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## Localizing Disaster Risk Reduction and Climate Change Adaptation in Planners' and Decision Makers' Agenda: Technical Comprehensive Model, Quezon City, Philippines

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### Abstract

Super Typhoon Haiyan devastated portions of Southeast Asia, particularly the Philippines on November 8, 2013. It caused unprecedented destruction but it also brought about new awareness for urgent and immediate action, not only on integrating Disaster Risk Management in our daily functions but also on addressing Climate Change variation impacts. In response, various stakeholders have made numerous efforts in reducing the country's risk through crafting laws, statutes and government issuances. However, adaptive and coping capacities of Local Government Units remain very weak, and information on how to assess expected risk and incorporate it in developing local risk sensitive physical and development plans are still not part of the planners' and decision makers' agenda. The main objective of this study is to develop a technical Risk Sensitive Comprehensive Land Use and Development Planning Model to mainstream scientific-based risk assessment into the Quezon City Government (the pilot urban area) planners' and decision makers' agenda. The Model also comes with a toolkit with eight (8) Guideposts in operationalizing the Model. It is an effective tool and is a foundation to support in achieving imminent 2020 targets of the Sendai Framework, Paris Agreement and the Sustainable Development Goals up to 2030.

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## 1. Introduction

The sharp increase in natural and extreme weather related disasters and their associated impacts have resulted in human sufferings and economic losses in the Philippines during the 20th century. Extreme weather events like Super Typhoon Haiyan that devastated the country on November 8, 2013 was a wakeup call for urgent and immediate action, not only on integrating Disaster Risk Management (DRM), but also in addressing Climate Change (CC) variation impacts [1] in cities and municipalities. Further, these impacts also necessitate adjustments in the urban planning paradigm. Fundamentally, to make resilient urban environment for future generations, the institution and personnel's (e.g. planners and decision makers) coping and adaptive capacity building need to be established and pursued towards Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) [2]. To deal with the above challenges and growing concern of failure in response to the negative impacts of natural and climate-related disasters' risk, a technical Risk Sensitive Comprehensive Land Use and Development Planning (RSCLUDP) Model with Coaching Tool Box (CTB) is developed and its workability assessed using Quezon City (QC), a highly urbanized city, as a the pilot Local Government Unit (LGU). The research make use of primary and secondary research designs, international and local concepts of achieving resilience through expanding personal and institutional coping and adaptive capacities, and Jurisprudence for developing local DRR and Climate Change Adaptation and Mitigation (CCAM) action plans. In addition, Suitability, Feasibility and Acceptability (SFA) test was also conducted to check the workability of the Model. The results revealed an overall workability of the Model with the highest rank of five (5) meaning the Model is very suitable, feasible and acceptable. [3].

## 2. Scope of Literature Review

### 2.1. Coping and Adaptive Capacities' Concepts

There exists an important difference between coping and adaptive capacities. Coping is typically used to refer to *ex post* actions, while adaptation is normally associated with *ex ante* actions. This implies that coping capacity also refers to the ability to react and reduce the adverse effects of experienced hazards, whereas adaptive capacity refers to the ability to anticipate and transform structures, functions, or organizations to better survive any hazards [4]. In other words, the capacity to cope does not infer the capacity to adapt [5]. This research used coping capacity for DRR to decrease or minimize vulnerability towards four thematic areas (i.e., Disaster Preparedness, Disaster Response, Prevention and Mitigation, and Rehabilitation and Recovery) recognized under the National Disaster Risk Reduction Management Plan (NDRRMP) 2011 – 2028 [6]. Furthermore, the adaptive capacity is used in the context of CCA to improve adaptive capacity against vulnerability towards the seven strategy areas (i.e., Food Security, Water Sufficiency, Ecological Environmental Stability, Human Security, Climate Smart Industries and Services, Sustainable Energy, and Knowledge and Capacity Development) as prioritized under the National Climate Change Action Plan (NCCAP) 2011 – 2028 [7].

