

**GENDERED ADAPTATIONS TO CLIMATE CHANGE:
THE CASE OF RICE FARMING COMMUNITIES IN THE PHILIPPINES**

**A Thesis Submitted for the Degree of
Doctor of Philosophy**

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ABSTRACT

GERLIE TOQUE TATLONGHARI, Gender, Leadership and Social Sustainability (GLASS) Unit, Social Work Department, Faculty of Medicine, Nursing and Health Sciences, Monash University, Australia. **Gendered Adaptations to Climate Change: The Case of the Rice Farming Communities in the Philippines**

Major Supervisor: Prof. Margaret Alston

Climate change causing heavy rainfall and floods is one of the major constraints to agricultural productivity particularly in rice farming in the Philippines. Despite many studies on the adverse impacts of unpredictable extreme weather events on agriculture, very few studies have examined the differential vulnerabilities and adaptation strategies of male and female farmers in rice farming communities. This study examines gendered vulnerabilities and impacts as well as variable adaptation strategies taken by men and women in response to extreme flooding events in Nueva Ecija, Philippines.

To assess how gendered adaptation strategies are produced and reinforced in two selected farming communities in the Philippines, I draw on practice theory and adopt a feminist perspective to examine how structure and agency influence practices and how practices can be changed in order to adapt to climate change. Moreover, since this study has a feminist agenda - gender is central to the analysis in order to expose gender differences and inequalities in areas experiencing climate change and to show how social change can empower and improve women's position as they adapt to climate change.

Adopting a feminist methodology was facilitated by a combination of qualitative and quantitative methods. Results of this study reveal that gendered vulnerabilities to extreme flooding are due to traditional gender roles in household and farming activities and women's lack of access to assets and resources. Also, men and women adapt to flooding according to traditional roles and gender relations. The differential vulnerabilities and responses to the negative effects of flooding events of women and men are further aggravated by women's lack of access of assets and resources and lesser participation in making decisions related to farming.

However, prolonged exposure to flooding and continuous loss of livelihood motivated some men and women to realize the need to alter their existing gender roles and relations. Women are compelled to spend more time outside their homes to seek income from non-farm work. In this situation, men assume household and child care responsibilities. This alteration of gender roles and relations has significant impacts particularly for women who have challenged the underlying assumptions and taken action to change their situation and lessen the impacts of climate change on themselves

and their households. However, their desired changes are dependent on other institutions, such as non-government organizations (NGOs) and government that must facilitate much needed social change. This implies that changes in gender practices not only require women to think and act differently but require changes at the state and institutional level. Thus, this study concludes that climate change is a necessary but not sufficient condition for women to achieve social change. Furthermore, in order to sustain new *practices* in gender roles and relations, a women's global movement is needed to assist local women to assert their rights to greater access to and control of resources and to influence policies which are necessary in building women's resilience to climate change.

SIGNED STATEMENT

I affirm that this thesis, except with the Graduate Research Committee's approval, contains no material which has been accepted for the award of any other degree or diploma in any university or other institution.

I affirm that to the best of my knowledge this thesis contains no material previously published or written by another person, except where due reference is made in the text of this thesis.

A solid black rectangular box used to redact the signature of the author.

Gerlie Toque-Tatlonghari

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CHAPTER ONE: INTRODUCTION

1.1. Introduction

Climate change poses a significant threat to a developing¹ and disaster-prone country like the Philippines. According to the 2011 World Risk Report, the Philippines ranks third among countries with high risk of disasters (Birkman et al., 2011). This finding is consistent with a 2010 study conducted by the World Bank that ranked the Philippines in the top 10 countries worldwide at risk for both climate change and disasters. It was reported that during the previous decade, the country experienced the highest recorded rainfall and the strongest typhoons. Furthermore, different studies around the world show that the consequences of changing climate are worse for women. Climate change adaptation is gendered (Alston, 2007; 2010; Demetriades & Esplen, 2008; Lambrou & Nelson, 2010; Terry, 2009) and recent studies from the Philippines (Gaillard et al., 2008; Peralta, 2009; Bacalla, 2010) confirm that weather-related disasters such as flooding, increased women's vulnerability and domestic burdens as they were responsible for borrowing money, securing food in case of crop failure, caring for the sick and cleaning and maintaining their houses after flooding. Consequently, women were perceived to recover more slowly than men from economic losses due to the climate change event and this exacerbated gender inequalities. Yet there is evidence that shows that some adaptations strategies of women altered existing gender roles and shifted current power relations within the household and the community (Dalisay, 2008; Enarson, 2000; Lambrou & Nelson, 2010; Sultana, 2010). These times of upheaval and change could potentially lead to increased women's empowerment and more gender equality.

In order to examine how *social change* can occur in the context of climate change, it is important to look at the way men and women adapt to extreme weather events. Adaptation is understood as a modification of behaviour that can either alleviate adverse impacts or open new opportunities in response to observed or expected changes in

¹A developing country also called less-developed country (LDC) is a nation with low living standard, underdeveloped industrial base and low Human Development Index (HDI) *source: en.wikipedia.org*

climate and associated extreme weather events (Adger, et al., 2004; Adger, et al., 2007; Nielsen & Reenberg, 2010).

Thus, this thesis examines *how gendered adaptation practices are accepted and reproduced in a given community amidst climate uncertainty*. A number of subsidiary questions are addressed.

1. Do men and women respond differently to climatic events based on their gender roles, identity and relations?
2. How do traditional gender practices exacerbate gender inequalities and relate to women's future adaptation?
3. Can natural disasters like flooding provide an opportunity to empower women by changing gender practices?
4. Can current power relations within the household and community be changed through adaptation strategies?
5. What are the factors that can limit and facilitate women's abilities to change their situation and position as they respond to climate change?

To answer these questions, my research was conducted in the Philippines and focused on two rice-farming communities, both of which have experienced severe flooding in recent years. I used a mixed-method approach working from a feminist-structuralist perspective in an effort to understand and explain how social structures and agency influenced the adaptation strategies undertaken by men and women. Eight focus group discussions and four participatory rural appraisal activities were conducted with male and female farmers in the villages of Cama Juan and Papaya in San Antonio, Nueva Ecija in the Philippines. I also carried out 23 in-depth interviews with male and female rice farmers and surveyed 402 male and female respondents from farming households. I also interviewed 13 key informants such as agricultural extension agents, health workers and association leaders who have sufficient knowledge about the socio-economic conditions of the rice farming communities. These methods allowed me to examine the perceptions of men and women farmers of their existing gender roles and relations and their vulnerabilities to, the impacts of, and their adaptation to severe flooding. Their responses were compared to

draw out the degree of differential impacts, vulnerabilities and adaptations of men and women using quantitative analyses.

The motivation for writing this thesis came from my experience working with male and female farmers from rice farming communities in various Southeast Asian countries. These farmers are seeking ways to increase their rice farming productivity and welfare. I was extensively involved with gender studies through my membership of the gender group at Social Sciences Division at the International Rice Research Institute (IRRI) in 2007. My first assignment with this group was a project entitled “Evaluation and dissemination of submergence tolerant rice varieties and associated new production practices in Southeast Asia”. This project was implemented in five Southeast Asian countries including the Philippines. Through this project, I was introduced to the men and women of Papaya village in San Antonio, Nueva Ecija. They were the ones who initially tested and evaluated the flood-tolerant varieties. My main tasks were to develop gendered methods and to incorporate the perceptions and evaluations of farm women of the flood-tolerant rice varieties. My involvement with this project sparked my interest in exploring the gendered aspects of rice farming. I saw the important contribution of women to rice farming and how they struggled to sustain their livelihoods despite their continued *invisibility* due to gendered roles and relation in rice farming. I also met several female farmers who had achieved significant goals despite their situations. They refused to be defeated by extreme losses and worked for themselves and their households. My interactions with them convinced me that gender inequality is something that can be addressed, challenged and questioned. My interest and the farm women’s passion and commitment inspired and challenged me to pursue this research project.

1.2. My background

Before joining GLASS for my PhD study, gender and climate change was perceived as an emerging issue by IRRI. Aside from my involvement in the project on the dissemination and evaluation of flood-tolerant rice varieties, I was working on a project in Eastern India. This project addressed the consequences of extreme climate variability on men and women farmers who are working to ensure food security and sustainable livelihoods. Because of this project, I already had a broad understanding of gendered consequences of

climate change in relation to rice farming. It was very unlikely that I would have the opportunity to pursue my PhD study and at first I found it untimely due to my busy schedule at IRRI. My husband, however, persuaded me that I had the ability and experience to pursue PhD study in the area of gender and climate change. His encouragement really motivated me as I am aware that not all women are privileged to have the space for professional growth especially when already married with a child. Young professional Filipina woman like me are still caught up with gender roles relating to being a mother and wife- roles and responsibilities that I am expected to attend to before anything else. Thus, professional advancement is not a priority on my to-do list in life. However, this opportunity presented itself and the support of my husband and family enabled me to finally accept the challenge of being a PhD student.

The process of enrolment from a forwarded email from GLASS to scholarship and admission from Monash University was quick and initially overwhelming. However this finally convinced me that this PhD is the next step in my professional development. From this experience, I came to realise that, no matter how difficult might be the path for growth and advancement for woman like me, if given space and opportunity by the people around her, can move beyond the traditional roles that had been ascribed to her.

My interest in gender studies also developed through my previous academic studies. I have a strong interest in studies relating to economics and sociology. Although I have a pure economics education background, my interest in exploring how men and women interact and are influenced by their society has always been my passion. The lack of a human face in my previous studies made me feel disconnected from the realities of this world. Thus, during my MS thesis, I began using my skills in quantitative analysis to explore abstract concepts such as social capital and human behaviour. I found my economics background a strength rather than a weakness in studying men and women and their society. My quantitative analytical skills due to my positivist background combined with my qualitative analytical skill developed through my professional background enabled me to pursue a mixed method approach for my PhD study.

My personal background also has influenced me to pursue this area of study. I am the second child and only daughter in my family and since childhood, I was trained to behave and act according to prescriptive gender roles within my traditional Filipino family.

Although I grew up in an educated family, I was caught up with the burden of doing most of the household chores with my mother despite attaining higher education. Now that I am a wife and a mother, I am still confronted with my ascribed roles and relations. For a Filipina like me, I adopt multiple roles - being a daughter, wife, mother and daughter-in-law. Although, I did not grow up in a rice farming community, my lived experience as a Filipino woman reflects that of the farm women I studied. My connection with them was so personal that it made me cry and laugh with them during my stay in their communities. My PhD journey is a life-changing experience as I questioned and challenged my own reality. My advocacy for greater gender equality grew stronger within me as I went on this journey.

Moreover, flooding and typhoons are typical phenomena in the Philippines. I myself experienced flooding and danger due to this extreme hazard. The fear of losing properties and becoming insecure because of the intense flooding was real to me. Back in 2007, typhoon *Ondoy* devastated our home. It caused flash flooding which rarely happens in the region where we lived. My husband and I were newly married. The flood came on the very day that we knew that I was expecting our first baby. I felt vulnerable and frightened for my safety and my baby in my womb. I thought we would be trapped by the massive flood because we were renting a ground level apartment. Fortunately, our neighbour let me in to their apartment on the second floor, while my husband tried to save our important documents, a few significant items and clothing. He was injured as he tried to walk in the flood. I witnessed how people struggled to save their lives and properties. I saw women, children and even a new born-baby going up to their roofs even though it was raining very hard. This traumatic event lasted for several hours and the flood finally subsided, leaving thick mud all over the place. It had destroyed houses, properties and infrastructure. Its adverse impact did not end on the day the flooding occurred. For the next couple of weeks power and water supply were interrupted. We stayed with my parents as we waited for our town to be restored. This experience had a significant influence on how I viewed disasters and their impacts on men and women. Every time I hear stories about flooding and extreme weather events, I can vividly recall how unpredictable flooding brings catastrophes to the people affected.

My flooding experience really motivated me to study disasters and climate change. I felt the rice farmers of Papaya and Cama Juan villages would be an appropriate focus for my study to highlight the experiences and voices of men and women who are faced with crisis due to extreme weather events. The people in these communities do not just live in the community where they experience flooding; they depend on the environment for their livelihoods. As I analysed and interpreted their stories and lived experiences I recognised my own personal experiences of disaster and in particular flooding. These stories of the lives of people affected by disasters must be acknowledged and recognised by policy makers and development workers working with vulnerable groups and sectors to adapt to changing climate.

This thesis is undeniably located within my personal experience, own interest and background in rice research. Thus, throughout all phases of this research, from the development of the research questions to the fieldwork and to the final analysis of data, I was conscious of my own background and experiences. I have therefore embraced these identities and used them to access participants, to understand and respond to participants and express these findings with an innate understanding of cultural context.

1.3. Relevance of the study

Through my personal experiences I recognise that gender determines experiences, perceptions, expectations and options in life. Thus, from the start of my study, I knew that gender analysis would be an integral part of my study. Since gender is a socially constructed identity, it influences how individuals of various backgrounds are impacted by and adapt to climate change. Past studies on gender and disasters reveal the differential impacts of disasters on men and women (Fothergill, 1998; Enarson 2000; Enarson and Meyreles, 2004; Bradshaw, 2004; Enarson 2010; 2012). These major findings are consistent with recent literature on gender and climate change and highlight that women are often more vulnerable than men (Terry 2009; Alston, 2007; 2010; Sultana, 2010; Dankelman; 2010 Skinner, 2011; Lambrou and Nelson, 2010; Aboud, 2011). Evidence from these studies indicates that it is critically important to understand how climate change is perceived and experienced by men and women. This study contributes to a growing body of literature on gender and climate change inspired by my

work in the Philippine context. The main task of my study is to provide an understanding of how the experiences of extreme weather events like flooding might give insights into how to improve the adaptive capacity of men and women.

Climate change is increasingly being recognised as a global crisis, but responses to it have so far been overly focused on scientific and economic solutions, rather than on the significant human and gender dimensions (Aboud, 2011). Only a handful of academic scholars have focused on the gendered implications of natural hazards and disasters in recent years (Enarson and Morrow, 1998; Fordham, 1999, 2003; Enarson and Fordham, 2001; Cannon, 2002; Neumayer and Plumper, 2007; Alston, 2007; 2010; Sultana, 2010). In published Philippine disaster and climate change literature in particular, there is a focus on the impacts of climate change in different communities and sectors (see for instance Perez et al, 1996; Perez, 1999 (coastal communities), Pulhin et al., 2006; Peras et al., 2008 (water sector), Acosta-Michlik and Espaldon, 2008 Cuesta and Rañola, 2008; 2009; Reyes et al. 2009; Concepcion et al., 2011 (agriculture) and little focus on the gendered experiences of individuals. Limited studies (Dalisay, 2008; Gaillard et al., 2008; Sarmiento, 2008; Peralta 2008; 2009; Yocogan-Diano and Kashiwazaki, 2009; Mason, 2012) were found that highlighted the gendered vulnerabilities and impacts of extreme weather events. Thus, this thesis extends previous Philippine gender and climate change studies as I focus on gendered vulnerabilities, adaptation to and impacts of climate change. Given that the country is a climate-change prone nation, my thesis contributes to our emerging understanding of the Philippine gender and climate change literature. Our country's climate change policy does incorporate gender as an overarching theme. However, climate change policy is not yet well implemented. Actions are needed to address vulnerable people and communities. This research on the way women and men adapt to extreme weather events like flooding will aid the political leaders and development leaders in drafting a more gender-sensitive adaptation programs and projects. Moreover, gender concerns relating to climate change are not just issues for the developing and climate change prone-countries like the Philippines but are now a global concern. This study will therefore be relevant to other countries faced with climate change.

Another point where this thesis deviates from previous studies (Dankelman, 2002; Alston, 2007; Terry, 2009; Sultana, 2010; Lambrou and Nelson, 2010) is that it focuses on understanding how gendered adaptation practices are accepted and reproduced as a response to climate change. Scholars have highlighted that women's and men's responses to climate change is based on gender roles, identities and relations. Some extend their analysis by accounting for gendered vulnerabilities as a factor caused by ascribed roles and behaviours according to their gendered identities. Lambrou and Nelson, (2010) drawing on research in India, note that most of the adaptation strategies are done jointly by women and men but that women's coping strategies are different from men. However, deciding who should do what in response to climate change is not a mechanical task. In most cases, it involves conflict and cooperation between men and women living in the same household. Also, existing power relations have a conscious or unconscious effect. Therefore this thesis will contribute to the limited knowledge about how gendered adaptation is formed and reinforced based on traditional gender roles, relations and identities. These formal and informal practices are embedded in the social institutions, norms and tradition of the given community. Thus, in Chapter 6, I note how physical and social structures affect gender roles and relations and thus how men and women respond to climate change (Chapter 7).

Literature in this area also reveals that existing gender inequalities are one of the main causes of differential vulnerabilities among men and women and that an increase in gender inequalities is a possible negative consequence of responses to climate change. Sultana (2010) argues that one coping strategy requires women to sell important assets and this leads to extra burdens on them as they are responsible for maintaining the kitchen and raising livestock. Consequently, women's response weakens their bargaining position in the household, as their assets are depleted and their income-earning options become inferior (Enarson, 2000:11). Moreover, because women spend a great deal of time in managing these resources as they do their ascribed roles even after disaster; it causes some limits to some of their (economic) development options (Dankelman, 2002).

My study confirms that due to gender roles and limited resources women are more vulnerable to climate change. Depleting resources also results in a decreased capacity to adapt and thereby exacerbates existing gender inequalities. By contributing to this

existing literature and revealing a clearer picture of the way adaptation strategies can worsen existing inequalities and how this is related to women's future adaptation strategies, I hope to persuade policy makers to keenly incorporate gender issues in climate policy negotiations.

Further studies (Enarson, 2000; Nelson et al., 2002; Lambrou and Nelson; 2010; Mishra, 2009; Sultana, 2010) indicate the potential of role reversal and alteration of existing power relations as women adapt to changing climate. Bacalla (2010) states that women are empowered as they go out of their domestic sphere and contribute more to the household's productive activities. However, this new found opportunity is still under debate. Alston and Whittenbury (2012) in their Australian drought study suggest that climate crises have led to changes in gender relations but women's power in gender negotiations does not necessarily occur because their enhanced economic contribution is viewed as a farm survival strategy. Further they note no real change to traditional farm roles. This supports Bradshaw and Linneker (2009), in research based in Nicaragua that notes that involving women in community efforts and outside their domestic sphere was not sufficient to bring about a change in women's position and situation, Thus, I ask, what are the factors that limit and facilitate women's abilities to change their situation and position as they respond to climate change.

Finally, in terms of methodological contributions, I have developed qualitative and quantitative methods and gender analysis techniques to highlight the perceptions and experiences of men and women rice farmers during and after severe flooding. This is an extension of the methodological model used by Lambrou and Nelson (2010) for studying gender and climate change. This differs from their Indian study as I have employed different statistical techniques and increased the number of respondents in the quantitative survey. I also used additional qualitative data collection methods such as participatory rural appraisal (PRA) and in-depth interviews with men and women rice farmers. Additionally I have quantified the degree of differences between men's and women's perceptions of, responses to and impacts of severe flooding. Innovative methodological techniques used in this study serve as replicable methodology for examining gendered vulnerability and responses to climate change elsewhere.

1.4. Structure of the thesis

This thesis comprises nine chapters. Following this introductory chapter is an outline of the literature divided into two chapters. Chapter 2 discusses gender and climate change in a global context, while Chapter 3 focuses on literature related to the study of gender and climate change in the Philippines.

Chapter 4 provides the theoretical framework of this thesis. I initially present practice theory, which is the main theoretical framework of my study. I then discuss how I define adaptation through the lens of the practice approach. Using the feminist-structuralist perspective, I use the concepts of gender, power and agency to map out the conceptual framework used in this study.

Chapter 5 describes the methodology of the study. This chapter begins with the rationale for choosing a feminist framework and a case study as a research method. I then discuss the mixed-method research design used for the case study, focusing on mixed-method sequential design and its procedural issues. Methodological limitations of selected techniques and strategies for establishing and enhancing trustworthiness were also discussed in this chapter.

Chapter 6 is the first of three findings chapters. This chapter discusses the physical and social environment of the rice farming communities studied. Chapter 7 discusses the gendered aspects of climate change. Chapter 8 outlines my findings relating to changes in gender roles and relations in rice farming communities due to climate change. In this chapter I extend the theoretical discussion of gender, power and agency discussed in Chapter 4. I also identify factors that limit and promote women's abilities to change their situation and position as they responded to climate change.

The final chapter, Chapter 9, summarises the key findings of the thesis and draws out the implications for both policy and practice as they relate to significant stakeholder groups such as academia, policy-makers, the rice farming sector and male and female farmers. Limitations of the research and areas for further investigations are also documented.

CHAPTER TWO: GENDER AND CLIMATE CHANGE IN THE GLOBAL CONTEXT

2.1. Introduction

This chapter locates my research in the Philippines in a global context. It begins with a discussion of the linkage of gender and environment with a special focus on farming. The next section discusses climate change as an emerging threat to existing social and farming conditions, then the following section draws a link between gender and climate change. I examine past studies of gendered impacts and vulnerabilities, and also of gendered adaptations to climate change. A sub-section discusses how climate change might redefine the concept of gender, challenge existing power relations and change gender roles as men and women cope with the effects of climate change. Finally, a summary of the chapter is presented, highlighting how my case study will contribute to the existing global literature.

