 2009). Majority of the deaths were caused by drowning (GOP 2009). The total damage by Ketsana reached PhP 11 billion pesos or around 775.74 million Euros. More than half of the cost of damage was (a) agricultural resource-related wherein around 203,477 hectares were affected and incurred losses of about 392,230 MT of crops such as rice, corn and high value commercial crops; fishery products, livestock/poultry; and facilities for irrigation, fishery and livestock/poultry; and the rest were

(b) infrastructure-related such as schools and hospitals. A total number of 185,004 houses were partially and/or fully destroyed (NDCC 2009).

Ketsana caused extensive flooding in Metro Manila and neighboring Rizal province (GOP 2009). There were three reported landslide incidents in areas in Luzon. The heavy rainfall brought by the tropical storm also prompted the National Irrigation Administration to open some of the gates of major dams (i.e., La Mesa Dam, Ipo Dam, Ambuklao Dam and Binga Dam) which resulted in heavy flooding in areas in Region 3, north of Metro Manila (NDCC 2009). Fifty-seven road sections were impassable to all types of vehicles in five regions, including the 37 road sections in Metro Manila during the peak of the tropical storm due to eroded shoulders, presence of floodwaters and landslides (NDCC 2009).

From 3 to 9 October 2009, seven days after Ketsana, Typhoon Parma entered the Philippines and crossed over Central and Northern Luzon. Based from the Post-Disaster Needs Assessment, both Tropical Storm Ketsana and Typhoon Parma caused substantial damages and losses which were equivalent to around 2.7 % of the Gross Domestic Product or GDP. The two storms account for over 60 % of the GDP (including Metropolitan Manila or the National Capital Region which accounts for about 38 % of the total GDP) and were considered significant in the overall magnitude of their effects (GOP 2009) in the country. The scales of these disasters were magnified because these storms hit highly populated economic centers. These two events were comparable to other major disasters in the world (GOP 2009, p. 15).

Effects of Tropical Storm Ketsana on the Local Government of Marikina City. In the Metro Manila region, Marikina City is reported to be the most heavily affected by flood waters. Although the local government of Marikina City has prior experience with "normal" floods, they were unprepared for the intensity of that rainfall event on 26 September 2009. On that fateful day, the local government convened the Marikina Disaster Coordinating Council (MDCC), which is chaired by the city mayor and is in-charge of responding to calamities and disasters experienced by the city. Rescue 161, the city's local communication and command center, was ordered by the council to deploy rescue operations. Only three of the 16 barangays, the smallest administrative unit in the Philippines, were accommodated by ambulances in the morning of the 26 September. At noon, most of the affected areas were unreachable because of the high flood levels.

5 Local Government's Disaster Arrangement Before and During Ketsana

As early as the 1990s, the local government of Marikina City had undertaken disaster-related initiatives. The vision and plan of the local government for its city is for its inhabitants to have a clean and safe place. To accomplish the plan, the local government (a) reactivated the MDCC; (b) created the Rescue 161, also known as the Disaster Management Office; and (c) established the 5-Minute Quick

Response Time. These initiatives were tied up with different programs that are related to flood control, mitigation and response.

Marikina Disaster Coordinating Council. Even before and during the time of Ketsana up until 2010, the Presidential Decree 1566, series of 1978, entitled "Strengthening the Philippine Disaster Control, Capability and Establishing the National Program on Community Disaster Preparedness," was the very basic Philippine law on disaster management. It mandates all levels of government from the national to the barangay level to organize multi-sectoral disaster coordinating councils. With said decree, communities can mobilize resources and capabilities needed to manage disasters with the presence of disaster coordinating councils. Said councils act as a link with all relevant government agencies and civic organizations (Duque 1999).

The decree provides the creation of the National Disaster Coordinating Council (NDCC). It is the highest policy-making body on disaster concerns and provides advice to the President (WB and NDCC 2005). WB and NDCC (2005) cites important stipulations in the decree, which includes (a) the state's policy on self-reliance among local leaders and their constituents; (b) documentation of plans by government departments and attached bureaus and agencies; (c) execution of planning and operation at the barangay level in a multi-sectoral basis; (d) leadership responsibility lies at the local level particularly on the provincial governor for provinces, city/municipal mayor for towns, and barangay chairman for barangay, the lowest political unit (WB and NDCC 2005).

