

Evaluating Local Capacity for Climate Change Adaptation and Disaster Risk Reduction: The Case of Pulilan, Bulacan, Philippines

Christa Brown
October 2014



Photo Credit: Christa Brown

EVALUATING LOCAL CAPACITY FOR CLIMATE CHANGE ADAPTATION
AND DISASTER RISK REDUCTION:
THE CASE OF PULILAN, BULACAN, PHILIPPINES

by

CHRISTA LOUISE BROWN

B.A., University of Victoria, 2001

B.A., University of Victoria, 2012

A PROJECT SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS (PLANNING)

in

THE FACULTY OF GRADUATE STUDIES

School of Community and Regional Planning

We accept this project as conforming
to the required standard

.....

.....

.....

THE UNIVERSITY OF BRITISH COLUMBIA

October 2014

© Christa Louise Brown, 2014

ABSTRACT

Climate change is often discussed as something that will happen in the future. However, in many places around the world such as the Philippines, extreme weather events and changing weather patterns that may be attributed to climate change are already occurring and the destructive impacts are very real for communities that are exposed and vulnerable to natural hazards. Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) are now commonly viewed as interrelated policy areas, linked together through a shared focus on weather and climate, and with many overlapping objectives. Both complex issues in their own right and rife with uncertainty, CCA and DRR create new challenges for planning, policy formulation, decision making, and implementation. In the Philippines, authority has been delegated to Local Government Units (LGUs) – provinces, cities and municipalities, and barangays – for the implementation and maintenance of both climate change and disaster risk reduction programs. It is therefore essential to ensure that LGUs tasked with planning for climate change adaptation and associated hazard mitigation possess the capacity required to do so.

This project utilizes an asset-based approach to evaluate the local capacity for CCA and DRR of one LGU within the Angat Watershed, the Municipality of Pulilan. Drawing from Appreciative Inquiry – an action research methodology that not only allows for better understanding and appreciation of current capacity, but can also provide for the possibility of innovative transformation to occur within an organization – it focuses on the existing strengths and past successes of the Municipality in order to assess existing adaptive capacity. Adaptive capacity is the ability of a system or community to cope with, prepare for, avoid, or recover from the exposure to the effects of climate change. High adaptive capacity reduces the vulnerability of a community by serving as a counterweight to the community’s exposure and sensitivity to climate change impacts and associated hazards.



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

ACKNOWLEDGEMENTS

I feel extremely blessed to have been given the opportunity by Dr. Leonora Angeles to participate in the “Collaborative Governance of Urbanizing Watersheds” project under her lead. For me, I find my greatest learning about myself and the world around me has come from opportunities such as these, to engage in a cross-cultural context, sharing knowledge with people from all walks of life, whom I otherwise would not have the chance to meet. With gratitude Nora, I thank you for your tireless dedication to improving the conditions in the Angat Watershed and thus the lives of the people who live there, and for your continued commitment to bringing your students along to share in this amazing journey.

My deepest thanks to my Pulilenyo family. Without you this project would not have been possible. Everyone whom I worked with at the Municipality of Pulilan truly embodied the *bayanihan* spirit. You welcomed me into your community and your lives and always made me feel more than welcome. Specifically, I would like to thank Mayor Vicente Esguerra, Sr., Vice Mayor Elpidio Castillo, and Municipal Administrator Vicente A. Esguerra, Jr. for your strong leadership and commitment to a climate adaptive future for Pulilan. An especially heartfelt thanks goes out to Obet Cruz, Harrieth Cruz, and Cymbie Mano for sharing so much of your time and knowledge with me. The people of Pulilan are lucky to have you working tirelessly to build resilience to climate change and reduce the risks they face from natural disasters. Thank you also to Tito Esguerra, Gil Garcia, Tes Tetangco, Lori De Jesus, Tita Dory, Irene Manalastas, Vincenta Santos, Rico Toribio, Demy Macasuhot, Joy Mano, Laiza Valero, Rhea Reyes, Donna Cortez, Rueben Rey Arenas, and Andrew de Guzman.

To my project partners in the 2013 Community Service Learning field school – Lavino Krystie – I deeply appreciate having had the chance to work with you both. To Sarah and Gabi, you kept me company and ensured I remained self-reflective. You probably don’t realize how much I learned from each of you. Thank you also to my other classmates in the field school – Mel, Eliana, Frankie, and Daniel – and to Dr. Mark Stevens for acting as second reader on this project. To Father Dennis and the St. James Parish in Plaridel, your hospitality in offering us a home during our time in the field is greatly appreciated.

Finally, thank you to all my wonderful family and friends for your ongoing love and support during my journey through grad school. There are too many of you to mention, but know that I couldn’t have done it without you!

TABLE OF CONTENTS

Abstract	1
Acknowledgements	2
List of Tables and Figures.....	5
Acronyms	6
1. Introduction – Project Context and Rationale	7
1.1 Overview	7
1.2 Project Context – Angat Watershed Governance.....	8
1.3 Statement of the Research Problem.....	9
1.4 Research Methodology	10
1.4.1 Research Question and Objectives	10
1.4.2 Methodological framework	11
1.4.3 Methods.....	13
1.4.4 Ethical Considerations	15
1.4.5 Challenges and Limitations	16
1.5 Organization of Report	18
2. Analytical Framework and Definition of Key Terms	19
2.1 Climate Change Adaptation and Disaster Risk Reduction	19
2.2 Integration of Climate Change Adaptation and Disaster Risk Reduction	20
2.3 Vulnerability to Climate Change Impacts and Disasters	22
2.4 Analytical Framework – Determinants of Adaptive Capacity	24
2.5 Building Adaptive Capacity	26
3. Study Area: Pulilan, Bulacan, Philippines.....	27
3.1 Geographic Context	27
3.2 Social and Economic Context.....	29
3.2 Policy Context for Climate Change Adaptation and Disaster Risk Reduction	30
4. Evaluating Adaptive Capacity.....	34
4.1 Economic Resources	35
4.1.1 Financial Resources/Funding	35
4.1.2 Economic Growth	35
4.1.3 Infrastructure.....	36
4.2 Social Capital.....	37
4.2.1 Bonding Social Capital.....	38
4.2.2 Networking/Bridging Social Capital	39

4.3 Effective Institutions	40
4.3.1 Effective Leadership/Political Champions.....	40
4.3.2 Recognition	41
4.3.3 Enabling policies/Environment	42
4.3.4 Managerial Ability.....	43
4.3.5 Inter-jurisdictional Cooperation	43
4.3.6 Cooperative Constituents	44
4.4 Information, Knowledge, and Skills	44
4.4.1 Data Availability/Information Resources.....	45
4.4.2 Raising Awareness of Risk, Vulnerability, and Impacts.....	45
4.4.3 Information Dissemination/Education	46
4.4.4 Capacity Building.....	47
4.4.5 Skills	48
4.4.6 Planning Experience.....	48
4.5 Equity	49
4.5.1 Social Programs.....	49
4.5.2 Community/Stakeholder Involvement	51
5. Discussion, Recommendations, and Conclusions	52
5.1 Discussion	52
5.2 Recommendations	54
5.3 Conclusions	55
References.....	57

LIST OF TABLES AND FIGURES

Table 1.1: Semi-Structured Interview Participants	14
Table 1.2: Municipal Plans Reviewed	14
Table 1.3: Legislation Reviewed	14
Table 2.1: Determinants of Adaptive Capacity	25
Table 2.2: Proxy Indicators of Determinants of Adaptive Capacity	26
Figure 2.1: Integrating Disaster Risk Reduction and Climate Change Adaptation	21
Figure 2.2: The Vulnerability Assessment Process	23
Figure 2.3: Relationship between Determinants of Adaptive Capacity	25
Figure 3.1: Map of the Province of Bulacan	27
Figure 3.2: Barangays of Pulilan, Bulacan	28

ACRONYMS

AI	Appreciative Inquiry
CCA	Climate Change Adaptation
CCC	Climate Change Commission
CDP	Comprehensive Development Plan
CLUP	Comprehensive Land Use Plan
DILG	Department of Interior and Local Government
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction and Management
IEC	Information Education Campaign
LCCAP	Local Climate Change Action Plan
LGC	Local Government Code
LGU	Local Government Unit
MDRRMO	Municipal Disaster Risk Reduction and Management Office
MENRO	Municipal Environment and Natural Resources Office
MPDO	Municipal Planning and Development Office
MRF	Material Recovery Facility
NCCAP	National Climate Change Action Plan
NFSCC	National Framework Strategy on Climate Change
NDCC	National Disaster Coordinating Council
NDRRMC	National Disaster Risk Reduction and Management Council
NDRRMP	National Disaster Risk Reduction and Management Plan
PAIO	Public Affairs Information Office
PPDO	Provincial Planning and Development Office
RHU	Rural Health Unit
SWDO	Social Welfare and Development Office

1. INTRODUCTION – PROJECT CONTEXT AND RATIONALE

1.1 OVERVIEW

Climate change is often discussed as something that will happen in the future. However, in many places around the world such as the Philippines, extreme weather events and changing weather patterns that may be attributed to climate change are already occurring. The challenge then, or perhaps opportunity, is not only to find ways to adapt to future climate change, but also how to begin now to adapt with climate change as it is presently taking place. Although mitigation – efforts to reduce or prevent emissions of greenhouse gases – still forms an important part of any comprehensive strategy for potentially reducing the impacts of anthropogenic climate change, adaptation – reducing vulnerability and building resilience to the impacts of climate change – is now being recognized as equally important. Increasingly there is evidence that climate change is already occurring and the destructive impacts are very real for communities that are exposed and vulnerable to natural hazards.

Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) are now commonly viewed as interrelated policy

areas, linked together through a shared focus on weather and climate, and with many overlapping objectives. Increasingly there has been a focus on strategically linking these two policy areas, harnessing their synergies in order to advance the goals of sustainable development and human security (Birkmann & von Teichman, 2010; UNISDR Asia and Pacific, 2011). Both complex issues in their own right and rife with uncertainty, CCA and DRR create new challenges for planning, policy formulation, decision making, and implementation.

In the Philippines, authority has been delegated through the Local Government Code (LGC), the Climate Change Act of 2009, and Disaster Risk Reduction and Management (DRRM) Act of 2010 to Local Government Units (LGUs) – provinces, cities and municipalities, and barangays (the smallest administrative unit in the Philippines) – for the implementation and maintenance of climate change and disaster management programs. The intention is for LGUs to address prevention, mitigation, preparedness, response, rehabilitation and reconstruction, and development (Penalba, Elazegui, Pulhin, & Cruz, 2012). It is therefore essential to ensure that LGUs tasked with planning for climate change

adaptation and associated hazard mitigation possess the capacity required to do so.

Understanding capacity often begins with identifying gaps in capacity and barriers to effective planning and implementation that currently exist, followed by recommendations on how to move from the current to the desired state. Rather than using a deficit-based approach such as those that focus on gaps and barriers to CCA and DRR, this project instead focuses on the existing strengths and past successes of one LGU within the Angat Watershed, the Municipality of Pulilan, in evaluating current capacity for climate change adaptation and disaster risk reduction. This asset-based approach draws from Appreciative Inquiry, an action research approach that not only allows for better understanding and appreciation of current capacity, but can also provide for the possibility of innovative transformation to occur within an organization that may increase future capacity to move the community towards the goals of adaptation and resilience (Bushe and Kassam, 2005).

1.2 PROJECT CONTEXT – ANGAT WATERSHED GOVERNANCE

The Municipality of Pulilan, Bulacan, Philippines was selected as a case



study for evaluating capacity for CCA and DRR due to two factors: its location adjacent to the Angat River within the Angat Watershed Region, which is experiencing water and livelihood variability due to climatic change, and its vulnerability to disasters, particularly cyclical drought and flooding, similar to other Bulacan municipalities. It is also one of three municipalities hosting nine students from The University of British Columbia on a 2013 Community Service Learning field school to assist in the development of Local Climate Change Action Plans (LCCAP). Both this project and the Community Service Learning field school are part of a larger research project led by Dr. Leonora Angeles and funded by the Social Sciences and Humanities Research Council of Canada entitled “Collaborative Governance of Urbanizing Watersheds: Integrated Research, Institution- and Capacity Building for Sustainability and Climate Risk

Adaptation in Angat River Basin, Philippines”. The aim of that project is “to build knowledge and understanding of the relationship between rescaled watershed governance and its institutional, social, economic, and environmental outcomes” (Angeles, 2011).

There are two specific project objectives that relate to the Pulilan case study:

- 1) identify and analyze “the system of relationships among the political, economic and socio-cultural factors supporting (or hindering) the institution- and capacity-building needed for collaborative governance to support environmental sustainability and long-term climate adaptation in urbanizing watersheds” (Angeles 2011); and,
- 2) generate “insights about the kinds of remedial/preventative/adaptive collaborative action that could be taken by various stakeholders to strengthen collaborative governance and coordinate regulatory and other decisions at various scales” (Angeles, 2011).

Therefore, the aim of this project is to assist in meeting the objectives of the larger project, and in doing so to assist the Municipality of Pulilan in laying the foundation for planning a municipality more

resilient to climate change and the risks posed by more frequent and intense climate related hazards from extreme weather events.