2.2. Gender and environment

The link between gender and environment, particularly in developed countries² had often been interpreted in ideological terms. Early ecofeminist writers made a link between women and nature. Ortner (1974) for example argued that women are closer to nature and men closer to culture. She argues that women's bodies and physiological processes are more concerned with the natural process of reproduction of the species, (such as menstruation, pregnancy and lactation). Because of their concern with child care and primary socialisation, women are said to develop a more personal and intimate relationship with others. On the other hand, men are viewed as closer to culture because of their engagement with politics, warfare and religion. Ortner further defines culture in her context as a means by which humanity controls and regulates nature. Thus, she concludes that since culture is superior to nature then men are viewed as superior to women. This ideology persists and partly explained the domination of patriarchy³. Ortner's works and other eco-feminists, however, are substantially criticised as essentialising women as being closer to nature.

²A developed country or "more developed country" (MDC), is a sovereign state that has a highly developed economy and advanced technological infrastructure relative to other less developed nations. Most commonly the criteria for evaluating the degree of economic development are gross domestic product (GDP), the per capita income, level of industrialization, amount of widespread infrastructure and general standard of living: *source:en.wikipedia.org*

³Walby (1990) defines patriarchy as a 'system of social structures and practices in which men dominate, oppress and exploit women'.

Meanwhile, the connection of gender and the environment in developing countries have been interpreted by the way women and men interact with the environment. Menon (1991) and others (Alston, 1998; Sachs 1996) introduced the concept of how *work* links gender and environment. Work is often defined as active, labour-based interactions of human beings with the material world. Menon redefines work to include food procurement, protection of life, property and territory, the collection of water, energy sources and fodder, childbearing, child rearing and the maintenance of basic health standards. Most of these human activities are being done by women and in so doing, directly interact with the natural environment.

Earlier studies pointed out the importance of women's work and their direct interaction with the environment. Under capitalism women were displaced from their key roles in land cultivation and food production. Esther Boserup (1989) for example in *Women and Development* describes the transition of women's and men's roles and positions due to economic development. She cites the case of women in many African communities as an example. She suggests that in primitive times women were regarded as the food gatherers and did most of the farming, while men were off hunting.

Colonisation, increases in population density and the introduction of technology in farming, however, revolutionised the division of labour relating to food production. Women were displaced from their role in farming and men took over the land. These transitions brought changes with the way the contributions of men and women were perceived and valued. Boserup's work is further supported by the work of Carney and Watts (1991) among Mandinka rice growers in Senegambia. Their work details the 150 years of agrarian change that altered the gender division between male and female peasants. One main consequence, particularly of rice mechanisation, was that women lost their crop rights and were denied of access to land. The writers emphasized that women's struggle was not solely local and familial but reveals more about the way patriarchal powers were supported by the state through the bureaucratic demands of state organisation and through the devolution of power to adult men by state-run development schemes.

Because of colonisation, a patriarchal structure dominated colonized nations. Vandana Shiva (reprinted 2006) argues that the concept of *development* was a new project for western patriarchy. She equates development to the westernisation of economic categories such as needs, productivity and growth in Third World countries. She further describes development as the extension of wealth creation in modern western patriarchy based on the exploitation and exclusion of women and the exploitation and degradation of nature. Women's displacement from productive activity was mainly due to the manner in which development projects were appropriated. These destroyed the resource base on which families relied for sustenance and survival and consequently removed their control and management of these resources. Thus, she concluded that gender subordination and patriarchy have taken on new and more violent forms through the project of development.

Bina Agarwal (1992) writing from a political economy perspective critiques the work of Shiva, arguing that she fails to recognise the local forces of power, privilege and property relations that predate colonialism. Agarwal emphasises that what exists today is a complex legacy of colonial and pre-colonial interactions that defines the constraints and parameters within which and from which present thinking and action on development, resource use and social change have to proceed. She suggests that women's and men's relationship with nature must be understood as rooted in their material reality; that is, in specific forms of interaction with the environment. Hence, 'insofar as there is a gender and class division of labour and distribution of property and power, gender and class structure people's interactions with nature and so structure the effects of environmental change on people and their responses to it' (Agarwal 1992:126).

Gender-specific division of labour related to the environment is still visible in modern societies: women and men perform different tasks and carry diverse responsibilities. In many cases, however, women are disadvantaged compared to men with regard to land and water rights and rights over natural resources (Dankelman and Jansen, 2010). This is clearly reflected in existing farming systems in many parts of the world. The next section discusses the roles of men and women in farming and how their lives and experiences differ because of their adherence to gender norms, roles and responsibilities.

2.3. Gender and farming

Farming is a unique livelihood because it is so intimately linked with the lives of those who are engaged to it and so it has become the way of life. Business relations on the family farm are not separate from family relations and necessitate cooperation between husband and wife to help the family survive and the rural communities in which agricultural production takes place (Brandth, 2002). Women and men usually enter into farming through different pathways, however, and have differentiated roles and status in farming.

In most developed countries, farming is characterised as a male-dominated enterprise where the patriarchal structures are historically dominant and obviously continues (see for example Brandth, 2004). Separate studies in Australia (Alston, 2000) and Ireland (Shortall, 2002) and the US (Sachs, 1996) show how patriarchal structure shapes the face of farming; dictating the existing structures, culture and norms. Shortall (2002) explains that men dominate in the sphere of farming due to their access to and control over land. She claims that property is a central source of power in farming. Customary practices in most of developed countries dictate inter-generational transfer of land to the male heir of the family. Thus, women have limited independent access to land as an economic resource and to the status, prestige and political power ownership of land brings (Shortall, 2002:7).

Moreover, Saugeres (2002) further notes how men construct and reaffirm their masculine identities through land ownership. She argues that masculine identities are produced both in identification with and opposition to women and nature. She further explains that farmers do not only inherit land, they also inherit their farming knowledge. Furthermore, she points out that men and women identities in farming are in relation to and in opposition to others. Because farming is defined as a masculine sphere of activity, male farmers see the work that women do as being secondary. Consequently, women not only do works that are devalued by both men and women, their inputs are often restricted to certain types of work on the farm which is not physically demanding.

Women's entry into farming has commonly been through marriage. Women rarely inherit the land, thus their labour contribution remains under the control of men and they have

limited influence over agricultural decisions (Brandth, 2002; Alston, 1995; 2000). Because farm work is commonly defined as the work of the owner and manager, women's work is not considered to be real work as many focus on assisting men as the need arises (Brandth, 2002). Furthermore, even women may define their work in relation to that of their husbands. Saugeres (2002) even argued that while there are women who own and run a farm they are viewed as doing so because they lack a man. Historically, farm women exercised great influence in indoor work but when they participated in outdoor work they perceived as farm hands or helpers to the male farmer (Alston, 2000).

Bennett (2004), in her comparative study of the situation of women in the former coalfields and family farming in the United Kingdom concludes that patriarchal structures are simultaneously beyond women's control and affected by women. She further observes that women are apparently defensive and protective of the culture and traditions dictated by patriarchal gender relations and both men and women are consciously and less consciously implicated by the workings of power. She positively notes, however, that both men and women can weave the patriarchal into something altogether less oppressive.

On the other hand, women's involvement in developing countries is viewed somewhat differently. As described by Boserup (1989), women traditionally contribute to the household's food security by gathering food, fuel and water and mainly managing plots for subsistence. However, due to population growth, fallow periods and agrarian change in African agriculture, women are less visible in food production. Due to these changes, women were displaced from their lands while men gained more access to land, as agrarian reform supported the cultivation of cash crops which were mainly planted by men. As with women in countries in developed countries, women do not inherit land in most of the sub-Saharan African societies. They are given cultivation rights but they do not have other property rights. In exchange for this right, women are obligated to work on their husband's crop (Worldbank, 2009).

In Latin America and Asia, redistributive land reform has been recently carried out. The distribution of land in most cases, however, has directly benefited male household heads while ignoring wives and even in some cases ignoring single women household heads (Worldbank, 2009). Thus, it is a common pattern in agricultural sectors across regions to

see women as the main producers of food while men manage most of the commercial crops with the help of women's unpaid contribution (Fontana and Paciello, 2009). Even though women are seen to be more visible in agriculture over the last few decades, their involvement is mainly due to their increasing responsibility for household survival and their response to economic opportunities in commercial agriculture (Lastarria-Cornhiel, 2006).

Moreover, the increasing participation of women in agricultural activities does not necessarily translate into improved women's position in farming. Sachs (1996) explained that this situation persists in many farming communities in developed and developing countries since women's significant farming labor contribution does not translate into income control, decision making, or improvements in status. Also, she argued that the mix and multiple tasks women take in both reproductive and productive spheres led to the underestimation of women's productive labour contribution in farming. These partly explain the continued perception and portrayal of women as no more than as agricultural helpers. Radel's recent study (2011) about the smallholder agriculture in Mexico, further argues that the invisibility of women in agriculture is mainly due to women having much less access to and control over resources than men. Farming is so intimately associated with having land, and thus for women to become a farmer, she must at least be entitled to have access to and control over resources particularly the land. The transformation of gendered farming identities is not just about the provision of resources, however, but more so will require a transformation in the system, such as the customary practices in inheriting the land (Shortall, 2002). Also, since the continued invisibility of women as farmers is linked to discursive processes (Sachs, 1983), then the dominant construction of farmers as men, can be challenged and changed.

Based on the cited studies in both developed and developing countries, men consistently dominate agriculture. The patriarchal structure seems to permeate even in modern agricultural societies. Furthermore, no study was found that shows that this social arrangement is better for both men and women, instead, overwhelming evidence highlights that women's subordinate position is detrimental to both partners and to the rest of the household. Moreover, no empirical study was found that would suggest that

men are better farmers than women. In fact, Quisumbing (1996) strongly states that men and women are equally efficient farm managers. Empirical evidence in five countries, Kenya, Burkina Faso, Nigeria, Korea and Thailand suggests that male and female farmers can both be good farmers if individual characteristics and input levels are controlled for. It was also noted in that study that the case of Burkina Faso was an exception in which women were seen as inefficient farm managers mainly because of cultural constraints, such as having more active roles and obligations within the household and lower levels of education and technical development. A recent report by FAO (2011) further reinforced this view by suggesting that closing the gender gap in agriculture and increasing women's access to agriculture would generate significant gains in food production. In particular it would raise the total agricultural output in developing countries by 2.5 to 4 per cent, which translates to a reduction of hungry people in the world by 12 to 17 percent. It is fair to say that if women and men were given equal access to resources and recognition, then this will be the beginning to see the world to be less oppressive to women and that this might increase the welfare of the society.

2.4. Climate change: an emerging threat

With increasing population and economic integration, an emerging threat such as climate change has a detrimental impact on both men and women in agriculture. This becomes a reality rather than a perceived uncertainty and risk in the future. Thus, adequate responses to climate change are important to reduce the expected impact as climate variations occur. Adaptation responses, as well as mitigation, are critical strategies that every state and person should act upon with careful consideration. Moreover, as climate change is expected to have differential impacts across nations and peoples, these responses should be examined in a focused and detailed way.

2.4.1. Climate change causes and potential impacts

The Intergovernmental Panel on Climate Change (IPCC), the leading international body for the assessment of climate change, refers to climate change as the 'change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically

decades or longer'. The IPCC attributes climate change to natural variability or to human activity, while the United Nations Framework Convention on Climate Change (UNFCCC) highlights the contribution of human activities to changes in climate that alter the composition of the global atmosphere in addition to the natural climate variability that can be observed over a comparable period of time (UNFCCC, 2007). Climate change is mainly characterised by increases in average global temperature (global warming); changes in cloud cover and precipitation, particularly over land; melting of ice caps and glaciers and reduced snow cover; and increases in ocean temperatures and ocean acidity due to seawater absorbing heat and carbon dioxide from the atmosphere (UNFCCC, 2007:8).

The fourth assessment report of the IPCC in 2007 clears many uncertainties in climate change. It claims that warming of the climate system is unequivocal as new evidence from the observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea levels shows. In the same year, the UNFCCC secretariat released reports which clearly show that these characteristics of climate change are mainly due to man-made emissions of greenhouse gases. The increase in the world's population and a heavy dependence worldwide on economic growth that is energy intensive has contributed to this. Increased burning of fossil fuel, production of mining waste, overuse of agricultural chemicals, land-use changes and other practices have resulted in environmental contamination and a build-up of greenhouse gases. These gases include carbon dioxide (CO₂), methane (CH₄) and nitrogen dioxide (N₂O). A rise in these gases has caused a rise in the amount of heat from the sun held in the Earth's atmosphere, heat that would normally be radiated back into space. This increase in heat is the greenhouse effect, which causes climate change. The IPCC (2007) report gives a detailed account of these observations and some clear projections of the upcoming challenges due to climate change. Atmospheric concentrations of carbon dioxide increased from a pre-industrial value of 278 parts per million to 379 parts per million in 2005, and the average global temperature rose by 0.74°C over the last century. This trend is the largest and fastest warming observed by scientists in the history of the Earth. The increase in the rate of warming was experienced particularly over the last 25 years.

Eleven of the 12 warmest years (1995–2006) on record have occurred in the past 12 years.

Moreover, the IPCC (2007) report recognises that climate change has begun to affect the frequency, intensity and length of many extreme events, such as floods, droughts, storms and extreme temperatures. Thus, a special report on managing the risks of extreme events and disaster to advance adaptation to climate change was proposed (IPCC, 2009). In this special report, a clear relationship between climate change and extreme weather and climate events (climate extremes) is established. The report states that ‘a changing climate leads to changes in the frequency, intensity, spatial extent, duration and time of extreme weather and climate change events, and can result in unprecedented extreme weather and climate’ (IPCC, 2012:5). Separate studies had already been conducted showing the overwhelming impacts of extreme weather events in different parts of the world: the Australian drought (Alston, 2007; Alston and Whittenbury, 2012), extreme flooding in different countries such as Bangladesh (Sultana, 2010), more frequent typhoons and floods in the Philippines (Tatlonghari and Paris, 2013) and sea-level rises in the Pacific region (Alston, 2013) are just a few of the many studies which recognise that the poor, women and children were the hardest hit by such climate disasters.

2.4.2. Global climate politics

Global efforts to address climate change issues began formally with the creation of the Intergovernmental Panel on Climate Change (IPCC) in 1988. It was jointly established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). The task of the IPCC is to provide clear scientific knowledge about climate change and its environmental and socioeconomic impacts. Its first scientific report in 1990 provided important information about climate change that became pivotal to the creation of the United Nations Framework Convention on Climate Change (UNFCCC), the key international treaty that binds different countries to address the issues of climate change (IPCC, 2012). In 1992, the UNFCCC was adopted and opened for signature at the 1992 UN Summit for Environment and Development also known as Earth Summit in Rio de Janeiro. The treaty also establishes the Conference of the Parties (COP)

and the UNFCCC Secretariat that supports the international process of climate change negotiations (Rohr, 2006).

Other outcomes of the Earth Summit include Agenda 21 and the Rio Declaration which gave attention to gender. Agenda 21 recognised women as one of the nine major groups whose active participation is crucial to achieve sustainable development (Rohr et al., 2009). In 1995, an international women's forum, Solidarity in the Greenhouse was run parallel to the first COP in Berlin. Two hundred women from 25 countries came together to discuss their views on climate protection (Rohr, 2006). It was expected, that from then on women's concerns and issues would be part of the succeeding climate change negotiations. This did not happen, however, as climate protection had been presented as a gender neutral issue (Rohr, 2006).

UN conferences have, however, also acknowledged the importance of a gender approach to implementing policies. In fact, gender equality was identified as one of the Millennium Development Goals and it became a cross-cutting issue for the work of the Commission on Sustainable Development, 2002–2017 (Hemmati, 2005; Rohr and Hemmati 2008; Rohr et al., 2009). Despite the UN's effort to integrate gender to its process, however, the UNFCCC does not include gender in its international framework for addressing climate change (Aguilar, 2009; Skinner, 2011). This is a growing concern among feminist scholars and activists as this could lead to gender concerns in the national and international policies dealing with climate change issues being neglected. Despite this, human rights, disaster risk reduction and gender instruments still influence the UNFCCC and its work. Out of the 195 parties and observer states to the UNFCCC, only eight have not signed the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW), the principal instrument for the protection of women's rights, which was adopted in 1979 (Aguilar, 2009). This shows that majority of the parties to the UNFCCC have already made a commitment to gender equality. Thus, gender issues can still be incorporated in climate policy; it just needs the right language to make it through in a science-dominated instrument. This action is possible as the IPCC, the scientific body that informs COP processes on climate change, has already mentioned the adverse effects of climate change on women in its previous reports, such as the 4th Assessment Report (IPCC, 2007), and is

expected to provide more information about gender issues in their 5th Assessment Report (IPCC, 2012). Moreover, efforts have already been made in past COPs for gender to be noticed in climate change negotiations. One of these efforts was during COP 9 in Milan where a network of women was formed to pursue gender matters. The network was formally recognised as Gender CC – Women for Climate Justice during COP 13 in Bali where the network produced several position papers tackling the gendered impacts of climate change (Alston, 2013). This formal recognition provided an entry point for tackling gender issues and in 2008 the UNFCCC Secretariat was persuaded to include gender-specific recommendations in conference documents (Skinner, 2011). This clearly demonstrates that collective efforts can have a substantial impact on gender issues being recognised and included in the international climate change negotiations. It is worrisome to note, however, that a small percentage of women are represented in the COP process; only 15 to 25 per cent are heads or members of the national delegations (Alston, 2013). ‘This gender imbalance not only results in unrepresentative policies, but it also denies women the right to participate and have a political voice’ (Skinner, 2011:4). This poses a challenge for the women’s organisation to be formally recognised as part of the international climate change debate (IPS, 2010).

Meanwhile, the UNFCCC recognises that there is a need to reduce emissions as the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases (UNFCCC, 2012). Thus, the Kyoto Protocol was adopted in 1997 during the third COP in Kyoto. The Kyoto Protocol legally binds developed countries to emission reduction targets. The protocol’s first commitment period started in 2008 and ended in 2012. In 2010, governments agreed that emissions needed to be reduced so that global temperature increases were limited to below 2 °C (UNFCCC, 2012) but despite such a clear reduction target the ‘process to gain global cooperation has been painfully slow’ (Alston, 2013). At COP17 in Durban, governments of the parties to the Kyoto Protocol decided that a second commitment period, from 2013 onwards, would seamlessly follow the end of the first commitment period (UNFCCC, 2012). The vision may be smooth but long negotiations and their outcomes tell a different story.

Tensions were observed from COP 3 through subsequent COPs, as no binding agreement has been achieved. During COP 15 in Copenhagen in 2009, developing countries such as China and India clamoured for some leeway for them to further develop before committing to any binding agreement, while Pacific island countries were discontented with the lack of action (Alston, 2013). Consequently, US President Obama and other world leaders decided to put off the difficult task of reaching a climate change agreement and opted for a less specific politically binding agreement (Cooper, 2009). A Copenhagen Accord was formulated which was set to limit the maximum average temperature increase to no more than 2 °C. The target is subject to review in 2015; however, there was no agreement on how to do this in practical terms (UNFCCC, 2012). The lack of a global and binding agreement to address greenhouse emissions clearly shows that some countries are able to continuously emit greenhouse gases beyond the limit while other countries and social groups vulnerable to climate change are constantly being challenged by its negative impacts. It is not enough, therefore, to wait for the UNFCCC to unify all the parties and come up with a binding agreement. The present global climate debate instead poses the challenge for local individuals, civil societies and national governments to take their own practical actions regarding climate change.

2.4.3. Responses to climate change

As argued earlier, climate change impacts require all stakeholders to respond to climate change. The formal reports and discussions of the UNFCCC and the IPCC identify two main responses to climate change: mitigation and adaptation responses. Mitigation responses involve human interventions to reduce the emissions of greenhouse gases or enhance their removal from the atmosphere by *sinks* such as forests, vegetation or soils that can reabsorb CO₂ (UNFCCC, 2009). Adaptation responses, on the other hand, are defined by the IPCC as processes through which societies make themselves better able to cope with an uncertain future. Adapting to climate change entails taking the right measures to reduce the negative effects of climate change (or to exploit the positive effects) by making the appropriate adjustments and changes (IPCC, 2007:10).

Mitigation responses

The Kyoto Protocol identified three main mitigation mechanisms that countries can adapt to reduce their greenhouse gas emissions. These include the Clean Development Mechanism (CDM), Joint Implementation (JI) and Emission Trading. CDM is a mechanism that can fund sustainable development projects in non-Annex I Parties ⁴(mostly developing countries) that could enhance sinks through afforestation or reforestation or reduce emissions while JI is funding countries with economies in transition (EIT). Emission trading, on the other hand, is a mechanism that allows Annex I Parties (industrialised EIT countries) to trade credits or emissions allowance among themselves (UNFCCC, 2009). These mitigation strategies are more straightforward mechanisms compared to adaptation strategies. The process of mitigation mechanisms has been formalised and has been written in a policy instrument.

Adaptation responses

Because climate change is expected to have differential impacts across nations and people, adaptation responses attract the attention of scholars, development workers and even policymakers. Different studies define adaptation differently, depending on the context of the study. Grothmann and Reuswig (2006:102) define adaptation as ‘the ability of people to avoid some of the potential damages through adjustment in ecological, social or economic systems in response to actual or expected hazards and their impact’. Similarly, other studies (Smither and Smit, 1997:135; Smit et al., 2000) specifically refer to adaptation as a strategy that ‘involves change in a system in response to some force or perturbation related to (climate)’. Adaptation aims to make improvements to current living standards based on ‘learning from the past to make improvements from changing circumstances’ (Yamin et al., 2005:5; van Aalst et al., 2008). Moreover, because the word *adaptation* connotes adjustment to some sort of change in environment and to some uncertainty, it is now widely use in the disaster and climate change research. The UNFCCC, (2007:10) defines adaptation as follows:

Adaptation is processes through which societies make themselves better able to cope with an uncertain future. Adapting to climate change entails taking the right

⁴Annex I Parties are industrialised economies in transition (EIT) countries

measures to reduce the negative effects of climate change (or exploit the positive ones) by making the appropriate adjustments and changes.

