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PREPARING METRO MANILA TOWARD URBAN RESILIENCY:

Prospects and Retrospect

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Introduction

The 2010 census of the National Statistics Office of the Philippines puts the population of Metro Manila, the National Capital Region of the country, at 11,855,975 people (National Statistics Office, 2012). The census only indicates people who are living within Metro Manila. If the migrant worker population from neighboring areas is put into account, the capital of the Philippines may be at 20,700,00 at its peak and well into the definition of a *megacity* (European Association of National Metrology Institutes 2013) or *hypercity* (Davis 2006). This means that a minimum of close to 12 million people and a maximum of nearly 21 million people are at risk, given that the Philippines is the third most vulnerable country to natural hazards (International Federation of Red Cross and Red Crescent Societies 2012).

Learning from the onslaught of Typhoon Ketsana (local name: "Ondoy") that flooded and crippled the metropolis in 2009 and with the increasing severity of hazards exacerbated by changing climatic patterns particularly in Metro Manila, disaster planning and preparedness are indispensable to be able to strategically plan and carry-out initiatives aimed toward reducing the disaster risks. As a to commitment to the Hyogo Framework for Action (HFA), the Philippines ratified the Republic Act 10121 in 2010 or the Philippine Disaster Risk Reduction and Management Act, which replaced the decades-old highly reactive framework to disaster risk management. Corollary to the enactment of the said law, it became imperative that disaster risk reduction plans and its corresponding contingency plans have been formulated at the national, provincial, and community level. Also, the Republic Act 9729 better known as the Philippine Climate Change Act of 2009 was passed in 2009. Subsequently, Republic Act 10174 was signed in 2011 as an amendment to the Climate Change Act of 2009 and established the People's Survival Fund, which aims to provide long term financing to enable the government to address climate change. The city and community disaster prepapredness plans and its correspoding contingency plans pursuat to these laws are expected to be products of risks assessments, which are sound basis for disaster risk reduction and management planning in the country. However, the long-term effects of the policies are yet to be assessed. Moreover, cutting Metro Manila lays the Valley Fault System – a geological hazard that may cause a major earthquake known as "The Big One" resulting to the loss of thousands of lives. This geological hazard needs to be integrated in the planning and preparedness initiatives as well.

This paper intends to answer the following questions, namely: (1) are disaster risk reduction plans in placed in the cities of Metro Manila and at the community level? Are these plans reflecting the local level contexts? Do these plans embody the national framework for risk reduction?; (2) Are corresponding contingency plans in place? To what extent are these contingency plans hazard and context specific?; (3) Are simulation drills at different levels and communities regularly carried out? To what extent is the community participation in this undertaking?; and, (4) what are the challenges in disaster preparedness planning in the Philippines? What are concrete policy recommendations to address these concerns?

The study is a qualitative study in nature. As an assessment study, there are three (3) primary methods utilised in the conduct of the impact study, namely: key informant interviews, focus group discussions, and review of secondary data. The key informant interview is a key method as it provided avenue for more in-depth information gathering and reflects the experience of the informants/respondents. Local government officials as well as community members have been interviewed for the purpose of the research. In the same way, the focus group discussions served as a good venue to identify the gaps and challenges in competencies, which is an important area of the study. Local government officials, civil society organisations as well community members have been

invited for this purpose. Finally, the review of relevant documents have been carried out to review the exiting contingency plans of various government agencies.

Metro Manila: Risk, vulnerability, and exposure

Urban areas such as Metro Manila have an increased vulnerability to disasters due to the number of people that are exposed to hazards. The flooding of Metro Manila in 2009 due to Typhoon Ketsana has caused alarm. The Philippine capital has seen its worst flooding in over four decades, killing hundreds and displacing thousands (Tharoor 2009). A similar flooding event due to the annual monsoon season occurred in 2012. A year after, the metropolis was again flooded due to the monsoon. Comparing the numbers of total affected, including those outside of the capital, between the 3 flooding events, the 2009 Typhoon Ketsana affected 4,901,763 persons, the 2012 Southwest Monsoon (*habagat)* affected 4,236,151 persons affected, and the 2013 Monsoon affected 3,096,392 persons. The total amount of damage of the 3 events is equal to Php 14.69 Billion (Rappler.com, 2013). The staggering numbers simply indicate that Metro Manila, one of the most populated areas in the world, has become a prime example on why urbanization can lead to higher vulnerability to disasters.

The increase of human settlements in an already vulnerable area due to rapid urbanization results in higher disaster risk rather than the increased frequency of hazards experienced. Rapid uncontrolled urbanization and increasing insecure economic conditions worsens the effects of disasters in developing countries such as the Philippines (El-Masri and Tripple 2002). There is a link between urbanization, poverty, and vulnerability. Opportunities in urban areas are generally perceived as higher. The population of the world's poor moving to urban areas has been increasing yearly and that migration from rural areas to urban areas has significantly altered the demographic landscape. Dense concentrations of people lead to potential hazards due to overcrowded living conditions (Bankoff 2003). Metro Manila has a population density has a population density of 19,137 persons per square kilometer (National Statistics Office 2014).

Overcrowding drives poor people to live in the cheapest way possible such as dwelling on unsafe housing. Rapid uncontrolled urbanization has also lead to strained environmental conditions and negative health impacts. Increased population density also cause ecological deterioration due to the pressure of survival. Survival in a highly dense urban area also leads ironic situation wherein poverty is perpetuated due to diminishing returns to those who cannot take advantage of the economic opportunities. This cycle of misery and poverty helps convey the notion that the urban poor remain poor. (El-Masri & Tripple 2002).

It has been increasingly obvious that poor countries are experiencing higher vulnerability to disasters. There is now a growing recognition that mortality is put at risk by factors external to a natural hazard such as urbanization and increasing population density that lead to increased damages at times of disasters. However, it is important to note that these factors are context specific. Improved economic conditions and or effective prevention and mitigation measures play an important role in reducing the effects of disasters (Mitchell et al., 2013). It is in this context that disaster risk reduction has become a pivotal strategy to reduce effects of disasters in poorer countries with highly populated areas such as Metro Manila. The World Disaster Report in 2012 has argued that disaster risk reduction a basic precondition towards sustainable development (International Federation of Red Cross and Red Crescent Societies 2012).

The aftermath of Typhoon Ketsana in 2009 triggered a response from various government agencies and international donors to conduct studies that would assess the risks present in Metro Manila.

The Risk Analysis Project (RAP) of Greater Metro Manila Area (GMMA) was initiated in 2010 among the Collective Strengthening of Community Awareness of Natural Disasters (CSCAND) agencies composed of the Philippine Institute of Volcanology and Seismology (PHIVOLCS), Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA), Mines and Geosciences Bureau (MGB), National Mapping and Resource Information Authority (NAMRIA), and the Office of Civil Defense (OCD). This three-year collaborative project was in partnership with Geoscience Australia, and the Australian Agency for International Development (AusAID). The RAP is part AusAID's Building Resilience and Awareness of Metro Manila Communities to Natural Disasters and Climate Change Impacts (BRACE) Project. The main objective of the RAP is to have an assessment of flood, cyclone, and earthquake hazards in in the Greater Metro Manila Area (GMMA) through the development of fundamental datasets and information on hazard, exposure and vulnerability (Solidum Jr. 2013).