1.3 STATEMENT OF THE RESEARCH

PROBLEM

Due to its combined physical and human geography, the Philippines is one of the most disaster-prone nations in the world, exposed to a whole range of natural hazards, including cyclonic storms, floods, earthquakes, volcanoes, droughts, forest fires, landslides, and epidemics (United Nations, 2010). In addition, the Philippines is already experiencing a number of changes that can be attributed to climate change, such as:

- increased mean, maximum, and minimum temperatures;
- increased frequency of hot days and warm nights;
- decreased frequency of cold days and cool nights; and,
- increased annual mean rainfall and number of rainy days.

On average, 20 cyclones are occurring annually, with eight or nine making landfall, and sea levels could rise by 40cm by the end of this century (United Nations, 2010). Coupled with the challenges posed by

urbanization, growing informal settlements, and poverty, these climatic changes create a situation of increasing vulnerability for citizens. According to the Intergovernmental Panel on Climate Change (2012), countries can more effectively manage these risks if they adopt climate change adaptation strategies, consider hazard risks in their national and sector plans, and target actions towards vulnerable areas and groups.

As described above in the Overview, there are a number of pieces of legislation in the Philippines aimed at addressing risk and implementing climate change adaptation strategies (Local Government Code, Climate Change Act, and Disaster Risk Reduction and Management Act). These legislations delegate authority to Local Government Units (LGUs) for climate change and disaster management programs (Penalba, Elazegui, Pulhin, & Cruz, 2012). One way these vulnerabilities are to be addressed at the local level is through the development of Local Climate Change Action Plans (LCCAP), however, it is not always clear whether LGUs have the capacity in this emerging area of planning to effectively deliver on this mandate downloaded from the National government. It is therefore prudent to explore both what the relevant

capacities are for CCA and DRR, as well as the ways in which these capacities may already be embodied and demonstrated by the LGU, in this case, the Municipality of Pulilan.

1.4 RESEARCH METHODOLOGY

This section explains the project research methodology. It first outlines the primary and secondary research questions as well as key research objectives. It then discusses the methodological framework and specific methods used for data collection and analysis. Lastly, it examines some of the ethical considerations, challenges, and limitations encountered in the research process.

1.4.1 RESEARCH QUESTION AND OBJECTIVES

This project utilizes information gathered during participation in the one month Community Service Learning field school described above and a further three weeks of onsite research conducted in Pulilan, Bulacan, Philippines, along with a review of secondary literature relevant to capacity building for CCA and DRR, in order to meet the following three objectives:

- 1) assist the Municipality of Pulilan to begin planning for a community more

resilient to hazards and the impacts of climate change;

- 2) generate knowledge about the kinds of action that can be taken to strengthen inter-jurisdictional governance for climate change adaptation; and,
- 3) identify factors supporting regional institution-building and collaborative governance.

This project aims to answer the following primary and secondary research questions:

What institutional capacities already exist that can be drawn upon by the Municipality of Pulilan in planning for and implementing climate change adaptation and disaster risk reduction strategies?

- What planning strategies have already been developed that address improving disaster resilience and adaptation to climate change?
- What collaborative partnerships exist that can be drawn on in planning for climate adaptation and improved hazard resilience?
- What might a future Pulilan resilient to climate change and natural hazards look like?

1.4.2 METHODOLOGICAL FRAMEWORK

This project utilized a case study

methodology, influenced by Appreciative Inquiry (AI). In case study research the focus is on depth and contextualized understanding of the case being studied, with the idea that an in-depth understanding of a case is valuable of its own accord (Baxter, 2010). Appreciative Inquiry is often seen as an approach to organizational development (OD), but according to Bushe and Kassam (2005), AI differs in its transformative potential due to two qualities: its focus on changing how people think rather than what they do; and its focus on supporting self-organizing change processes that result from the generation of new ideas. As an approach to research, it fits well with qualitative research methods. It is closely connected with action research, case study, narrative, portraiture, and evaluation methods and often utilizes interviews for data collection (Appreciative Inquiry, 2008).

The theoretical framework that underpins AI is social constructionism (Appreciative Inquiry, 2008; Preskill, 2005; Schooley, 2008), which looks at the ways in which humans create shared meaning together through language and dialogue, creating powerful images that we then use to generate our own realities and futures (Watkins, Mohr, & Kelly, 2011). Within AI, the idea of a social construction of

reality allows for an intentional co-creation of change, whereby “the very act of inquiry causes the system to shift in the direction of the inquiry by evoking anticipatory images” (Watkins, Mohr, & Kelly, 2011, p. 42). AI deliberately focuses on the positive during the inquiry, in order to create confident and positive self-images and therefore a positive future. AI utilizes a four stage process termed the 4D model or cycle. This cycle moves from discovery (appreciating what is), to dream (imagining what could be), to design (determining what should be), to destiny (creating what will be) (Appreciative Inquiry, 2008; Bushe & Kassam, 2005; Preskill, 2005; Watkins, Mohr, & Kelly, 2011).

AI is collaborative, action oriented, and systems oriented (Preskill, 2005). The collaborative focus of AI fits well with the objectives of the “Collaborative Governance of Urbanizing Watersheds” project described above. In its action orientation, AI is striving towards a vision of a future state that is firmly rooted in the positive attributes of the existing system with a “deliberate focus on the creative, generative, and positive aspects of a system” (Appreciative Inquiry, 2008, p. 23). In the context of this project, this is useful because the problem at hand – planning for climate

change adaptation and building hazard resilience – requires more than simply describing the current situation, but rather is intended to move the community towards a new vision of the future. Furthermore, AI has the potential to create transformative change in complex, highly interconnected systems through, for example, strategic modifications in the relationship of the organization with its environment, or shifting the way the work of the organization is approached (Watkins, Mohr, & Kelly, 2011). This systems approach is particularly relevant when addressing issues related to climate change and hazard resilience, because it helps to solidify the connections between complex, highly interconnected social systems and the arguably even more complex and interconnected ecosystems in which they are embedded.

AI and its focus on the transformation of social systems dovetail well with an evolutionary or socio-ecological definition of resilience. An evolutionary definition of resilience rejects the notion of equilibrium states and focuses instead on the ways that complex systems tend towards change over time, even without external disturbance, and adapt and reorganize themselves in often novel and unpredictable ways (Davoudi, 2012). In the

context of planning for climate change, the challenge therefore is not how to adjust our communities to live in ways much the same as we now live, but rather it is to find new, flexible, innovative ways of organizing our communities that can respond to a variety of future scenarios that we might encounter. Within the field of climate change adaptation, there has been a move towards a vulnerability approach to assessing the impacts of climate change and a corresponding shift from considering specific adaptation measures to a focus instead on the assessment and promotion of adaptive capacity (Smit & Pilifosova, 2003). Adaptive capacity is the ability of a system or community to cope with, prepare for, avoid, or recover from the exposure to the effects of climate change. Concepts relating to vulnerability, including exposure, sensitivity, and adaptive capacity will be explored in greater detail in Section 2, however, the point here is that AI has the potential to stimulate the kind of organizational change necessary to build adaptive capacity for climate change adaptation and hazard resilience.

1.4.3 METHODS

This research project is both descriptive and exploratory in nature. It

concentrates on the first two stages of the Appreciative Inquiry 4D cycle – discovery and dream – with the aim of accurately portraying the current adaptive capacity for climate change and disaster risk reduction within Pulilan, as well as exploring new ways in which this existing capacity can be further developed. This project builds upon the research conducted in creating the “Towards a Local Climate Change Action Plan” report produced by Babalos, Brown, and Chen (2013) as part of the Community Service Learning field school in July 2013 that laid the groundwork for the Municipality of Pulilan to develop their Local Climate Change Action Plan (LCCAP). Additional data were then collected through: a) semi-structured interviews with municipal employees from various departments as well as other relevant stakeholders (Table 1.1); b) a review of existing plans (Table 1.2); c) participant observation; and d) a review of applicable legislation (Table 1.3). Participants selected for interviews, held between August 5 to 21, 2013, were based on a combination of what Bradshaw and Stratford (2010) call criterion sampling, where all those within the Pulilan local government who work in a planning capacity or on issues related to climate change and hazard planning were selected,

and opportunistic sampling, whereby new leads were followed that arose during my fieldwork. Data from participant observation was gathered between July 1 and August 21, 2013 included: informal interviews and conversations with people both within and outside the Municipal government of Pulilan; collective discussions, most notably with employees

within the Municipal Environment and Natural Resource Office (MENRO) and Municipal Disaster Risk Reduction and Management Office (MDRRMO); direct observation; and participation in community life, such as attending a mass wedding sponsored by the Municipal Mayor and a birthday party for a Municipal employee.

Table 1.1: Semi-Structured Interview Participants

Municipal Employees	Other Stakeholders
Disaster Risk Reduction & Management Office (MDRRMO) x 2	Department of the Interior and Local Government Employee
Environment & Natural Resource Office (MENRO) x 2	Barangay Captain
Planning and Development Office (MPDO)	Rescue Team Volunteer
Social Welfare and Development Office (SWDO) Nutrition Office	Community Member from a Not-for-Profit Society
Public Affairs Information Office (PAIO) x 2	
Agriculture Office	

Table 1.2: Municipal Plans Reviewed

Municipality of Pulilan Comprehensive Land Use Plan (2011)
Municipality of Pulilan Contingency Plan for Flash Flood
Municipality of Pulilan Executive-Legislative Agenda (2010)
Municipality of Pulilan Disaster Risk Reduction and Management Plan

Table 1.3: Legislation Reviewed

Climate Change Act of 2009
Comprehensive Zoning Ordinance of Pulilan, Bulacan
Ecological Solid Waste Management Act of 2000
Local Government Code of 1991
Municipal Environmental Code of Pulilan
Philippine Disaster Risk Reduction and Management Act of 2010

1.4.4 ETHICAL CONSIDERATIONS

This project involved humans and occurred in a cross-cultural setting and therefore a number of ethical issues were considered prior to and throughout the research process. The research falls under UBC ethics review H12-01252 for the “Collaborative Governance of Urbanizing Watersheds” project described above. The purpose of the ethics review process is to ensure that ethical considerations have been identified and addressed within the design of the project, including the researcher’s responsibilities to the research subjects in terms of: ensuring privacy and confidentiality, seeking informed consent, and not exposing participants to harm (Dowling, 2010). There was a low level of risk to participants involved in the research. Interviews were conducted with adult participants after seeking informed consent. The interview consent letter provided for participants was translated into Tagalog to ensure comprehension. Participants were asked whether they preferred to remain anonymous, which several did and so I decided due to the relatively small number of interviews conducted not to use the names or position titles of any participants in order to ensure the anonymity of all.

Throughout the research process I remained critically aware of the relations of power between myself and the communities and participants that I engaged with. I was constantly conscious during my time in the field of my social position as a young, white, female university student from a developed country and how it affected the power dynamics between me and those I conducted research with. I found myself at various times in each of the three different types of power relations described by Dowling (2010): reciprocal relationships, where there were comparable social positions and relatively equal benefits and costs from participating in the research between myself and those participating; asymmetrical relationships, where participants were in positions of influence much greater than my own; and potentially exploitative relationships, where my position was of greater power than those participating. However, upon reflection I feel that most of my interactions could be described as reciprocal relationships, because there were not large power differentials between myself and those who participated in the research process in terms of our similar middle-class location, professional status, and educational backgrounds.

One theme that recurred throughout

the research process is the post-colonial context of the Philippines and the ways in which this affected both perceived and real power dynamics between me and those that I interacted with. I, along with my peers who were also conducting research, engaged continuously in what Dowling (2010) describes as critical reflexivity whereby we explored our role in relation to the research process and the cross-cultural social context. Being intensely aware of my privileged position as a university educated student from a developed nation with a high standard of living, the choice of Appreciative Inquiry to underpin my research, allowed me to enter the research relationship, not as an outside expert purporting to have the answers to solve this community's problems, but rather as a partner in inquiry, deeply aware and respectful of the local knowledge and capacity to find appropriate strategies to confront the challenges of climate change. I view myself first and foremost as a student, who was able to both learn and contribute through this unique experience in cross-cultural planning and knowledge exchange.

1.4.5 CHALLENGES AND LIMITATIONS

There were a couple of key challenges encountered during the research

process that resulted in limitations to the data collected. The first was due to language. I am a native English speaker and prior to my involvement in this research project had no experience at all with Tagalog, the local language spoken in the study area. The research participants were primarily native Tagalog speakers and although most of them had some proficiency in English, the level varied significantly from person to person. There was at least one case where I had hoped to conduct an interview with someone with direct experience dealing with issues related to climate change where the person was not comfortable being interviewed in English even with the assistance of a translator. She instead opted to write out her answers to the interview questions in English, but this did not result in responses that were as fulsome as I felt I was able to attain when conducting in person interviews. Overall, I felt I was able to build a good rapport with most people I interacted with in the Municipal government and wider community and through that I could usually discern and overcome most instances of miscommunication; however, there is still a reasonable chance that I may have made mistakes or misinterpreted information that was shared with me.