In the same way, the IPCC (2007) and other studies (Burton et al., 1998; Adger et al., 2003; Rincon and Virtucio, 2008) refer to adaptation as an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects to moderate the impacts of climate change and to take advantage of new opportunities and benefits that may arise as a result of new climatic conditions. Thus, adaptation is a response that 'can reduce people and their system's vulnerability to climate change through the reduction of their sensitivity' (IPCC, 2007:64).

Adaptation responses are viewed and analysed in various ways. Smithers and Smit (1997:142) present three dimensions of adaptation that are important in analysing adaptation response: the nature of the disturbance stimulus or force of change; the properties of the system that may influence its sensitivity; and the type of adaptation undertaken. Smit et al. (2000) extend this to an anatomy of adaptation particular to climate change by posing the questions (1) Adaptation to what? (2) Who or what adapts? and (3) How does adaptation occur? Based on his concepts, the question 'Adapt to what?' can be answered in different ways: it can refer to climate change, to change and variability or just to climate. It can also be a response to climate's adverse effects or to the vulnerability of the system. It can be a response to past, actual or anticipated conditions. The answer to 'Who or what adapts?' could involve people, and social and economic sectors or activities. The nature and effects differ based on the properties that relate to adaptation propensity such as adaptability, vulnerability, viability, sensitivity, susceptibility, resilience and flexibility. Lastly, the answer to 'How does adaptation occur?' It could be by passive, reactive or anticipatory action, or it could be by spontaneous or planned action.

Meanwhile, Burton et al. (2008) introduces another way of understanding adaptation strategies according to adaptation measures. He identifies eight categories: (1) *bear losses*, comparing all other adaptation measures with the baseline response of 'doing nothing' except bearing or accepting the losses; (2) *share losses*, sharing the losses among a wider community; (3) *modify the threat*, exercising a degree of control over the

environmental threat itself; (4) *prevent effects*, preventing the effects of climate change and variability; (5) *change use*, changing the use (e.g. cropping) where the threat of climate change makes the continuation of an economic activity impossible or extremely risky; (6) *change location*, changing the location of economic activities; (7) *research*, researching new technologies and new methods of adaptation; and (8) *educate, inform, and encourage behavioural change*, disseminating knowledge through education and public information campaigns, leading to behavioural change.

The abovementioned studies specifically use a typological and thematic way of understanding adaptation strategies. They apply a more scientific way of viewing adaptation strategies. Using such analysis can be limiting, however, in that it cannot accommodate the complexity of adaptation strategies that occur in the local context. There are underlying factors that can influence adaptation strategies that are important in understanding adaptation responses. Thus, another group of scholars offers different approaches to understanding adaptation response. They introduce the concept of vulnerability (Adger and Kelly, 1999), social and economic institutional constraints (Kelly and Adger, 2000) and adaptive capacity (Adger et al. 2003) as important concepts in understanding adaptation response. These studies also introduce the concept of social vulnerability as an influence on adaptation response. Other studies introduce psychological factors in determining adaptation (Grothmann and Patt, 2005; Grothmann and Reusswig, 2006). In this approach, risk perception is shown to also affect adaptation response. Meanwhile, recent studies introduce factors such as gender, caste, social norm and values (Aguilar, 2009; CARE, 2010; Lambrou and Nelson, 2010; Neilsen and Greenberg, 2010; Onta and Resurreccion, 2010). These factors play a key role in determining whether a certain adaptation strategy will be rejected or accepted at the local level. Because of the overwhelming importance of such factors in understanding adaptation, the following sub-section offers detailed discussions about these key concepts and uses these concepts to introduce gender as the social factor that affects adaptation to climate change.

Concepts around adaptation responses

Much of the international policy instruments in climate change and disaster research share broad concepts related to adaptation response. Three of those concepts that stand out based on their frequency of use and their impact on contemporary policy making are vulnerability, capacity and resilience (Gaillard, 2010). The concept of vulnerability has been used by scholars in quite different ways. There are a variety of definitions which depend on disciplinary orientation and the way this term is used in a particular study. With this in mind, Yamin et al. (2005:4) discuss various definitions of vulnerability based on different discipline and policy approaches. They specify three broad approaches to vulnerability studies: the natural hazards and disaster approach, the social vulnerability approach and the integrative approach.

The natural hazards and disaster approach focuses on the hazard and the extent of exposure of affected communities in identifying the impact's hazard-related vulnerabilities (Yamin et al., 2005:4). Downing et al. (1999:5) refer to vulnerability in this context as 'the degree of loss (from 0 percent to 100 per cent) resulting from the potentially damaging phenomenon. In this definition, vulnerability can be seen as an outcome of certain phenomena (Few, 2003). This view gives much attention to factors such as the frequency (or probability), intensity and nature of the physical hazard as key components of vulnerability and the exposure of communities to such hazards. This view, however, fails to account for the socioeconomic conditions and power relations that shape the vulnerability of a particular system or group of people (Yamin et al., 2005:5).

The work of Blaikie et al. (1994:9) gives another view of vulnerability. They define it as the 'characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of natural hazards'. Succeeding studies adapt this definition (Adger, 2000; Kelly and Adger, 2000). Burton et al. (2008) define vulnerability in their study as 'susceptibility to harm or damage potential' considering factors such as the 'ability of a system to cope or absorb stress or impacts and to *bounce back* or recover'. In this light, vulnerability is seen as 'set of attributes that conditions outcome': the societies' susceptibility to impacts' (Few, 2003:48). Furthermore, vulnerability stresses the condition of a society that makes it possible for a hazard to become a disaster

(Cannon, 1994; Gaillard, 2010:13). This perspective is described as the social vulnerability approach, where vulnerability is already *given* and embedded in the social and political order. One implication of this approach is that policy shifts from the macro level, where hazards are being addressed through disaster mitigation and risk reduction, to the micro level, wherein vulnerable groups and individuals are being capacitated in order to adapt.

While both the mitigation response and the adaptation approach discussed above serve their purpose in their respective disciplines, a third approach, the integrative approach, focuses on both the effects of the hazard itself and the socioeconomic set-ups that condition vulnerability. This approach was developed from climate change research. The state of the art integrative approach to vulnerability comes from the disaster community and is set out in the Hyogo Framework 2005–2015, adopted by the UN in 2005.

Vulnerability is defined as ‘the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.’ *Hazards* are defined as ‘a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation (Yamin et al., 2005:5)

This definition is also reflected in the IPCC Technical Summary Report (2007), where it defines vulnerability as a function of physical and social aspects of a system:

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. *Vulnerability* is a function of the character, magnitude and rate of climate change and the variation to which a system is exposed, its sensitivity and its adaptive capacity. (IPCC, 2007:27)

The IPCC definition of vulnerability emphasises that vulnerability can be attributed to the physical and social conditions of a system or group of people. The degree of exposure can be largely influenced by the physical location of the system. For instance, the degree of exposure to flooding can be measured by indicators such as flood frequency, water level, flow velocity and flood duration in a given region. Sensitivity to flooding can be measured

by population density, economic values and building structures in the exposed regions. Adaptive capacity, on the other hand, captures the ability of people to avoid some of the potential damage through adjustments in the ecological, social or economic systems in response to actual or expected floods and their effects or impacts (Grothmann and Reusswig, 2006:102).

Meanwhile, Few (2003) argues in his study that while the degree of exposure because of the physical environment (e.g., flood-prone areas) makes a group of people vulnerable, vulnerability is often a result of poverty. Historically, the sites avoided by the considered more wealthy, such as low lying sites along the rivers, flood plains and coastal marshes, are often settled by the poorest communities because of their proximity to sources of economic livelihood (Zoleta-Nantes, 2002; 2007) and for some it is just a matter of the affordability of the land or its accessibility. Moreover, some studies suggest that hazards such as flooding are not rated as a problem but as a trade-off for occupying such a location or as a smaller problem than their economic concerns (Stephens et al., 1996; Davis and Hall, 1999; Dalisay, 2008). This concern was raised by Gaillard in his study (2010:222). He states:

Assets and resources essential in the sustainability or un-sustainability of livelihoods are conversely crucial in defining vulnerability. Such an intimate relationship between livelihood and vulnerability justifies that many people have no other choice but to face natural hazards to sustain their daily needs.

Drawing from the example of these studies, Few (2003:50) argues that 'vulnerability is more than just a product of physical location but it is also a social product'. Being in a specific location is inherently more due to human decisions and social arrangements than to the social and economic situation. This argument is supported by Adger et al. (2003:181) as they conclude that 'vulnerability is a socially constructed phenomenon influenced by institutional and economic dynamics'. Studies such as Few, (2003); Enarson, (2000); Cannon, (2002); Adger et al., (2003) and many others focus on *social* vulnerability because it is more practical to explore social vulnerability as physical exposures to hazards are also influenced by social factors. Following this argument, Cannon (2002:47) lists some of the components of vulnerability that vary from higher to

lower levels of political and social factors: (1) the initial condition of a person, how well fed they are, what their physical and mental health and mobility is and their capacity for self-reliance; (2) the resilience of their livelihood, how quickly and easily they can resume activities that will earn money or provide food and other basics; (3) a person's opportunities for self-protection, the right type of building to resist high winds or a house site that is raised above flood levels; and (4) a person's access to social protection, forms of preparedness provided by institutions at levels above the household (systems that supplement what people can afford and implement measures that can only be provided collectively, such as codes to improve building safety, or warning systems) and social capital. These components of vulnerability identified by Cannon are largely determined by the availability of resources and, crucially, by the entitlement of individuals and groups (Few, 2003) that determines what resources an individual can access and use in order to adapt. This is well documented across a wide range of political and economic circumstances and development processes (e.g. Sen, 1981; Hewitt, 1983; 1997; Bohle et al, 1994; Adger, 1999). Enarson (2000:3) identified key survival and recovery resources that are critical in determining a person's vulnerability:

Access to such key resources as social power, strong social networks, transportation, time, information, bureaucratic skills and literacy in dominant languages is socially distributed. Other key resources for disaster survival and recovery include control over land, money, credit, and tools; households with low dependency ratios; good health and personal mobility; household entitlements and food security; secure housing in safe locations; and freedom from violence. Diverse income sources, secure employment, labor mobility, relevant job skills, and control over economic decisions in the household are critical.

Within societies, an individual's ability to access and control resources is also shaped by age and physical ability, citizenship status, racial, ethnic and cultural group, and gender (Enarson, 2000). The unequal exposure to risk generated by social systems by making some people more prone to risk and the opportunity to resist it is largely due to power relations operating in a society (Bankoff, 2003:96). In this case, the effect of gender as a fundamental division in every society can be highlighted. As the literature shows, 'gender and power relations greatly affect the socially-constructed vulnerability' (Enarson, 2000; Nelson et al., 2002:54).

Furthermore, vulnerability is not solely determined by the physical and social factors within a given society. With globalisation and integration, global forces now shape the social phenomena (van Krieken et al., 2000). Global forces such as environmental degradation, increasing social inequalities, population pressure, hyper-urbanisation and economic globalisation increase the likelihood of destruction after disasters. Increasing technological interdependencies also exacerbate social disruption. Due to increasing population density, there were three times as many disasters in highly vulnerable locations in the 1990s compared with the 1970s (Enarson, 2000).

In summary, human vulnerability to hazards has many causes. Factors that determine the vulnerabilities of an individual, a group or a community are hazard- and society-specific. This means that in order to understand vulnerability, it is important to specify the hazards and identify the groups or societies we are talking about. Some societies are susceptible to specific hazards (e.g., flooding) but not to others (e.g., earthquakes). Also, within a specific society, some individuals are more susceptible to hazards because of their social and economic situation. Thus, the physical, social and economic conditions of an individual, group or society largely determine how they are affected by any hazards.

Meanwhile, capacity reflects 'people's ability to face climate related or any hazards which was not captured in the mainly negative concept of vulnerability' (Gaillard, 2010:220). The concept has been long used in reference to the ability of a system to face ecological changes (Holling, 1973; Gaillard, 2010) and is now referred to as *adaptive capacity* by the IPCC (Parry et al., 2007). Adaptive capacity mainly refers to the resources and assets that people possess that allow them to resist and cope with hazards and also to adapt from disasters they experience (Davis et al., 2004). It also refers to the ability to use and access resources in order to adapt; this ability is mainly determined by a household's rights and entitlements (Few, 2003). These resources can be in the form of natural, human, physical, financial and social capital. It is important to have these resources and assets since the greater and more varied the resources, the more secure a household will be. Households and communities, however, have different resources and entitlements that largely define their adaptive capacity. Sen (1981) in his book *Poverty and Famines* conceptualises the

connection of vulnerability and entitlements. He argues that starvation is a result of failure to be entitled to food (Sen, 1982). People are vulnerable and insecure when they do not have the means to access resources even if resources are abundantly available. Adger and Kelly (1999) use this entitlement approach in assessing the capacity of an individual to adapt to stress. They emphasise that 'the degree of entitlement to make use of resources determines the ability of that particular population to cope with and adapt to stress' (Adger and Kelly, 1999:256). Entitlement to material assets in this view are mostly legitimised by government and formal laws. Thus, they argue that adaptation 'occurs through the actions of individuals facilitated or constrained by relevant institutions as well as through the action of the institutions themselves' (Adger and Kelly, 1999:258). Although it may seem that capacities are largely determined by an individual's access to and control of resources, capacities are often rooted in resources endogenous to the community that are mainly in the form of traditional knowledge, indigenous skills technologies and solidarity networks (Gaillard, 2010). Unlike vulnerabilities that are often influenced by structural constraints, capacities are developed and internalised by individuals or communities.

Resilience is defined as a form of adaptation that seeks to secure continuation of desired systems that can absorb disturbances through enabling alteration in institutional form (Nelson and Stathers, 2009; Pelling, 2011). Resilience of a community is often facilitated through self-organisation and social learning. Self-organisation, according to Pelling (2011), refers to the propensity for social collectives to form without direction from the state or other high-level actors, while social learning is described as the 'capacity and process through which new values, ideas and practices are disseminated, popularised and become dominant in society'. The outcomes of repeated social learning are common values, beliefs and behavioural norms that serve as the way of social life. While social learning usually seeks to improve established practices, it can also facilitate transitional and transformational adaptation but this requires critical thinking (Pelling, 2011). Thus, an individual can reflect on her past actions in order to adjust her social learning that can in turn lead to reflexive adaptation. Pelling (2011) stresses that reflexive adaptations are arguably the most significant indicator of resilience.

In terms of taking action through adaptation, individuals need to consider their capacity to identify problems, take decisions and act on them (Allen, 2006:84). As mentioned earlier, individuals act through social learning. In this sense, adaptation is characterised as decision-making largely dependent on the social processes. This reflects the negotiated adjustment between individuals, their networks, capabilities and social capital and the civil societies and the state (Adger, 2001; Adger et al, 2003). Larson (2002) extends this kind of perspective in a system approach where she engages different stakeholders in responding to climate change adaptation. A system approach brings together diverse policymakers, NGOs and community leaders to enhance the cultural vision of all stakeholders. This multilateral dialogue offers less powerful groups the opportunity to describe their own situations, prioritise strategic interest and implement meaningful adaptation. This dialogue produces the most effective capacity building initiatives through long-term partnerships among stakeholders. These relationships facilitate the equitable exchange of resources and create synergy for innovative adaptation.

This type of negotiation and innovative adaptation by different stakeholders and institutions is clearly illustrated in the case of households and communities dependent on the use of natural resources such as agriculture and fishing. These communities are faced with greater risks and uncertainties. They are highly vulnerable in such a way that they are always expected to adapt to changes in their environment brought about by climatic variation and other socio-economic environment. Their adaptation responses are more complex since they need to consider the interplay of their physical and socioeconomic environments. Aside from climatic events, hazards and extreme events, non-climatic forces such as economic, political, social and technological forces have proved to have significant implications for adaptive decision-making. Changing commodity prices, trade agreements and resources rights complicate the adaptation response. They may counteract or exacerbate the climatic events. Therefore, adaptive decisions are not likely to be based on climatic conditions alone (Smit and Skinner, 2002). People who are dependent on these livelihoods learn to see the bigger players who influence their vulnerability as well as the potential allies who could complement their adaptation strategies.

2.5. Gender and climate change

As mentioned in the earlier discussion, individual or household vulnerability is very much dependent on power relations within the society and on access to and control of resources. Assets and resources are very important for people to be able to secure themselves from disruptions in their external environment such as the effects of climate change. However, the ability to cope and the capacity to adapt varies between people. This fact is clearly recognised in the IPCC report (2007) which confirmed that the effects of climate change will be unevenly distributed among countries and social classes, and the poor and women will be hardest hit. Literature around gender, natural disaster, environment and sustainable development states that because of gendered norms, ascribed roles, inequalities in the access to and control of resources and low participation in decision-making, women are more vulnerable than men before, during and after disaster (Brody et al., 2008; Lambrou and Piana, 2006; Carvajal, 2008; Peralta, 2009). Regardless of whether the disasters are caused by climate change or not, women are expected to be more vulnerable.

2.5.1. Gendered vulnerability to climate change

Women's vulnerability to climate change is related to the nature of their ascribed roles, their access to and control over resources, and the existing power relations within their community. Many traditional economies are founded on a gender division of labour in which women typically have primary responsibility for certain areas of natural resource management. This means that women's connection to the environment has mostly been rooted in their work. They are largely dependent on nature as part of their ascribed role as women (Enarson, 2000), consequently, their access to and effective control over natural resources such as land, water and forests are important indicators of their gender positions. But women's role as resource managers does not necessarily mean that they have direct control over and benefit from these resources. The use and management of these resources, as well as the decision-making, are gender-differentiated (Dankelman, 2002:24). Generally, their access to and control of these resources are still limited. Ironically, even though they have limited control and access and thus limited benefits from these resources, they are required to maintain and manage them through their

gender roles. This implies that if the quality and quantity of resources are affected, women's work, effort and energy needed to maintain and manage the resources will also be affected. Consequently, women tend to be one of the most vulnerable to climate change. Moreover, because women spend a great deal of time in managing these resources, such roles cause some limits to some of their development options (Dankelman, 2002). They can be absent from some of the development activities in the community that can better secure them in times of disaster. Given their situation and their limited options, it is clear that it is the social settings and existing norms that drive gender inequalities which have existed in society even before any climate change related disaster events (Demetriades and Esplen, 2008)

The existing gender inequalities are one of the main causes of differential vulnerabilities among men and women, where women intersected with class and race are the disadvantaged and vulnerable group. Globally, women have less access than men to resources such as land, credit, agricultural inputs, decision-making structures, technology, training and extension services that could help them to develop their adaptive capacity to avoid or minimise the adverse effects of extreme weather events (Denton, 2004:48). These resources are hard to access and in some instances are institutionally unavailable to women (Osman-Elasha, 2009). For instance, customary law does not allow women to share land property rights along with their husbands and in some instances female heads of household are excluded from land entitlement schemes (FAO, 2010; Demetriades and Esplana, 2008). Because of this restriction, they cannot provide the collateral required for credit, and so their access to seed, new technology and information is limited. This limited access to resources could hinder adaptive measures and lead to poverty (Denton, 2004:48). Moreover, two-thirds of the one billion illiterate in the world are women and girls (UNESCO, 2007; Crooks, 2009). Although good understanding of their situation could help women to better adapt, limited education causes them to experience more hardship, to be voiceless and may cause them to be in cycle of poverty.

The worst consequence of gender inequality is poverty. Of the 1.3 billion people in the world living in poverty, 70 percent are women (UNESCO, 2007; Terry, 2009; Crooks, 2009). More women than men are poor because their access to and control over

resources is not equal to that of men. Poverty results in women having a limited ability to provide adequate self-protection, good quality housing, a safe location on raised ground and adequate food (Cannon, 2002). Thus, they are more likely to be vulnerable when disaster strikes. In Florida's hurricane Andrew, for example, Fothergill (1998:13) states that poor, minority women were the most at risk because they lacked status, power and resources; this is due to their reduced ability to create safe conditions during or after flooding or cyclones (Cannon, 2002:48). Households headed by women are particularly poor and vulnerable during and after disasters. Their vulnerability is not just because of their limited capacity but also because they carry most of the family burden caused by climate variability and extremes.

On the other hand, men also have specific vulnerabilities that can affect their health and safety and that are linked to ascribed gender roles, traditional norms and values, and how the ideas of masculinity are constructed. Men experience considerable stress when they are left with little economic and livelihood opportunities during and after extreme weather events. They are expected to provide for the family, and when they cannot suffer depression and to some extent mental illness (Alston, 2007; Demetriades and Esplen, 2008; Skinner, 2011). Men tend not to seek medical attention and health care compared to women, which makes them more susceptible to depression and stress during a crisis (Alston, 2007; Masika, 2002). Moreover, due to a perceived failure to make the masculine grade, men, particularly young men, tend to generate emotional tension and internal conflict which is expressed through fear, isolation, anger, self-punishment, self-hatred and aggression (Mishra, 2009). The anxiety and stress experienced by men can cause them to become violent and agitated. Several accounts show that women living in poverty bear the stress and violence of men after disaster as there are increased incidences of sexual and domestic violence (Nelson et al, 2002; Demetriades and Esplen, 2008). Moreover, Aguilar (2009) points out that men are usually exposed to risky situations and even death because they believe that they are the *stronger sex* and need to take on heroic action. For instance, when Hurricane Mitch struck Central America, men were engaged in outdoor activities and took fewer precautions than men when facing risks (Bradshaw, 2004; Neumayer and Plumper, 2007). Consequently, 'households headed by women rose up to 40 per cent in Nicaragua and half in Honduras' (Nelson et al., 2002:55).