### 2.2. Institutional and Personnel Adaptive and Coping Capacities Assessment

Local institutions and personnel's coping and adaptive capacities form the basis for assessment of disaster resilience. Local institutions play a critical role in supporting adaptation. Thus, expanding the institutional and personnel's coping and adaptive capacities are the integral parts in creating resilient societies [8]. The Adaptive Capacity Wheel (ACW) by Gupta et al (2010) was also considered in identifying institutional assessment parameters [9].

### *2.3. Disaster Risk Reduction and Climate Change Adaptation Integration and Local Planning Processes*

Climate Resilient DRR is an area where CCA and DRR converge within the practice of sustainable development. In fact the conceptual and practical similarities and differences of DRR and CCA have been the subject of several studies [9,10,11]. While DRR and CCA have developed independently, they share the aim of reducing the occurrence and impacts of climate-related disasters and associated risks, and must both be integrated into all kinds of development and sectoral planning (including urban planning) [12,13,14].

### *2.4. Legal Foundation for Developing Risk Sensitive Comprehensive Land Use and Development Planning Model*

The Philippines' existing DRR and CCA laws, policies and principle guidelines are aligned with most of the bilateral international agreements, conventions, frameworks and action plans. For review of these international agreements readers are referred to comprehend [3,15,16]. In the Philippines, each LGU is mandated to prepare their Comprehensive Land Use Plan (CLUP), and Comprehensive Development Plan (CDP) to comply with Republic Act No. 7160, An Act Providing for a Local Government Code of 1991[17], Local Climate Change Action Plan (LCCAP) under Republic Act 9729 or the Climate Change Act of 2009 [18] and Local Disaster Risk Reduction Management Plan (LDRRMP) under Disaster Risk Reduction Management Act No. 10121 [19].

### *2.5. DRR and CCA Risk Assessment Instruments towards Planners' and Decision Makers' Agenda*

A review of substantial local and international literature consisting of journals, books, and conference proceedings was undertaken to select appropriate scientific methodologies frameworks and models that can be referred here as instruments. Seventy (70) instruments were ranked based on its coverage on central coordination, local implementation, participation, relevance and requirement on resources feasibility [20]. The top 7 most relevant instruments were considered in developing the RSCLUDP Model [16].

## **3. Objectives of the Study**

The main objective of this research is to develop and assess a technical model, a conduit to mainstream scientific knowledge-based disaster risk assessment in changing climate into the local planners' and decision makers' agenda. This study seeks to answer the following questions:

3.1. What are the QCG's and its Barangays' existing institutional coping and adaptive capacities? What are the QCG's, Barangays', Private/Civic and/or Non-Governmental Organizations' (NGOs) (refer onward as NGOs) personnel coping and adaptive capacities to mainstream LDRRMP and LCCAP in the QC Comprehensive Land Use Plan (CLUP) 2011-2030 and Comprehensive Development Plan (CDP) 2010-2013?

3.2. What activities should be part of the Model and what logical decision alternative paths of interrelated activities should be developed to brand the Model as RSCLUDP Model?

3.3. What is the level of workability of RSCLUDP Model based on the overall result of Suitability, Feasibility, and Acceptability (SFA) test?

## **4. Research Methodology**

The descriptive research design using a combination of quantitative, qualitative, participatory, and collaborative approaches is applied to analyze the existing practices in the LGUs to promote sustainable urban development and livable communities resilient to natural and climate related disaster impacts. See Fig. 1 for the details of the research paradigm.

4.1. Research Locale

The selection of Quezon City (QC) (Fig. 2) as the pilot urban area was empirically done by collecting data from all candidate cities using the Key Informative Interviews (KIIs). The specialized Logical Decision for Windows (LDWs) software with built-in statistical tool was used to rank and select the top-ranked city as a pilot LGU, see Fig. 3 [15]. The ranking results of the candidate cities are shown in Fig. 4 [16].