A second challenge relates to the completeness of data. Given the reality of limited time and resources in the field, it was not possible to explore every avenue of information related to CCA and DRR within the community. For example, due to circumstances beyond anyone's control, I was unable to interview the Municipal Mayor, Vice Mayor, or Municipal Administrator, all of whom certainly had valuable information to share. With the exception of one barangay captain, I was unable to arrange interviews with representatives from the 19 barangays, although I did speak informally with elected representatives from two additional barangays during my field visits. Undoubtedly collecting further data at the barangay level would have been beneficial in creating a more complete picture of the capacity that currently exists for CCA and DRR within the municipality as a whole.

Similarly, my interactions with community members outside the Municipal and barangay government structure were also very limited. Had I wished to include the voices of local residents, the scope of the project would have to be significantly expanded and resource limitations prevented this. However, a comparative study contrasting the experiences of Municipal

staff and local residents could provide an interesting perspective of adaptive capacity at various scales as well as differences in the types of adaptations – for example, reactive vs. anticipatory or autonomous vs. planned – that each is likely to be involved in. This could be an area for future research. By choosing to focus primarily on the experiences of Municipal staff, I was able to specifically assess institutional adaptive capacity for CCA and DRR, which was one of my aims due to the mandate from the National government for LGUs to develop and implement their own LCCAPs.

Finally, there were some limited issues with accessing relevant documents, plans, and other secondary sources of information, but for the most part Pulilan had and made available most of the data that was requested. For example, I had hoped to review a copy of the most recent Executive Legislative Agenda (ELA), however, it was not yet available by the time I returned to Canada. With more time and resources the scope of the project could have been expanded to include a more representative subset of the entire community, including various stakeholder groups, non-government organizations, the church, and all levels of government. For this reason, this project is exploratory in nature and descriptive mainly

of the Municipal government of Pulilan's capacity for CCA and DRR, rather than the wider community.

1.5 ORGANIZATION OF REPORT

This report is organized into five sections. The first section introduces the project context and provides the rationale for why the research was undertaken, as well as describes the specific objectives addressed through the research and the methods used to answer the research question. The second section outlines the analytical framework

utilized to evaluate capacity for CCA and DRR. It also defines key terms relevant to the development of the framework. The third section presents the geographic, socio-economic, and policy context of the study area. Section four, through application of the analytical framework, evaluates the Municipality of Pulilan's adaptive capacity in relation to CCA and DRR. The final section provides a brief discussion of the results of my analysis, recommendations for moving forward, and conclusions drawn from the research process.

2. ANALYTICAL FRAMEWORK AND DEFINITION OF KEY TERMS

This section outlines the analytical framework utilized to evaluate capacity for CCA and DRR. It also defines key terms relevant to the development of the framework, particularly those that relate to the vulnerability assessment process and adaptive capacity.

2.1 CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION

In order to effectively evaluate capacity for CCA and DRR, it is first necessary to clearly articulate what is meant by these and other related terms as well as the intended outcomes of CCA and DRR planning and policy. In this and the following sub-sections, key terms will be defined and discussed in regards to how they relate to evaluating capacity for CCA and DRR in the context of local government in the Philippines. This discussion forms the basis of the analytical framework which was developed to analyze and evaluate the Municipality of Pulilan's existing capacity in these areas.

Climate Change Adaptation or **CCA** refers to adjustments in natural or human systems in response to actual or expected changes in climatic stimuli and

their effects and impacts in order to lessen adverse impacts or take advantage of new opportunities (Adger, Arnell, & Tompkins, 2005; Smit & Pilifosova, 2003; UNISDR, 2011). **Disaster Risk Reduction** or **DRR** “is the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and the improved preparedness for adverse events” (UNISDR, 2011, p.7). The intersections between CCA and DRR will be discussed in more detail below, however it is important to point out here that these two policy areas share the objective of reducing negative impacts experienced by humans resulting from changing climate and other hazards. A hazard event, whether related to climate and weather or not, only becomes a **disaster** through its interaction with vulnerable social conditions, whereby severe alterations in the normal functioning of a community occur, leading to adverse human, material, economic, or environmental effects requiring immediate emergency response (IPCC, 2012). **Disaster risk** is the likelihood over a specified period of time

that a disaster will occur, which is a relationship between the hazard, the elements at risk, and vulnerability (Smith & Petley, 2009). Common to both CCA and DRR is the concept of reducing the vulnerability of a system or community to the potential negative impacts of climate change and hazards. The concept of vulnerability and what makes a system vulnerable is discussed in more detail in section 2.3.

2.2 INTEGRATION OF CLIMATE CHANGE

ADAPTATION AND DISASTER RISK

REDUCTION

Climate change adaptation and disaster risk reduction as policy and planning areas are increasingly being linked together, although varying opinions exist regarding whether this should be the case, and if so, how it should be accomplished. Birkmann and von Teichman (2010) make the argument that there needs to be a systemic link between DRR and CCA in order to advance sustainable development and human security. They cite the relationship between climate change and an increase in disasters over the past 20 year due to natural hazards, mainly meteorological and hydrological events. In the Philippines, according to Pulhin, Tapia,

and Perez (2010), climatic hazards cause the greatest number of disasters, the highest economic losses, the most number of people affected, and highest loss of lives, and this is under the current climate regime, with the threat of climate change bringing about more frequent and intense occurrences of these hazards.

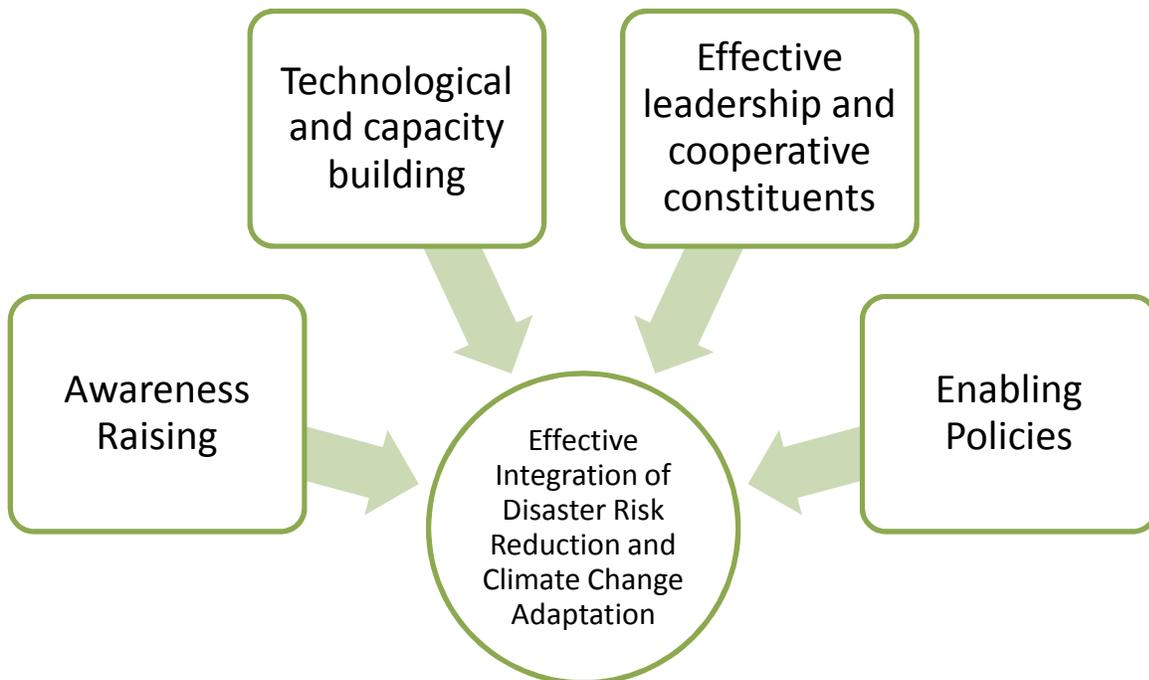
The evidence of this connection between climate change and disasters is one of the reasons the argument is made that there are synergies between the fields of CCA and DRR that can be drawn upon. It is expected that integrating CCA and DRR could lead to a reduction in climate-related losses through the implementation of DRR measures as part of adaptation; efficiencies could be realized in financial, human, and natural resources; and effectiveness and sustainability of CCA and DRR approaches could be increased (UNISDR Asia and Pacific, 2011). Beyond these potential benefits, another important element linking CCA and DRR is that they are not thematic sectors in themselves, but rather are implemented through policies in various other sectors, such as planning, land use, agriculture, and water resources, and they have linkages to other policy areas like sustainable development and poverty reduction (UNISDR Asia and Pacific, 2011).

Therefore it is not only CCA and DRR that could be integrated with one another, but a process of mainstreaming both into other sector and policy areas is the ultimate goal.

According to Pulhin, Tapia, and Perez (2010), what is needed for effective integration in the Philippines is a greater awareness of the synergies between CCA and DRR; technological and capacity building in the areas of weather surveillance, preparedness, and response; political champions pushing for CCA and DRR and their integration; and the creation of enabling policies that institutionalize the

integration of CCA and DRR (Figure 2.1). Despite these challenges, the move to integrate and mainstream CCA and DRR into other policy areas and sectors has been progressing. Both the Climate Change Act of 2009 and the Disaster Risk Reduction and Management Act of 2010 reference the relationship between these two fields and call for their mainstreaming into development planning and sectoral decision making (CC Act, 2009; DRRM Act, 2010). These two pieces of legislation, along with other relevant legislation and policy will be discussed in detail in Section 4 of this report.

Figure 2.1: Integrating Disaster Risk Reduction and Climate Change Adaptation



Adapted from Pulhin, Tapia & Perez. (2010). Integrating disaster risk reduction and climate change adaptation: Initiatives and challenges in the Philippines.

2.3 VULNERABILITY TO CLIMATE CHANGE

IMPACTS AND DISASTERS

What makes a system or community vulnerable to climate change impacts and disasters? **Vulnerability** is widely viewed as an interaction between the exposure and sensitivity of a system to hazardous conditions and the capacity of that system to manage, adapt to, or recover from the effects of the hazardous conditions (Smit & Wandel, 2006). A community's **exposure** is the likelihood of experiencing the hazardous conditions, while its **sensitivity** to that exposure is determined by occupancy and livelihood characteristics (e.g. settlement location, building types, livelihoods, land uses, etc.). The capacity of a system or community to manage, adapt to, or recover from the effects of a hazard is often referred to as **adaptive capacity**, although a number of other terms have also been utilized to describe this concept, such as adaptability, coping ability, management capacity, stability, robustness, flexibility, and resilience (Smit & Wandel, 2006). One of the common aims of CCA and DRR policies is to reduce vulnerability within a system or community and this can be achieved in three ways – by reducing exposure, reducing sensitivity, or enhancing adaptive capacity.

"I think my vision, like for me, did you see a bamboo tree? A bamboo tree, every time the typhoon comes, the bamboo tree bends and then after the typhoon they raise again. Like us, like us people, we encounter a disaster, a calamity, but after we raise again, after the calamity we raise again. We help each other. So my vision is a better Pulilan after the calamity or any disaster."

- Pulilan Municipal Employee

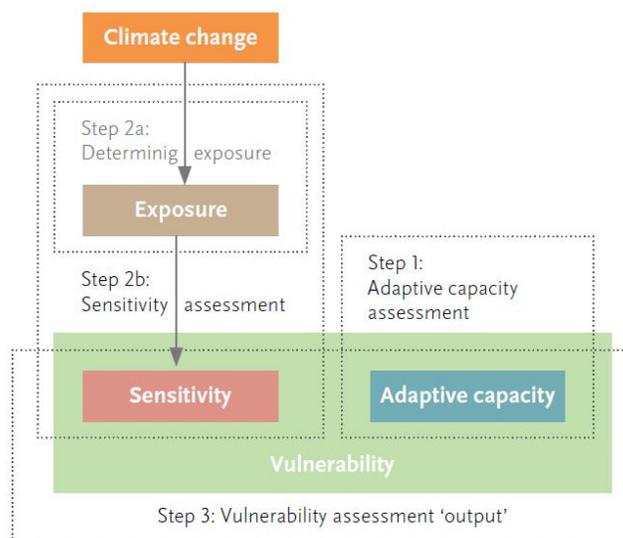
Planning for adaptation often begins with a **vulnerability assessment**. Loftus (2011) lays out a three step process for conducting a vulnerability assessment (Figure 2.2). The first step is reviewing adaptive capacity, which requires selecting proxy indicators to serve as determinants of adaptive capacity. The second step is to determine exposure to climate change hazards and to assess the sensitivity of the system to those hazards. The final step is to conduct the vulnerability assessment by determining the extent to which the adaptive capacity serves as a counterweight to sensitivity, and thereby the resulting vulnerability (Loftus, 2011).

This research can be seen as a preliminary assessment of the Municipality

of Pulilan’s adaptive capacity – Step 1 in the vulnerability assessment process. There are two primary reasons why a complete vulnerability assessment was not completed. The first is that it was outside the scope of this project to conduct a full vulnerability assessment, which should be undertaken as part of a participatory process that endeavors to involve both the municipal and barangay levels of government as well as stakeholders from across a broad spectrum of sectors and civil society. In addition, Appreciative Inquiry as a research methodology is well suited for inquiring into the adaptive capacity of a community, but is less conducive to evaluating exposure and sensitivity. For this reason, the analytical

framework that was developed, and is described in further detail in Section 2.4, was designed to elicit examples of adaptive capacity. However, examples of Pulilan adopting strategies aimed at reducing exposure or sensitivity, especially in regards to DRR, were also revealed through the research process. These will be noted where relevant, but are not the focus of the evaluation of Pulilan’s capacity for CCA and DRR. A more detailed discussion of Pulilan’s exposure and sensitivity can be found in the report “Towards a Local Climate Change Action Plan” report produced by Babalos, Brown, and Chen (2013) as part of the Community Service Learning field school.