Risk Analysis Project for Flood Hazards

Flood has been one of the major concerns in Metro Manila. The 2009 Typhoon Ketsana event was about one in a hundred years event. The RAP for flooding simulated scenarios from 1/5 Annual Exceedance Probability (AEP) to 1/200 AEP. Pasig-Marikina River Basin was the focus for the flood hazard mapping.

Mr. Roy Badilla in a presentation during a workshop on Upscaling Community-Based Disaster Risk Reduction & Management for LDRRMOs in the Urban Context discussed different scenarios on flooding through the results of the RAP. Figure 1 represents the peak flood depth of Typhoon Ketsana (Ondoy). Heavy flooding was experience during this time along the east of the National Capital Region, particularly in the Pasig-Marikina River Basin and its exit point along Laguna Bay.

Figure 2 shows areas that will experience heavy flooding if a 1/200 year flood event occurs. This large flood event shows intense damage around the areas of the Marikina River near Tumana, those along the Mangahan Floodway, the banks of San Juan River, and other various locations near the lakeshore and Taguig-Pateros areas. In comparison to Figure 1 which shows the flooding during typhoon ketsana, the damages to be dealt with is around 40% greater and the population whose houses are inundated is 20% more (Badilla, 2014). This 1/200 year event serves as a scenario backed with scientific data to present the worst case to Metro Manila in terms of flooding.

Risk Analysis Project Results for Wind Damage

Typhoons also bring in strong wind along with flooding. While wind has generally been ignored, several instances recently foresaw the problem of having strong winds. During strong typhoons, billboards along the EDSA Ave presented what damages can wind do. Falling billboards presented a hazard that may cause fatalities.

According to a presentation by Dr. Hilario during a workshop on Upscaling Community-Based Disaster Risk Reduction & Management for LDRRMOs in the Urban Context, there are a high proportion of buildings susceptible to wind damage in the GMMA. Dense areas with a high concentration of buildings with light frame types such as those made of wood commonly seen in informal settlements are high risk. Examples of these areas are in Payatas, Quezon City, San Antonio, Pasig City, and Barangka Ilaya, Mandaluyong. There is also a high proportion of older structures in GMMA that are at severe risk to wind damage. Buildings built before 1972 when the first building code was enacted are very vulnerable to wind hazards. (Hilario et al., 2014)

In the case of a major wind disaster, the RAP results estimate that the damaged floor area for GMMA is about 582 hectares.

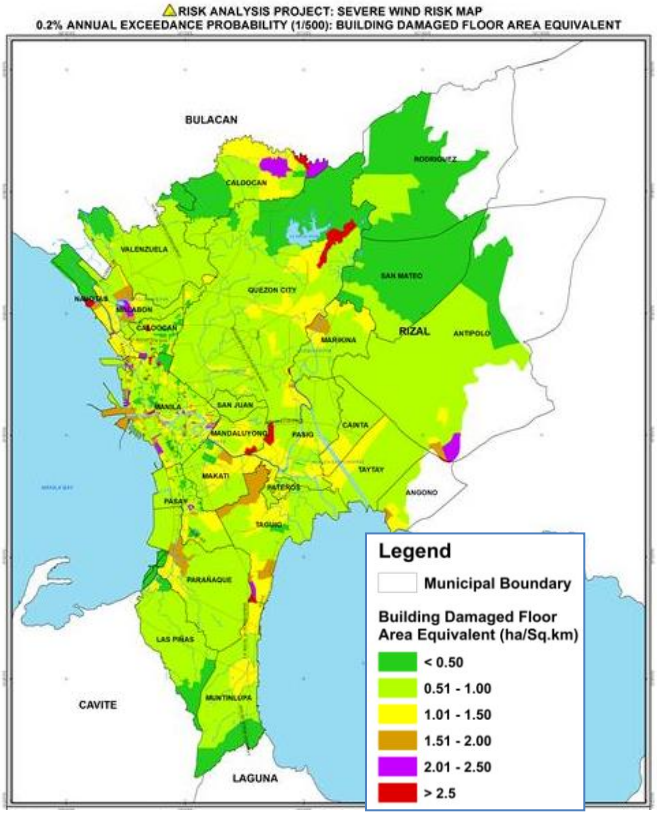

Image 1. Severe Wind Risk Map (Hilario et al., 2014)

The expected cost of damage is about PhP 67.88 Billion. (Hilario et al., 2014). The RAP results for wind risk seen in Figure 3 shows that densely packed areas in Metro Manila are increasingly susceptible to Wind Damage. It is also in these areas that the informal settler communities are abundant.

While flooding has been analyzed and planned for extensively, another major cause for concern is earthquake. The damages brought to by the 7.2 magnitude 2013 Bohol Earthquake have caused alarm in Metro Manila with regards to planning and preparedness. The RAP has given data on the extent of damages that may occur.