In those cases where men survive the disaster, some go to other locations to find new jobs leaving women behind to do most of the household chores, and to 'borrow money to make both ends meet in case of crop failure and caring for the sick children and elderly' (Pulhin et al., 2006:33). There is growing evidence that extreme weather events (e.g., cyclones, floods) increase women's domestic burden in general (Cannon, 2002:48; Nelson et al., 2002:55; Zoleta-Nantes, 2002:254; Brody et al., 2008:4). Women need to devote more time to collecting water and to cleaning and maintaining their houses and properties after disaster. These increased burdens make it difficult for women to return to their productive work (Nelson et al., 2002:55) and cause them to miss some important decision-making processes which would address their situation because they are too busy attending the needs of their own household (Demetriades and Esplen, 2008). In some cases, women are also expected to engage in community organising and take jobs in the informal sector while men generally try to return to their pre-disaster work. Thus, women recover more slowly than men from economic losses due to increased responsibilities in their households and communities, damage to property and the loss of livelihood, exacerbated by less access to important resources to help with recovery (Peralta, 2009).

The earlier discussions suggest that in many poor societies women have a high share of agricultural activities but only little decision-making power or control over inputs and outputs (Lambrou and Piana, 2006:14). Women predominate in the world's food production (50 per cent) with an even higher percentage (60 to 80 per cent) in developing countries, and women work 66 per cent of the world's working hours yet they remain poor and receive only about 10 per cent of the world's income (FAO, 2010; UNESCO, 2010). This is because women do most of the world's unpaid labour, which is often unrecognised – such as childcare, cooking and cleaning (UNESCO, 2007). Moreover, men prefer mechanised agriculture and are responsible for irrigation and often claim more fertile land for growing market-oriented crops, while women are usually involved in very labour-intensive subsistence agriculture on more vulnerable and less fertile land (Lambrou and Piana, 2006; CARE, 2010). Because of the existing division of labour and inequitable access to and control over resources, the value of women and their contribution to household and community is unrecognised and belittled. This

consequence is clearly illustrated in the study of Enarson (2000:4) of the experiences of women at risk of floods in Bangladesh. She argues, 'it is not gender but gender inequality that puts girls and women at risk when floodwaters rise in Bangladesh':

Abul Kalam had five daughters and one son. He was a poor sharecropper. He was holding his children together and fighting against the wind – fearful of the rising water. In his struggle to survive, AbulKalam released his daughters one after the other, so his son could survive (Akhter, 1992:64).

The above account also shows that men (and society) value women less in some cultures. This also extends to the nutritional status of women living in poverty. In Bangladesh, 'women of all ages are more calorie-deficient than men, and the prevalence of chronic energy deficiency among women is the highest in the world' (Cannon, 2002:48). Valuing women less than men does not happen in Bangladesh alone, but also in other countries that are experiencing adverse effects of climate variability. Demetriades and Esplen (2008) outline some issues of vulnerabilities and consequences based on documented studies on climate change related disaster such as droughts and floods. In terms of physical and mental health, men and boys are favoured in the allocation of nutrition and health, just as they are in any of the other household resources. Consequently, women suffer more from health-related problems and are unlikely to seek health care because of limited resources and barriers to access such as immobility and religious constraints.

It should be noted, however, that inequalities among men and women are not only due to gender. Demetriades and Esplen (2008) caution against generalising inequalities as solely caused by gender since it is also embedded in and varies with class, age and race. Moreover, the analysis of the vulnerability of women should not be separated from men because women live with their families, they live with men. The relational nature of gendered power and the interdependency of men and women can be fully understood by looking at their lives and the consequences in their lives of any changes such as climate change. For instance, climate change raises the issues of men. Even though men seem to be the more privileged group in the society, men share with women the experiences of indignity and subordination as a result of social, class or racial discrimination, and political and economic oppression; this leaves men also vulnerable to climate change.

2.5.2. Gendered adaptation to climate change

Though it may seem that women are very vulnerable during climate change, several studies (Enarson, 2000; Denton, 2002; Nelson et al., 2002; Brody et al., 2008; Peralta, 2009; Sultana, 2010) highlight that women are often the key to household survival during disasters. Since women are largely dependent on nature as part of their ascribed role, they have a key role to play throughout the disaster cycle: preparedness, mitigation, relief and recovery (Enarson, 2002). As active members of households, as community leaders or members, as stewards of natural resources, women can offer different resources, indigenous knowledge and understanding of causes and consequences that could significantly contribute to responding to extreme climatic events (Peralta, 2008:18). Peralta (2008) points out that often women lead the communities in conserving natural resources, adapting crops to changing soil and climatic conditions and rebuilding following a natural disaster. This is supported by other studies (Brody et al., 2008:5; Mitchell et al., 2007) which stress that despite the obstacles women face in accessing resources for their adaptation, women who are already experiencing the effects of weather-related hazards such as erratic monsoon patterns, flooding and extended periods of drought, have developed effective coping strategies such as changing their farming practices. Women in Bangladesh described their changing farming practices as changing to flood- and drought-resistant crops, changing to crops that can be harvested before flooding season or changing to crops that can grow above the water when floods occur (Demetriades and Esplen, 2008:29).

While women are perceived to be the key agent in household survival during disaster, adaptation strategies by the household are still done hand-in-hand with men. Women's coping strategies are different from men, however, and are often based on their roles and gender norms (Dankelman, 2002; Lambrou and Nelson, 2010). Men, despite the loss of loved ones, assets, livelihood and income, continue to protect the household's remaining assets, safeguard family members from natural elements and violence and participate in post-disaster community activities such as repairing broken roads or clearing debris (Mishra, 2009). Women, on the other hand, generally seek for drinking water (Carvajal-Escobal et.al, 2008), take care of the health of the children and elderly (Peralta, 2008), secure food for the household and seek temporary income sources. Women also often

lead or help in disaster relief operations. They have a pivotal contribution to such community works as they are more aware of who in the community are most vulnerable and require assistance (Enarson and Fordham, 2001).

Sultana (2010) analyses the gendered dynamics of floods and disasters in Bangladesh. She identifies some pre-disaster adaptation strategies that households are undertaking before the onslaught of floods. These include 'making portable stoves, saving food stock and fuel in dry places, tying possessions to trees and huts, lifting belongings to platforms created just under the roof and learning to live on the thatched roofs when the floods are too high'. She mentions, however, that many households headed by women do not have the financial resources, labour power or sociopolitical clout to use those strategies compared to male-dominated households. She further states that after the disaster event, in male-dominated households, decisions on the management of assets, household repairs and purchases are often decided by men, which causes further gender subordination during disasters. In times of crisis, one of the key survival strategies is to sell personal assets belonging to women, such as livestock, jewellery, utensils and household goods. In many cases, property belonging to men is sold after women's property (Nasreen, 2000; Sultana, 2010). Sultana argues that while these strategies can meet the household needs, they often led to an extra burden on women as they are responsible for maintaining the kitchen and raising livestock. This also has implications for a woman's bargaining position in the household as it weakens as her assets are depleted and her income-earning options become inferior (Enarson, 2000:11). Furthermore, this leads to food insecurity and fewer sources of nutrition for the family. Sharing food with kin and eating less as a consequence of food insufficiency implies that women will eat last and least in order to ensure that men and children are fed.

Migration as livelihood strategy is very common after floods and disaster (Enarson, 2000; Pulhin et al., 2006; Lambrou and Nelson, 2010; Sultana, 2010). Men more often move away in search of livelihood elsewhere. As a consequence, the women and children left behind are given the enormous burden of taking care of the domestic responsibilities, maintaining their livelihoods (e.g. farming and livestock), taking care of the sick and protecting themselves when men are away. This also has implications for family

relationships as Sultana (2010) accounts that such arrangements could lead to breakup of families and greater fragmentation where the possibility of desertion, divorce and polygamy can cause gendered suffering. Temporary out-migration is evident in Nepal, where men travel as far as the Nepal–China border to trade, or look for work in the main districts as masons or porters during drought periods (Onta and Resurrecion, 2011). This is also true in the case of male farmers from India, who temporarily migrate to cities for construction work during non-agricultural seasons (Lambrou and Nelson, 2010). Both men and women, however, are likely to seek employment elsewhere in response to low income due to extreme weather events. This has been highlighted in the study of Alston (2007) on the Australian drought which states that women are more likely to find work in small towns and regional centres for cash income.

Another dimension is the impact of adaptation strategies taken by other stakeholders such as government and societies. Programs and activities provided by other institutions can complement or constrain men’s and women’s adaptation and thus further improve or aggravate current vulnerabilities. A few studies (Boyd, 2002; Larson, 2002; Boyd, 2002; Sultana 2010) highlight the impacts of other institutions on the lives of men and women. Two separate studies (Boyd, 2002 and Sultana, 2010) illustrate that adaptation responses could fail if they do not consider other stakeholders, particularly the target groups. The assessment of Boyd (2002) of the Noel Kempff project in Bolivia demonstrates how a UN carbon sequestration pilot project that aimed to provide sustainable development benefits for forest-dependent people as well as to reduce greenhouse gas emissions had limited success in achieving its local development objectives. Boyd argues that this was partly due to the patriarchal underpinnings of the sustainable development and climate change policy agendas. There were gender-based inequalities in employment opportunities, and in power and decision-making processes. Women complained that in some ways the project did provide gender needs such as health, education and income-generating activities, but it was not sustainable, it was labour intensive and households headed by women needed to pay labourers or rely on the help of other male family members to clear plots of land. The author argues that the women’s needs were addressed but their interests were not advanced. The author states that the project’s enforcement of existing social structures and wide reliance on the traditional norms of

decision-making weakened women's ability to participate within or influence it. In another study, Sultana (2010) assesses the impact of a flood control drainage (FCD) project in Bangladesh. The project changed the hydrological balance of the area causing the water bodies important for fishing and water storage to disappear in some areas. Thus, fish stock suddenly diminished and fish as a source of protein for the rural poor and for income particularly for women was greatly affected. Subsistence fishing was further severely hindered as common property land was leased out under FCD areas. These two studies demonstrate that gendered vulnerabilities and adaptation strategies are influenced by other stakeholders. Development programs, if they continue to be gender-blind, can cause more harm than good.

Meanwhile, there is emerging research into the gendered nature of risk perceptions. These studies argue that men and women do not hear, believe or personalise disaster warnings in the same way (Fothergill, 1998; Messner and Meyer, 2006; Brody, 2008; Ho et al., 2008; Terry 2009). Men and women, although living within the same community, do not share the same opinions and priorities regarding climate risk and also express different levels of concern (Terry, 2009:8). Fothergill (1998:14) stresses that while there is agreement between men and women in the perceptions of specific hazards, 'women tend to show more concern with danger, human suffering and loss of life'. Men, on the other hand, are more focused on knowing the specific, technical aspects of protective measures. Women tend to personalise disaster as they see disaster as life-threatening. Thus, women are more sensitive to risks and are more likely than men to want to evacuate (Fothergill, 1998:17). They are also less likely to perceive governmental policies and measures taken to deal with climate change as sufficient. Consequently, they seem more prepared for behavioural changes than men, as fewer women than men believe that science and technology will solve environmental problems without changing their lifestyle (Brody et al., 2008:15). Gender differences in relation to risk perception may be explained by a number of factors. For instance, the source of information has an effect on men's and women's risk perception. Women tend to value the information given by an individual from their social networks, their peers, such as friends, neighbours and relatives, and subsequently relay the warnings to their husbands. Their husbands, on the other hand, are skeptical of these peer warnings (Fothergill 1998:16). Women are also

more likely than men to receive help from family members and to collect emergency payments and seek public assistance for the family. Many men feel that accepting financial aid carries a stigma and that the payments challenge their role as breadwinner (Fothergill, 1998:21). On the other hand, men rely more on risk communication campaigns as they are the main recipients of many institutional programs. Since men are likely to feel that the disaster is less life-threatening than women, they feel less fear of financial loss or sense of dread than women. Consequently, men are likely to decide to take less or no mitigation action compared to their female counterparts (Ho et al., 2008:642). Another explanation could be the differences in their economic status. Women generally have lower socioeconomic status than men, and therefore are more sensitive to the possibility of resource loss (e.g., monetary loss). In addition, women are physically more vulnerable than men, and thus more sensitive to risk (Ho et al., 2008:641).

The abovementioned studies also argue that differences in risk perception among men and women affect their gendered adaptations. A closer look at those studies suggest that the differences in risk perceptions and the way men and women respond to pre-and post-disaster events are not inherently because of differences in their physical abilities but more because of differences in their socially constructed identities, behaviour, norms and customs. It again goes back to the society's concept of gender; on how culture defines being a man and being a woman. How men and women view an event like flooding can be greatly dictated by their socially constructed roles and behaviour. Also, their positions in society give them different pathways to accessing information and resources that shape their perception of risk and so their adaptation strategies.

2.6. Climate change: a real threat or opportunity for change?

Climate change has the potential to produce new and different weather patterns that can worsen current typhoons and precipitation occurrence and thus flooding events. Based on various research findings, extreme weather events have gender-differentiated impacts (Enarson, 2000; Lambrou and Piana, 2006). As discussed in previous sections, women are the caretakers of the natural resources and to maintain their livelihood they need to change cropping and livestock production in response to changing weather events.

Climate change also has associated effects on the gender division of labour and income opportunities (Lambrou and Piana, 2006). Moreover, women lose productive assets, lose entitlements and they have hardly any access to resources, which adds to their burden. This clearly shows that women often lose economic resources due to climate change and consequently climate change contributes to the deterioration of their economic and relational status. These situations also imply that climate change can exacerbate the existing gender inequalities.

On the other hand, other studies (Enarson, 2000; Nelson et al., 2002; Lambrou and Nelson, 2010; Mishra, 2009; Sultana, 2010) look at climate change and extreme weather events as a window of opportunity to alter existing social arrangements and power relations. Disaster, for instance, may enable women to challenge or override the existing gender norms. This can affect the current division of labour and allow women to explore possibilities of engaging in more productive activities than the socially ascribed roles. Gender norms are challenged as women take on roles traditionally taken on by men, gain new skills and change their view of themselves and their capabilities. As women struggle to revive their status and livelihood, the post-disaster period also serves as a window of opportunity for personal security, land rights, secure housing, employment, job training, decision-making power, mobility, autonomy and a voice in the reconstruction process (Nelson et al., 2002).

Based on the country report synthesised by Enarson for Pakistan (2000:15), there are distinct gender divisions of labour during flood and in some instances there is a temporary shift in the gender division of labour when the household experiences an extreme weather event, men sometimes having to prepare food and women needing to cut fodder. Also, in Bangladesh, flooding causes a role reversal, where necessity often dictates what has to be done. Men increase their roles in childcare and provisioning of domestic water, while women have to go out into public spaces and violate *purdah* (gender-based segregation and seclusion) to seek food, shelter and relief/aid. Though they may face cultural and religious edicts, these are weighed against the need to survive (Sultana, 2010:4). The same situation happened post-cyclone in Orissa, India, where women took on men's roles. Since a crisis such as disasters or extreme weather events

could change the demography of place, age and sex ratios, it is necessary for women or men to step out of their conventional roles (Mishra, 2009:30).

According to Bradshaw and Linneker (2009), the idea that gendered change may occur is explained by several interrelated assumptions. First, women often having to assume non-stereotypical gender roles can change attitudes towards women's capabilities. Moreover, women are forced to take on new roles, including income-generating activities, which pave the way to improve their position within the household and enhance their ability to participate in decision-making processes around the use of household resources. Lastly, the physical absence of a male partner because of death, migration or desertion causes women to assume decision-making roles within the home and de jure or de facto headship of the household.

'Disasters are seen to be levellers, changing old gender norms and creating new power dynamics' (Mishra, 2009:32) as governments and humanitarian organisations create space for women and include them in discussions and enable them to influence larger community decisions in the aftermath of disasters. Also, the potential for empowerment is documented in changes in status for community women due to the initiatives of grassroots women's groups during post-disaster reconstruction efforts (Meyreles, 2000). Emergent women's groups, which so often arise in the wake of disaster, succeed when they build upon women's pre-existing neighbourhood connections and groups (Enarson and Meyreles, 2004). While it may seem that disasters seem to be good opportunities to reduce gender inequality and to empower women, evidence from Nicaragua shows that women's involvement in reconstruction initiatives was not enough to change their position or situation (Bradshaw and Linneker, 2009). The study also argues that although women might think that their situation has changed; men might not think and feel the same way. Moreover, Mishra (2009) argues in her study that it is a challenge for both men and women to violate the existing gender norms. 'No one individual or minority group could challenge it without retaliation from the rest of the community and from religious leaders and even possible humiliation or punishment of the women or girls themselves. Unless the entire community shares the same perception of how women suffer from the existing gender norms, such oppressive behaviour will still persist' (Mishra, 2009:32). A recent study by Alston and Whittenbury (2012) of the Australian climate crisis also

argues that although it led to some changes in gender relations, the enhanced economic contributions of women did not necessarily translate into an increase in power in gender negotiations. This is so because women's contributions are viewed as a farm survival strategy. Nevertheless, they also found that women are actively resisting their traditional gender relations by moving physically and mentally away from a farm family ideology, questioning gender inequalities and, by extension, their relationships.

Disaster studies provide insights into how gender roles and existing power relations might change due to disruption of power structures and norms. Since disasters are deemed temporary, however, the possibility of gendered changes is also deemed temporary (Enarson, 2000). A recent study by Enarson (2010) further argues that climate change is essential to reflect about women's situation and their experiences at the critical moment. Climate change offers a different scenario; it has the potential to challenge the existing gender power imbalances which can contribute to the realisation of greater gender equality and women's rights (Skinner, 2011). Furthermore, as men and women adapt to climate change, it creates a space for social reforms, and for the questioning of values that drive inequalities in development and our relationship with the environment (Pelling, 2011)

In summary, the gendered impacts and consequences of climate change have many possibilities. Climate change can exacerbate existing social problems, such as gender inequalities, or alter the existing norms and traditions that lessen women's subordination. These consequences cannot be pre-determined unless there is a good understanding of the present situation of men and women and action is taken through policy agenda and programs that can truly benefit both men and women. This can be done by reducing their vulnerability or enforcing their new found empowerment so that they can create their own ways to minimise their vulnerabilities.

2.7. Summary

This literature review has focused on the major interrelated areas around gender and climate change. Throughout the discussion of these areas of inquiry, feminist critiques and approaches have been brought to bear. This chapter also highlights the increasing importance of incorporating gender in climate change research. It particularly articulates

how women can be in a vulnerable situation and yet can be agents of change in the midst of climate change.

The first section of the literature review concentrated on the relevant studies associated with gender and environment and specifically gender and farming. It began by highlighting how women have an intimate relationship with their environment and consequently how it has been dominated by women. Different perspectives from developed and developing countries emerged from the literature. However, although the situations between developed and developing countries are very different, a common observation was drawn: men's domination permeates in farming even in modern agriculture. Several studies were shown to emphasise that because of the existing social arrangements and power relations, gender inequalities in terms of accessing important resources in agriculture still limit women. Therefore, women are in a weaker position particularly in the sphere of farming. However, no study was found informing that men are indeed superior farmers. The section ended arguing that women are equally efficient farmers as men and if women were to be given access to and control of resources, the agriculture sector could achieve a significant increase in its production and a reduction in the numbers of hungry people in the world.

The chapter moved to a review of literature on climate change. In this section, the review started with the definition of climate change and the expected impacts on societies of changes in climate. A sub-section tackled climate change policy, highlighting that the existing climate change policy instruments lack gender and so pose a challenge to feminist groups and scholars to deliberately make an effort to ensure gender concerns are incorporated in climate change policy negotiations. Responses to climate change were also discussed, emphasizing the different adaptation strategies taken by women and men in response to climate change at the local scale. Concepts related to adaptation were reviewed, such as vulnerability, adaptive capacity and resilience. In this sub-section the literature showed specifically that vulnerability to climate change varies across societies and groups of people, particularly women and men. It is understood that vulnerabilities are often influenced by structural constraints, and capacities are developed and internalised by individuals or communities. Moreover, adaptation responses are complex

because they are affected by the interplay of the physical and socioeconomic environment and even the responses of other stakeholders and institutions.

Using the concepts discussed from previous sections, a separate section about gender and climate change was developed. It mainly discussed the gendered vulnerabilities and adaptations observed across the world in response to extreme weather events. Most of the evidence from different studies showed that women are more vulnerable to climate change. It was also pointed out, however, that as much as women are vulnerable to climate change, men also experience the negative consequence of climate change. It was even argued in several studies that men often suffer from mental and emotional disturbance due to their strong connection to their livelihoods and masculine identities. Meanwhile, with the discussions about gendered adaptation, it was highlighted that women are often deemed to be the key agent of household survival. Because they are expected to secure food for the table and care for the welfare of household, they readily go out of their way to find food, collect water and fuel and take care of the sick and elderly. There was increasing evidence that they also participate in productive activities in those difficult times and even manage the farm as men migrate to look for alternative jobs. At the end of the section, a sub-section discussed two possible outcomes of climate change. It could exacerbate the worse situation of women or serve as an opportunity for women to negotiate their existing roles and alter the existing power relations. The section ended by concluding that these consequences cannot be pre-determined and a good understanding of the real situation of women and men is still needed.