Figure 2.2: The Vulnerability Assessment Process



Source: Loftus. (2011). Adapting urban water systems to climate change: A handbook for decision makers at the local level.

2.4 ANALYTICAL FRAMEWORK – DETERMINANTS OF ADAPTIVE CAPACITY

In order to evaluate the Municipality of Pulilan's capacity for CCA and DRR, an analytical framework was developed based on common determinants of adaptive capacity cited in the literature (IPCC, 2001; Jones, Ludi, and Levine, 2010; Loftus, 2011; Smit and Pilifosova, 2003; Smith, Klein, and Huq, 2003). Similarities between the determinants of adaptive capacity cited in several publications were examined and five were selected to form the basis of the analytical framework: Economic Resources; Social Capital; Effective Institutions; Information, Knowledge, and Skills; and Equity (Table 2.1). Infrastructure, which is another category commonly put forward as a determinant of adaptive capacity, was subsumed under Economic Resources since it can be argued that infrastructure development is largely dependent on economic factors. Similarly, Technology as a determinant of adaptive capacity was included with Information, Knowledge, and Skills, because the range of adaptation technologies available to a community will in some degree be reliant upon information available to the community about the technology, as well as the level of

knowledge and skill for properly utilizing the technology. A final determinant – Ecosystems or Natural Capital – was left out of the analytical framework primarily because an assessment of the status of this determinant falls outside the scope of this research. A diagram of the framework showing the relationship between the determinants of adaptive capacity utilized to evaluate the Municipality of Pulilan is shown in Figure 2.3.

As an approach to assessing adaptive capacity, Loftus (2011) states that typically proxy indicators are selected to evaluate adaptive capacity determinants. However, she also warns that the selection of indicators is not straightforward and is location specific. Furthermore, it can be difficult to determine whether an indicator reveals high or low adaptive capacity and even more challenging to understand the relationship between the various determinants of adaptive capacity and how this might influence the overall adaptive capacity of a community. Despite these challenges, I felt it was necessary for the purposes of my analysis to develop a list of indicators for each determinant. They are listed in Table 2.2. The analysis of data sources then sought to discover examples of these proxy indicators and thus of the

determinants of adaptive capacity outlined above. The evaluation of Pulilan’s adaptive

capacity based on the analytical framework is detailed in Section 4.

Table 2.1: Determinants of Adaptive Capacity

	IPCC (2001)	Smit & Pilifosova (2003)	Daze et al. (2009)	Jones et al. (2010)	Loftus (2011)
ECONOMIC RESOURCES	Economic Resources	Economic Wealth	Economic Resources	Asset Base	Economy
	Infrastructure	Infrastructure	Physical Resources		
SOCIAL CAPITAL		Social Capital	Social Resources	Asset Base	Society
EFFECTIVE INSTITUTIONS	Institutions	Institutions		Institutions & Entitlements; Flexible Forward-looking Decision-making	Governance
INFORMATION, KNOWLEDGE & SKILLS	Information & Skills	Information & Skills	Human Resources	Knowledge & Information; Innovation	
	Technology	Technology			
EQUITY	Equity	Equity			
			Natural Resources		Ecosystems

Figure 2.3: Relationship between Determinants of Adaptive Capacity

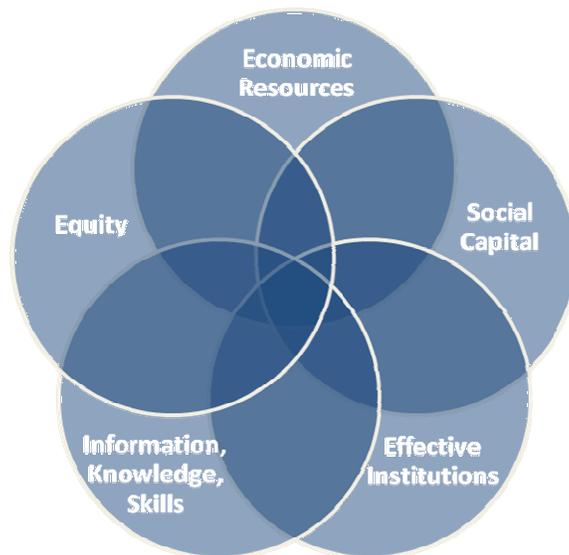


Table 2.2: Proxy Indicators of Determinants of Adaptive Capacity

ECONOMIC RESOURCES	SOCIAL CAPITAL	EFFECTIVE INSTITUTIONS	INFORMATION, KNOWLEDGE & SKILLS	EQUITY
Financial Resources/Funding	Bonding Social Capital	Effective Leadership/Political Champions	Data Availability/ Information Resources	Community/ Stakeholder Involvement
Infrastructure	Public Service	Recognition	Skills	Social Programs
Economic Growth	Volunteerism	Enabling Policies/ Environment	Information Dissemination/Education	
	Networking/ Bridging Social Capital	Managerial Ability	Raising Awareness of Risk, Vulnerability & Impacts	
	Claims of Reciprocity in Times of Crisis	Inter-jurisdictional Cooperation	Planning Experience	
	Political Influence	Cooperative Constituents	Capacity Building	

2.5 BUILDING ADAPTIVE CAPACITY

Since planning for CCA is fairly new for the Municipality of Pulilan, it is expected additional capacity for this type of undertaking will need to be developed. Fortunately, activities that enhance adaptive capacity to climate change are often aligned with those that support adaptation to hazards and sustainable development (Handmer, 2003; IPCC, 2001; Smit & Pilifosova, 2003). How the Municipality of Pulilan decides to move forward with building adaptive capacity for CCA and DRR will be a local decision, however, Appreciative Inquiry as an approach to organizational change and development may prove useful in this regard. The scope of this research

aims to address the first of the two stages in the AI 4D model – discovery (appreciating what is) and dream (imagining what could be). As the Municipality continues to move forward with the LCCAP process and maintains its commitment to DRR the final two stages – design (determining what should be) and destiny (creating what will be) – can also be embarked upon. The end goal is for Pulilan to be a climate adaptive municipality, demonstrating resilience in the face of uncertainty. Building adaptive capacity in the form of economic resources, social capital, effective institutions, information, knowledge, and skills, and equity will help Pulilan to reduce the vulnerability of its citizens to the negative impacts of climate change.

3. STUDY AREA: PULILAN, BULACAN, PHILIPPINES

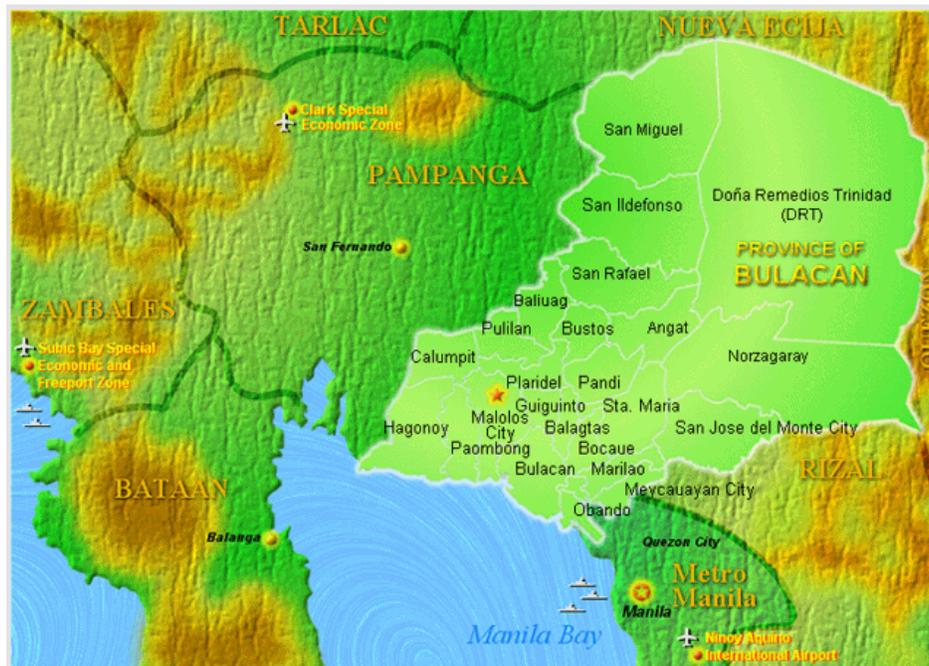
3.1 GEOGRAPHIC CONTEXT

Located 45 kilometers north of Manila, the Municipality of Pulilan, occupying an area of 3,975 hectares, is one of 24 municipalities in the Province of Bulacan, Philippines (Figure 3.1). The Angat River forms its southern border, with the Municipality of Plaridel across the river. It is bordered on the west by the Municipality of Calumpit, on the east by the Municipality of Baliuag, and on the north by the Municipality of Apalit, Province of Pampanga. Pulilan is considered part of the Pampanga River Delta, which experiences

regular flooding from the Upper Pampanga River watershed. The predominant land use is agriculture, covering 86.5% of the total land area, with a further 11.5% being urban land uses (Municipality of Pulilan, 2011).



Figure 3.1: Map of the Province of Bulacan

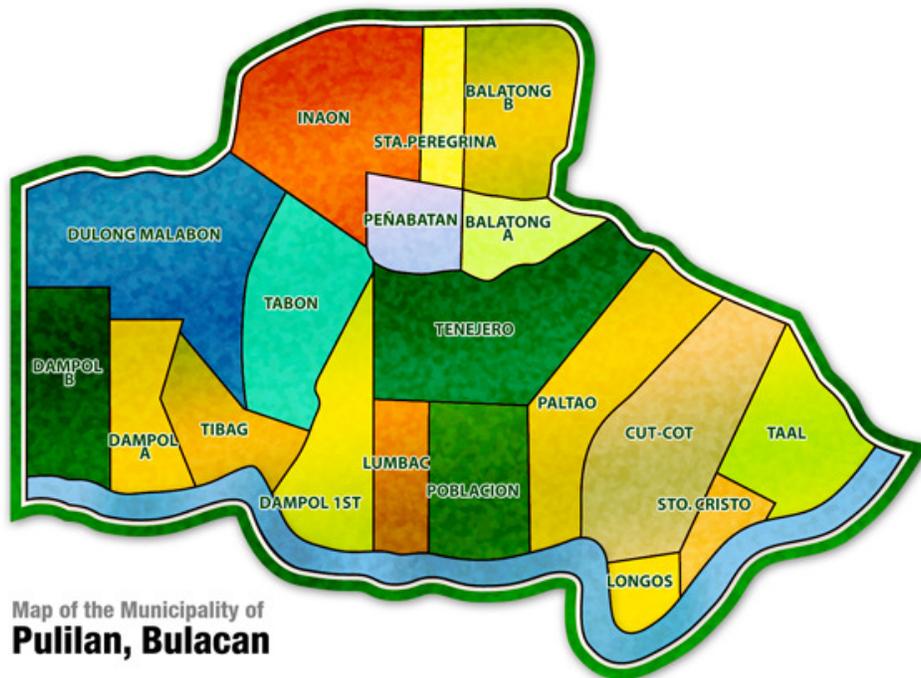


Source: Provincial Government of Bulacan. (2007). Cities and Municipalities of Bulacan webpage. Retrieved from <http://www.bulacan.gov.ph/municipalities/index.php>

Within Pulilan there are 19 barangays, each with its own elected Barangay Captain and Councilors (Figure 3.2). The population of Pulilan as of the 2007 census was around 85,000, with the population growth rate of 3.2% between 2000 and 2007 outpacing the provincial

(2.36%) and national (2.04%) average during the same time period. The rate of natural increase was slightly higher than the rate due to net in migration – 8664 persons versus 8156 persons (Municipality of Pulilan, 2011).

Figure 3.2: Barangays of Pulilan, Bulacan



Source: Municipality of Pulilan. (2014). Retrieved from <http://www.pulilan.gov.ph/>

The main natural topographical feature in Pulilan is the Angat River that forms its southern border and the primary human-made features are the North Luzon Expressway (NLEX), Cagayan Valley Road, and the Pulilan-Calumpit National Road that form a U-shaped transportation network through the Municipality. The landscape is

relatively flat with level to nearly level slope categories throughout (Municipality of Pulilan, 2011). The climate of Pulilan is characterized by two distinct seasons – a rainy season (southwest monsoon season) when typhoons frequently occur, roughly from May to October, and a dry season (northeast monsoon season) from November

to April, with March, April, and May being the hottest months (Babalos, Brown, & Chen, 2013; Municipality of Pulilan, n.d.). A network of narrow creeks and irrigation canals draining into the Angat River provide drainage within the Municipality, however flooding still occurs, particularly in the northwest portion of Barangay Dulong Malabon where floodwaters come from the Candaba Swamp to the north (Municipality of Pulilan, 2011).