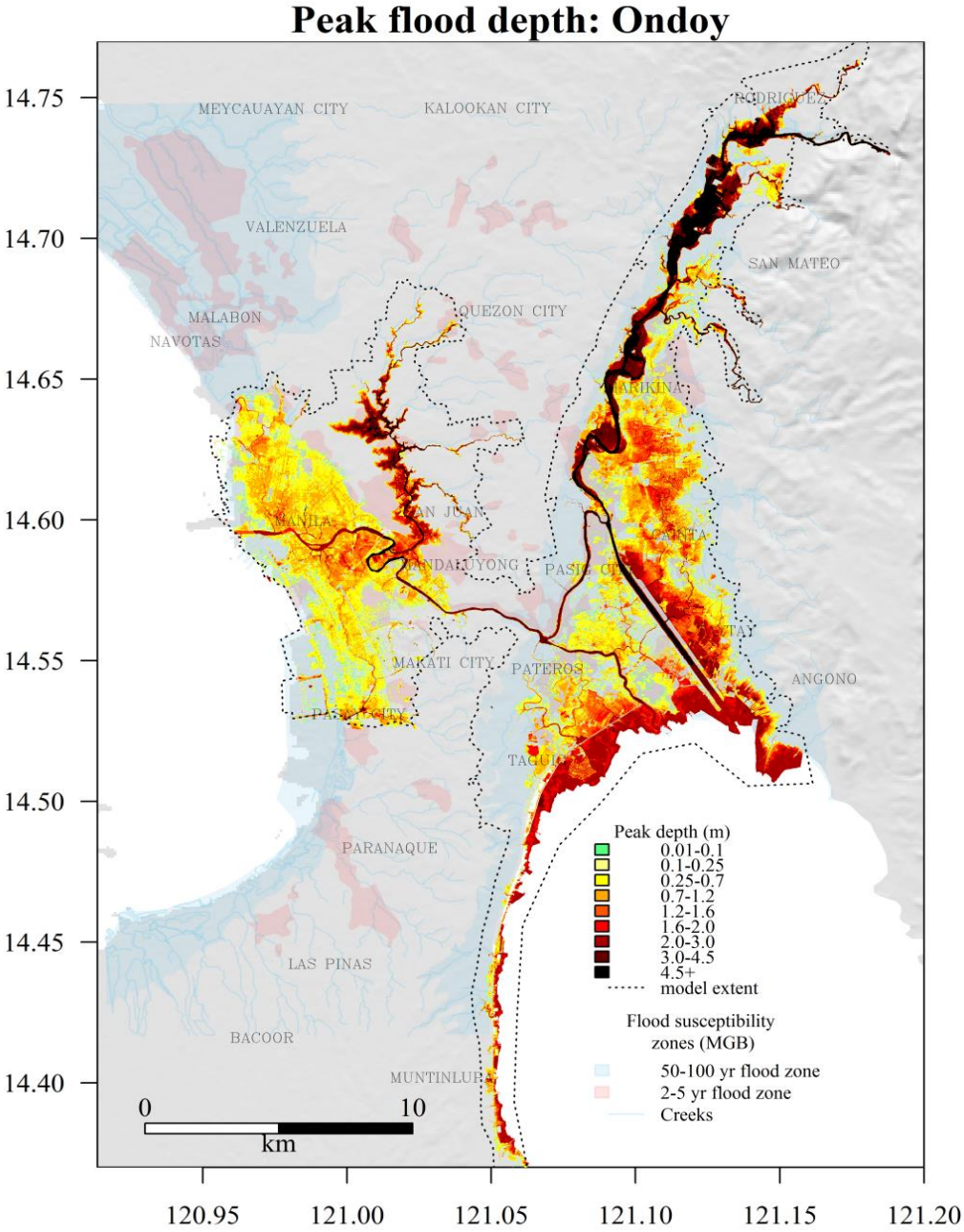

Image 2. Map of Peak Flood Depth of Typhoon Ketsana (Ondoy) (Badilla, 2014)

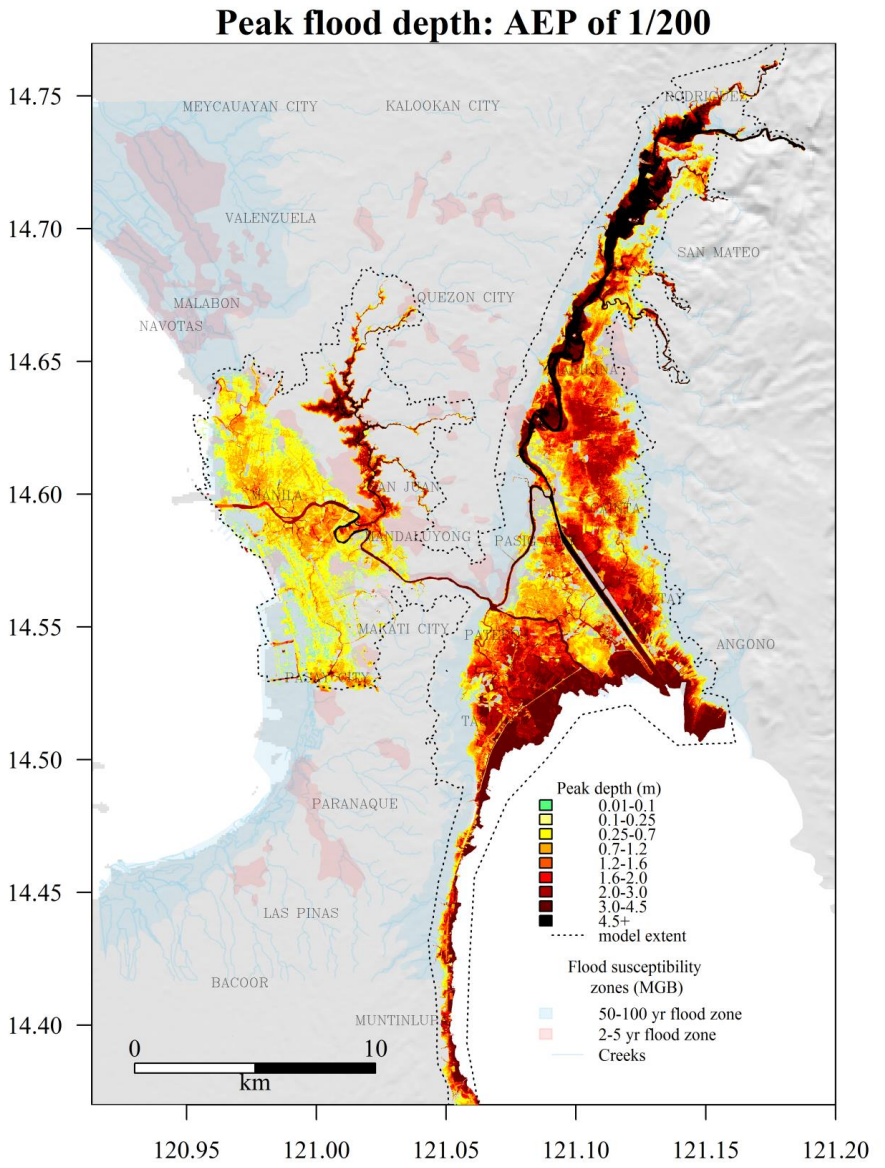

Image 3. Flood Map of an Annual Exceedance Probability of 1/200 (Badilla, 2014)

Risk Analysis Project Results for Earthquake

Earthquakes have affected the GMMA in the past. In 2 August 1968, a Magnitude 7.3 earthquake in Casiguran, Aurora has dealt significant damage to GMMA that resulted in 268 Casualties. Metro Manila is now waiting for "The Big One" – an earthquake produced by the West Valley Fault System. The fault has a 400-year interval and has last moved in 1658, making it ripe for movement (Solidum Jr., 2013). It is expected to deal huge damages to life and property in the Greater Metro Manila Area. Table 1 shows a summary of the results of the RAP.

	Magnitude 7.2 Earthquake	Magnitude 6.5 Earthquake
Total Floor Area in Collapsed Damage (sqm)	11,053,000	8,169,000
Total Floor Area in Complete Damage (sqm)	89,089,000	66,646,000
Total Floor Area in Extensive Damage (sqm)	70,490,000	57,083,000
Total Floor Area in Moderate Damage (sqm)	76,704,000	73,819,000
Total Floor Area in Slight Damage (sqm)	44,804,000	50,218,000
Total Fatalities	37,000	27,000
Total Injuries		
Very Serious	16,000	12,000
Serious	132,000	102,000
Slight	456,000	359,000
Total Economic Losses (millions of PhP)	2,473,000	1,940,000

Table 1. Summary of Results of Risk Analysis Project for Greater Metro Manila Area (Metro Manila + 5 LGUs of Rizal – Rodriguez, San Mateo, Antipolo, Cainta, Taytay) - Source: (Solidum Jr. 2013)

Enabling Environment: DRR and CCA policies in the Philippines

The discourse on disaster risk reduction and climate change has become intertwined over the years. Sustainable development aims to address both climate change and disaster risk reduction. The Philippine Government, in the aftermath of the 2009 Typhoon Season, has become increasingly active in promoting climate change awareness and disaster risk reduction. Consecutive laws were passed resulting in a comprehensive strategy to address the effects of increased intensity of natural hazards.