CHAPTER THREE: GENDER AND CLIMATE CHANGE IN THE PHILIPPINE CONTEXT

3.1. Introduction

This chapter is a review of the existing Philippine literature about gender and climate change. It also provides an overview of the physical, social and economic conditions of the Philippines which influence how its people become vulnerable to different extreme weather events as well as how they adapt to them. The chapter begins with a discussion of the condition of the Philippines under climate change, how climate change threatens the lives of many Filipinos and how the government responds to climate change through its climate policy. The next sub-section tackles how men and women become vulnerable to climate change. This is followed by a discussion of the adaptation strategies taken by different groups. A summary of the chapter is then presented and, at the end of the chapter, the rationale for the research questions is discussed.

3.2. Philippines under climate change

Climate change is likely to be one of the most significant development challenges confronting the Philippines in the twenty-first century. Comprised of 7107 islands with a tropical climate and located in typhoon belt of the western Pacific, the Philippines is widely considered to be one of the world's countries most vulnerable to climate change and disasters (World Bank, 2010). This observation is consistent with the 2011 World Risk Report, which states that the Philippines rank third in the world for being at risk of disasters. With a 24.32 per cent disaster risk, the country is highly exposed to natural disasters such as storms, floods, earthquakes, drought and rising sea levels (Birkman et al., 2011).

According to the 2007 IPCC report, the temperature of the Philippines has increased by 0.14 °C per decade since 1971. The frequency of hot days and warm nights has also increased, while the number of cold days and cool nights has decreased. Moreover, since 1960, mean annual rainfall and the number of rainy days have increased (Anglo, 2005) while the frequency of typhoons entering the Philippines has increased more than four-fold during 1990–2003 (ADB, 2009). During the last decade, the country has experienced

the highest recorded rainfall and the strongest typhoons. Recorded floods and storms have risen dramatically, rising from just under 20 during 1960–1969 to nearly 120 by 2000–2008 (ADB, 2009). These climatic changes have led to severe flooding and landslides in different provinces which have caused devastating impacts on properties, livelihoods and human lives. Weather-related disasters accounted for 98 per cent of lives affected and 78 per cent of lives lost between 2000 and 2008 (World Bank, 2010). A longer period study indicates that intensified tropical cyclones from 1975–2002 caused an annual average of 593 deaths and annual property damage was estimated at \$83 million, including damage to agriculture of around \$55 million (Amadore, 2005; ADB, 2009).

Home to 92.34 million people (NSO, 2012), the Philippines consistently experiences heavy rainfall and strong typhoons. On average, 20 typhoons hit the country annually (NDCC, 2008). Heavy reliance on climate-sensitive sectors such as agriculture for livelihood makes a large percentage of the population vulnerable to extreme weather events. Eight out of ten Filipinos are exposed to climate-induced natural disasters and more than three-fourths of the national economy is derived from climate-sensitive sectors (Garcia Rincon and Virtucio, 2008; Peralta, 2008). This clearly shows that any change in climate could mean disaster for the Philippines.

Existing socioeconomic conditions, land-use practices and policy responses cause the high sensitivity of Filipinos to climate variability. As of 2009, 26.5 per cent of the population still lives below the poverty line (World Bank, 2013) and subsistence agriculture is the main livelihood (ADB, 2009). According to the International Fund for Agricultural Development (IFAD, 2009), almost 80 per cent of the country's poor live in rural areas and illiteracy, unemployment and the incidence of poverty are higher among indigenous peoples and people living in the upland areas. Small-scale farmers who cultivate land received through agrarian reform, landless workers, fishers, people in upland areas and women are also considered the poorest of the poor. In general, poverty is caused by a decline in the productivity and profitability of farming, shrinking farm sizes and unsustainable farming practices, which in turn cause the exploitation of natural resources through deforestation and overfishing. Moreover, poor people have little access to

productive assets and business opportunities. They have few non-farm income-generating activities, and lack access to microfinance services and affordable credit provided by the government.

According to the IFAD (2009) some vulnerable groups in the Philippines face specific problems. For instance, indigenous peoples' development is affected by the encroachment of modern technology and cultures onto traditional norms and practices. Meanwhile, fishers face continuing reduction in their catches and have few opportunities or skills outside of fishing. Women, however, are deemed poor because of their limited roles in marketing products and family responsibilities. Thus, when disasters strike, these vulnerable groups are expected to be hardest hit by their devastating impacts. Moreover, the weak economy has implications for the common people, especially the poor, such as farmers, fishers and women. The government has a limited capacity to provide basic services to its people. For instance, financial and infrastructure facilities that give access to financial and other farm inputs are costly and out of reach of poor farmers. Poor people have limited options of other employment opportunities and are left with agriculture and fishing for their livelihood, both of which are very susceptible to weather and economic changes.

3.2.1. Climate change and severe flooding in the Philippines

One of the key identified adverse effects of climate change is a widespread increase in flooding. Based on the IPCC Synthesis Report (2007), it is projected that by 2080 more people will experience floods every year due to rises in sea levels, particularly in densely populated and low-lying mega deltas in Asia and Africa and small islands in the Pacific. The report also suggests that there will be a significant increase in heavy rainfall events in many regions. This implies that it is likely that 20 per cent of the world's population will live in areas where there will be an increase in river flood potential. Furthermore, the report predicts that it is likely that future tropical cyclones (typhoons and hurricanes) will become more intense, with higher peaks in speed and heavier precipitation.

A study conducted by Manton et al. in 2001 predicts that the wet season days in the Philippines will become fewer but rain during those wet days will tend to be heavier than

usual. If these results are extrapolated it means two extremes events would both become more pronounced: drought and flood. Moreover, under the climate change scenario, an increase in sea-surface temperature enhances the strength, frequency and range of tropical cyclones (Emanuel, 2005). Consequently, since most of the tropical cyclones entering the country originate from the Pacific (ADB, 2009), flooding brought about by typhoons will be more frequent and intense and probably worse in coastal areas as it occurs alongside accelerated rising sea levels (CCC, 2010).

Nonetheless the direct causal link between specific extreme climate events and climate change is still under debate. It is even more difficult to predict what will happen to smaller-scale atmospheric events such as storms (Aalst et al., 2008). In a 2005 article, Anglo examines hurricane Katrina in the USA and typhoon *Yoyong* in the Philippines. In the case of hurricane Katrina, two groups of scientists have contending ideas about the connection of the occurrence of strong cyclones to climate change. Both groups of scientist confirm that the Earth is warming up and that there is an increase in the number of strong cyclones, but they disagree as to whether the hurricane was the result of climate change caused by human activity. The same is true of the Philippine typhoon, *Yoyong*. Anglo raises the point that the increase in the number of disturbances entering the Philippine Area of Responsibility (PAR) during the 1990s may be because of improvements in the technology of tracking tropical cyclones. He also argues that the typhoons from the 1960s to the 1970s appear to be as active as the recent ones, so the rising trend cannot be taken as a clear proof of climate change.

It is also problematic to attribute flooding trends to climate change since flood dynamics may have multiple drivers. According to Few and Matthies (2006), the incidence of flooding is strongly affected by a range of environmental changes. They point out that alterations in land cover, urbanisation and loss of wetlands can affect the incidence of flooding. Humans can be more vulnerable to floods because of increases in population, economic development and changes in settlement patterns. Though other factors may be the main cause of flooding in a specific location, the fact that extreme events are liable to adversely affect human wellbeing in the future means it is still worthwhile to explore the possibility of extreme weather events exacerbating the incidence of flooding. A recent

study of the IPCC (2012) finally establishes a clear relationship between extreme events and climate change. According to the IPCC (2012:5) changing climate leads to changes in the frequency, intensity, spatial extent, duration and time of extreme weather and climate change events, and can result in unprecedented extreme weather and climate. In the Philippines, climate change triggers the rise in temperature and variability of rainfall and super typhoon events (CCC, 2010). Denton (2002) stresses that since there is a high probability of climate change being linked with an increase in extreme climate events, it is important to monitor the occurrence of these events and how to cope with them. Even though extreme events may not happen as predicted by the climate change scenario, flooding hazards and their impacts need to be explored. As argued by Few (2003:46),

Flooding does not have to bring whole destruction or displacement to cause severe impacts. More frequent flooding events of lower magnitude can still bring serious damage by ruining crops and causing food scarcities, disrupting infrastructure and access to services, suspending business activities and exacerbating health risks. Moreover, continuous flood water makes people to face hazards for weeks or even months.

3.2.2. Threats to Philippine agriculture

Agriculture plays a major role in the economy of the Philippines. It is the main generator of income and employment in rural areas of the country. Agriculture accounts for about a third of employment and a fifth of gross domestic product (GDP) (ADB, 2009:152). About six out of ten people in rural areas depend on agriculture for their livelihood (IFAD, 2009). Main agricultural crops are rice, corn and coconut. In Mindanao, almost one third of the land is devoted to agriculture, which accounts for 40 per cent of the Philippines' food requirements. It contributes more than 30 per cent to the country's food trade (IFAD, 2009). Although the agricultural sector is growing at an average rate of 3.2 per cent (Worldbank, 2008), production is not keeping pace with population growth. A large part of Philippine agriculture operates at subsistence level with an average farm size of 2.5 hectares and is vulnerable to year-to-year weather changes (IFAD, 2009).

Agriculture is one of the most vulnerable sectors in the Philippines. Before the onset of climate change, the country had been traditionally exposed to climate hazards brought

about by typhoons and drought. El Niño⁵ years caused some farmers to totally give up rainfed rice farming due to extreme water shortages (ADB, 2009). During this period, agricultural crops became vulnerable to pest attacks and diseases which resulted in a significant decline in agricultural production in some areas (ADB, 2009). Previous El Niño years in 1982–1983 and 1997–1998 resulted in a significant decline in gross value added and in volume of production in four major crops: rice, maize, sugarcane and coconut (Amadore, 2005). La Niña⁶ years, on the other hand, bring rain, causing massive run-off, severe erosion of fertile soils and inundation of agricultural areas and aquaculture farms (ADB, 2009:38). These unpredictable weather patterns cause significant changes and uncertainty in farming systems, which in turn result in loss of production. In rice production, for instance, 82.4 per cent of total Philippine rice production losses from 1970 to 1990 were attributed to typhoons, floods and droughts (Lansigan et al., 2000).

Climate change has triggered a rise in temperature, an increase in super typhoon events and an increase in the variability of rainfall in the country (CCC, 2010). When the weather impacts of climate change combine with El Niño and/or La Niña events, the result is complex and unpredictable temperatures and extreme rainfall (CCC, 2010). Planting time and growing seasons have been changing due to erratic patterns of precipitation (ADB 2009:38). Farmers who depend on water supply are faced with greater risks in growing crops. Of the more than three million hectares of agricultural area that could benefit from irrigation, 56 per cent still depend on seasonal rainfall (COMSTE, 2010), while climate-sensitive dams and irrigation, of which 60 per cent of the irrigated rice production in Luzon depend on these dams and irrigation, weaken the overall resiliency of the country's national food security and self-sufficiency to climate change (CCC, 2010). Given the risks of this kind of livelihood due to climate variability, many people have no choice but to face natural hazards to sustain their daily needs (Gaillard, 2010) and consequently are constantly needing to adapt to the changing climates.

⁵An abnormal warming of surface ocean waters in the eastern tropical Pacific.

⁶An extensive cooling of the central and eastern Pacific Ocean

3.2.3. The Philippines' climate policy

The Philippines was one of first 154 nations to sign the creation of the UNFCCC. Since then, it has been active in engaging in policy negotiations and implementing its national policy at the local level. Although the country is considered a low greenhouse gas (GHG) emitter, with only 21,757 Gg of GHG emitted in the last inventory in 2000, its realisation of the great impacts of climate change and the international imperatives at the Bali Conference in 2007, made the country's adaptation to climate change urgent (CCC, 2010). In 2009, the Philippine government passed the National Climate Change Act (Republic Act No. 9729) that mandates the mainstreaming of climate change into government policy and enables the establishment of the Framework Strategy and Program on Climate Change and creation of the Climate Change Commission (CCC) (Congress of the Philippines, 2009). With the creation of the CCC, the sole policymaking body of the government related to climate change, it has formulated the National Framework Strategy on Climate Change (NFSCC), the National Climate Change Action Plan (NCCAP) and guidelines for the Local Climate Change Action Plan (LCCAP) (CCC, 2010). The NFSCC was adopted in April 2010 to build a roadmap for drafting the NCCAP. After a year of adoption of the Framework Strategy, the NCCAP was developed. Consistent with the Framework, the ultimate goal of NCCAP is to build the adaptive capacities of women and men in their communities, increase the resilience of vulnerable sectors and natural ecosystems to climate change, and optimise mitigation opportunities towards gender responsive and rights-based sustainable development (CCC, 2011:5).

The NCCAP recognises gender mainstreaming as a cross-cutting strategy. In the context of NCCAP, gender mainstreaming is about ensuring that the concerns and experiences of women and men are an integral dimension of the design, implementation, monitoring and evaluation of policies and programs so that women and men benefit equally and inequality is not perpetuated (CCC, 2011:36). The NCCAP further draws on how women and men are differentially vulnerable and recognises the potential of women in responding to climate change. Thus, the NCCAP outlines prospective activities to enhance women's participation in climate change adaptation. Having a female legislator and representative can increase the chance that gender concerns will be incorporated in the

climate change agenda (Cayetano, 2008). This is a proven fact in the Philippine case: the incorporation of gender in the main policy of the Philippines on climate change and in its national plan is partly due to the fact that the author of the Climate Change Act is a woman, Senator Loren Legarda. The implementation of such policies and national plans is being led by another woman, CCC Secretary Mary Ann Lucille Sering, who also heads the Philippine negotiating party in the international conventions.

Prior to the enactment of the Climate Change Act, various policies were drafted that entail a commitment from the Philippine government to respond to climate change. These policies pertain to the preservation and conservation of the natural environment and resources that could sustain the productivity of such resources and at the same time protect the environment. Perez (2008) cites several national policies across sectors that are related to adaptation and mitigation responses to climate change. These policies are composed of the Republic Act (RA), the Presidential Decrees (PD) and the Presidential Order (PO), which are further strengthened by the Climate Change Act. Because of the Philippine government's deliberate effort to formulate climate change policies, the UN special envoy, Margareta Wahlström described the Philippine laws as the 'best in the world'. Although the Philippines have the laws in place already, another challenge to take on is to translate these laws into positive and concrete actions (Ubac, 2012). As emphasised by Senator Loren Legarda, the 'challenge is to translate them [the laws] into local community action to save lives, and reduce disaster risks and economic losses' (Ubac, 2012).

3.3. Gendered vulnerability to extreme weather events in agriculture

Filipino women may be considered to be advanced compared to women in other countries (Santiago, 2008). The Philippines has a relatively egalitarian arrangement with respect to gender roles and access to resources (Quisumbing et al., 2004; Godquin and Quisumbing, 2008; De Silva and Bahktiar, 2011). Filipino families have a bilateral family system in which sons and daughters have equal roles in supporting their parents and both men and women have equal rights to inherit property (Domingo and Asis, 1995; Estudillo et al., 2001; Agree, et al., 2002; Godquin and Quisumbing, 2008; Yamauchi and Tiongco,

2011). Similarly, there seems to be no inequality in terms of allocation of food among members of Filipino households (Bouis and Pena, 1997). Furthermore, men and women have an equal propensity to participate in formal groups (Godquin and Quisumbing, 2008). In fact, the Philippines ranks eighth out of the 135 countries in the 2011 Global Gender Gap Report and even ranks first in terms of educational attainment and health survival (Hausmann et al., 2011).

Although past studies and reports have indicated that the Philippines is far ahead in terms of addressing gender inequality, women are still perceived as vulnerable before, during and after climate change. This can be explained by a lack of resources, existing power relations and the traditional gender roles ascribed to women. In the case of women in farming, it is a double jeopardy since farming is a male-dominated livelihood and thus resources, especially land, are owned and controlled by men. Older studies claim that despite women's great contribution to farming, they have not been perceived as farmers and farm labourers; historically, being a *farmer* has been always been attributed to men (Paris, 1988). Thus, Castillo (1988) concludes that 'in many instance, it is probably fair to say that women at work in agriculture are *physically visible* but conceptually or culturally *invisible* even to those who actually see them' (Castillo, 1988:32).

These observations still hold true in the present agricultural situation in the Philippines. Twenty-five per cent of those employed in agriculture are women (Leyesa, 2008), and the majority of these women are unpaid family labour. According to the study of Leyesa (2008), with 1194 female respondents, women are engaged in different farming operations. They dominate the planting and harvesting activities, particularly in rice and corn production. They also participate in land clearing and harrowing and often spend more time doing these activities than men. Women also play a critical role in activities related to farm finance, such as accessing the production capital and marketing farm produce. Despite their great contribution, however, only 18 per cent of the women researched have the land they cultivate under their names (Leyesa, 2008). The study also reveals that they have little access to services such as access to seeds, farm animals, calamity assistance, social services, capacity building services and even basic necessities such as water and electricity. A separate report recounts that only 27 per cent of land-owning households are in the name of women (Santiago, 2008) despite women's

contribution to farming. This is partly because of the existing laws in regard to property ownership. The Family Code of the Philippines provides for the administration and enjoyment of community property by both spouses, but in case of disagreement the husband usually makes the ultimate choices (ADB, 2008).

The fact that only a few women own land in the Philippines implies that invisibility in agriculture will continue to persist. Although property can equally be inherited by sons and daughters, custom dictates that land is preferentially given to sons because farming is a male-labour-intensive livelihood (Estudillo et al., 2001) and the patriarchal system in the Philippines believes that men are the breadwinners and women are the child bearers (Santiago, 2008).

Moreover, women in the Philippines are strongly tied to their traditional roles as mother, wife and housekeeper (Santiago, 2008). Consequently, altruistic behaviour is observed among Filipino women because of they are expected to support their parents and siblings, and as wives and mothers to play the fullest role possible in safeguarding the wellbeing of their families, even at the cost of being away from loved ones (Brickell and Chant, 2010). This altruistic behaviour is further encouraged by parents' behaviour towards daughters. Yamauchi and Tiongco (2011) reveal that Filipino parents tend to invest in their daughters in terms of education with the expectation that they will be supported by their daughters in their old age. Parents expect a larger income share from the income of daughters who became educated in adulthood. Another traditional task of women in the Philippines is being the cash custodian of the household. It is often observed that men hand over their wages to their wives. The amount of money held by women, however, may be insufficient to cover all the family's expenses, leaving them struggling with money shortages and little opportunity to make economic planning decisions (Eder, 2006). Moreover, even if women decide to work for additional income, their essentialised roles as mothers and caretakers makes breadwinning a secondary role, leaving women's lives increasingly full of anxieties, pressures and work burdens (Angeles and Hill, 2009).

Meanwhile, men are impacted by the patriarchal structure in different ways. For instance, in the context of agricultural decline, men's self-esteem is tied to their livelihood and to their ability to maintain a family; this sets up men who are poor for failure (Angeles and

Hill, 2009). Although men in the rural Philippines have more leeway than women to seek fulfillment in their economic lives, they find it hard to look for jobs other than their main occupation (e.g., as farmers) simply because it does not suit them (Eder, 2006). Moreover, Bacalla (2010) reports that men take a bit to recover if they lose their livelihood because they are fixated on what they used to do and thus take longer to shift to an alternative livelihood. They are still reeling from the psychological impact of disasters while women are busy looking for food, seeking jobs and working in relief programs.

Given the current situation of women and men in agriculture, women are expected to be more vulnerable to weather-disaster events in the Philippines. Past studies (Delica, 1998; Zoleta-Nantes, 2002; 2007, Pulhin et al., 2006; Peralta, 2008; 2009) recount the vulnerabilities of women during and after disasters. For instance, when flooding accompanied by gusty winds becomes a normal occurrence, it causes inundation of farm lands resulting in crop loss (Dalisyay, 2008:375). Consequently, households that rely on their lands lose their livelihoods and become food insecure. There is hardly any food supply as food production is barely enough for daily subsistence in normal conditions. Food shortage is common during disasters, which means that a mother needs to give up her share or give more of her share to her children and husband (Peralta, 2008:8, Yocogan-Diano and Kashiwaszaki, 2009). Furthermore, Delica (1998) observes several additional burdens on women after disaster due to their traditional roles within households. Women are mainly responsible for ensuring that there is food on the table (Delica, 1998), thus they are the ones queuing up for food and to borrow money in case of crop failure. When the household does not have sufficient water, women spend a lot of time carrying, boiling and cleaning the water. They are also responsible for caring for the sick and cleaning and maintaining their houses after flooding (Peralta, 2008).

In the event of extreme weather events, Santos (2012) reports that many husbands lose their jobs or the farms that they used to till. Consequently, women experience domestic violence because of the stress experienced by men. On the other hand, some husbands leave home to look for a job, leaving all the responsibilities to the women, including cultivating the fields. Due to prolonged exposure to extreme heat and harsh weather conditions, many of the women suffer from urinary tract infections and other health problems that often go untreated (Santos, 2012). Although women are claimed to be more

prone to UTI than men (Griebing, 2004), no study was found that links the prevalence of UTI to long exposure to extreme heat.

Women who are farm workers are even more vulnerable since they neither own land nor have access to credit and technology to help them adapt (Sarmiento, 2008). Peralta (2008) recounts how women fall into chronic indebtedness in cases of crop failure due to climate change:

Because of their limited resources, women farmers in Amulong, Cagayan, often have to take out loans at exorbitant interest rates from village moneylenders before every planting season to purchase fertilizers and other farming inputs. However, intense rains and sudden floods, followed by an unexpected drought and an unusually high incidence of insect infestations, caused their maize harvests to fail three seasons in a row, which meant they have not been able to pay their debts. The creditors have sued them for estafa (swindling), resulting in some women going to jail. In the province of Pampanga, the soaring cost of rice has led some women farm workers who have lost their livelihoods to resort to providing sexual favors in order to save their families from starvation. The “palit-bigas” (or “sex for rice”) phenomenon was first documented by women’s groups in 1992 with the violent eruption of Mount Pinatubo, which caused tremendous damage to farmlands in Pampanga and neighboring areas, and therefore to rural livelihoods (Peralta 2008: 10).