3.2 SOCIAL AND ECONOMIC CONTEXT

The economy of Pulilan is based primarily on three sectors: the service sector; agriculture, fisheries, and forestry; and the industrial sector. Service industries (wholesale/retail, transportation, storage and communication, and private services) comprise the major share of the Municipality's economic output (68%), with another 25.4% attributed to agriculture, fisheries, and forestry, and only 4.8% from

the industrial sector (Municipality of Pulilan, 2011). Tourism is also a developing sector of the economy. Pulilan has numerous resorts, 5 hotels, an ecological park (Butterfly Haven), and 43 heritage houses. The Feast of San Isidro Labrador (Kneeling Carabao Festival) and the Feast of the Biglang Awa are major attractions that draw tourists to Pulilan every year (Babalos, Brown, & Chen, 2013).



Several hundred informal settler households reside in ten of Pulilan's 19 barangays (Municipality of Pulilan, 2013). These informal settlers are among the most economically disadvantaged citizens and therefore tend to reside in areas without adequate infrastructure and at risk of exposure to hazards, in particular flooding. Some of the informal settlements have been identified for relocation programs. For example, those residing under the North Luzon Expressway (NLEX) in Dulong

Malabon, an area prone to annual flooding from the Candaba Swamp to the north, are part of a joint relocation program between the Municipality and NLEX (Leovigildo Garcia, Municipal Planning and Development Officer, personal communication, July 10, 2013). Others that live along the banks of the Angat River in Sto. Cristo may be relocated as part of a Provincial relocation program, although this would likely be to outside of the Municipality (Burt Ambo, Secretary of Barangay Sto. Cristo, personal communication, July 11, 2013).



The Municipality of Pulilan offers many social welfare and nutrition programs aimed at improving the lives of its most vulnerable citizens. Examples include: the development of social housing; Conditional Cash Transfer payments to alleviate poverty; the requirement that large businesses hire 70% of their employees from applicants that

reside inside the Municipality of Pulilan; and nutrition programs, such as supplementary feeding, aimed at eliminating malnutrition (Babalos, Brown, & Chen, 2013).

3.2 POLICY CONTEXT FOR CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION

There are several pieces of legislation and policies at multiple scales that lay the foundation for CCA and DRR at the local level within the Philippines. Taken together they provide a framework for the Municipality of Pulilan to utilize when developing its LCCAP and in implementing any adaptation strategies. Furthermore, this multi-scaled legislative framework also supports the integration of CCA and DRR and the mainstreaming of both into other sector and policy areas.

As far back as 1978 a national disaster management system was formulated when Presidential Decree 1566 created the National Disaster Coordinating Council (NDCC) with a focus on post-disaster relief and short-term preparedness (Pulhin, Tapia, & Perez, 2010). The NDCC structure is replicated at multiple scales – regional, provincial, city, municipal, and barangay – and the comprehensive disaster management framework now encompasses pre-event

disaster risk reduction/mitigation and preparedness and post-event disaster response and rehabilitation/recovery, with the expectation that the framework is to be integrated at all levels and by all stakeholders (Pulhin, Tapia, & Perez, 2010). Recently, two important pieces of National legislation previously mentioned – the Disaster Risk Reduction and Management (DRRM) Act of 2010 and the Climate Change Act (CCA) of 2009 – have been adopted that aim to integrate and mainstream these two policy areas with each other and into other sectors and policy agendas.

The focus has shifted over the past 30 or so years from post-disaster relief to “addressing the root causes of vulnerabilities to disasters, strengthening the country’s institutional capacity for disaster risk reduction and management and building the resilience of local communities to disasters including climate change impacts” (Philippine DRRM Act, 2010, p.2). With the DRRM Act of 2010 the NDCC became the National Disaster Risk Reduction and Management Council (NDRRMC), tasked with developing a National Disaster Risk Reduction and Management Framework (NDRRMF) to provide for “a

inter-agency and community-based approach to disaster risk reduction and management” (p. 15). Furthermore, the DRRM Act also requires the formulation of a National Disaster Risk Reduction and Management Plan (NDRRMP) aimed at strengthening the capacity of the national government and LGUs to enhance the disaster resilience of communities. As with the NDCC before it, the NDRRMC is to have agencies modeled on it at the regional, provincial, and local level. The NDRRMC is also tasked, in coordination with the Climate Change Commission (CCC) to formulate and implement a framework for CCA and DRRM (DRRM Act, 2010).

Similar to the DRRM Act, the Climate Change Act (CCA) of 2009 creates a legislative body – the Climate Change Commission (CCC) – responsible for developing a National Framework Strategy on Climate Change (NFSCC) and a National Climate Change Action Plan (NCCAP) (CCA, 2009). The CCA addresses both climate change mitigation and adaptation and again emphasizes the interconnectedness with DRRM as well as sustainable development. The importance of vertical integration across different governance scales and horizontal integration across sectors (government, business, non-

government organizations, local communities, and the public) is also highlighted, along with the concept of mainstreaming climate change and disaster risk reduction into national, sectoral, and local development plans and programs (CCA, 2009). The CCA also contains the legislative mandate for the formulation of Local Climate Change Action Plans (LCCAP) by LGUs, to be consistent with the Local Government Code (LGC), the NFSCC, and the NCCAP and requiring that barangays be directly involved with prioritizing climate change issues and identifying and implementing solutions.

One interesting difference between these two complimentary pieces of legislation is that the CCA does not set out an expectation for regional, provincial, and local agencies to be created modeled on the national level CCC as the DRRM Act does with the NDRRMC. However, coordination between the different levels of government is called for with Provincial governments expected to provide technical assistance, enforcement, and information management and the National government tasked with providing technical and financial assistance to LGUs in the development of their LCCAPs, as well as facilitating capacity building for local adaptation planning (CCA,

2009). In this regard the policy framework supports LGUs in the formulation of their LCCAPs, however, at the time I conducted my research in Pulilan it was still unclear how this assistance was to be accessed in practice by Municipal staff involved in the LCCAP development.

Recognizing the multi-sectoral nature of CCA and DRR planning, it is useful to note a few other relevant policies and legislation that lend support to the goal of reducing vulnerability to local climate change impacts and related hazards. At the highest level, the Constitution of the Philippines affirms that “the state shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature” (Municipality of Pulilan, 2001, p.11). The Local Government Code (1991) then allows for the appointment of a Municipal Environment and Natural Resources Officer with duties related to environmental and resource management and directs the Sangguniang Bayan to enact ordinances that will protect the environment. Additionally, the national Ecological Solid Waste Management Act (2000) has become an important piece of legislation that was often cited by Pulilan municipal government interviewees in relation to reducing the risk

of flooding from drainage and irrigation canals clogged with solid waste.

At the local level within the Municipality of Pulilan, the Municipal Environmental Code of Pulilan (in the process of being updated) is a compilation of the local laws that have been enacted through ordinances for the management of land and resources and protection of the environment (Municipality of Pulilan, 2001). It includes sections on land resource management, water resource management, air quality, and solid waste management. Pulilan has also developed a Municipal Disaster Risk Reduction and Management Plan as well as a Contingency Plan for Flash Flood to help the municipality prepare for and mitigate the negative effects of hazards (Municipality of Pulilan, n.d.a; Municipality of Pulilan, n.d.b). Finally, both the Comprehensive Land Use Plan (CLUP) and

the Comprehensive Zoning Ordinance of Pulilan are policy tools that can be utilized in the advancement of CCA and DRR at the local level (Comprehensive Zoning Ordinance of Pulilan, 1996; Municipality of Pulilan, 2011).

This review of legislation and policy supportive of CCA and DRR is in no way intended to represent the totality of policy tools within the Philippines that could be applicable to these areas. Rather, it is intended to provide an overview of some of the more relevant legislation that is influencing the way that CCA and DRR are being formulated at the local level. The mandate to plan for CCA and DRR comes from the National government, however, much of the responsibility for implementation within the decentralized governance system in the Philippines falls to the LGUs.

4. EVALUATING ADAPTIVE CAPACITY

The determinants of adaptive capacity evaluated and discussed below are not mutually exclusive categories, nor do they represent a definitive list of adaptive capacities that a community may embody. As discussed in the Analytical Framework section above, they were compiled based on common adaptive capacity categories found in the CCA and DRR literature. Similarly, the proxy indicators utilized do not represent an exhaustive list, but rather were selected because there was sufficient evidence of their existence available within the data from the Municipality. This is not to say that a particular indicator, for example political influence as a proxy for social capital, does or will always lead to an increase in adaptive capacity in relation to CCA or DRR. These indicators and the adaptive capacity they are meant to represent are not static; they operate in a complex socio-economic, political, and biophysical environment with multitudes of interacting components. However, given the right conditions, for example in conjunction with effective leadership and adequate financial resources, political influence could go a long way in increasing a community's adaptive capacity. The point is that the more adaptive capacity the system or community

has, the better positioned it should be to adapt to uncertain future conditions and reduce vulnerability. Adaptive capacity does not work in isolation either. Rather, it interacts with the exposure and sensitivity of a community to determine the vulnerability of the system to the hazard risks posed by climate change.

More specific to the evaluation of Pulilan's adaptive capacity, I have only been able to draw out those determinants of adaptive capacity I witnessed firsthand, heard about in the interviews I conducted, or read about in the plans and legislation I reviewed. Therefore it is prudent to reiterate that my research was exploratory, that there are undoubtedly gaps in the data that could not be overcome within the scope of the project, and that the findings are the result of only one person's analysis. For this reason, the evaluation of Pulilan's adaptive capacity provided below is only preliminary, but it should serve as a good starting point for a more thorough assessment of adaptive capacity to be conducted by the Municipality, and with the larger community, during a full vulnerability assessment as part of the LCCAP planning process.

4.1 ECONOMIC RESOURCES

Not surprisingly, economic resources are a major determinant of adaptive capacity at any scale, because they are needed to facilitate preparation and recovery (Smit & Pilifosova, 2003). In addition, economic resources can facilitate the development of new infrastructure that could help reduce exposure or sensitivity. In the case of Pulilan, I found three indicators of adaptive capacity related to economic resources: financial resources/funding, economic growth, and infrastructure.

4.1.1 FINANCIAL RESOURCES/FUNDING

Through my interviews with Municipal staff, I learned that the Municipality of Pulilan has sufficient financial resources to dedicate to CCA and DRR. One interviewee stated,

“Of course, we have sufficient funding, because we have a lot of savings. Meaning, aside from implementing the honourable programs of the Municipal government, we still have some clear funding for all those things and really we allot sufficient funds for the disaster risk reduction management.”

In fact, five percent of the Municipality’s general funds are allocated as a calamity

fund for DRRM. Of that five percent, 70% is allotted for disaster preparedness, while the other 30% is to be used for emergency response in the event of a disaster. One interviewee also stated that she believed the barangays were also obliged to allot funding for DRR, which means they would be less reliant on the Municipal government’s assistance in that regard.

In addition to the internal sources of revenue, it was also mentioned that outside sources of funding are also accessed for specific projects. For example, some development projects receive funding and even technical assistance from aid agencies such as USAID or the Japan Foundation. Other projects receive partial funding from other levels of government, such as the acquisition of drying equipment for *palay* (rice), where the Regional Office of the Department of Agriculture will pay 50% and the Municipality will pay 50%.

4.1.2 ECONOMIC GROWTH

Records on economic growth rates for the Municipality were not available to me during my research, so it is difficult to say with certainty the outlook for Pulilan in this regard. However, a couple of examples from interviews are worth mentioning. In one instance I was told that the number of

factories in the town had increased, resulting in the creation of more jobs that many of the youth are now employed in once the harvest season is over. Of interest, the interconnectedness of socio-economic and biophysical systems was also noted by this same interviewee who said, “But as you know, when there is growth there is always some sort of... it’s not easy to have immediate growth without destroying some of our environment.”



Photo Credit: Christa Brown

In contrast to this type of development where tradeoffs between economic aims and environmental aims have to be made, another interviewee discussed with me at length a proposed eco-tourism

development where riverboat tours on the Angat would bring attention to the state of the River. He envisions the development of this type of economic activity being able to stimulate the people’s appreciation for the River once again, and that it would eventually lead to efforts to restore the river’s ecology and to relocate informal settlers to areas that are not prone to the hazards of flooding. Although the project had not yet progressed to implementation, discussions within the Municipality with the MPDO and Tourism Office sounded as if it was likely to proceed in some form.

4.1.3 INFRASTRUCTURE

Many departments within the Municipality are active in developing infrastructure that could reduce vulnerability to the impacts of climate change. For example, an initiative led by the Municipal Mayor and Vice Mayor enabled all the barangays to be supplied by the Pulilan Water System, reducing residents’ reliance on artesian wells that can run dry in the summer months. The Engineering Department constructs the drainage system that is an important component in managing stormwater and thus flooding. MENRO is responsible for the collection of waste and for the operation of Material Recovery

Facilities (MRF), which is where waste is segregated and materials recovered for recycling and composting. And within Pulilan there are five ambulances, two in barangays and three in the Municipality – critical to providing emergency services in times of disaster. The Provincial Disaster Risk Reduction and Management Office (PDRRMO) also has rescue vehicles, equipment, and personnel available to augment those of individual municipalities. This includes having designated evacuation centres to supplement local evacuation centres when needed.