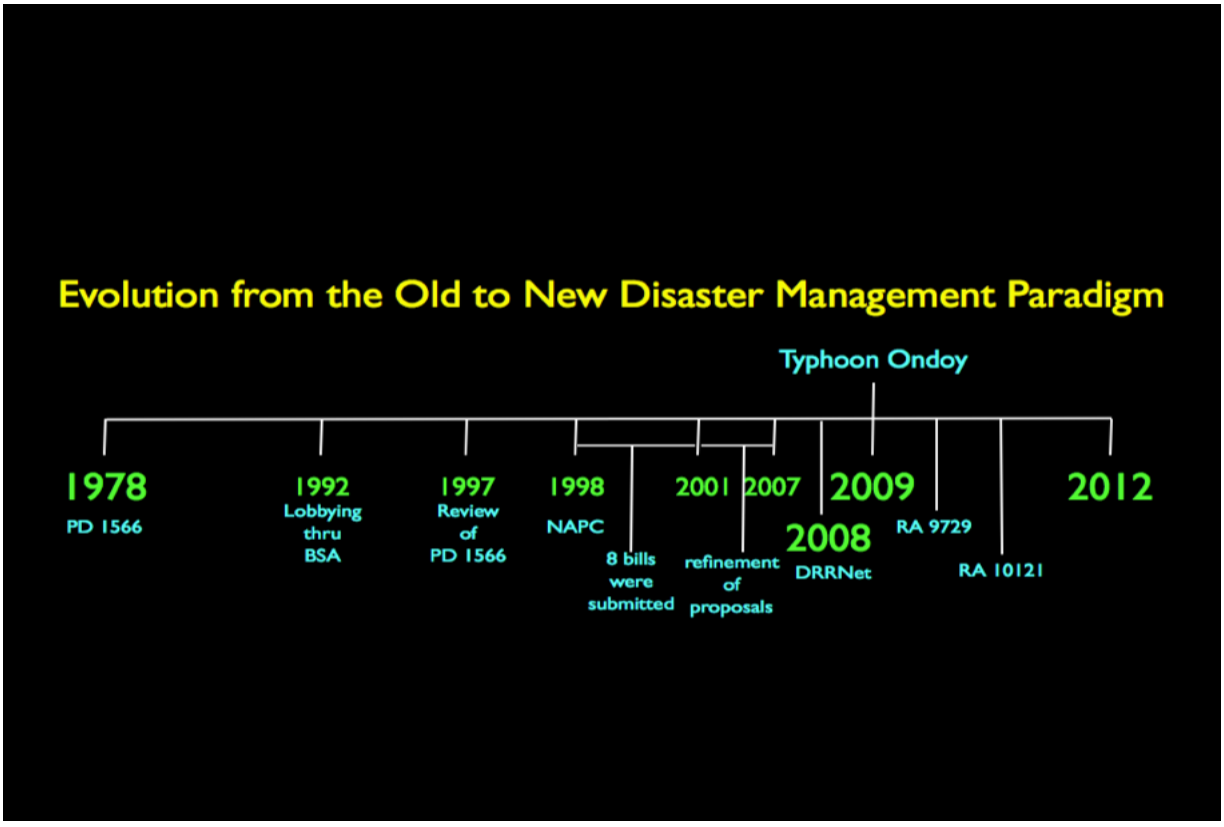

Image 4. Evolution from the Old to New Disaster Management Paradigm (Balgos 2013c)

The Republic Act 9729 or the Philippine Climate Change Act of 2009 was passed by then President Gloria Macapagal-Arroyo. The act aimed to mainstream the discourse of climate change and has established the Climate Change Commission. It also has closely linked climate change and disaster risk. The Republic Act 10121 or the Philippine Disaster Risk Reduction and Management Act of 2010 replaced the National Disaster Coordinating Council with the National Disaster Risk Reduction and Management Council that aims to promote prevention, mitigation, and preparedness strategies as a key components to disaster risk reduction. Moreover, the law also involves a bottow-up approach in resolving disaster risk reduction. It mandates local government units to establish their own disaster risk reduction and management councils from the provincial level down to the community level. In 2011, the Climate Change Act of 2009 was amended with Republic Act 10174 that establishes the People's Survival Fund wherein financial resources are now made available for climate change adaptation and mitigation strategies. However, it took decades before the said laws have been ratified. Figure 1 provides the evolution from the old to new paradigm in Philippine DRRM (Balgos 2013c). As highlighted in Figure 4, Typhoon Ondoy served as the policy window, reform conjucture, and tipping point for the said policies to be realised (Balgos 2013c).

This trio of laws has made the Philippines a model in integrating Disaster Risk Reduction strategies to policies. Comprehensive laws to address climate change and disaster risk reduction are a step forward. To echo the conclusion of Silvia Llosa and Irina Zodrow's (2011) article in the Global Assessment Report on Disaster Risk Reduction 2011, "Legislation is a key requirement for effective, coordinated disaster risk reduction and for climate change adaptation. Both, disaster risk reduction and the climate change actors should work closely together when developing new or revising existing legislation (Llosa and Zodrow, 2011)."

Reducing vulnerability and exposure of Metro Manila

Prior to the enactment of the Philippines' existing legislations on disaster risk reduction and climate change adaptation, the country's disaster management system prescibed to the Presidential Decree 1566 signed on 21 September 1978 by then President Ferdinand Marcos. Corollary to this, cities in Metro Manila aligned their disaster management plans on this. However, the said law was focused mainly on emergency response. In fact, the Disaster Risk Reduction Network Philippines (DRRNet-Phils), an alliance of civil society organisations in the Philippines working on disaster risk reduction, notes that there are three (3) main differences of the previous law to the new law on ridk reduction, namely : (1) the PD 1566 was top-down in nature, while its management is highly centralised through the National Disaster Coordinating Council (NDCC), while RA 10121 capitalizes in bottom-up and participatory disaster risk reduction ; (2) the PD 1566 looked at disasters as merely a function of physical hazards, while under the current laws, disasters are view as a reflection of people's vulnerability ; and, (3) the PD 1566 focuses on disaster response and anticipation, while the new law emphasizes on an integrated approach to genuine risk reduction to sustainable development (DRRNet-Phils 2011).

For three (3) decades, the Philippines disaster management and preparedness plans, including the cities in Metro Manila had been very reactive. This means that city governments respond only whenever disaster strikes. In the same way, as seen in the case of Typhoon Ondoy in 2009, Metro Manila was not prepared for large-scale catastrophes.