Government support is critical to lessen the vulnerability of Filipinos, particularly the poor. The nature of the political system of the Philippines, however, is a main constraint on fully assisting its people in times of crisis. Bankoff (1999:407) describes government’s lack of support as due to patronage, regionalism and the lack of strong central government, while Nantes (2007:93), on the other hand, points out that a lack of concern and sense of urgency among government officials and the limited resources of the government also lead to the poor suffering more. Government’s incapacity to identify areas at risk: resource conservation; disaster preparedness; information campaign on floods and climate change and sea-level rise; and, improving government efficiency in providing help in every phase of the problem leads to suffering of the many who are largely dependent on government for help (Bankoff, 1999). For instance, government’s lack of support during emergencies increases the risk of sexual violence. There have been reported cases of gender-based violence because of the open living conditions in

evacuation centres during natural disasters. Women's special needs – such as safety, privacy, separate toilets and gender-sensitive hygiene kits – should be taken into consideration by local government during disaster-planning (Santos, 2012).

Meanwhile, vulnerability to catastrophic events such as flooding is not only different according to gender but also according to wealth and the extent of social networks. The study of Nantes (2007) in Metro Manila reports that wealthy people can exert some pressures on public officials that lead to improved flood protection policies and programs. They are also able to provide necessary logistics and cooperate with other urban groups in providing the needed initiatives and leadership to mobilise community actions. Meanwhile the urban poor always point out that they need considerable government support and interventions during hazardous conditions, but the amount of government assistance they receive is not equal to the level of suffering they experience on a yearly basis. Their networks with neighbours, friends and relatives are the most dependable sources of help during flood hazard events but are limited to the provision of immediate help during flood events and post flooding periods. They do not have the community-wide networks of wealthy people. This disables them from embarking on activities and programs to address flood vulnerability reduction in the long run.

3.4. Adaptation responses to extreme weather events

Extreme weather events like typhoons, flooding and droughts are a common experience in the Philippines. People are so used to them that they perceive climate hazards such as flooding as a nuisance rather than a catastrophe (Palmiano-Reganit, 2005). Thus, most of the adaptation strategies are just adjustments to everyday activities rather than extraordinary measures to face extreme or rare natural events (Gaillard et al., 2008). Adaptation responses to flooding and many other disasters have been part of the 'normalisation of threat' that has had a significant influence on the development of culture in the Philippines. Bankoff (1999; 2003; 2004; 2007) has spent a long period of time studying how disasters have shaped the culture of the Philippines and the influences of a long history of extreme weather events can be observed in many ways:

It is there in the historical record, in the design and construction of buildings to accommodate climatic and seismic contingencies, in the agricultural system that emphasises minimising risk rather than maximising surplus, and in the constant relocation of settlements and migration to find safer locations and more sustainable livelihoods. Many of these are themselves coping practices that have evolved in order to permit communities to come to terms with the constancy of hazard and to mitigate the worst effects of disaster (Bankoff, 2004:102).

The long experience of climate-related disasters in the Philippines makes it more interesting to study how women and men adapted to previous disasters. Despite their limited capacities, early studies (Bankoff, 2003; 2004; 2007) proved women's and men's resilience to disasters. The following section discusses the adaptation strategies applied by women and men in the community, in their households and in the agricultural system and looks at how these adaptation strategies are affected by other institutions such as government and non-government organisations. An understanding of previous adaptation strategies is important to the exploration of how short-term and long-term adaptation strategies can be formulated to better adapt to climate change.

3.4.1. Adaptation responses in the community

Natural disasters have influenced the culture of Filipinos. In the same way, culture has dictated the adaptation responses which are critical in understanding how disaster could impact individuals and the society. The Philippines have developed through time a 'sense of community welfare and encourage forms of mutual assistance and reciprocal labour' (Bankoff, 2007:343). Both men and women share responsibilities in keeping these norms alive particularly in times of crisis. Many studies have proved that social networking and alliances among individuals and across groups are found to be one of the effective coping strategies during crisis (Bankoff, 2004; 2007; Dalisay, 2008; Gaillard et al., 2008; Yocogan-Diano and Kashiwaszaki, 2009). Bankoff even claims in his study (2007) that those who ignore the sense of community and refuse assistance find it difficult to obtain aid when they are most in need (Bankoff, 2007:343).

Filipinos developed a unique sense of community largely captured in concepts such as *bayanihan* (from the root *bayan* meaning *people* or *nation*), *pakikipagkapwa* and

pakikisama. They largely depend on and willingly help each other when one of the community members is in dire need. *Bayanihan* (toiling on another's behalf) is more complex than mere unity or togetherness. It has the connotation of shared identity and common association (Bankoff, 2007:3). This concept also involves a shared activity and willingness to help one's neighbour in a set of reciprocal obligations (Rodell, 2002:214). Bankoff (2007) recounts several community endeavours at times of crises. In Ilocos Norte, the destroyed houses were immediately rebuilt as soon as the storm was over because owners helped each other in spite of lack of funds. In Antique province, a communal dam was constructed to protect the neighbourhood from frequent flooding. Further, influential persons in Batangas province undertake charity work to help some families who suffer loss from flooding, storms and other disasters. Indeed, *bayanihan* is essential for mobilising labour in emergency preventive actions such as raising funds, securing shelter, food and other basic needs and even reconstructing livelihoods (Gaillard et al., 2008). The *bayanihan* spirit is enhanced by and resembles the concepts of *pakikipagkapwa* (being part of the group) and *pakikisama* (getting along well with others). These norms maintain the level of unity and togetherness in the community. People get along with others for the benefit of group harmony even if it requires personal sacrifices. These attitudes keep Filipinos focused on being in a group rather than being individualistic (Rodell, 2002:196). In this way, people have a sense of responsibility for the welfare of the group or community.

Another important coping strategy identified involves the emotional and psychological requirements of living with uncertainty. Since most of the population believe in the existence of God, turning to their religion has helped people accept their pain and suffering by perceiving that their experiences are the will of God (Dalisay, 2008). Several studies (Bankoff, 2004; 2007, Dalisay, 2008, Gaillard et al., 2008) indicate that Filipinos, particularly women, recognise that turning to their religion, by praying more often, for example, is critical and a last resort response to extreme weather events. The development of the concept *bahala na* (fatalistic passiveness) is somewhat influenced by religious faith; they leave things in the hands of God. Though this concept has an element of a 'leave it to fate' sentiment, it also implies a sense of risk-taking. It takes courage, daring and a sense of a finely calculated assessment of the odds, at the same time as

elements of faith, through prayers. *Bahala na* sentiments also help people to accept that tragedy can occur despite their best efforts and divine intervention (Bankoff, 2004:3). Another adaptive strategy identified among Filipinos is their ability to laugh even in worst calamity or disaster. Having a sense of humour and sharing jokes with friends is perceived as an important means of dealing with angst, relieving stress and overcoming anguish. 'Jokes were made to defend one from getting weak, and so to be able to go on gathering the dead without shedding too many tears ' (Bankoff, 2004:105).

While these attitudes, norms and traditions may not be unique to Filipino culture, it is evident that culture shapes the way people adapt to changing weather events. In some instances, some of these practices may seem illogical, but, as Bankoff (2004) argues in his study, only the individuals who are experiencing the real events can tell what adaptation strategies are important and effective. He concludes his study by stating that:

The social construction of hazard is a matter of considerable moment to those engaged in disaster preparedness, management and relief. All too often, insufficient recognition is accorded to the manner in which people's actions are influenced by their cultural interpretation of what they are experiencing. Behaviours that appear inappropriate or illogical to external agency or relief workers may be entirely consistent and rational actions when understood in the context of the operating schema of the individuals experiencing such phenomena (Bankoff, 2004:91).

3.4.2. Adaptation responses within the household

Filipino households are deemed to be co-headed by husbands and wives. They are culturally expected to share the household's planning strategy (Eder, 2006). This is observed during times of extreme weather events. Huigen and Jens (2006), studying farming communities in Isabela, Philippines, found that the usual adaptation strategies of the households are modification of lifestyle, disposal of assets and finding alternative sources of income. Almost all farm households studied report that they did not have enough money after the typhoon so they needed to adjust their lifestyle by changing from eating meat to eating less expensive food items and some skipped meals to minimise expenses. Some households also reduced their investment expenditure by asking their

children to stop their education for a while and help them to earn income. Although selling assets such as livestock and land could have helped them augment their lost income, few resorted to this option as they perceived the greater risk of losing those important assets when another disaster strikes. Consequently, to obtain additional income, male farmers participated in non-farming activities and sometimes illegal activities such as hunting and logging. Local employment was preferred but is often limited, pushing them to migrate to urban centres and nearby towns in search of employment. The authors point out, however, that this employment is a temporary adjustment and does not represent a permanent structural change.

While most of the household adaptation strategies seem to be carried out by male and female members of the household hand-in-hand, Dalisay (2008) argues that the coping strategies of households in response to extreme weather events are gendered. In her study of the coastal communities in the provinces of Batangas and Mindoro, it was mainly the wives who thought of ways for their households to survive and took action. Most of the coping strategies were carried out within the domestic sphere and thus were more influenced by women. Wives used their social ties with relatives and friends to gain some favour and entitlements. They felt entitled to help and they borrowed money through 'pay when able' schemes. They also sent their children to their relatives to ask for extra food or to temporarily live with their more wealthy relatives to reduce the cost of living during a lean season. Thus, relatives became their safety nets. To make sure that the income of the family would be enough at least for the food sustenance of the household, wives practised frugality and reallocated food resources in the home. They included cheaper food items like fish and vegetables, root crops and wild fruits in their meals. They divided the meals into portions and some parents skipped meals such as breakfast and snacks to allow their children more.

Despite the additional burden on women during extreme weather events, they appear to be more aggressive than men in ensuring their families' survival (Bacalla, 2010). Bacalla (2010) reports that women from Quezon province were willing to take on challenging tasks right after they had experienced a series of typhoons. After the floods dissipated, many women started to look for work they could do for a fee or they queued for relief goods for hours. Moreover, even though women are used to doing domestic work, they

readily explored other types of work, such as digging creeks, clearing roads and hauling stones. Because of their presence in the productive sphere, there were signs of empowerment among women and even a shift in gender roles. For instance, some women learned to delegate their domestic tasks to their husbands and children. Although this seems to be an opportunity for women to change their socially constructed roles and status, Bacalla (2010) quotes gender issues consultant Jeanne Illo's comments that the local government seems to be slow in picking up this trend as only few livelihood opportunities are being offered to women. She further comments that unless women are able to sustain such momentum, they can end up being even more marginalised than they were before the disaster.

3.4.3. Adaptation responses in agricultural systems

Since agriculture is one of the climate sensitive sectors, women and men involved in agriculture have learned to adapt to extreme changes in climate. Several studies have recounted adaptation strategies undertaken by farmers as a response to climate change. Most of these studies (Huigens and Jen, 2006; Lopez et al., 2004; 2008; Yap, 2009; Dawe et al., 2009; Concepcion et al., 2011), however, are gender-neutral and therefore tend to see adaptation strategies as the same for men and women. Only a few studies in the Philippines have recounted gendered adaptation strategies in the farming system (Peralta, 2008; Yocogan-Diano and Kashiwaszaki, 2009).

Adjustment of the agricultural system is a very common adaptation strategy among farming households (Huigen and Jens, 2006; Gaillard et al., 2008; Concepcion et al., 2011). Since the likelihood of typhoons and flooding occurrence is high, adaptation strategies observed in agricultural systems focus more on reduction of crop losses, rather than increases in efficiency and yield (Bankoff, 2007). Most farmers do not easily change their crops but tend to adjust planting times. This technique is useful in the case of yellow corn and lowland rice plots when crops are still in the flowering stage and thus less susceptible to strong winds and less likely to be destroyed by monsoon rains. Some farmers change crops to a *quick cash crop*, from banana to yellow corn (Huigen and Jens, 2006). Crop diversification is another common strategy that provides access to a secure food source in times of climatic adversity. Ivatans, for instance, the indigenous people of Batanes, one of

the areas most visited by tropical cyclones in the Philippines, also plant other crops as a coping mechanism. Farmers plant a wide variety of root crops such as yams (two species: uvi or *Dioscorea alata* and dukay or *Dioscorea esculenta*), sweet potato, taro, garlic, ginger and onions, as they mature underground and are relatively unaffected by the typhoons that lash the islands regularly and flatten cereal crops such as rice. Cereal crops, on the other hand, are primarily grown in naturally occurring depressions in the terrain in parcels no larger than 400 square metres that afford some protection from strong cyclonic winds (Bankoff, 2007; Dalisay 2008). Ivatans are also reported to plant vutalaw trees (*Calophyllum inophyllum*) as windbreaks (Dalisay, 2008). Aside from the abovementioned strategies, Conception et al. (2011) report farmers from different provinces of the Philippines have started to use new technologies and farming innovations to adapt to climate change, including using drought-, submergence- and saline-tolerant varieties, using irrigation facilities in drought-prone areas, practising contour farming and taking other soil conservation measures, promoting organic farming and even reforestation.

Although only a few studies have mentioned women's adaptation strategies in farming systems, these are quite notable. Women are adapting indigenous agricultural systems that preserve the environment and base their actions on co-responsibilities with others. Women farmers in Montalban, Rizal, are beginning to cultivate traditional and indigenous varieties of rice which do not require many chemical fertilisers and pesticides and are deemed more resistant to pests than commercial varieties. They are also reported to be planting fruit trees and vegetables between borders of their rice paddies (Peralta, 2008). Another study (Yocogan-Diano and Kashiwaszaki, 2009) cites similar adaptation strategies. In rural communities in the Philippines, particularly among the indigenous women of Cordillera, resource management is based on the worldview of communal ownership, sharing and cooperation. They live with values such as *inayan* (let us not monopolise the good), or *paniyo* (restrain or have fear of being greedy or evil). Rural women also practise exchange of labour (*innabuyog*, *ubbo*, *baddang*, *alluyon*) to cope when produce is low and when disasters happen. These two quoted studies reflect that women's adaptations to climate change tend to incorporate their concerns for the environment and household security. Women emphasise cooperation as an important

factor in adaptation to climate change. Studies like these are worth exploring to understand why women develop such adaptation strategies and how the process of adaptations happens in the context of agriculture.

3.4.4. Adaptation responses by agents in the community

People and communities also react to the responses of other agents, such as government and civil society. Though people take much of the responsibility for minimising their own vulnerabilities, actions taken by government and other agents most of the time drive their adaptation response. In the Philippines, though the government is perceived to be giving less support than expected, still a lot of Filipinos are dependent on the government in times of disaster. The National Disaster Coordinating Council (NDCC) is the main governing body that carries out the preparedness, prevention and mitigation responses during disasters (Casis, 2008). It releases calamity advisories on storm signals and flooding events. It is also the government that arranges the relocation and evacuation of the people to safer places if needed. Despite the efforts of government, however, some studies (Heijmans and Victoria, 2001:15, Gaillard et al., 2008) characterise the response of government to disasters as limited to emergency relief. Rehabilitation and mitigation are undertaken in rare cases and are limited to technical and structural measures only, such as the construction of dams and dikes (Heijmans and Victoria, 2001:15). Gaillard et al. (2008:392) point out that since the national and local governments still rely on a reactive disaster management system, which only relieves flood victims in critical situations, government fails to strengthen the ability of the people to cope with the situation. They further argue that the official disaster management policy limits its focus to treating the symptoms rather than treating the root sources of harm. Although government lacks funds to support its own adaptation programs, there are a lot of international agencies such as the Asian Development Bank (ADB), the World Bank, the Food and Agriculture Organization of United Nations (FAO), the International Labour Organization (ILO) and the Red Cross as well as other countries who fund projects that are being implemented across the country (Gass et al., 2011). Meanwhile, non-government organisations (NGOs) in the country take the lead in assisting affected communities (Heijmans and Victoria, 2001). NGOs are effective in helping communities to manage their own natural resources. In fact, as a response to climate change, some NGOs

are taking the lead in supporting rural women in partnership with female farmers' organisations, campaigning for sustainable agriculture and protecting natural resources (Sarmiento, 2008). No review has yet been done, however, on how these projects and programs contribute to increase women's and men's adaptation strategies and a community's resilience. Thus, it is worth exploring how other stakeholders facilitate or hinder individual and community responses to climate change.

3.5. Summary

This chapter has been dedicated to examining gender and climate change in the context of the Philippines. The vulnerability of the Philippines to disasters like flooding are mainly attributed to its climatic and geographical location and socioeconomic conditions. Despite its limited capacity as a country to face all the possible negative impacts of climate change, however, it was highlighted in the literature that the Philippines was one of the first third-world countries to respond to the emerging threat of climate change. The country has been active in climate change policy negotiations and has even formulated a law to serve as a guide to responding properly to climate change. This law has already incorporated gender as a cross-cutting strategy. However, the country needs a strong political will to implement such a policy. Moreover, because of its long history of disasters, people have become accustomed to frequent typhoons and flooding. Thus the discussion examines how their norms, traditions and culture adjusted to changing weather events. A subsection reviewed the literature on the vulnerabilities of men and women in the Philippines. These vulnerabilities are caused by different factors such as socioeconomic situations, particularly the condition of livelihoods. Gender roles within households and in livelihoods also largely dictate the responses of men and women to climate variability and so affect their vulnerabilities. Women in particular are more vulnerable as they are placed in more difficult situations, such as getting more labour-intensive work or illegal work such as prostitution. The discussion also highlighted the great disparity of vulnerability between the wealthy and the poor in the Philippines. Income-structure status affects access to resources and social networks and thus vulnerability to floods and climate variability. The final discussion in this section was about adaptations to extreme weather events. The literature on what women and men do in their communities, households and

agricultural systems in order to cope with extreme climatic events was discussed, as was how other agents, such as government and non-government organisations, help communities to cope with the devastating impacts of extreme weather events. It was pointed out that government support can lessen the vulnerability of the people, but in the case of the Philippines, aid from the government usually falls short and thus people remain vulnerable after every flooding and typhoon event. This chapter ends with the conclusion that the literature about gendered adaptations is still limited. Likewise, no clear studies indicate the positive impacts of other institutions in capacitating women and men to better adapt to changing climate.

3.6. Rationale for research questions

This sub-section is a summary of Chapters 2 and 3 of this thesis, the two chapters of literature review. It has the aim of presenting the rationale for choosing the research questions that this study hopes to answer. This thesis is derived from and adds to the broad research literature on gender and its relation to environment and climate change with specific reference to climate change in the Philippines and gendered vulnerabilities and adaptation strategies to extreme weather events.

The discussions in the review of literature are mainly derived from a feminist perspective with the aim of presenting the literature and framing the thesis questions in such a way that gender will be the main concept of discussion. To illustrate how gender as a social category shapes the identity and experiences of women and men, I discussed the literature on gender and environment with specific attention to farming literature. The literature presented in this chapter explains how women's identity, roles and relations shape their behaviour towards changes in their livelihoods. One of the main threats to farming is changes in climate and so the next section discussed the broad literature about climate change. In this section, the literature argued that men and women are affected and respond differently. Therefore, the first specific research question developed in this thesis addresses the following question: How do men and women respond to climatic events based on their gender roles, identities and relations? A sub-section was developed discussing how adaptation strategies are mainly influenced by women's and men's

vulnerability and adaptive capacity. The review further discussed vulnerability. Evidence was shown that women's and men's roles, resources and power relations affect their vulnerabilities. The literature further showed that in most cases women are more vulnerable than men to climate change because of existing gender inequalities shaped by social arrangements and differential access to and control over resources. Limited studies, however, have indicated that women's and men's adaptation responses based on gender roles, identities and relations lead to increasing gender gaps. Thus, the second and third specific research questions are as follows: Do gendered adaptation responses exacerbate gender inequalities? and How does gendered adaptations relate to differential outcomes for women's future adaptation? The literature has also established that despite women's vulnerabilities, they are the key to household survival and to adaptation to climate change, and a growing literature points out that responding to climate change can create a '*window of opportunity*' to alter existing gender relations and inequalities. Thus the last specific question that the thesis addresses is as follows: Can current power relations within the household and community be changed through adaptation strategies?

To narrow down the scope of the study, the Philippines was chosen as the site of the study. Thus, the literature review also discussed the current situation of the Philippines and the perceived threat of climate change. The country experiences an overwhelming frequency of extreme events which makes it more interesting to examine how men and women respond to climate change. A large population in the Philippines is still dependent on climate-affected sectors such as agriculture. Rice farming in particular is greatly impacted by the severe flooding caused by the increased frequency of typhoon events in recent years. Moreover, limited studies were found on how men and women processed and decided to respond to changes in climate. Therefore the main question that the thesis wants to answer is the following: How are gendered adaptation strategies produced and reinforced in rice farming communities in the Philippines as responses to increasing flooding events? This main question, together with the four specific questions is addressed in the Philippine rice farming context.