The organization of the disaster coordinating councils exists from the national to the local levels. At the city/municipal level, the disaster coordinating councils are chaired by the highest elected official which is the mayor and vice-chaired by the station commander of the integrated National Police. The latter also acts as action officer. According to the decree, the council is comprised of members of organic city/municipal officials as well as national officials assigned by the city/municipality. The set-up of disaster management then, according to Duque (1999), is based on the democratic governance of the Philippines. The local disaster coordinating councils also cooperate with central government agencies and civic and non-government organizations whereby it links these relevant groups and mobilize resources and capabilities to manage disasters (Duque 1999).

The Marikina Disaster Coordinating Council (MDCC) was reactivated in the 1990s. It is chaired by the city mayor, vice-chaired by the vice mayor and the action officer is either the city administrator or the city engineer. The council is comprised of (a) damage and needs assessment; (b) central communication and command center; (c) plans and operations; (d) support services; and (e) recovery and rehabilitation. All of which are manned by regular and casual government employees from the different offices of the city government.

The MDCC has three functional stages, i.e., (a) pre-disaster stage, (b) disaster stage and (c) post disaster stage. For the pre-disaster stage, the functions of the Council include ensuring local departmental offices to have plans and defined disaster management roles. The Council is also responsible in conducting researches and studies; compiling and keeping geo-hazards maps which will be

useful in land use planning; identifying potential evacuation centers in coordination with the barangay offices; conducting training and seminars related to disaster response; and information, education and campaign on disaster related matters. The Council also has administrative and documentation tasks as well (Marikina City Government 2007). During disaster stage, the MDCC is expected to do a lot of communication and coordination such as oversee actual response; coordinate with other offices like the Barangay Disaster Coordinating Councils and Rescue 161; maintain central communication and command center; and perform documentation. The local government of Marikina is aware of its responsibility during post-disaster stage. Here the MDCC is the lead of the recovery and rehabilitation unit. The Council is also responsible for the damage and needs assessment, recommendation of these evaluations to the City Council for legislative actions and documentation.

6 Local Government's Disaster Arrangement After Ketsana

After the great flood event caused by Tropical Storm Ketsana, changes took place both at the national and local levels. For instance, the Philippine Disaster Risk Reduction and Management bill was passed into law in 2010. It now superseded the Presidential Decree 1566 which has been enforced for the past 33 years. The law aims to strengthen the Philippine Disaster Risk Reduction and Management System by providing for the national disaster risk reduction and management framework and institutionalizing the National Disaster Risk Reduction and Management Plan. The scope of the act includes provisions on development of policies and plans and the implementation of measures on all aspects of disaster risk reduction and management. It also encompasses good governance, risk assessment and early warning, knowledge building and awareness raising, reducing underlying risk factors, and preparedness for effective response and early recovery. With the passage of the new law, there is now a new mandate for the local government units particularly making communities more disaster resilient as well as institutionalizing disaster risk reduction within their functions and operations.

Marikina Disaster Risk Reduction and Management Council. At the Marikina City level, the city's Council passed City Ordinance No. 32 creating the Marikina City Disaster Risk Reduction and Management Council (MCDRRMC). This move reorganizes the current MDCC with an emphasis on disaster preparedness. The importance of the people's right to life and property, incorporation of internationally accepted principles to plan, mainstream disaster risk reduction and climate change policies to all sectoral plans, program and engage civil society groups, private sectors and volunteers in the government's disaster risk reduction programs are considered and incorporated to the local law.

According to the said ordinance, the leadership of the reorganized council is still the same where the city mayor is the head or chairman, the vice-mayor and the

city administrator as the vice-chairman and action officer, respectively. Members of the council include city officials, the Bureau of Fire Protection, Philippine National Police, Chinese Volunteer Fire Brigade, non-governmental organizations and people's organizations such as the Rotary Club of Marikina, Red Cross, Marikina Valley Contractors Association, Tzu Chi Foundation, Fil-Chinese Chamber of Commerce, Marikina Valley Medical Society, among others. The manpower of the council is comprised of regular and casual local government employees.

The MCDRRMC has also three function stages, i.e., (a) pre-disaster stage, (b) disaster stage and (c) post-disaster stage. According to the city ordinance, the pre-disaster functions includes formulating policies related to disaster risk reduction and management; approving, implementing and monitoring of plans; and ensuring that disaster risk reduction and climate change adaptation policies and strategies are integrated in the city's development plans, programs and budget. With regards to the disaster and post-disaster functions, the reorganized council has responsibilities over forced evacuation of local inhabitants and to ensure that there is smooth coordination among the government, public and private sectors.