As a consequence of the vulnerability and exposure of Metro Manila to various forms of hazards, and as a committment to the RA 10121, the Metro Manila Disaster Risk Reduction and Management Council (MMDRRMC) was formed. In keeping with the Republic Act 7924, the Chairman of the Metro Manila Development Authority sits as the chairman of the council. Concurrently, the National Capital

Region Director of the Office of Civil Defense serves as the 1st Vice Chairperson of the council. The other members of the councils that acts as Vice-Chairpersons are : Department of Science and Technology (DOST) –NCR for prevention and mitigation, Department of Interior and Local Government (DILG)- NCR for preparedness, Department of Social Welfare and Development (DSWD) –NCR for response, and the National Economic and Development Authority (NEDA) –NCR for recovery and rehabilitation. In addition to this, excutive departnment of the Metro Manila Development Authority, regional and field stations operating in NCR are members of the council. All local governments in Metro Manila are likewise members of the council. The local governments form part of the MMDRRMC interim organisation. Figure 5 underscores the interim organisational structure of MMDRRMC.

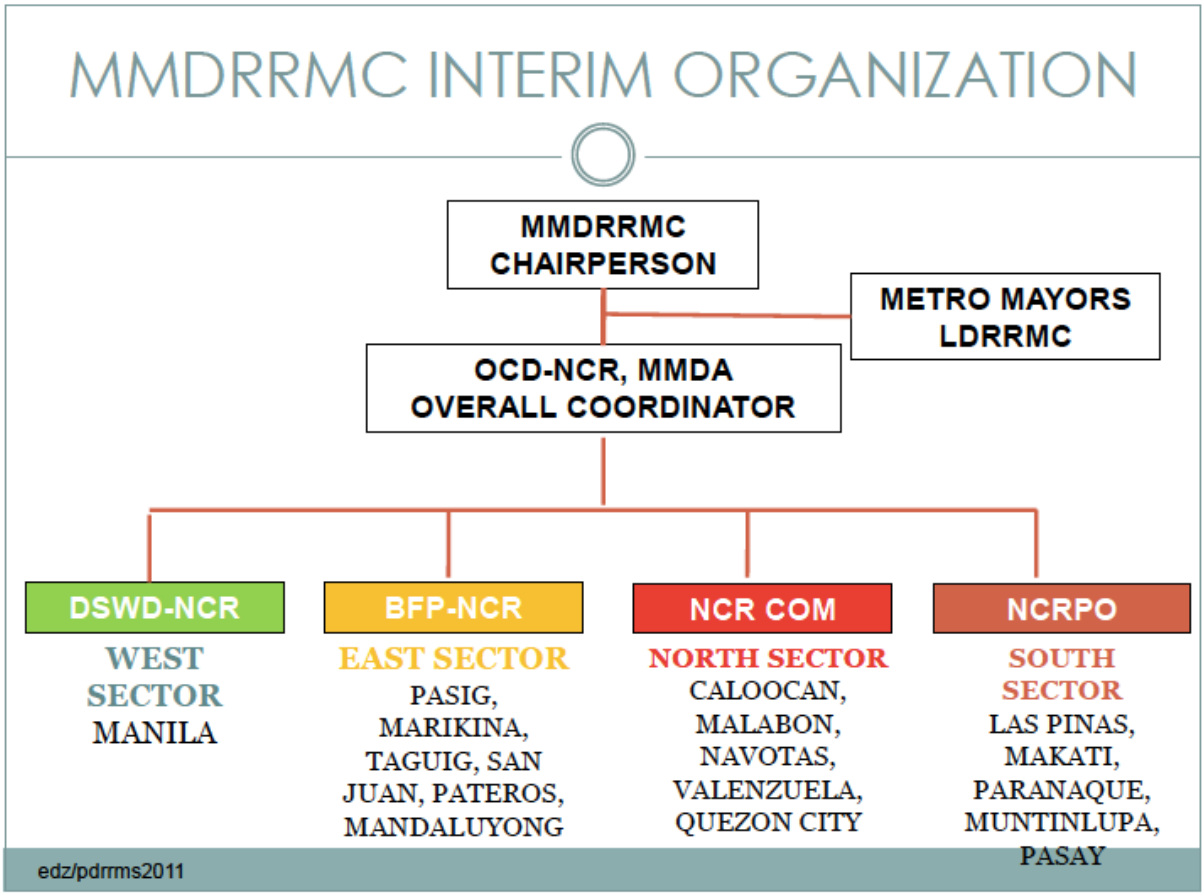

Image 5. MMDRRMC Interim Organisational Structure

Concurrently, given that Metro Manila is also vulnerable to earthquake, the MMDRRMC orgnanised the Task Fore Rainbow specifically designed to respond to emergencies as a consquence of earthquake. Figure 6 underscores the Task Force Rainbow organisational structure.

Similary, after series of consultations, the Department of Public Works and Highways (DPWH) in partnership with various stakeholders came up with the Metro Manila Integrated Flood Risk Management Master Plan. The said plan was deemed imperative given the vulnerability and exposure of Metro Manila to flooding. In the same way, DPWH Secretary Rogelio Singson shared that there are three (3) important issues why the master plan was produced, namely : (1) lack of integrated plan and strategic program to address perennial flooding and other water-related disasters such as landslides, lack of potable water, and siltation ; (2) massive urbanisation and lack of effected land use plans in the Greater Metro Manila Area (GMMA), which has exacerbated the flooding ; and, (3) the waterways of Metro Manila haves been encroached and constricted by illegal structures causing

massive flooding in Metro Manila (Singson 2013). Singson notes that due to the lack of the master plan, the flooding in Metro Manila affected the economy ($160 million damaged annually to the economy), claimed lives (640 lives lost annually), displaced people (3.4 million people affected annually), and damaged houses of Metro Manila residents (71,000 houses totally damaged annualy) (Singson 2013).

Image 6. Task Force Rainbow Organisational Structure

In the Philippine Development Plan 2011-2016 under the Aquino Administration, among the policy directions and programs in relation to addressing perennial flooding in Metro Manila are : (1) preparation of flood control master plan for major river basins ; (2) priorisation of the construction of flood control structures in high risk areas ; (3) application of CCA and DRRM strategies in the planing and design of flood management ; (4) increasing the local government and community participation in DRR and CCA initiatives ; (5) creation of a master plan for flood management and clearing of waterways in Metro Manila ; (6) initiation of a water convergence program with various government agencies such as the Department of Public Works and Highways (DPWH), Department of Agriculture (DA), Department of Agrarian Reform (DAR), and the Department of Enviroment and National Resources (DENR) ; and, (7) allocation of funding of various flood control projects and eleven (11) small water impounding projects (SWIPS).

Under the New Integrated Approach for Metro Manila, among the urgent measures identified (structural and non-structural) are : (1) flood modelling, forecasting and warning system through Project NOAH ; (2) enforcing the easement requirements and clearing of priority rivers and waterways of informal settlers and obsructions ; (3) creating resettlement action plan and provision of housing options (4) upgrading of pumping stations ; and, (5) widening the waterway channel, dredging and construction of dikes and riverwalls (Singson 2013). On the other hand, the long term measures include : construction of flood control dam upstream, use of natural flood plains near waterways, land use ordinances, strict enforcement of waterway easement laws, and increase participation of local government and communities (Singson 2013).