In answering the cited research questions, gaps in the literature are also addressed. First, scholars have highlighted that women's and men's responses to climate change are based

on gender roles, identities and relations. Several studies even extend their analysis by recounting the gendered vulnerabilities that result from ascribed roles and gendered identities. No study was found, however, that explains the process of adapting to climate change according to gender roles, identities and relations. Lambrou and Nelson (2010) state in their study in India that most of the adaptation strategies are carried out by women and men hand-in-hand, but women's coping strategies are different from men's. Coming up with the decision of who should do what in response to climate change, however, is not a mechanical task. In most cases, it involves conflict and cooperation between men and women living in the same household. Also, existing power relations take effect consciously or unconsciously. Therefore this thesis will contribute to the limited knowledge of how gendered adaptation is formed and reinforced based on traditional gender roles, relations and identities. Second, the literature revealed that existing gender inequalities are one of the main causes of differential vulnerabilities among men and women and an increase in the gender gap is a possible negative consequence of response to climate change. Limited studies indicate, however, that gender inequalities increased as women and men coped with extreme weather events. Sultana argues that selling important assets that belong to women led to an extra burden being placed on them as they are responsible for maintaining the kitchen and raising livestock. Consequently, women's response weakens their bargaining position in the household, as their assets are depleted and their income-earning options become inferior (Enarson, 2000:11). Moreover, because women spend a great deal of time managing these resources as they perform their ascribed roles even after a disaster, depletion of their assets causes some limits to some of their development options (Dankelman, 2002). By contributing to this existing literature and giving a clearer picture of how adaptation strategies can worsen the existing inequalities and how it is related to women's future adaptation strategies policymakers can be persuaded to keenly incorporate gender issues in climate policy negotiations. Third, increasing studies (Enarson, 2000; Nelson et al., 2002; Lambrou and Nelson; 2010; Mishra, 2009; Sultana, 2010) indicate the potential of role reversal and the alteration of existing power relations as women adapt to changing climate. Some literature (Bacalla, 2010) even states that women are empowered as they go out of their domestic sphere and contribute more to the household's productive activities (Alston and Whittenbury, 2012). This new found *opportunity*, however, is still

under debate. Other studies, such as Bradshaw and Linneker (2009), find differently. Their evidence from Nicaragua appears to suggest that involving women in community efforts outside their domestic sphere was not sufficient to bring about changes in their position and situation. These contradicting findings motivate me to seek a clearer answer about the possibility for women to change their status and identities. Furthermore, my thesis intends to show how changes in women's situations happen, that is, to extend my analysis to answer this question: What are the factors that limit and facilitate women's abilities to change their situation and position as they respond to climate change? Finally, limited gender and climate change studies have been conducted in the Philippines. Given that the country is prone to the effects of climate change, my thesis is a great contribution to the Philippine gender and climate change literature. As shown in this review of literature, the country's climate change policy already incorporates gender as a cross-cutting strategy. It was noted, however, that the climate change policy is not yet being implemented well. Action still needs to be taken. Therefore, providing enough evidence of how women and men adapt to extreme weather events like flooding will aid the political leaders and development leaders to draft more gender-sensitive adaptation programs and projects. While the Philippines is the focus of this thesis, my hope is that it will also appeal to and be relevant to the rest of the world. After all, gender concerns in climate change are not just issues of developing and climate change sensitive countries like the Philippines, but are now a global concern.

CHAPTER FOUR: THEORETICAL FRAMEWORK

4.1. Introduction

This chapter establishes the theoretical framework which guides this research. The first section discusses practice theory which is particularly pertinent to answering the conceptual questions raised in this thesis. The second section of the chapter discusses how adaptation is conceptualised as a dynamic human practice which can be a site for interrogating how structures and agency interact with each other during the process of responding to climate change. Following this section are discussions of critical concepts relevant to the research. Drawing from feminist and structuralist perspectives, I discuss the concepts of gender, power and agency. In the final section of this chapter, I present a conceptual framework which explains how these concepts relate to each other and how they might be relevant in analysing how gendered adaptations to climate change are formed, reinforced and challenged.

4.2. Practice theory

Practice theory seeks to explain the relationships between human action (practice) and wider social structures or *the system* (Ortner, 1994; Philips, 1998; Whittenbury, 2003). This theory has two main considerations: how practice reproduces the system and how the system may be changed by practice. *Practice* in this sense largely refers to all forms of human action or what people do in everyday life, while *system* refers to wider social structures or *society* (Ortner, 1984; 1994). Feldman and Orlikowski (2011) point out that critical to practice theory is the relationship between specific instances of situated action and the social world in which the action takes place. Viewed from their perspective, practice theory is very context specific – influenced by the unique social systems and social agents that perform the practices. This also indicates that although practices are largely influenced by the system, which make practices somehow predictable and *structured*, the social agents still respond differently given a specific situation, thus the influence of agency that is inherent in every individual is actively at work.

To understand how practice theory can explain the ongoing relationships of systems and practices, Ortner (1984) describes new practice approaches, drawing mainly from the works of Bourdieu. She fully acknowledges that 'action is constrained deeply and systematically by the ways in which culture controls the definition of the world for actors, limits their conceptual tools and restricts their emotional repertoires. 'Culture becomes part of the self' (Ortner, 1984:153). In this view *the system* has a powerful determining effect upon human action and the turn of events. On the other hand, to understand how practices inform the system, approaches to new practices place greater emphasis on ordinary living. Bourdieu for instance pays close attention to the little routines such as eating, sleeping and relaxing that people enact in a routinely fashion. As Ortner synthesises (1984:154):

These routines and scenarios are predicated upon and embody within themselves, the fundamental notions of temporal, spatial and social ordering that underlie and organize the system as whole. In enacting these routines, actors not only continue to be shaped by the organizational principles involved, but continually re-endorse those principles in the world of public observation and discourse.

The above discussions suggest that practices remain valid as long as the social actors re-enact and adhere to the principles of the established practices. Therefore, without validation from the social actors, actions can be divergent and can lead to change in practices and eventually to change in the system. This leads to the question whether divergent practices are simply due to a response to changes to the existing culture or whether they can actually imply alternative modes of social and cultural being. Ortner presents two models of systematic change. One view of change within the practice theory is influenced by the Marxist model, which argues that dominated groups endeavour to escape from the prevailing hegemony. 'Change comes about as a result of class struggle in which formerly dominated groups succeed to power and institute a new hegemony based on their own distinctive ways of seeing and organising the world' (Ortner, 1984:155). Marshall Sahlins, on the other hand, offers a less intentional view of change (Whittenbury, 2003). Sahlins proposes that radical change need not necessary come from groups of alternative visions of the world, instead he emphasises the importance of changes of meaning of existing relations (Ortner, 1984). Sahlins views change as failed reproduction

(Sahlins, 1976). In this sense, change may come about largely through abortive attempts to apply traditional interpretations and practices. This happens when traditional patterns of relations are deployed in relation to novel phenomena which do not respond to those strategies in traditional ways (Ortner 1984). Structural contradiction leads to slow but sure change. The build-up of inconsistencies in the system from successfully incorporating new circumstances can lead to a change of structure from within, accommodating the future in the present (Cotidiana, 2011).

Sahlin's arguments are somewhat similar to the notion of the *structuring structures*' concept of Bourdieu. The core of Bourdieu's concept of theory of practice is not really about structures but of agents--real individuals. His concept of *habitus* is designed to account for the fluid, open-ended and incomplete nature of social action (Krais, 2006). In other words, *habitus* accounts for the possibility of agency, which enables an individual to adhere to or abort a certain practice or action. However, although *habitus* has the capacity for generating representations and practices, this capacity is exercised within the limits imposed by the objective structures that produce the field (Costa, 2006). This indicates that the individual is born into a particular historical society and incorporate that *society* in her or his *habitus*. Thus, 'everything that is passed down and incorporated within them, they carry on, change and vary and sometimes they even revolutionize elements of their worlds' (Krais, 2006:129). It is quite clear that Bourdieu's concept of practice explains the interplay of the structures and agency. It does not favour the dualistic notion of structure and agency but emphasises that change and alteration of actions and practices that inform the structure are possible but is not without influenced by existing structures.

Another important concept that Bourdieu (1984) introduces to understanding how practices are accepted and performed by social agents is *symbolic violence*. This term refers to the imposition of particular symbols and meanings that are the *culture* observed by a group of individuals. The violence is said to be symbolic rather than physical; it may deny individuals access to resources, treat them unfairly or limit their opportunities (Whittenbury, 2003). However, the domination of one group or individual does not occur by direct coercion or force, rather it is imbedded in culture which is perceived as

accepted, legitimate and natural. The values of the dominating culture are accepted and internalised by the subordinates, who become complicit in their own domination thus reproducing the existing power relations (Whittenbury, 2003:126). This idea is not unique to Bourdieu but is a similar concept to Gramsci's (1971) ideological hegemony and Lukes' (1974) third-dimensional view of power relations which I also discuss in this study. These concepts are essential to this study as they capture the influence of culture in the existing power relations in the farming communities studied. Symbolic violence is observed during climate crisis as some women complain that they are limited by their gender roles and relations with men (see chapter 7). Although some women realise their subordinate position, some see it as legitimate, as it is traditional in farming communities.

Practice theorists (Bourdieu, 1977; 1990; Bourdieu and Wacquant, 1992; de Certeau, 1984; Giddens, 1976; 1979; 1984; Ortner, 1984; 1989; Schatzki, 2001; 2002) subscribe to different theorising moves which lead to a different logic and understanding of the relationship of human action and structure. Nevertheless, Feldman and Orlikowski (2011) summarise the key principles of practice theory: (1) that situated actions are consequential in the production of social life, (2) that dualisms are rejected as a way of theorising, and (3) that relations are mutually constitutive. They further explain these principles in a more elaborative and concrete way. The first principle follows the basic argument of practice theory that *everyday actions are consequential* in the production of social life; what it produces varies across scholars. It may be field and *habitus* (Bourdieu, 1990), social structures (Giddens, 1984) or a bundled array of activity (Schatzki 2001). For instance, Bourdieu (1990:57) argues that *habitus* is a 'generative principle of regulated improvisations' ... which reactivates the sense objectified in institutions, while Giddens' (1984) views practices as social actions that recursively produce and reproduce structures which limit and facilitate actions. For Schatzki (2002), the sets of human array activity constitute practices which enact social order. Moreover, recent studies in a post-humanist vein introduce the influence of non-humans such as natural objects and technology; they are quite important as they acknowledge the importance of materiality in the production of social life (Feldman and Orlikowski, 2011).

The second principle encourages skepticism towards analytical oppositions and provides the conceptual means to redefine and reintegrate concepts that have been partitioned and polarised in other theories (Feldman and Orlikowski, 2011). In other words, it rejects dualism but recognises the inherent relations between elements such as mind and body, structure and agency, individual and institution and so forth. Bourdieu's works (1990) for instance, focus on the deconstruction of the longstanding notion that the subjective and objective are independent and antithetical concepts. Giddens' (1984) structuration theory aims to transcend the dualism of agency and structure. As he writes (Giddens, 1984:25), 'the constitution of agents and structures are not two independently given sets of phenomena, a dualism, but represent a duality'. In particular, practice theory enables scholars to theorise that there is a dynamic constitution of dualities and thus avoid the twin fallacies of *objectivist reification* on the one hand and *subjectivist reduction* on the other (Taylor 1993).

The third principle of practice theory, the relationality of mutual constitution, states that phenomena always exist in relation to each other, produced through a process of mutual constitution. The specific interactions of phenomena entailed by relationality vary among scholars. Giddens (1984) is well known for theorising that there is a recursive relationship between agency and structure. Such practices are said to be recursive because they are 'constantly recreated by the same means whereby they express themselves' (Gherardi 2006:31). Further, Bourdieu also proposes a relationality in which practice, *habitus*, and field produce and reproduce one another. The notion of mutual constitution implies that social orders such as structures, institutions and routines cannot be understood without examining the role of agency in producing them and in the same way agency cannot be understood simply as human action but as already informed by structural conditions. Feldman and Orlikowski (2011) add that relations of mutual constitution do not imply equal relation rather these relations of power, with asymmetrical capacities for action, lead to differential access to resources, and conflicting interest and norms. It therefore implies that the asymmetric relations are fundamental to practice theorising as 'the notion of power can often serve as a helpful tool for identifying the relational force(s) at play in a particular practice theory' (Østerlund and Carlile 2005:94). This also implies that practices are performed and adapted by individuals in

differing ways because of the power relations at play at a given time and in a given space, and thus that practices can have differential impacts and in some instances, cause inequalities among individuals and groups.

Practice theory provides a useful framework for a feminist research like this because it enables the researcher to explore how gender as a structure/belief system influences adaptation and how adaptation as a response to systems, particularly changes in climate, also influence the socially constructed notion of gender. This particular theory is important to this study on several counts. First, drawing from the principles of practice theory, while structures dictate practices, practices are mutable and can be challenged, which means while adaptation seems to be influenced by roles, norms and traditions, men and women are still capable of changing their responses away from what is expected. Second, responses to particular situations have important consequences in the production of practices, and therefore I argue that my case study about actions taken by men and women in response to severe flooding can provide insights on how gendered adaptations to climate change may change over time. Third, my personal perspective sits well under practice theory as I tend to reject the dualism of structure and agency. Instead, I recognise that both of these concepts are not mutually independent from each other, rather they influence each other and thus both produce and reshape practices. Fourth, noting that practices are formed under asymmetrical mutual relations, an examination of gendered power relations is deemed important to how relational forces operate in the production of situated action. Gendered power relations influence differential access to resources, conflicting interest and norms and asymmetric capacities and thus, by examining the gendered adaptation practices, it can aid me in understanding how responses can lead to gender differences and inequalities. Finally, practice theory provides insights into how people can respond in innovative and in unpredictable ways which offer a space for social change. In the same vein, this study also attempts to explain how social change becomes possible as men and women respond to changing climate.

4.3. Adaptations: dynamic process for change

In a previous chapter (Chapter 3), I defined adaptation in the context of climate change as a modification of behaviour that can either alleviate adverse impacts or open new opportunities in response to observed or expected changes in climate and associated

extreme weather events (Adger, et al., 2004; Adger et al., 2007; Nielsen & Reenberg 2010). This definition needs more explication as it leads to questions concerning who or what dictates adaptation process and what would be the effects of adaptations on those who undertake them. This section extends my analysis of this concept by looking more closely at how adaptations are undertaken by individual agents. The practice approach can provide insights into how adaptations undertaken by social agents such as men and women are limited and facilitated by structures and how men and women as thinking agents conform and change their actions in response to climate variability. In order to closely examine how changes in practices occur through adaptation in the context of climate change, I will be drawing much from the work of Mark Pelling (2011), who sees social relations, practices and even values as sites for adaptations. He defines adaptation as (Pelling, 2011:21):

The process through which an actor is able to reflect upon and enact change in those practices and underlying institutions that generate root and proximate causes of risk, frame capacity to cope and further rounds of adaptation to climate change.

Pelling contrasts adaptation with coping as he views coping with climate as the process through which established practices and underlying institutions are marshaled when confronted by impacts of climate change. Coping means to survive within the prevailing systems of rules; adaptation is indicated when institutions (cultural norms, laws, routine behaviour) and livelihoods change (Pelling, 2011:35). He argues that adaptation is a dynamic phenomenon – a process rather than a status. Climate change has become an intimate element of human history, thus it requires adaptation that can co-evolve with it. In order to see dynamic change in prevailing systems and practices, Pelling proposes three levels of adaptation: resilience, transition and transformation.

4.3.1. Three levels of adaptation

Resilience refers to a refinement of actions to improve performance without changing assumptions or questioning established routines (Pelling 2011:23). It only allows existing functions and practices to persist and thus power asymmetries prevailing in society remain unchanged. This kind of adaptation focuses on changes in technology,

management practices and organisation, such as resilient building practices and use of new seed varieties. Resilient systems are characterised as having the capacity for social learning and self-organisation as well as displaying functional persistence. In this context, social learning is described as the pathways and social relationships that shape information exchange and can lead to new ways of thinking or acting, while self-organisation is attributed to novel and undirected collective action. Adaptation as resilience, however, can also contribute to incremental progressive change in distributive and procedural justice within a defined structure. For instance, individual cases that build resilience through internal value shifts, when up scaled through government action or replicated horizontally, can open real opportunities for contributing to transitional or transformative change (Pelling 2011).

Transition acts at an intermediary level of engagement focusing on the governance regime but through acts that seek to assert full rights or undertake responsibilities rather than make changes in the regime (Pelling 2011:50). The goal of this kind of adaptation is to realise the full potential of the actors through the exercise of rights within the established regime or system. It seeks to change the practices in governance to procedural justice which can lead to some changes in the governance system. An example of this form of adaptation is the implementation of legal responsibilities by private and public sector actors and the exercise of legal rights by citizens. Institutions play a critical role at this level of adaptation as institutions can 'constrain the aspiration and behaviour of actors but it can also facilitate change by legitimating the processes of critique and reform' (Seo and Creed, 2002; Pelling, 2011). Institutions in this context refer to formal rules, such as legislation and guidelines, and informal rules, such as cultural norms, that determine how actors interrelate (North, 1990). Opportunity for change opens up when external shocks such as climate change expose the institutional architecture that needs to be changed and thus provide the impetus needed to generate the political will for transition and potential transformation. It must be noted, however, that disasters associated with climate change triggers are but one driver of crisis and do not guarantee transformational change (Pelling, 2011:84).

Transformation is the deepest form of adaptation indicated by reform in overarching political-economy regimes and associated cultural discourses on development, security

and risks (Pelling, 2011:50). This level of adaptation requires a critical reflection on existing institutions and practices working in society as it aims to reconfigure the structure of development and its focus to change the overarching political-economy regime. An example of this is the introduction of new political discourses that redefine the basis for distributing security and opportunity in society and social-ecological relationships. Transformation as adaptation is concerned with the wider and less easily visible root causes of vulnerability which are embedded in social, cultural, economic and political spheres. In this kind of adaptation, vulnerability is viewed as the outcome of wider social processes that shape how individuals see themselves and others and their relationship with the environment, and reflects on the role of political processes. In this sense, adaptation is a much broader problem that requires a transformative type of adaptation.

These three levels of adaptation are relevant to this study as they describe how adaptation can be influenced by existing structures and practices and at the same time how individuals through internalised value shifts can effect change in the way they respond to climate change. Resilience reflects an adaptation through adherence to existing structures and practices but also provides an opportunity for incremental change as people learn to adjust to their environment through social learning and self-organisation. However, actions taken by individuals are limited or facilitated by external intervention, such as by government, which influences the existing structures in terms of policies and procedures. This indicates that structures influence the actions of individuals. As reflected in transition adaptation, actors can assert for their rights and undertake responsibilities but within the context of the existing regime. Nevertheless, climate change as crisis can expose the much needed change in the system that compels the imposition of stronger political will that could lead to transitional or transformative change (Pelling 2011). The concept of transformation as adaptation is also relevant to my study. I argue that one of the root causes of vulnerability to climate change is gendered roles and relations. Existing gender differences and inequalities require a transformative and collective action on the part of social agents to better adapt to climate change. Overall, Pelling's concept of climate change adaptation well reflects the agenda of this research as he argues that it is 'an opportunity for social reform, for the questioning of values that

drives inequalities in development and our unsustainable relationship with the environment' (Pelling 2011:3).

4.4. Gender

The concept of gender is relevant to understanding how adaptations are taken up by men and women in farming communities. For the purpose of this research, I view gender as both a *situated accomplishment* (Fenstermaker et al., 2002) responsive to realities of society, and a form of structure (Connell, 1987; 2002) that shapes men's and women's adaptation practices within society. Recently, Martin (2003; 2006) introduced the concepts of *gendering practices* and *practising of gender*. Her work has been influential particularly in organisational and education research (Ridgeway, 2009; van den Brink and Stobbe, 2009; Kelan, 2010; van den Brink and Benschop, 2011). She makes a distinction between practices that are culturally available to *do gender* and the literal practising of gender that is constituted through interaction (Martin, 2006). Her work is also relevant to my view of gender in the context of this study as it captures the influence of structure and agency in examining the gendered adaptations of men and women to climate change. In this sense, I focus my analysis not only on the individual but also on the social relations, institutions and practices shaping the concept of gender.

West and Zimmerman (1987) in their work *Doing Gender* contend that although individuals are the ones who *do gender*, it is a *situated doing*, carried out in the virtual or real presence of others who are assumed to be oriented to its production. This makes gender an emergent feature of social situations rather than a property of individuals. Gender is both 'an outcome of and a rationale for various social arrangements and as a means of legitimating one of the most fundamental divisions of society' (West and Zimmerman, 1987:126). Moreover, they argue that doing gender is unavoidable because of the social consequences of sex-category membership, as it serves as a basis for the allocation of power and resources from the domestic to the broad arena of interpersonal and institutional relations. More recent work of Fenstermaker et al. (2002) extends this analysis by arguing that viewing gender as *situated accomplishment* opens the possibility of examining the influence and intersection of other social categories such as race and class in the analysis of gender. It also builds interest to look at how men and women 'do'

gender based on the material conditions of the society. In this sense, gender is viewed as an accomplishment in response to conditions of society and the physical environment. Thus, doing gender remains, 'a situated social practice producing different outcomes in different social and cultural contexts' (van den Brink, 2009:453).

On the other hand, in discussing how gender as a concept influences the way women and men think, it is important to look at how gender works within the social structure. I agree with Connell (1987) that to have an adequate theory of gender requires a theory of structure. In his book *Gender and Power*, he discusses how gender relations are organised. He examines the underlying concepts of *structure*, identifies the sub-structures under gender relations and proposes structural analysis that produces concepts. He assumes that structure is not just about patterns but also 'reflects the experience of being up against something, of limits on freedom; and also the experience of being able to operate by proxy, to produce results one's own capabilities would not allow' (Connell, 1987:92). In other words, structure is deemed as constraining how men and women behave within society.