Photo Credit: Christa Brown

4.2 SOCIAL CAPITAL

“If we’re going to be down, we can stand again and rebuild whatever and stand proud to say that we are the Pulilenyos. Strong enough to face all these problems and can solve the problems.”

- Pulilan Municipal Employee

According to Adger (2003), societies adapt to climate change through collective action, which requires networks and information flows between individuals and groups in order to stimulate decision making. These sets of networks and norms that allow for collective action constitute social capital, and are associated with a progressive, flexible, and adaptive society. Social capital can be further categorized into bonding social capital – ties within a defined socio-economic group based on family kinship and locality – and networking or bridging social capital – economic and other ties external to the group based on bonds of trust and reciprocity (Adger, 2003). I found examples of both bonding social capital and networking/bridging social capital in Pulilan. There were general examples of these types of networks as well as a few more specific indicators that I’ve

labeled: public service, volunteerism, political influence, and claims of reciprocity.

4.2.1 BONDING SOCIAL CAPITAL

One of the things that became very apparent to me during my time in Pulilan was the willingness of the people to help one another. There is a term in the Tagalog vernacular language for this attitude and practice amongst the people – *bayanihan* – and it is seen as a common cultural trait amongst the Filipino people. It speaks to their camaraderie, their willingness to cooperate and to help other people – even those they don't know – and their hospitality. One interviewee put it this way,

“Well, I could probably say and be proud of being the best strength of our town, of Pulilan, is the fact that *bayanihan* attitude is still in the system of most Pulilenyos where unity and common concern is an automatic reaction among us.”

This sense of connection amongst Pulilenyos extends beyond the town's borders. Another interviewee spoke of the people of the adjacent Municipality of Calumpit as “sisters or brothers” and spoke of working hand in hand, cooperating, and helping each other. Another interviewee used the word “unity” (*pagkakaisa*) when talking about how the Municipality could be

successful and resilient regarding climate change. These strong networks of people are demonstrative of the bonding social capital that represents one source of adaptive capacity.

Under the indicator of bonding social capital, I also gathered much evidence of a commitment to public service amongst both the Municipal staff and the other stakeholders that I interviewed. Perhaps again this is representative of the *bayanihan* attitude. At least five of the Municipal staff spoke in some way about wanting to be of service to the public and the ways they could contribute to their community. One interviewee said she is happier helping other people than herself and another said the highlight of his work was helping people.

Related to this commitment to public service is the spirit of volunteerism, akin to the value of reciprocity (*pakikisama*) or helping (*pagtutulungan*), that I also found ample evidence of, especially amongst those involved with DRRM and the Rescue Team. It was explained to me this way by one interviewee,

“I just wanted to tell you that Rescue is not just any kind of responder in Bulacan. We have our own kind of selection, the responders. We don't just get any medical related courses to be employed in the

Rescue; we make sure that they have their spirit and volunteerism. This is the most important, if you are willing to work for free, that is Pulilan Rescue... in Pulilan Rescue, when the disaster come we all sleep here for a week. Our families just bring us some clothes. We all live here.”

This dedication and spirit of volunteerism was reiterated by other interviews when talking about the DRRMO staff and Rescue Team. These volunteers and their dedication to service were well recognized as a strength within the community in relation to DRR.

4.2.2 NETWORKING/BRIDGING SOCIAL CAPITAL

Evidence of networking or bridging social capital was demonstrated through the relationships Municipal staff spoke of with agencies outside the government, within the businesses community, with NGOs, but also with other municipalities in close proximity. In relation to DRR, the Municipality has been able to ask some of the local companies to provide assistance in the form of donated materials, food, and rescue equipment. As a testament to the strength of this networking social capital, many examples were given of the support received from a variety of companies and NGOs. Beyond the provision of goods to assist with DRR, some companies also offer programs,

such as livelihood and training programs that benefit local residents, including many of the informal settler families. In particular, one interviewee spoke of how the support from NGOs was an important factor in winning a National award for success of their nutrition programs. She said,

“I have so many NGOs, which I do not have to beg and they all give their support freely, voluntarily, and until now they are supporting the nutrition program of the municipality. That is one of my strengths – talking to people... Yes, building relationships, networking, brokering meetings with the Rotary, with the Sir Optimist International, with the Catholic Women’s League and never have I gotten a reply that is no – always a yes.”

With regards to other municipalities, one of the ways networking social capital is experienced is through the sharing of experiences with peers. The MPDO participates in monthly meetings hosted by the Provincial Planning and Development Office (PPDO), where problems are shared with the group to benefit the learning of all members.

Networking social capital is also sometimes realized through claims for reciprocity, particularly in times of crisis. In Pulilan this is exhibited through the

relationship the DRRMO staff and Rescue volunteers have with their counterparts in neighbouring municipalities. It was described to me that when there is disaster, usually in the form of flooding, after the Rescue volunteers help all who need it in Pulilan, they then offer to assist the neighbouring municipality of Calumpit in their relief operations and cleanup. The idea of claims for reciprocity was perfectly described by one interviewee in this way,

“After the disaster in Pulilan we make sure that we help them, because we can never tell if we in Pulilan also needs assistance from them. That’s why it’s just like brotherhood or partnerships where we help them and it comes a time, if there is a difficult time, they can also help us.”

One final indicator of social capital that I identified was that of political influence. Two interviewees mentioned influential political figures that have been active in helping Pulilan – a senator, T. G. Guingona, and Jojo Ochoa, the Executive Secretary to the President of the Philippines who is from Pulilan. Ochoa specifically was cited as having been very supportive in times of disaster, visiting the Municipality of Pulilan in 2011 after typhoon Pedring hit Bulacan.

4.3 EFFECTIVE INSTITUTIONS

Effective institutions – those that are stable and have the capacity to manage the risks associated with climate change and other hazards – are another important determinant of adaptive capacity (Smit & Pilifosova, 2003). The proxy indicators I found to represent adaptive capacity in relation to effective institutions were: effective leadership/political champions, recognition, enabling policies/environment, managerial ability, inter-jurisdictional cooperation, and cooperative constituents.

4.3.1 EFFECTIVE LEADERSHIP/POLITICAL CHAMPIONS

“Our Municipal Mayor is eager to help these people when it comes to disaster. He personally goes out in the rain, in the flood to help the people. He makes sure that the Pulilenyos is safe or they have all their needs when it comes to disaster... and after the disaster our Municipal Mayor makes sure that they can bounce back, giving some livelihood to them, just for them to bounce back. For example, the agriculture sector, the Mayor makes sure that he will give some seedlings, the fertilizer, what they need.” This quote from one of the Municipal interviewees exemplifies the concept of a

political champion. Numerous times from a variety of people I heard about the support and dedication of the Mayor, Vice Mayor, and Municipal Administrator when it comes to DDR and CCA. Another interviewee mentioned how the Mayor and Vice Mayor work well together and how this has ensured continuity in projects during their successive terms in the Mayor's Office. Under the leadership of the current Mayor, Vicente Esguerra, Sr., Pulilan has developed from a fourth class municipality to a first class municipality, which is a classification based on the annual income of the municipality. This kind of effective leadership can be a critical component in moving forward with a policy agenda, such as is expected with the development of the LCCAP. Furthermore, leaders who have the admiration and respect of those they govern are more likely to find their constituents cooperative in the implementation of plans.

4.3.2 RECOGNITION

I decided on Recognition as one of the proxy indicators of effective institutions since it was a recurring theme in many of my interviews. People were proud to share with me the successes of the Municipality and also expressed that it meant a lot to them when their work was recognized by others.

This program of recognition is embedded throughout different scales of government and across various sectors and Pulilan has been recognized for its performance in many of these. The National Nutrition Hall of Fame award was mentioned by multiple interviewees and is an obvious source of pride amongst Municipal staff. The success of the municipality attaining status as a first class municipality was also mentioned by more than one interviewee and was nicely summarized as follows,

“However, in my personal point of view, the most significant among its successes is the fact that Pulilan rose from none to a first class municipality! Imagine, it used to be a sleeping town that recognition is a ‘no-no’ to a lot, but now it’s a home for so many industries that includes Nestle, a worldwide known corporation.”

The Municipality of Pulilan has also received awards and recognition for the work of the DRRMO and the Rescue Team, as well as being chosen as the cleanest and greenest municipality in District 1 of Bulacan. These programs of recognition not only allow for a feeling of pride, they also, I believe, serve to motivate the Municipal staff to strive to do the best they can in their work. In response to the question asking about a time the interviewee felt successful

in terms of his/her contribution to a program or project, one person replied, “that they appreciate what we are doing... the help we give to them, all of the things that when it comes to disaster, now they know that’s the Rescue Team.” Providing basic recognition – whether it is between peers, from the constituents that are receiving the services, or in a more formalized, institutional process – provides for an effective institutional environment.

4.3.3 ENABLING POLICIES/ENVIRONMENT

As detailed above in Section 3.2, a great deal of legislation and policy exists at multiple scales within the Philippines supporting CCA and DRR. Within the Municipality, as described in the section above on leadership, these policies have been embraced by the elected and administrative leadership of Pulilan. In addition, one of the outcome areas that the DILG is currently focused on is Environment Protective, Climate Change Adaptive, and Disaster Resilient LGUs. Combined, this creates an enabling policy environment for moving ahead with actions to promote adaptation at the local level. Staff during our interviews often referred to the legislation or policies that they felt enabled them to pursue the goals of their

department. For example, one interviewee spoke of how MENRO, MPDO, and Engineering were conducting inspections of different companies with the intention of strictly implementing the Municipal Environmental Code. Another spoke of the Provincial Ordinance banning Styrofoam and plastic bags and how this allowed MENRO to approach store owners in Pulilan in order to convince them not to use plastic bags, because they contribute to the clogging of the drainage system.

Another theme that emerged was the strong inter-departmental working relationships within the Municipality, especially on issues related to DRR. One interviewee shared,

“When it comes to disaster, they give us the report, because the National Disaster Risk Reduction always ask us to submit the report, even the Department of Agriculture, the Municipal Engineering, the Health Offices, Mayor’s Office, DSWD, we always work as one when it comes to disaster.”

The open communication and strong working relationships between departments will be an asset in relation to developing an LCCAP and moving forward with adaptation actions in the future.

4.3.4 MANAGERIAL ABILITY

The effectiveness of institutions has a lot to do with the effectiveness of the people who operate within them. The ability of department heads to provide leadership to their staff and to successfully implement programs is a significant component of adaptive capacity. I've previously discussed some of the bigger accomplishments of the Municipality in the Recognition section above, but there are numerous smaller, day to day projects that are just as important to the success Pulilan is able to achieve in becoming a more adaptive and resilient community. One example of the successful implementation of a project was described to me this way,

“The program that we implemented this February, the banning of the styro and plastic bag used here in the Municipality, at first we were very afraid that it will not be well received by the community, but with perseverance and hard work of our team, for two months we work hard in telling the people what would be the benefits of not using styro and plastic. And they all participated and by now the Municipality is plastic free and styro free. So with the cooperation of the people, the program has been well implemented.”



4.3.5 INTER-JURISDICTIONAL COOPERATION

Many examples of inter-jurisdictional cooperation between the Municipality of Pulilan and other government agencies exist. Commonly cited were interactions with the DILG, with a department's counterparts in other (especially neighbouring) municipalities, and in the corresponding Provincial, Regional, or National level departments. Interactions with barangay captains or other barangay officials or volunteers were also frequently mentioned. The Provincial government was noted as being especially supportive of DRR. An example illustrative of this inter-jurisdictional cooperation was provided by one interviewee. He spoke of the planners from the Province and all the municipalities working together not just on plans for their own towns, but for the whole province.

“We plan Bulacan as a whole. Especially those in the municipalities that are near to us, our plans must go hand in

hand in cooperation with the other municipalities, because if we will not plan together, the planners, our plan might be good in our town, but in the other municipalities it might not be, it might be different.”

4.3.6 COOPERATIVE CONSTITUENTS

“I would say a Pulilan which is flood free and the people would be aware of the different laws and comply with them and the local officials would set aside their political ambitions for the sake of the environment and the sake of the people. Safer Pulilan for everybody.”

- Pulilan Municipal Employee

Cooperative constituents can be an indicator of the efficacy of institutions. If constituents are well informed, possessing important information about the causes of climate change, the risks it poses, and the impacts that may be expected, then they are more likely to cooperate with projects and programs aimed at reducing those risks. One example is in relation to waste segregation. One interviewee stated that a high percentage of residents, around 70%, are now separating their waste. Much time and effort has gone into Information Education Campaigns (IEC) on solid waste

management within the barangays and in the schools, so it speaks to the effectiveness of these efforts in having an impact on the behaviour of residents.