According to the Official Gazette of the Republic of the Philippines, DPWH, under the flood master plan for Metro Manila, shall carryout eleven (11) strucutal mitigation measures until 2035. These are : Pasig-Marikina River Improvement and Dam Construction, Meycauayan River Improvement, Malabon-Tullahan River improvement, South Parañaque-Las Piñas River Improvement, East Mangahan Floodway (Cainta & Taytay River Improvement), West Laguna Lakeshore Land Raising, Land Raising for Small Cities around Laguna Lakeshore, Improvement of the Inflow Rivers to Laguna Lake, Manila Core Area Drainage Improvement, West Mangahan Area Drainage Improvement, and the Valenzuela-Obando-Meycauayan (VOM) Improvement (to be studied further). The estimated project cost for all the initiatives is 351.718 billion pesos.

From macro to micro : Downscaling plans to component cities

Local Disaster Risk Reduction and Management Plans (LDRRMP) are now in placed in 16 cities and 1 municipality of Metro Manila. The RA 10121 mandates the each local government unit (regional, provincial, city, municipal, and barangay) to have a Disaster Risk Reduction and Management (DRRM) Plan. The said plan will serve as the bible and the primary basis for the disaster risk reduction inititiaves, programs, and activities at the local level. Generally, the LDRRMP includes the following :

(1) ***overview of the local government profile*** (i.e. ecological profile, risk profile, and the LGUs' strengths, weaknesses, opportunities, and challenges divided into the four thematic theme of DRRM – disaster prevention/mitigation, preparedness, respone, and rehabilitation and recovery) ;

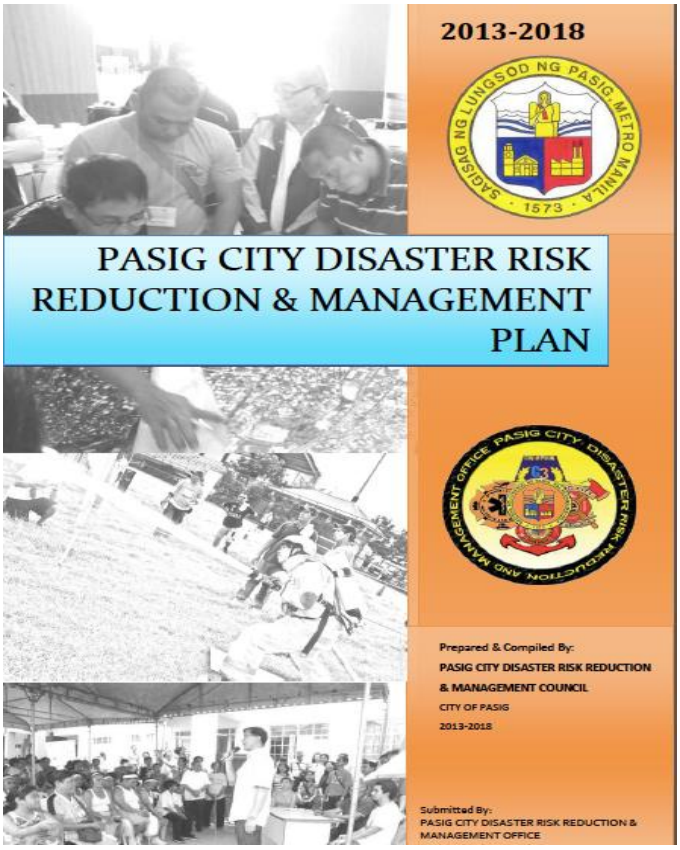

Image 7. Local Disaster Risk Reduction and Management Plan of Pasig City

(2) ***disaster risk reduction plan and vision of the local government unit*** based on the four thematic theme of DRRM – disaster prevention/mitigation, preparedness, respone, and rehabilitation and recovery. Each of this has the following component, namely : goals, objectives, outcome, programs/activities, targets including gender concerns, key outouts, responsible person, timeframe, and the specific sources of funds ; and,

(3) ***monitoring and evaluation*** based on the four thematic theme of DRRM – disaster prevention/mitigation, preparedness, respone, and rehabilitation and recovery. Each of this has the following component, namely : expected results, baseline, assumptions/risk, objectively verifiable indicators, targets, sources of data, collection methods, frequency and audiece of the report, and resources needed.

Figure 5 provides the LDRRMP of Pasig City, one of the component cities of Metro Manila. The LDRRMP should also shows the DRRM council at the local level. Figure 6 provides the organisational chart of the DRRM Council of the City of Marikina as written in their LDRRM Plan. It is imperative that the LDRRMP to be approved by the local council or *sangguniang bayan*.

In relation to the access and use of DRRM funds, the LDRRMP is crucial because a local government unit can only make use of such funds, which is 5 per cent of the internal revenue allotment of the local government, once the LDRRMP is available and approved by the council. Furthermore, the LDRRMP should carefully stipulate how the said funds will be disbursed and what specific activities it shall be used.