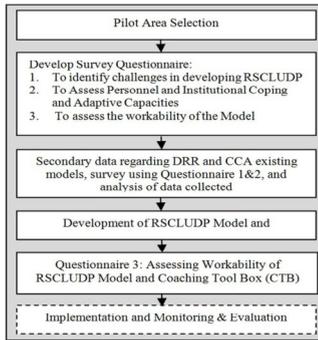


Fig. 1. Research Paradigm to develop RSCLU DP

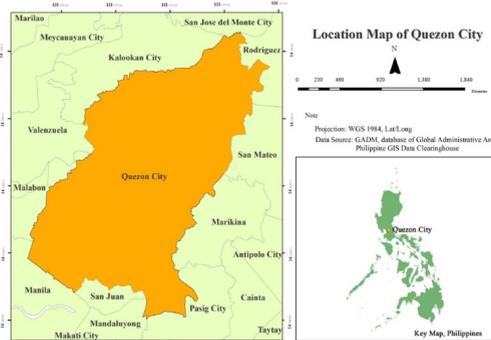


Fig. 2. Location Map of the Quezon City [15]

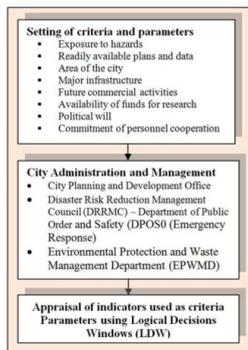


Fig.3. Framework to select pilot city

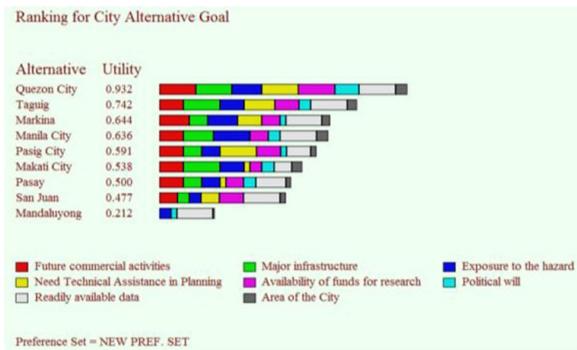


Fig. 4. Ranking produced through LDWs Software

4.2. Sample Size

The sample is composed of 142 barangays’ representatives, QC officials, the private sector, non-government and civic organizations’ representatives that are members of the City Development Council (CDC) as shown in Table.1 [16].

Table 1. Respondents who have returned survey questionnaires with response.

Personnel and Intuitional Adaptive and Coping Capacities	Selected total population by core team	Sample Size	Survey Responded
Quezon City Government (QCG) responsible Head of Departments and Offices	3	3	3
City Development Council (Barangay)	142	104	88
Civic, NGO, Private Organizations	16	15	6
Total	161	122	97

### 4.3. Research Instruments

Three sets of questionnaires were developed to elicit pertinent data to achieve the objectives of this research:

- Questionnaire 1= to identify issues with bearing on the development of the RSCLUDP Model.
- Questionnaire 2= to determine personnel and institutional coping and adaptive capacities.
- Questionnaire 3= to collect pertinent data to perform SFA test.

## 5. Findings

Data was systematically gathered, tabulated and analyzed using Microsoft Excel and Special Program for Social Sciences (SPSS), and finally interpreted to achieve the objectives of this research.