4.4 INFORMATION, KNOWLEDGE, AND SKILLS

Recognizing the necessity to adapt to climate change is a precursor to successful adaptation, as is having the appropriate knowledge of adaptation options, and the capacity to assess and implement them (IPCC, 2001; Smit & Pilifosova, 2003). This requires access to information about climate change at the appropriate scale, as well as people with the right training and skills to implement adaptation options (IPCC, 2001). In assessing the information, knowledge, and skills determinant of adaptive capacity for Pulilan, I utilized the following proxy indicators: data availability/information resources; skills; information dissemination/education; raising awareness of risk, vulnerability, and impacts; planning experience; and capacity building. As with the other determinants of adaptive capacity, there is some degree of overlap between proxy indicators, but perhaps particularly so for this one.

“My vision... One of our traits here as Filipinos is that we are very resilient. We can easily live in any kind or system of living. But, for me, preserving the environment is so much important so that we cannot encounter climate change. But, climate change is already here, so we can... it is very hard to say that we cannot do nothing or anything for the environment, even though we are experiencing already climate change. So we must learn to adapt. We must learn to be resilient. And we must do anything and even little things to help the environment, like what I’ve said. By preserving water, you use the dipper, instead of shower, so we could save water. So we’re not using appliances, you unplug it. And try to go to work with mass transportations or using bicycles. And plant trees. So... use less paper, so that we can save trees. And let the people be aware of what can they do in preserving the environment. That is my vision. That Pulilans very much educated and very much organized and very responsible in preserving our environment.”

- Pulilan Municipal Employee

4.4.1 DATA AVAILABILITY/INFORMATION

RESOURCES

As will be discussed in further detail in the sections below, there has been a great deal of effort invested in making

information about climate change and its impacts available to a broad spectrum of the municipal population. As well, information specific to disasters is generated locally and flows upwards through the multiple DRRMCs at the various levels of government. One interviewee mentioned how information used to flow from the top down, but how there has been a shift with information now flowing from the lowest level up. She gave the example of the number of evacuees that might be at a particular evacuation centre. That information would flow from the local level to the National level for the purpose of procuring financial support when there is a disaster. Another interviewee spoke of how with the new technologies of computers, the internet, and cell phones now being used at all levels that it is easy to communicate information between the Municipal, Provincial, and National governments.

4.4.2 RAISING AWARENESS OF RISK, VULNERABILITY, AND IMPACTS

Closely linked to information dissemination/education is raising the awareness of risk, vulnerability, and impacts. Before exploring ways to implement potential adaptations to reduce vulnerability, it is important for citizens to

understand the basics about climate change and how it may influence vulnerability to certain hazards. This raising of awareness has begun with the Municipal staff, with many of them taking part in a Training of Trainers program held at the University of the Philippines on Community-based Disaster Risk Reduction and Climate Change Adaptation. Those who were trained are now involved in hosting information dissemination campaigns and capacity building workshops to increase the level of awareness about the potential impacts climate change may bring and thus the need to begin to make preparations for hazards or other adaptations. The Rescue Team conducts information dissemination campaigns in the barangays, in schools, and with some companies to help them understand the hazards in their locality. MENRO similarly conducts information dissemination campaigns and also endeavours to involve community members in efforts to cleanup irrigation canals, so that they begin to understand the connections between climate change, hazards, and other areas like solid waste management.

“I just hope that Pulilan will always be ready and educated by the time that we cannot stop climate change.”

- Pulilan Municipal Employee

4.4.3 INFORMATION

DISSEMINATION/EDUCATION



The program of information dissemination is strong within the Municipality of Pulilan. Active in Information Education Campaigns (IEC) are MENRO, MDRRMO, and PAIO. One of the main ways information is disseminated is by Municipal staff going out to the various barangays and speaking or holding training seminars at schools or in the community about various topics including solid waste management, climate change and CCA, hazards mapping and DRR, and first aid. MENRO and MDRRMO often work together on IEC to broaden the information that is shared with community members to include DRR, CCA, and solid waste management. The commitment to sharing this knowledge is nicely summarized by one interviewee who said,

“At the education and training, I’ll make sure that all my participants in my

seminar they perfectly understand what I am trying to tell to them. I make sure that when they go to their home it will be marked to them what did I say, because it's not just making my work much easier, but making their life more long, because of the disaster. Just the simple knowledge that I'm sharing to them, I know that there is a big impact to them if they will do whatever I want to tell them. But if not, I failed."

"Just a proper knowledge for the people to understand the climate change, because they know how to adjust themselves to the climate change. It's not too hard for us to teach them, to make them resilient if they can do it by their selves. That's why knowledge is the best. Equipping them with knowledge – how the garbage affects us, how the change of weather affects us, so they have to know that because we can't say to them you have to be resilient if you don't know how to be resilient if you don't teach them how to be resilient to the climate change. So you have to teach them, you have to equip the barangays, you have to equip the mother leaders and the volunteers with knowledge so they can share it to the community. Aside from giving them the relief goods, everything they need, the most important is the knowledge."

- Pulilan Municipal Employee

4.4.4 CAPACITY BUILDING

Much of the capacity building that interviewees spoke of is in the form of training, but the formulation of the MDRRMO office and Rescue Team and the purchasing of rescue equipment has also been an important element of capacity building. According to interviewees, training has at times been arranged for them by the Municipal Administrator, at other times has been hosted by the Provincial government, or offered by the DILG. Internally one of the best examples of capacity building is within the Rescue Team itself. The name given to the intensive training that Rescue Volunteers must undergo is *matira matibay* (the strong survives) and they have recently extended the training to 150 youth aged 15 to 18 from the different barangays to capacitate them with skills on DRR. As mentioned previously, some of the capacity building that Municipal staff members have been involved in is a Training of Trainers format, which prepares them to take the new skills and knowledge they've acquired and pass it along to those at the barangay level. In this way, people throughout the community become equipped to help themselves in times of disaster, rather than relying on the

Municipality or the Rescue Team. An example of this is the DRRMO working with flood prone barangays to paint flood markers and then teaching the community members how to assess the level of flooding so that they can determine on their own when they should evacuate.

4.4.5 SKILLS

Interrelated with capacity building is an assessment of skills. Again, it is within the Rescue Team that the development of skills was best demonstrated to me through the interviews I conducted, as well as my own observations. On one occasion I was invited to watch the Pulilan Rescue Team participate in the 3rd Annual Bulacan Rescue Olympics where they competed with other Rescue Teams from around the province in a number of events demonstrating their skill in everything from rescuing a victim in the water to extinguishing a fire. The Pulilan Team came first in CPR and first in Situational Analysis. The skill of the Pulilan Rescue Team was mentioned to me by several interviewees. One person stated,

“As far as I’m concerned our Rescue Team is the product of our intensive training, selection... it’s really something in comparison with our other LGUs, because they are more trained, they are more

equipped with the capacities and training. It really helps a lot in performing their job as Rescue Volunteers or Rescue Workers.”

These same well trained Rescue Volunteers teach basic life support and first aid to the *barangay tanod* (community police officers). They also teach hazard mapping and disaster response at the barangay level, further equipping community members with skills to ensure their own safety in times of disaster.



4.4.6 PLANNING EXPERIENCE

Although Planning Experience could be grouped in with the Skills indicator category, I felt it was important enough to highlight on its own. As Pulilan moves forward with their LCCAP planning process and the implementation of any adaptation strategies it will be important to draw upon previous successful planning experience. Aside from the experience within the MPDO, another Municipal staff member

was trained as a planner through the Urban and Regional Planning program at the University of the Philippines. Within the Municipality she crafted a Solid Waste Management Plan and has been involved in the revision and approval of the Comprehensive Land Use Plan (CLUP) and Comprehensive Development Plan (CDP) at the Provincial level. The Municipal Planning and Development Officer also has a number of years of experience in the MPDO and has worked on revisions to the CLUP and Municipal zoning ordinances.

"I dream of Pulilan be the best place to live, to work, to retire and to rest in peace where self-sufficiency on proper basic human needs such as food, clothing, education, shelter, health care and the like are available, where there is green and clean surroundings, where clean water and air is free, where people are self disciplined and contented."

- Barangay Elected Official

4.5 EQUITY

As opposed to the availability of resources, covered in the section on Economic Resources, Equity as a determinant of adaptive capacity has to do with access to resources – be they economic

or otherwise – especially by vulnerable subsets of the population (IPCC, 2001). The issue of equity is important to consider, because significant disparity in income distribution or access to resources can be a barrier to effective adaptation (Klein & Smith, 2003).

From personal observations made on visits to various barangays throughout Pulilan it was apparent that a great deal of disparity exists between different segments of the population. The most impoverished residents are the most vulnerable to the negative effects of climate change and the threat of disasters. They live in the most exposed locations and lack adequate access to basic services such as potable water. However, as my research utilized AI, the focus of my inquiries was on the positive aspects, on the strengths that Pulilan possesses, and that demonstrate adaptive capacity to responding to climate change and hazards. I've therefore utilized two proxy indicators of adaptive capacity in relation to equity: social programs and community/stakeholder involvement.

4.5.1 SOCIAL PROGRAMS

The staff of the Municipality of Pulilan has demonstrated a high degree of dedication to bettering the lives of their

fellow citizens. One of the most impressive examples was the awarding of the National Hall of Fame award for their nutrition programs. According to one interviewee, when she began working with the Municipality in 1997, Pulilan was ranked one of the lowest in Bulacan in regards to nutrition. After making steady improvements to their nutrition programs over the course of almost a decade, which included things such as nutrition education, micro-nutrient supplementation, and home and school food production to increase food production in the barangays, Pulilan was awarded the highest nutrition award in the country with near zero malnourished residents.



Another positive indicator is the success of the expansion of the PhilHealth program. According to one interviewee, there has been an increase in the number of beneficiary members of the PhilHealth card

program from 100 when she began with the Municipality to over 3000 members today. The beneficiaries are economically disadvantaged citizens who due to the program are able to access better health care programs, including visiting the Municipal or Provincial hospitals, rather than just the local Rural Health Unit (RHU). Additional social programs that help to reduce the vulnerability of residents include:

- livelihood programs that teach people how to farm and provide them with free animals for propagation;
- agricultural programs that assist farm families in the adaptation and application of improved farming practices and provide them with support and assistance in the event of a disaster;
- social welfare programs that provide financial assistance and counseling services for families;
- programs for persons with disabilities, seniors, and daycare services for children; and,
- resettlement programs to relocate informal settlers living in the most vulnerable locations prone to flooding during heavy rains and typhoons.

4.5.2 COMMUNITY/STAKEHOLDER INVOLVEMENT

Another way of promoting equity is by actively seeking out the involvement of residents in planning programs and services that directly affect them. Commitment by municipal staff and elected officials to involving community members in planning is exemplified by this quote from one interviewee,

“... we have to go through the real process of participatory governance. Multi-sectoral representatives should be part of the planning process as well as the implementation process. And of course, the monitoring process. So, we’ll be getting

representatives from multi-sects, like the gentiles, the civil society, the labour group, the women’s sector, the youth sector, the professional sector, the business sector, you know, the multi-sectors. And our Mayor believes that it should be a bottom-up kind of planning, not up to bottom planning, because we should get the people’s consent. It’s better to have it directly coming from the horse’s mouth. They are the end users, so we should get their consent.”

This sentiment was echoed by a number of other municipal interviewees, which indicates a strong willingness to work with the people to jointly address the challenges the community is facing.

5. DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

5.1 DISCUSSION

As the preceding section illustrates, the AI approach to interviewing allowed me to discover many ways in which the Municipality of Pulilan is demonstrating existing adaptive capacity in the areas of CCA and DRR. In my assessment Pulilan's adaptive capacity in relation to DRR at this point in time is more developed than its capacity for CCA, but this is likely due to climate change being a relatively new policy area for which LGUs are now mandated to address in a more deliberate way within their communities. Fortunately with strong links between CCA and DRR, there are many synergies that can be leveraged in moving forward with CCA strategies.

For example, the shift within the Philippines' DRRM community from short-term preparedness and post-disaster relief to longer-term strategies that address the root causes of vulnerabilities, strengthen institutional capacity, and build resilience aligns well with the longer term focus of CCA. By taking a longer-term focus in both CCA and DRR, adaptation strategies that address both may be undertaken. A water conservation program and rainwater harvesting are adaptations that might be

adopted to reduce the vulnerability of water supplies to increases in temperature as a result of climate change, but they are also effective strategies for reducing the risks posed by a long-term drought – an event that could become a disaster if appropriate measures have not been implemented to mitigate negative impacts on vulnerable populations. Similarly, developing green infrastructure – natural areas that use vegetation, soils, and natural processes to manage water – can help build resilience in the face of climate change by providing habitats to support biodiversity, and improving air and water quality (EPA, 2014). Green infrastructure also can be an important element in mitigating flood risk, working as part of the stormwater management system by retaining and infiltrating water. Many of the adaptive capacities the Municipality of Pulilan possesses – for example, in terms of economic resources and effective institutions – can be utilized to implement these types of adaptations.

As far as the five determinants – economic resources, social capital, effective institutions, information, skills, and knowledge, and equity – utilized in my evaluation, Pulilan demonstrated a level of

adaptive capacity in all of them. I would make the argument that the areas in which Pulilan is the strongest are in social capital and information, knowledge, and skills. Pulilan is a relatively small and close-knit community with evidence of strong kinship and fictive kinship ties. The *bayanihan* attitude, focus on public service, and spirit of volunteerism all work to create an environment where people want to look out for and help one another. This display of social capital was not difficult to uncover through a positive inquiry into the roles of Municipal staff, the accomplishments they were most proud of, and the strengths they viewed within the Municipality. Similarly, there was ample evidence of a strong commitment to both acquiring the skills and knowledge to adapt to climate change and reduce the impacts of hazards, as well as a strong desire to share these skills and information with others for their benefit. Through strong training and IEC programs, Pulilan is well positioned to be a leader when it comes to community awareness about the risks, vulnerabilities, and impacts of climate change.