Required Additional Office. With the passage of the Philippine Disaster Risk Reduction and Management Law, one of its mandates is to create the local disaster risk reduction and management office in the lower level, i.e., provincial, city, municipality and barangay levels. This additional office will be under the office of the provincial governor, city or municipal mayor or *punong* barangay or barangay leader based on the law. Further, the law mentions that the office shall be assisted by three staff responsible for administration and training; research and planning; and operations and warning. This mandate was considered by Marikina City. The creation of the Marikina Disaster Risk Reduction and Management Office was included in the City Ordinance No. 32.

7 A Reaction After Ketsana: Local Government's Creation of a Local Disaster Risk Reduction and Management Office

After the occurrence of Tropical Storm Ketsana, the local government of Marikina made several responses and adjustments. A comparison of the local government's disaster preparedness, management and response arrangement before, during and after Ketsana indicates institutional changes. One of the reactions of the local government was to legalize the creation of a disaster risk reduction and management office. Following the Philippine Disaster Risk and Management (DRRM) Act, the local government through the City Ordinance No. 32, passed by the city council, proposed a new office that consists of an administrative and training unit; a research and planning unit; and operations unit. The ordinance also reorganizes the former MDCC into MCDRRMC.

There was no disaster risk reduction and management office before and during Ketsana. There was only the MDCC and Rescue 161. Back then, the former MDCC did not have a permanent technical arm that supports the council. In reference to the earlier studies (Sutcliffe and Vogus 2003) a technical office manned with competent and efficient staff who are willing to learn and have relevant experience on disaster preparedness, management and response may increase the likelihood for the Council to produce more resilient responses or positive adjustments.

The local government of Marikina is currently making efforts to create a local DRRM office that will act as secretariat and technical arm of the MCDRRMC. Consistent with the DRRM Law, the new office will be under the office of City Mayor wherein its main tasks include setting the direction, development, implementation and coordination of disaster risk management programs. It will also be involved in formulating a local disaster risk reduction and management plan which should bein accordance with the higher level framework. According to the City Ordinance no. 32, an important role of a local DRRM office is to design, formulate and program disaster risk reduction and management plan. Said plan should be consistent with the national guidelines and be approved by the MCDRRMC. Other equally important tasks of the office include (a) identifying and assessing hazards vulnerabilities and risks within the city; (b) coordinating risk assessment and contingency planning; (c) operating a multi-hazard early warning system; (d) maintaining database of human resource, equipment, directories and location of critical infrastructures; (e) responding and managing the adverse effects of emergencies and carry out recovery activities; and (f) performing other functions that may be assigned by MCDRRMC.

However, it is should be noted that although, the local government already legalized the creation of such permanent office to assist the MCDRRMC, the (national) Commission on Audit made a recent report that the local government of Marikina has failed to established such office. In addition to this, the auditor also found out that the local government has not approved a DRRM Plan for 2011 with respective Work and Financial Plan. At present, the chief of the City Transportation Management and Development Office is the officer-in-charge on disaster-related matters. In response to this latest finding, the local government of Marikina said that the MCDRRMC has already issued a resolution instructing the use of the five percent calamity fund to implement the provisions of both the national law and city ordinance (Cordon 2012).

8 Conclusion

In the face of hazards posed by the changing climate, a local government that is resilient, such that it reacts and aspires to improve, is important to help cities to be resilient. This chapter examines a case study on organizational resilience, in particular, the response of the local government of Marikina City to the heavy flooding caused by Tropical Storm Ketsana. This chapter has shown that one of the reactions or responses is the legalization of the creation of the Marikina City

Disaster Risk Reduction and Management Office, after a comparison of the local government's disaster preparedness, management, and response arrangement before, during, and after Ketsana. A local government that is resilient, where it reacts and wants to improve is imperative. It helps the city to be resilient to disasters and hazards which are brought about by climate change.

There are, of course, other responses made by the local government of Marikina. However, these are further described and analyzed in a broader case study which is currently being undertaken under the Alexander von Humboldt Fellowship Programme.

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Marian Cruz a licensed environmental planner from the Philippines, is a fellow holder of the Alexander von Humboldt Stiftung/Foundation under the International Climate Protection Fellowship Programme 2011–2012. In relation to this, Ms. Cruz worked on her individual project on climate change and resilience at the Leibniz Institute of Ecological Urban and Regional Development in Dresden as a guest researcher. In Manila, she is currently connected with Perk Technical Consultants Corporation, a private engineering consulting firm. Her research interests include environmental planning, climate change mitigation and adaptation, resilience and disaster risk prevention.