### 5.1. Personnel and Institutional Coping and Adaptive Capacities

The personnel coping capacity was evaluated by determining the ability of Planners', Decision Makers', NGOs' to achieve the objectives under four DRR priority areas by ranking/rating from 1 to 5 with verbal interpretation as "Poor", "Unsatisfactory", "Good", "Very Good", and "Excellent" respectively. Figure 5 shows that the Barangay and QCG medians ranked at 3 or "Good" level of coping capacity in achieving the objectives of two priority areas set by NDRRMP 2011-2028 [6] i.e., Disaster Prevention and Mitigation and Rehabilitation and Recovery. While NGOs' coping capacity regarding Disaster Prevention and Mitigation, Preparedness and Response ranked at 2 "Unsatisfactory". Further, NGOs ranked at 1 "Poor" for Rehabilitation and Recovery. See Fig. 5 for the comparison of the overall level of coping capacity among QCG, Barangays, and NGOs for the other priority areas.

Similarly, personnel's adaptive capacities were also assessed by determining their respective personnel capabilities in achieving the objectives of the seven priority areas set by the NCCAP, 2011-2028 [7]. Figure 6 shows that QCG's adaptive capacity is "Poor" (Ranking = 1) for food security priority area while it is "Unsatisfactory (Ranking = 2)" for the rest of priority areas. Furthermore, Barangays and NGOs, have "Poor" adaptive capacity in terms of all seven priority areas. See Fig. 6 for details.

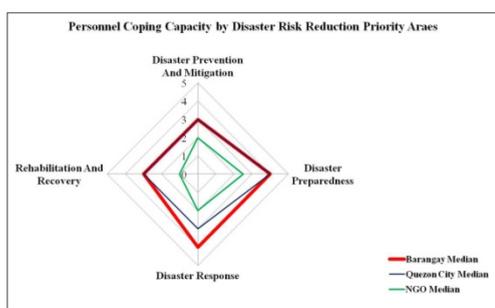


Fig. 5. Personnel coping capacity rating for four DRR priority areas under NDRRMP 2011-2028 [6]

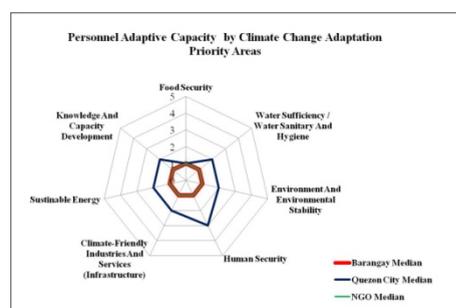


Fig. 6. Personnel adaptive capacity rating against seven strategic priority areas of NCCAP 2011-228 [7]

Five (5) parameters were used in order to assess the institutional coping and adaptive capacities. The researcher collected data only from QCG and Barangays as they have the jurisdiction on preparing Local plans. NGOs are usually involved in the participatory process but not directly in crafting City plans.

In case of institutional coping capacity, QCG and Barangays are ranked 2 "Unsatisfactory" in two parameters Training and Educational Background of institutions' personnel. The ranking of other parameters is presented in Fig. 7.

Similarly, institutional adaptive capacities of QCG and Barangays were also determined. Figure 8 shows that the Barangays are ranked 1 "Poor" in terms of Institutional Setup, Linkages, Training and Educational Background of the

institution’s personnel. See Fig. 8 for the ranking in terms of other parameters.