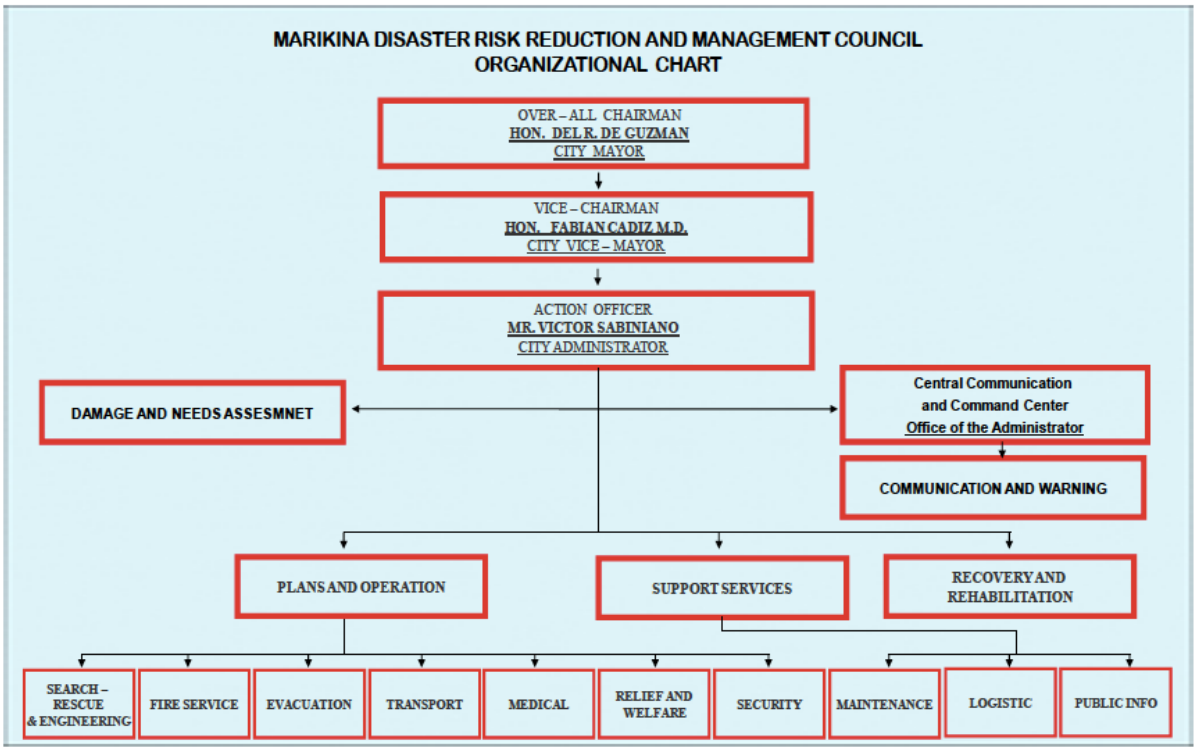

Image 8. LDRRM Structure of Marikina City

Along with the LDRRMP are the city-level contingency plans. The contingency plans are needed to be hazard-specific based on the risk exposure of the cities. The key components of a contingency plans are hazards maps, families-at-risk, early warning system, flood markers, communication protocols (both downstream and upstream), evacuation centre management, and the LDRRM structure.

As mentioned earlier, the LDRRMP are now in placed in Metro Manila. Also, given the rich experience of Metro Manila in disasters, there are existing practices in each city and communities in relation to evacuation, evacuation management, and information dissemination among others. However, the existing practices have to be improved to ensure lesser or no casualties during disasters. In the same way, there is a need to involve various stakeholders (i.e. non government organisations, people's organisations, business sectors, faith-based groups, and communities among others) in crafting the contingency plan to ensure participation and ownership of the plan.

Bringing plans and policies to the community level

The promise of a better and improved living conditions have motivated people from rural areas and nearby cities outside Metro Manila to dwell and work in its (Metro Manila) cities. The scale and the velocity of urbanization worldwide is unprecedented in human history. The rural population, particularly in developing countries is shrinking, while there has been a supernova growth of people in urban areas. As a result, cities are exploding. The World Urbanization Prospects released by the United Nations projects that by 2015, there would be 550 megacities worldwide. Davis (2006) proposes to kinds of cities to describe this epochal transition. He notes that there are *megacities* (population excess of 8 million) and *hypercities* (population of more than 20 million). Corollary to this, According to the 2013 Demographics of World Urban Areas, there are 10 cities that fall to the *hypercities* catergory. One of which is Metro Manila with approximately 21, 241,000 population.

With 94, 013, 200 people, the Philippines ranks as the 12th most highly populated country in the world (NSCB, 2012). Concurrently, the urban population reached 66.4 per cent of the entire population (ADB, 2010). This indicates that 6 out of 10 Filipinos live in urban areas. ADB estimates that by 2030, the figure will reach to 67 per cent. The Philippine Development Plan 2011-2016 attributes the lack of economic opportunities in rural areas as the culprit for the rise of urban population, which lead to disasters. Gupta (2010) held that the Philippines is the most flood-prone country in the Southeast Asian region. This is evident in the recent floodings in Metro Manila, which affected both rich and poor families dwelling along the waterways. As part of the current administration's goal to make Metro Manila flood-free, President Aquino mandates to clear the waterways in which an estimated of 104,000 informal settlers families inhabit.

The DRRNet-Phils through the Technical Assistance of the Australian Aid to the Department of Interior and Local Government (DILG) is implementing a project in relation to the capacity building of informal settler families (ISFs) on community-based disaster risk reduction and management (CBDRRM). The said undertaking is being carried out in 115 communities in ten (10) cities in Metro Manila – Quezon City, Pasig City, San Juan City, Mandaluyong City, Manila, Pasay City, Makati City, Caloocan City, Malabon City, and Valenzuela City. The cities are selected based on the dentified eight (8) priority areas paralled to the integrated master plan for flooding management in Metro Manila. The said river ways are as follows : San Juan River, Estero Tripa de Gallina, Tullahan River, Manggahan Floodway, Maricaban Creek, Pasig River, Estero de Maypajo, and Estero de Sunog Apog. The project has four (4) primary objectives, namely: (1) enhancing disaster preparedness and adaptive capacity of residents in selected communities facing and responding to disaster events through the conduct of a series of capacity building on CBDRRM; (2) installing an end-to-end community-based early warning system in ISF communities and capacitate local communities in monitoring and maintaining them; (3) supporting the communities in activating the Barangay Disaster Risk Reduction and Management Committee that will facilitate disaster risk reduction work at the community level; and, (4) produce Barangay Disaster Risk Reduction and Management Plan (BDRRMP) formulated by the communities and ratified by the Barangay Council with budget allocation for key activities and investments.

The project will be carried until May 2015. As of the moment, DRRNet-Phils had chosen thirty (30) priority communities where the series of capacity buildings will be undertaken first. The selection was based mainly on the vulnerabilty and exposure of the communities, available socio-economic and risk assessment data, as well as the recommendations of DILG and the respective communities leaders. The capacity buildling has three (3) components, namely : community risk assessment workshops (2-3 days), early warning workshops and BDRRM planning (5 days). Toward the end of the activities in each community, a simulation drill, to test the feasibility and effectives of the BDRRM and contingency plans shall be carried.

More pointedly, the priority thity (30) communities are : Barangay Balong Bato, Barangay Batis, Barangay Kabayanan, Barangay Progreso, Barangay Rivera, and Barangay Salapan in San Juan City ; Barangay Daang Bakal and Barangay Poblacion in Mandaluyong City ; Barangay Damayang-Lagi, Barangay Dona Imelda, Barangay Roxas, Barangay Sta. Cruz, Barangay Sto. Domingo, Barangay Talayan and Barangay Tatalon in Quezon City ; Barangays 602, 607, 894, 895, 195, and 135 in Manila ; and, Barangay General Tiburcio de Leon, Barangay Malinta, Barangay Marulas, and Barangay Ugong in Valenzuela City.

The process being employed in the project is participatory and empowering. In fact, in the entire process, the communities are encouraged to actively share their experiences on previous disaster events that occurred in the community as well as share their vision for their community toward a safer future. In addition, to ensure that the informal settler families will have a comprehensive understanding on the importance of CBDRRM, DRRNet-Phils prepared a module on the theme of urban resiliency. More pointedly, the contents of the module include: Introduction to CBDRRM, basic concepts of disasters, legal basis of DRRM and CCA in the Philippines, and the tools for community risk assessments among others. Figure 7 underscores pictures of the CBDRRM trainings conducted in the selected areas.