Although there is evidence to show that the Municipality of Pulilan has been making progress in certain areas in relation to equity, especially through multiple social

programs that reduce the vulnerability of the community's most impoverished residents, a great deal of disparity still exists. This is a problem many municipalities near Metro Manila are struggling with as they receive influxes of immigrants from other parts of the country wishing to be in closer proximity to the opportunities presented by a large metropolitan centre. Vulnerability is not static across a community. It varies based on numerous factors, but time and again, it tends to be the most economically disadvantaged citizens that are most sensitive to the negative impacts of climate change and related hazards. Just as the economic resources of a municipality have an impact on its adaptive capacity, the economic status of families and individuals also affects their ability to cope with the uncertainty and negative impacts brought about by climate change.

If there was one area in which I would recommend Pulilan place its efforts in regards to building additional adaptive capacity, it would be in the area of equity. Continuing to provide social welfare and health care programs aimed at helping the most marginalized citizens is one way to do this. Providing livelihood programs that assist people build the skills and acquire the knowledge they need to support themselves

and their families will also continue to be beneficial. As well, microfinance that provides small-scale financial services to low-income individuals could reduce vulnerability by offering opportunities for micro-credit loans, providing a source of funds to smooth income during times of financial instability, and providing insurance and savings opportunities (Lard & Barres, 2007). Finally, working to ensure reliable and affordable basic services, such as water, sanitation, and electricity, are available to all residents including informal settlers is an important step in improving their general health and well-being.



Photo Credit: Christa Brown

Overall, I was impressed by the results of my inquiries and feel that with the right support from other levels of government, Pulilan is well posed to forge a path towards a more resilient and climate adaptive municipality. Their political leaders are champions for CCA and DRR, their Municipal staff are dedicated to building the best possible future for their community, and they possess the economic, social, and informational resources to effectively integrate and mainstream CCA and DRR planning at the local level.

5.2 RECOMMENDATIONS

Although the purpose of this project was intended to be descriptive and exploratory in nature, I have come up with a few recommendations that may help the Municipality of Pulilan staff as they move forward with both their LCCAP planning and implementation. I therefore recommend that Pulilan:

- 1) Continue to work towards integrating and mainstreaming CCA and DRR within all policy areas in the Municipality. DRR is already being considered in relation to many projects and programs and CCA is beginning to receive more attention. Eventually, all future development projects or social

service programs should be viewed through the lens of both CCA and DRR to ensure adaptation opportunities are not overlooked.

- 2) Collectively work to create a vision statement of a future Pulilan that is more resilient to hazards and the negative impacts of climate change. Examples of some of the visions shared with me during the interview process are highlighted throughout this document in green text boxes and can provide a jumping off point for visioning sessions at the municipal and barangay level.
- 3) Complete a full Vulnerability Assessment as part of the LCAAP process and revisit it on a regular basis to account for changes in exposure, sensitivity, and adaptive capacity. These elements of vulnerability are dynamic and can be expected to change over time as population increases, development occurs, skills are built, etc.
- 4) Strengthen inter-jurisdictional cooperation in relation to CCA. A strong community or network already exists between the various DRRMCs in the Province. Building on this strength, work to build a similar network with neighbouring municipalities and other levels of government in relation to CCA

planning. Involve stakeholders both within the government and from outside, such as NGOs, businesses, civil society organizations, etc.

5.3 CONCLUSIONS

The aim of this project was to evaluate the institutional capacities already in existence within the Municipality of Pulilan that they could draw upon in planning for and implementing climate change adaptation and disaster risk reduction strategies. Through an AI approach, I was able to provide a preliminary assessment of the adaptive capacity of Pulilan in this regard. This can be seen as a first step in conducting a full vulnerability assessment that would also evaluate Pulilan's exposure and sensitivity to climate change and disaster risk.

My objective in undertaking this project was to assist the Municipality of Pulilan to begin planning for a community more resilient to hazards and the impacts of climate change. I hope that the time spent in their community and the results of both the Community Service Learning field school and this research will prove valuable to the Municipality as they continue with planning and implementation of adaptation measures. What I believe I've demonstrated is that

much adaptive capacity for CCA and DRR already exists within the Municipality that can be built upon as they look for new and

innovative ways to adapt their community to the changes in climate that they have already begun to experience.

REFERENCES

- Adger, W. N. (2003). Social aspects of adaptive capacity. In J. B. Smith, R. J. T. Klein, & S. Huq (Eds.), *Climate Change, Adaptive Capacity and Development* (pp. 29-49). London: Imperial College Press.
- Adger, W. N., Arnell, N. W., & Tompkins, E. L. (2005). Successful adaptation to climate change across scales. *Global Environmental Change*, 15, 77-86. doi:10.1016/j.gloenvcha.2004.12.005
- Angeles, L. (2011). *Collaborative Governance of Urbanizing Watershed: Integrated Research, Institution- and Capacity Building for Sustainability and Climate Risk Adaptation in Angat River Region, Philippines*. Proposal submitted to SSHRC, Ottawa, Canada.
- Appreciative Inquiry. (2008). In L. M. Given (Ed.), *The SAGE Encyclopedia of Qualitative Research Methods* (Vol. 1, pp. 21-23). Thousand Oaks, CA: Sage Publications. Retrieved from <http://go.galegroup.com.ezproxy.library.ubc.ca/ps/i.do?id=GALE%7CCX3073600024&v=2.1&u=ubcolumbia&it=r&p=GvRL&sw=w>
- Babalos, K., Brown, C., & Chen, L. (2013). *Municipality of Pulilan, Bulacan, Philippines: Towards a Local Climate Change Action Plan*. Retrieved from <http://urbanizingwatersheds.wordpress.com/portfolio/research-themes/environment-ecosystems-and-sustainability/>
- Baxter, J. (2010). Case Studies in Qualitative Research. In I. Hay (Ed.), *Qualitative Research Methods in Human Geography*. Don Mills, ON, Canada: Oxford University Press.
- Birkmann, J. & von Teichman, K. (2010). Integrating disaster risk reduction and climate change adaptation: Key challenges – scales, knowledge, and norms. *Sustainability Science*, 5, 171-184. doi:10.1007/s11625-010-0108-y
- Bradshaw, M. & Stratford, E. (2010). Qualitative Research Design and Rigour. In I. Hay (Ed.), *Qualitative Research Methods in Human Geography*. Don Mills, ON, Canada: Oxford University Press.
- Bushe, G. R., & Kassam, A. F. (2005). When is Appreciative Inquiry transformational? A meta-case analysis. *The Journal of Applied Behavioural Science*, 41(2), 161-181. doi:10.1177/0021886304270337
- Climate Change Act (CCA) of 2009. (2009). Republic Act 9729. Congress of the Philippines.

- Comprehensive Zoning Ordinance of Pulilan, Bulacan. (1996). Ordinance 20-96. Sangguniang Bayan of Pulilan, Bulacan.
- Davoudi, S. (2012). Resilience: A bridging concept or a dead end? *Planning Theory & Practice*, 13(2), 299-307.
- Daze, A., Ambrose, K., & Ehrhart, C. (2009). Climate Vulnerability and Capacity Analysis Handbook. CARE International. Retrieved from http://www.careclimatechange.org/index.php?option=com_content&view=article&id=25&Itemid=30
- Dowling, R. (2010). Power, Subjectivity, and Ethics in Qualitative Research. In I. Hay (Ed.), *Qualitative Research Methods in Human Geography*. Don Mills, ON, Canada: Oxford University Press.
- Ecological Solid Waste Management Act of 2000. (2000). Republic Act 9003. Congress of the Philippines.
- Handmer, J. (2003). Adaptive capacity: What does it mean in the context of natural hazards? In J. B. Smith, R. J. T. Klein, & S. Huq (Eds.), *Climate Change, Adaptive Capacity and Development* (pp. 29-49). London: Imperial College Press.
- IPCC. (2001). *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. New York, NY, USA: Cambridge University Press.
- IPCC. (2012). Summary for Policymakers. In C. B. Field, V. Barros, T. F. Stocker, D. Qin, D. J. Dokken, K. L. Ebi, M. D. Mastrandrea, K. J. Mach, G. K. Plattner, S. K. Allen, M. Tignor, & P. M. Midgley (Eds.), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (pp. 1-19). Cambridge, UK, and New York, NY, USA: Cambridge University Press.
- Jones, L., Ludi, E., & Levine, S. (2010). Towards a characterisation of adaptive capacity: a framework for analysing adaptive capacity at the local level. Retrieved from <http://www.odi.org/publications/5177-adaptive-capacity-framework-local-level-climate>
- Klein, R. J. T. & Smith, J. B. (2003). Enhancing the capacity of developing countries to adapt to climate change: A policy relevant research agenda. In J. B. Smith, R. J. T. Klein, & S. Huq (Eds.), *Climate Change, Adaptive Capacity and Development* (pp. 29-49). London: Imperial College Press.

- Lard, H., & Barres, I. (2007). Maximizing microfinance. *Georgetown Journal of International Affairs*, 2, 55-62.
- Local Government Code of 1991. (1991). Republic Act 7160. Congress of the Philippines.
- Loftus, A-C. (2011). Adapting urban water systems to climate change: A handbook for decision makers at the local level. Retrieved from <http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Adaptingurbanwatersystemstoclimatechange>
- Municipality of Pulilan. (n.d.a). *Contingency Plan for Flash Flood*. Municipal Disaster Risk Reduction and Management Office.
- Municipality of Pulilan. (n.d.b). *Municipal Disaster Risk Reduction and Management Plan*. Municipal Disaster Risk Reduction and Management Office.
- Municipality of Pulilan. (2001). *Implementing Rules and Regulations of the Municipal Environmental Code of Pulilan*. Municipal Ordinance 2001-C-02.
- Municipality of Pulilan. (2010). *Executive-Legislative Agenda: "The Agro-Industrial Growth Center of Bulacan"*. Office of the Mayor.
- Municipality of Pulilan. (2011). *Comprehensive Land Use Plan*. Municipal Planning and Development Office.
- Municipality of Pulilan. (2013). Informal Settlers spreadsheet. Municipal Social Welfare and Development Office.
- Penalba, L. M., Elazegui, D. D., Pulhin, J. M., & Cruz, R. V. O. (2012). Social and institutional dimensions of climate change adaptation. *International Journal of Climate Change Strategies and Management*, 4(3), 308-322. doi:10.1108/17568691211248748
- Philippine Disaster Risk Reduction and Management (DRRM) Act of 2010. (2010). Republic Act 10121. Congress of the Philippines.
- Preskill, H. (2005). Appreciative Inquiry. In S. Mathison (Ed.), *Encyclopedia of evaluation*. (pp. 19-20). Thousand Oaks, CA: SAGE Publications, Inc. doi:10.4135/9781412950558.n30
- Pulhin, J. M., Tapia, M. A., & Perez, R. T. (2010). Integrating disaster risk reduction and climate change adaptation: Initiatives and challenges in the Philippines. *Community, Environment and Disaster Risk Management*, 5, 217-235. doi:10.1108/S2040-

- Schooley, S. E. (2008). Appreciative democracy: The feasibility of using Appreciative Inquiry at the local government level by public administrators to increase citizen participation. *Public Administration Quarterly*, 32(2), 243-281.
- Smit, B. & Pilifosova, O. (2003). From adaptation to adaptive capacity and vulnerability reduction. In J. B. Smith, R. J. T. Klein, & S. Huq (Eds.), *Climate Change, Adaptive Capacity and Development* (pp. 29-49). London: Imperial College Press.
- Smit, B. & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16, 282-292. doi:10.1016/j.gloenvcha.2006.03.008
- Smith, J. B., Klein, R. J. T., & Huq, S. (2003). Introduction. In J. B. Smith, R. J. T. Klein, & S. Huq (Eds.), *Climate Change, Adaptive Capacity and Development* (pp. 29-49). London: Imperial College Press.
- Smith, K. & Petley, D. N. (2009). *Environmental Hazards: Assessing Risk and Reducing Disaster* (5th ed.). London and New York: Routledge.
- UNISDR Asia and Pacific. (2011). At the crossroads: Climate change adaptation and disaster risk reduction in Asia and the Pacific – A review of the region's institutional and policy landscape. Retrieved from <http://www.unisdr.org/we/inform/publications/21414>
- United Nations. (2010). Synthesis Report on Ten ASEAN Countries Disaster Risks Assessment: ASEAN Disaster Risk Management Initiative. Retrieved from <http://www.unisdr.org/we/inform/publications/18872>
- Watkins, J. M., Mohr, B., & Kelly, R. (2011). Chapter 2: Appreciative Inquiry: History, Theory, and Practice. In *Appreciative Inquiry: Change at the Speed of Imagination* (2nd ed.). San Francisco, CA: Pfeiffer.