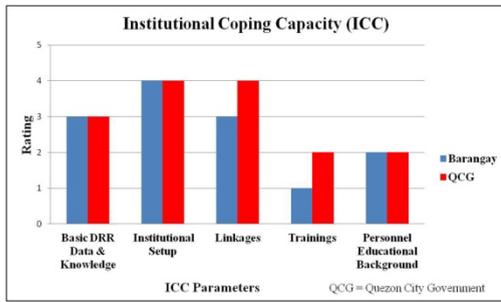


Fig. 7. QCG and Barangays’ Institutional coping capacity ranking /rating

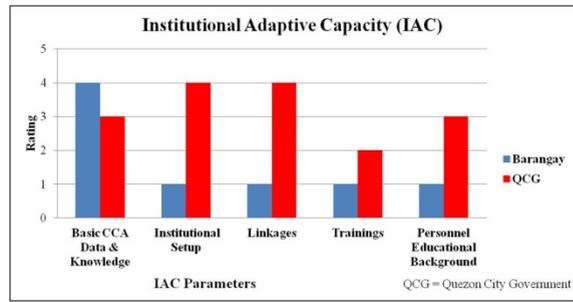


Fig. 8. QCG and Barangays’ Institutional adaptive capacity ranking/rating

### 5.2. Risk Sensitive Comprehensive Land Use and Development Planning Model

The existing instruments have limitations in QC context. Based on the study results, personnel and institutional coping and adaptive capacities do not support such applications. To resolve the challenges, this research developed a localized technical RSCLUDP Model as reflected Fig. 9. To make the Model effective and efficient for other similar LGUs, a Logical Decision Alternative Paths (LDAPs), which are represented by color-coded arrows illustrate how LGU’s will integrate their existing Local plans into the Model (See Fig. 9)? A Coaching Tool Box (CTB) with formulas to assess natural and extreme event risks has been developed to operationalize the Model’s interconnected activities. (See Table 2 for details) [16].

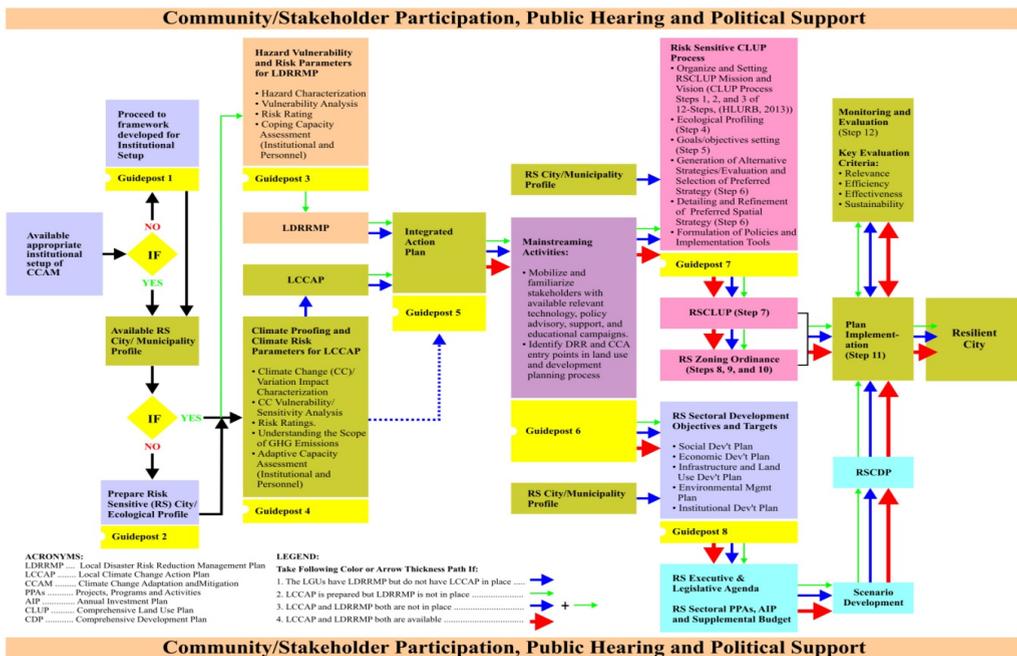


Fig. 9. Risk Sensitive Comprehensive Land Use and Development Planning (RSCLUDP) Model

### 5.3. Assessing the Workability of RSCLUDP Model

The standard of Suitability, Feasibility, and Acceptability test was conducted to assess the workability of

RSCLUDP Model [16].