Image 9. CBDRRM trainings in communities

Conclusions

Given the previous disaster events that befall in Metro Manila, the people are now more aware of the risks they are facing as well as the crucial things they need to carry out in order to ensure their safety. In the same way, as the goverance level, policies, plans, and initiiatives toward urban resilinecy are

now in placed. On the other hand, there are challenges in disaster preparedness planning in the Metro Manila. Also, there are concrete policy recommendations that can be undertaken to address these concerns. Some of them are : *First,* upscaling disaster risk reduction measures to cope and adapt to continued increase in frequency and intensity of hydro meteorological events occurring in the country. From Ketsana to the latest Supertyphoon Haiyan, coping with floods, storms, and landslides is an urgent concern. Relying only on historical data based on experience in the past has not been sufficient. Scenario based risk prediction through modeling is now an important consideration. *Second,* integrating disaster risk reduction and climate change adaptation initiatives in development planning. *Third,* developing scenarios suitable to local contexts through climate change modelling. Though scenario building is important, it is a specialised work that requires collaboration from national institutions including regional and global stakeholders. *Fourth,* conducting research to better understand vulnerabilities and possible adaptation measures. There are still lots of things that need to be studied such as how food security can be ensured. Research is one of the key answers towards coming up with solutions. There is a need to invest early in research considering the fact that it is a long-term endeavour. *Fifth,* integrating psychosocial in preparedness planning. This includes being ready with one's thoughts, feelings, and behaviour to appropriately respond to disaster. *Sixth,* establishing end-to-end early warning systems. Conditions can change fairly rapidly. Gathering and analysing field situation is important to enhance early warning and make timely information dissemination most especially to at-risk population. *Lastly,* seeking innovative funding mechanisms. Funds need to flow to community-based organisations, women's organisations and non-government organisations.

References

Books

Balgos, B. (2013c). *From Typhoon Ondoy to the Unnamed Monsoon: Policy Reforms and Challenges in the Philippines' Disaster Management System*. In K. Yau (Ed), Natural Disasters and Reconstruction in Asian Economies: A Global Synthesis of Shared Experience. United Kingdom: Palgrave Macmillan.

Bankoff, G. (2003). *Cultures of Disaster: Society and Natural Hazard in the Philippines.* London, UK: RoutledgeCurzon.

Davis, M. (2006). *Planet of Slums.* New York : Verso.

Mitchell, T., Lindsey, J., Lovell, E., & Comba, E. (Eds.). (2013). *Disaster risk management in post-2015 development goals: potential targets and indicators.* London: Overseas Development Institute.

Llosa, S., & Zodrow, I. (2011). Disaster risk reduction legislation as a basis for effective adaptation. *Global Assessment Report on Disaster Risk Reduction 2011* .

Journal Articles

El-Masri, S., & Tripple, G. (2002). Natural Disaster, Mitigation and Sustainability: The Case of Developing Countries . *International Planning Studies , 7* (2), 157-175.

Website

European Association of National Metrology Institutes. (2013, January). *Mega Cities.* Retrieved February 13, 2014, from European Metrology Research Programme (EMRP): http://www.emrponline.eu/call2013/docs/MegaCities.pdf

National Statistics Office. (2012, April 4). *The 2010 Census of Population and Housing Reveals the Philippine Population at 92.34 Million.* Retrieved February 11, 2014, from The Philippine Statitistics Authority Website: http://www.census.gov.ph/sites/default/files/attachments/hsd/pressrelease/National%20Capital%20Region.pdf

National Statistics Office. (2014, January). *NCR Quickstat.* Retrieved February 15, 2014, from The Philippine Statistics Authority: http://www.census.gov.ph/sites/default/files/attachments/ird/quickstat/ncr_2.xls

Official Gazette (2013, June), *DPWH report : Flood management master plan for Metro Manila and surrounding areas.* Retrieved 20 February 2014. http://www.gov.ph/2013/06/19/dpwh-report-flood-management-master-plan-for-metro-manila-and-surrounding-areas/

Rappler.com. (2013, September 27). *BY THE NUMBERS: Ondoy, Habagat 2012, Habagat 2013*. Retrieved February 14, 2014, from Rappler: http://www.rappler.com/newsbreak/39948-by-the-numbers-ondoy-habagat-2012-2013

Reports

International Federation of Red Cross and Red Crescent Societies. (2012). *World Disaster Report 2012.* Brussels, Belgium: International Federation of Red Cross and Red Crescent Societies.

Solidum Jr., R. (2013, November 14). *An Update on the Earthquake Hazards and Risk Assessment of Greater Metropolitan Manila Area [PDF Document].* Retrieved February 15, 2014, from http://www.mbc.com.ph/engine/wp-content/uploads/2013/10/Solidum-Update-of-Earthquake-Hazards-and-Risk-Assessment-of-MMla-14Nov2013.pdf

Magazines and Periodicals
Disaster Risk Reduction Network Philippines (DRRNet-Philippines) (2011). Primer on the Disaster Risk Reduction and Management (DRRM) Act of 2010.

Tharoor, I. (2009, September 29). *The Manila Floods: Why Wasn't the City Prepared?* Retrieved February 15, 2014, from Time Magazine: http://content.time.com/time/world/article/0,8599,1926646,00.html

Presentations
Cruz, Susana (undated). Metro Manila Disaster Risk Reduction and Management Council. Retreived 20 February 2014. http://www.jointokyo.org/files/cms/news/pdf/Presentation_Ms._Susana_M._Cruz.pdf

Badilla, R. (2014, January 15). Flood Risk Modelling in Pasig-Marikina River Basin. Bulacan, Philippines.

Disaster Risk Reduction Network Philippines (2013). Component 3: Capacity Building on Community-Based Disaster Risk Reduction and Management – CBDRRM.

Hilario, F., Cinco, T., & Monteverde, M. (2014, January 15). Tropical Cyclone Severe Wind Risk Modelling. Manila, Philippines.

Singson, R. (2013). Metro Manila Integrated Flood Risk Management Master Plan. http://www.gfdrr.org/sites/gfdrr.org/files/(SESSIO_%203)_Sec._Singson_(Philippines)_052413_DPWH_FLOOD_RISK_MANAGEMENT_(SECRETARY).pdf

Philippines Laws and Plans
Department of Interior and Local Government (2011). Primer on the National Disaster Risk Reduction and Management Plan (NDRRMP), 2011–2028.

Local Disaster Risk Reduction and Mangement Plan of Marikina City

Local Disaster Risk Reduction and Management Plan of Pasig City

Office of the President. 1978. *Presidential Decree No. 1566: Strenghthening the Philippine Disaster Control, Capability and Establishing the National Program on Community Disaster Preparedness.*

Office of the President. 2009. *Republic Act No. 9729: An Act Mainstreaming Climate Change into Government Policy Formulations, Establishing the Framework Strategy and Program on Climate Change, Creating for this Purpose the Climate Change Commission, and for Other Purposed or Climate Change Act of 2009.*

Office of the President. 2010. *Republic Act No. 10127: An Act Strengthening the Philippine Disaster Risk Reduction and Management System, Providing for the National Disaster Risk Reduction and Management Framework and Institutionalizing the National Disaster Risk Reduction and Management Plan or the Philippine Disaster Risk Reduction and Management Act 2010.*