Table 2. Coaching Tool Box (CTB) enlists the coaching tools to operationalizing corresponding activities of the RSCLUDP Model

Guidepost	Model Activity	Coaching Tool	Main Sample Output
1	Available appropriate institutional setup	Framework in Structuring Climate Change Adaptation and Mitigation (CCAM) Unit	Resolution to create a competitive functioning unit of CCAM
2	Risk Sensitive review, assessment and situation Analysis	Risk Sensitive (RS) Profiling Guide Sheet	Table of Contents of RS City/Municipality Profile
3	Hazard Vulnerability and Risk Parameters for Local Disaster Risk Reduction Plan (LDRRMP)	Hazard Risk Assessment Workbook (HRAW)	LDRRMP (Process)
4	Climate-Proofing and Climate Risk Parameters	Guide in Developing Local Climate Change Action Plan	LCCAP (Process)
5	Integrated Action Plan	LDRRMP and LCCAP Integration Framework	Integrated Action Plan Framework
6	DRR and CCA Mainstreaming Activities	Framework for Integrated Action Plan Mainstreaming in Local Planning	DRR and CCA entry points in CLUP and CDP
7	Risk Sensitive Comprehensive Land Use planning	RSCLUDP Process Guide Sheet	RSCLUDP and Zoning Ordinance (ZO), Framework on Guiding Principles and Table of Contents
8	Risk Sensitive Development Planning (RSCDP)	RSCDP Process Guide Sheet	RSCDP processing notes and Table of Contents

The graphic representation of the analysis is shown in Fig. 10 and 11 where 1 is the lowest and 5 as the highest rank. Rank 1 = Not Suitable, Feasible and Acceptable, Rank 2 = Inadequately Suitable, Feasible and Acceptable, Rank 3 = Moderately Suitable, Feasible and Acceptable, Rank 4 = Suitable, Feasible and Acceptable, and Rank 5 = Very Suitable, Feasible and Acceptable. The overall rating of RSCLUDP Model is ranked at 5 meaning the Model is very suitable, feasible and acceptable (See Fig. 11).

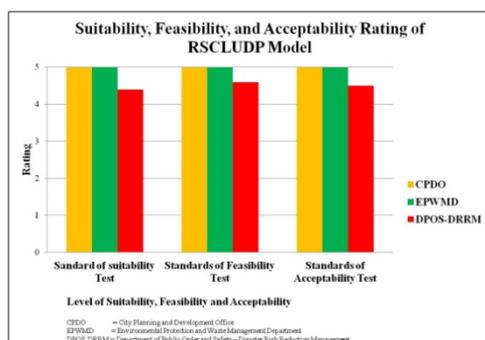


Fig. 10. SFA rating for RSCLUDP Model

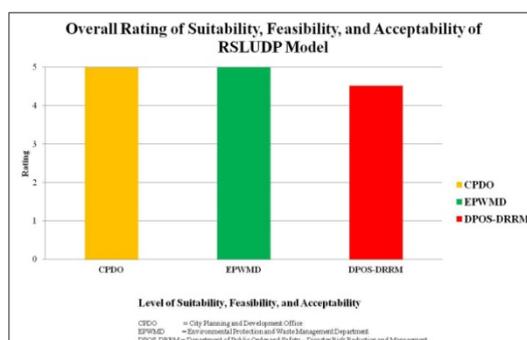


Fig. 11. Overall rating of SFA test for RSCLUDP Model

6. Conclusion and Recommendations

The key towards urban sustainable development and promoting livable communities is through mainstreaming DRR and CCA in the local planning processes. The RSCLUDP Model is a technically-oriented document that can be implemented by a technical persons/experts trained in preparing Local plans. A successful implementation of the Model depends on the LGU’s personnel and institutional capacities. The personnel and institutional coping and adaptive capacities of QCG’s and Barangays’ officials is not yet adequate to implement the Model and the CCA lacks the appropriate institutional mechanism to do so. Decision Makers and Planners should be trained using the CTB with step by step procedures to enhance their coping and adaptive capacities in preparing Local plans. Currently, the QCG

is in its final stages in implementing the Model, where challenges/gaps of the implementation is being documented and solutions are provided to enhance the workability and adaptability of the Model for other cities and municipalities.

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