Connell mainly draws his analysis about structures in practices from the theories of Bourdieu and Giddens. Although their theories offer insights on how structures are formed and influence practices, Connell critiques Bourdieu's theory of practice because it lacks a *historical dynamic*. For him, 'history happens in Bourdieu's world, but it is not produced' (Connell, 1987:94). On the other hand, Giddens' theory of structuration explains that human practice always presupposes structure and structure is always emergent from practice (Connell, 1987). This duality of structure is problematic for Connell in the sense that it closes the possibility of change in history and by doing so goes back to the traditional theory of structuralism. This criticism makes him then argues that the dualist model should be open towards history. Drawing from the arguments of Bourdieu and Giddens, he explains that practice, while presupposing structure, responds to a situation. He concludes:

Practice is the transformation of that situation in a particular direction. To describe structure is to specify what it is in the situation that constrains the play of

practice. Since the consequence of practice is a transformed situation which is the object of new practice, 'structure' specifies the way practice (over time) constrains practice (Connell, 1987:95).

Connell further argues that a human being is capable of being inventive in his actions and reflexive, practice can turn out to be against the structure and so structure might be the object of practice. Yet, he notes that practice is still informed by structure; it keeps on being reminded of the structure as part of history. His emphasis on structure brings him to his purpose of thinking of change in gender practices within the structure. Instead of analysing the whole structure in general, however, as feminists did in the past, he proposes three major structures in the field of gender relations. These are the division of labour, structure of power and *cathexis*. These major structures operate at a particular level of logical complexity and thus in order to understand the workings of these structures; he introduces the concept of gender order and gender regime. Gender order is a historically constructed pattern of power relations between men and women and definitions of femininity and masculinity that are widespread throughout the society while gender regime pertains to the state of play in sexual politics on a smaller stage. Gender regime corresponds to gender order and within these structures gender is viewed as dynamic, complex and strongly constrained. He also points out that gender is something as fluid and dynamic as practice.

Connell's book *Gender* (1992) explicitly defines gender as a structure but a special kind of structure since it has a specific relationship with bodies. It is a structure of social relations that focus on the reproductive arena and there is a set of practices that governs this structure. Since gender arrangements are reproduced by the power structures on a larger scale, it often appears unchanging. These gender arrangements can define the possibilities and consequences of individual actions but structures do not continue unless reconstituted through social action. In reality structures are constantly changing as individuals 'create new situations and as structures develop crisis tendencies' (Connell, 1992:10). Connell defines crisis tendencies as the 'internal contradictions or tendencies that undermine current patterns and force change in the structure itself' (Connell, 2002:71). When crisis tendencies result in actual crisis, rapid change can be enforced. Thus, it is essential to identify interests that can be used for and against change. It is also

important to examine where different groups are positioned in the structure and how they are affected by the structure. Crisis tendencies can be identified in large- and small-scale changes, in personal life and in intimate relationships.

Furthermore, to analyse the persistence of change of the existing gender order, Martin (2003; 2006) introduces the duality of doing gender. To view gender as practice (gendering practices) means to see it as a *system of action* that is institutionalised and widely recognised but also dynamic, emergent, local, variable and shifting. Practising of gender, on the other hand, is action learned through repetition while each practice of gender is a moving phenomenon, done quickly, (often) non-reflexively, in concert or in interaction with others (Martin, 2003).

Martin (2006), in her study in paid work settings, argues that unreflexive practising of gender has unexpected and often harmful effects on women as well as men. Although she acknowledges the importance of agency in practising gender, she assumes that people can and do practise gender both while intending to and without intending to and that others often perceive them as doing so irrespective of their intentions. This suggests that their practices are guided only sometimes by intention relative to gender. She uses the concept of *liminal awareness* to allow men (and women, in other circumstances) to act as they please without being concerned about the effects of their behaviour (Martin 2003). She then points out that one should have reflexivity – a special kind of awareness. She notes, ‘to practise gender reflexively, one would carefully consider the content of one's actions and act only after careful consideration of the intent, content, and effects of one's behaviour’ (Martin 356:2003). Thus, she stresses that in order for change to become apparent she calls for attention to reflexivity's role in the ongoing constitution of gender at work (Martin 2006). In other words, change starts from the reflection of the human agents on how practices work on them and others and how they might alter their course of action.

The reflexive practising of gender is essential in viewing *crisis tendencies* (Connell, 2002) in the context of climate change as *crisis* does happen in different social structures when faced with extreme weather events. Moreover, my view of gender is in line with my

adopted definition of adaptation (Pelling, 2011). As men and women adapt to climate change they are able to reflect upon and enact change in the existing social practices. Finally, since women occupy a subordinate status, they may be more reflexive about gender (Martin, 2003). Given this, climate change can be viewed as space to negotiate, question and challenge gender roles and relations that could improve women's oppressed position.

4.5. Power

Power lies at the heart of the conceptualisation of adaptation as power asymmetries determine for whom, where and when the impacts of climate change are felt and the scope of recovery (Pelling, 2011:5). Power held by actors can be translated into upholding the status quo and at the same time shape an actor's support for or resistance to adaptation or building adaptive capacity. Therefore, understanding how power operates is critical in analysing how men and women adapt to climate change. Post disaster and climate change studies relate that because women have a subordinate status in society, they have less power to effect change compared to their male counterparts (Ariyabandu, 2009). Women's subordination translates into their inability to decide for themselves how to manage risk brought about by climate change (CARE, 2010). Consequently, it is argued that women's subordination is one of the causes of disaster vulnerability (Enarson, 2000). Therefore, analysis of power relations has always been crucial for feminism. By looking at different forms of power, I want to show how power operates, affects and can be used to cause change. Previous feminist studies conceptualise power as a resource to be (re)distributed, as domination and as empowerment (Allen, 2011). For the discussion of power in this study, I will be adopting these three forms of power.

4.5.1. Power as resource

Feminists who conceptualise power as a resource understand it as a positive social good that is currently unequally distributed amongst women and men. The goal of this perspective is to redistribute this resource so that women will have power equal to men (Allen, 2011). In my view this form of power is something externally gained mainly from access to and control over resources which then gives someone higher status and

bargaining power. There is some kind of *power* attached to material resources such as land and thus possessing such a resource could mean enhanced power. This form of power is important in my research as farming mainly revolves around the use of land. Moreover, under the context of climate change, access to and control of physical resources is important in reducing someone's vulnerability to climate change.

However, the power inherited from having access to some form of physical capital does not necessarily translate to a changed situation for the one who is exercising the power. Based on the accounts of several studies conducted, which I will be discussing for the rest of this sub-section, I argue that power is still under the influence of structure. Because power exists within social relations, and the games of power are played under a certain structure, the outcomes of this form of power are unpredictable and might have positive and negative effects on the one who is intentionally exercising the power. Thus, it is important that the power should be legitimated and recognised by the existing structure to ensure the effect is favourable to the one who is deliberately exercising the power.

Shortall (1999), in her book *Women and Farming: Property and Power*, uses the concept of power as having access to resources which enables someone to control his or her environment. She acknowledges that those who own the means of production or resources such as land have access to power. Property ownership, according to her, provides status and prestige, which constitutes a form of power. She also views power as distributive and collective; that is, pursued by individuals or organisations. She follows Mann's (1986) concept of power where, with a fixed amount of power, in order for someone to gain some, others lose, while collective power is where people act together to increase their joint power. People engage in cooperative collective power relations in pursuit of their own personal and collective goals. She further argues that the stability of power depends on its legitimacy, with social norms, customs and traditions, underpinned by legal support, reinforcing that legitimacy (Shortall, 1999). In any traditional farming within a patriarchal structure, where men usually control the land, the power stemming from property ownership is legitimated by customs and traditions. This is particularly observed in my Philippine case study where legitimate power is given to men because of the custom of land inheritance and the farming system (see chapter 6).

The same arguments are found in the work of Alston (2000) in her study of women in leadership in Australian agriculture. She argues that power is shaped by the ownership of land, control of resources and the resultant status such ownership and control confers. She emphasises that while power has an economic basis, political and ideological foundations also influence one's power and because of patrilineal inheritance in agriculture, power is usually accorded to men and thus women are positioned as inferior. The dominant group shapes the interest of the subordinate group and makes it appear that the position of the subjugated group is legitimate, natural and unchangeable. Alston also argues, however, that women can find multiple opportunities to challenge the existing power relations. Following Foucault, power is always open to challenge because power is multi-layered and circular. Like Shortall, Alston argues that in order to shift power relations and redefine the gender order away from male dominance, men must yield power. Viewing power in this way means going back to the notion of power as a resource that can be redistributed for a better social arrangement acceptable to women and men.

Meanwhile, Agarwal (1994), in her work *A Field of One's Own*, analyses the interactive effects of economic factors, cultural norms and gender ideologies and politics in determining women's property position. In the agrarian economies of South Asia, arable land is the most valued form of property because of its economic, political and symbolic importance. 'Traditionally, it has been the basis of political power and social status' (Agarwal, 1994:17). She notes, however, that the issue at hand is not just who owns a property, but also who has control over it. She emphasise that a 'distinction between law and practice and between ownership and control are critical in the context of gender: for most South Asian women there are significant barriers to realising their legal claims in landed property, as well as to exercising control over any land they do get' (Agarwal, 1994:12). She then addresses the reason for such barriers and provides some insights into how the barriers to ownership can be overcome. Although the impacts of such barriers are relatively less threatening in the Philippines than in the South Asian countries, still it is important to note that there are economic, social and cultural barriers in the Philippines that limit access to and control over resources which in turn limits

power. Social norms, farming traditions and existing economic and social institutions in the Philippines are highlighted as barriers to access and control over land (see chapter 6).

Agarwal's succeeding work (1997) further strengthens her claim about the importance of land property. She argues that command over private land could strengthen women's bargaining power in negotiating less restrictive social norms and better treatment from husbands. She also notes, however, that it is difficult to see the impact of such bargaining given the complexity and that action at the household level also operate within a larger institutional setting. Nonetheless, she still highlights that collective bargaining and collective action by women clearly opens up possibilities for negotiation not just over economic resources but also over social norms and cultural constructions of gender.

The concept of power as something productive is largely influenced by Foucault's valuation of power. Foucault's theory of power is helpful in thinking about how to overcome women's subordination. For Foucault, power is a mobile, shifting set of force relations that emerge from social interactions. He sees power not as possessed by a few or by groups of individuals, but offers a microphysics of modern power (Foucault, 1977) which gives an account of how power flows between individuals. He also views power as something productive, as 'it produces reality; it produces domains of objects and rituals of truth'. Following his argument, a person can effect change as she/he possesses power that can be used for her/his own advantage. A person becomes a subject as she/he subjects her/himself to power. In this sense, she/he might be under power by her/his own free will, seeing a particular structure as something beneficial, and enhancing her/his welfare. I also argue that positioning in the society is essential in exercising power since it dictates what resources are available to her/him that can be used to effect change and exercising power can be empowering and disempowering at the same time.

4.5.2. Power as domination

Power as domination is well researched and has been debated by many scholars for many years now. One of the main works that has influenced current concepts of power is the work of Steve Lukes. His discussion of the three-dimensional view of power in *Power: A*

Radical View (1974, second edition published in 2005) focuses mainly on the 'capacity to exercise power' and deals with asymmetric power; that is, the power of some over others.

The one-dimensional view of power is the most tangible power being exercised by an individual. In this context, power is described as a behavioural attribute to the extent that an individual is able to modify the behaviour of other individuals within a decision-making process. It is often observed in the decision-making process when a person is obliged or coerced to do a certain action against her/his own will and not necessarily in her/his interests. This power is often seen in the expression of policy preferences which are revealed by political participation (Lukes, 2005:19). One example of this is the credit policy in the Philippines, where formal lending is only made available to registered land owners, and thus excludes landless farmers (mostly women) and some small-farm holders (see chapter 6). Based on this one-dimensional view, power is conceived as intentional and active. This also implies that if there is no observed conflict then power is not being exercised. Critics of this view point out that power is not only reflected in concrete decision-making since decisions might be limited to non-controversial issues and decisions influencing community values and political procedures and rituals (Lorenzi, 2006). This one-dimensional view of power is also limited since it cannot explain why different actors occupy different positions and why they have varying access to resources (Shortall, 1999).

A two-dimensional view of power mainly deals with the critique of the one-dimensional view of power as it focuses on decision-making and non-decision-making. The two-dimensional view of power also looks at current and potential issues and expands on the openly observable and subtle types of conflict. These potential issues and covert conflicts must be contained and should be kept off the decision-making agenda to make potential conflicts unobservable. In this sense, non-decision-making also represents power, because an *issue* can be kept out of the decision-making process. Lukes (2005) argues, however, that the two-dimensional view of power is limited because it concentrates on only observable conflicts (overt or covert). He also argues that inaction can be due to the outcome of socially structured and culturally patterned collective behaviours. Moreover, since non-decision-making power only exists where there are grievances, this kind of

power is beyond the comprehension of a political process in the form of issues (Lorenzi, 2006). Following this argument, Lukes proposes a three-dimensional view of power, 'which can be exercised by preventing grievances – by shaping perceptions, cognitions, and preferences in such a way as to secure the acceptance of the status quo since no alternative appears to exist, or because it is seen as natural and unchangeable, or indeed beneficial' (Lorenzi, 2006: 91).

The three-dimensional view of power considers the many ways that potential issues are kept out of politics, which can be done through the manipulation of social forces and institutional practices or through individual decisions. It may seem that it is impossible to examine the real interests of an individual or if her/his interests and wants are shaped by the influence of power. But Lukes argues that a potential conflict may never be actualised. This potential is captured in his concept of *latent conflict*.

What one may have here is a *latent conflict*, which consists in a contradiction between the interest of those exercising power and the real interest of those they exclude. These latter may not express or even be conscious of their interests, but, as I shall argue, the identification of those interests ultimately always rests on empirically supportable and refutable hypothesis (Lukes, 2005: 28–29).

Lukes (2005) deems Antonio Gramsci's work (1971) to provide some empirical evidence of how real interest can be impeded. Gramsci viewed civil society in the West as the site where consent is engineered, ensuring the cultural ascendancy of the ruling class and capitalism's stability (Lukes, 2005:144). Hegemony for Gramsci comprises the subordination of the working class by the bourgeoisie, which involves ruling by consent. Because of this submission and intellectual subordination, Gramsci points out people adopt a concept which is not their own, and 'affirm it verbally and believe it to be following the *normal times*' (Shortall, 1999:20). Thus, in order to see how power structures work, Lukes suggests observing how people behave during 'abnormal times', 'when power apparatus may be relaxed or removed, thus allowing the individual over whom power is exercised to act in a different way' (Shortall, 1999:21).

Moreover, Lukes' concept of power gives a clear explanation of not just how power is exercised by individuals but how it influences social structures and traditional practices which can dictate the wants, interests and thoughts of individual people. Men and women may not be aware of the workings of power because the social forces and traditional practices already impose on the way they behave and think. Men generally are the dominant group and, through just behaving as *men*, may be unconsciously dominating women while women, accustomed to their subordinate position, just respond to the state-of-play and do not challenge their subordination. Women also internalise this and may be sexist towards other women. This type of power is associated with *hegemonic masculinity* (Connell, 1987; 1995; 2002). It is a version of masculinity that is dominant or considered and even natural in a particular gender relation (Whittenbury, 2003). The presence of masculinity as the accepted norm renders masculinity as the unmarked category of power (Campbell and Bell, 2000).

I still argue, however, that women do not have *false consciousnesses* since they are fully aware of their situation and know the difficulties they experience due to their compliance to gender norms and traditions (see chapter 7). It can be seen that women's interests are limited by their position and that they are in a way trapped in the concept of being a 'woman'. I agree with Lukes that in 'abnormal times' it can be useful to observe how power structures normally operate and how people might act differently. Climate change challenges can be regarded as abnormal times and as such can expose the real power relations in a given society. It may also be the time to find a way to challenge existing power relations and reconfigure them in a way that will be better for both women and men. Abnormal times can also provide an opportunity for women to be exposed to new opportunities and realise their full potential as agents of change.

4.5.3. Power as empowerment

One of the criticisms of power conceived as domination is the perception that it is mainly a masculinist view of power. Consequently, many have argued that power should be reconceptualised in a way that will favour the enhancement of power, rather than diminish the power of others (Miller, 1992). For many feminists power should be viewed

as a capacity or ability; specifically, the capacity to empower or transform oneself and others (Allen, 2011). In this sense, empowerment operates on two levels: in relation to its capacity for personal change, and in relation to its capacity for social and political change (CWD, 2007). Because empowerment is a *positive* connotation of power, it has increasingly become popular among local NGOs and has received positive attention from the international community.

The concept of power as empowerment is prominent among lesbian feminism and ecofeminism. For instance, Allen (2011) points out the works of Hoagland (1988) and Starhawk (1987), who define power as *power-from-within*. Both of these scholars view power-from-within as a positive, life-affirming and empowering force. Hoagland defines power-from-within as the power of ability, of choice and engagement. In this sense, it is creative; it is an affecting and transforming power but not a controlling power. Likewise, Starhawk states that she is 'on the side of the power that emerges from within, that is inherent in us as the power to grow is inherent in the seed' (Starhawk 1987: 8).

Naila Kabeer (2001) explains how empowerment is developed from within. She introduces three dimensions of empowerment: resources, agency and outcomes. For her, to be able to expand one's life choices and to have effective transformation, it is important to have access to and control over resources. Resources in this context could be material, social and or human. In other words, not only economic resources but also human and social resources can enhance one's capacity. Human resources are embodied in the individual and include knowledge, skills, creativity, imagination and so on, while social resources are claims, obligations and expectations inherited in relationships, networks and connections. These resources, according to Kabeer, are complemented with the individual's agency, the motivations and purpose which individuals bring to their activity. Agency encompasses a wide range of actions, such as bargaining, negotiation and resistance, as well as the cognitive processes of reflection and analysis on the part of the individual. Resources and agency together constitute *capabilities*, the potential that people have for living the lives they want, of achieving valued ways of 'being and doing' (Kabeer, 2001:21). The possible ways of being and doing produce outcomes or

achievement and failing to have some form of achievement means that there is an absence of power.

Following Kabeer's (2001) argument, outcome or achievement is critically important in determining whether one is empowered or not. It implies that enhanced capacity is expected to result in some change, at least on a personal level. It might not be a change in a course of action, but somehow, I argue, changes are evident at least in one's thinking and/or speaking. However, transformation at a larger scale, for instance affecting the existing structure or practice, is another story. As argued in my discussion on power as resource, power is still played out within dominant structures and the effects of power are beyond the control of any individual solely exercising their power. Thus, again I contend that power as empowerment should be viewed in the larger context of structure. Batliwala (2007:559) defines the concept of empowerment in a more elaborative and broader context:

Empowerment was a *socio-political process*, and that the critical operating concept within empowerment was *power*, and that empowerment was about shifts in political, social, and economic power between and across *both* individuals *and* social groups.

The concept of empowerment from the feminist activist's perspective has a specific gendered meaning which aims to transform the power relations between men and women and within and across social categories. Batliwala (2007) defines the shifts of social power in three critical ways: by challenging the ideologies that justify social inequality (such as gender or caste), by changing prevailing patterns of access to and control over economic, natural and intellectual resources, and by transforming the institutions and structures that reinforce and sustain existing power structures (such as the family, state, market, education and media). Although change in structures and practices might not be seen immediately, history shows that transformation of gender relations in particular through the collective action of empowered women is possible (Batliwala, 2007).

Power as empowerment is related to power as resource. While power as resource can be externally granted, as I argued previously, empowerment due to enhanced access to and control over resources is internally developed. I argue that empowerment is a deeper sense of power. As claimed by scholars such as Allen (2011); Hoagland (1988) Starhawk (1987), empowerment is a *power-within*; it requires internalisation on the part of the subject. Thus, for the purpose of my research, I will adopt power as empowerment, a *power-within*, to encompass self-awareness, self-esteem, identity and assertiveness, while I will refer to power as resource as *power-to* to reflect the enhanced capacity to make decisions and bargain for one's interests with others.

4.6. Agency

My discussion about gender and power also indicates the centrality of the notion of agency. This concept is critically important in understanding how change is possible, although agency might be limited by the dominant structure. In her classic book, *Gender and Agency* (2000), Lois McNay gives a fresh account of agency. She contends that the negative paradigm of subjectification does not offer a theory of agency. This negative paradigm only highlights the retentive dimension of power of the body which undermines the future-oriented dimension of praxis and the anticipatory aspect inherent within the subject information (McNay, 2000). She emphasises that agency is required to explain the differing ways individuals or groups struggle over, appropriate and transform cultural meanings and resources. She proposes to contextualise agency within power relations, in this way giving a better understanding of how acts deemed as resistance can transform the immediate sphere so that individuals can eventually alter collective behaviour and norms. McNay (2000) then proposes to integrate the idea of a determining constraint with a more generative theoretical framework. Drawing on Bourdieu, she argues that a more generative process of subjectification offers some ways to overcome the difficulties in thinking about agency beyond the negative paradigm of subjectification. McNay shares her thoughts about the works of Bourdieu:

Bourdieu's understanding of *habitus* as a generative rather than a determining structure is expressed in a dialogical temporality denoting both the ways in which norms are inculcated upon the body and also the moment of praxis or living through these norms. His insistence on the inseparability of *habitus* from the field

suggests a way of considering how symbolic dimensions of subjectivity connect to overarching social relations (McNay, 2000:32).

McNay (2000) also critiques the work of Bourdieu, pointing out that it fails to sufficiently explain the implication of the fields to gendered habitus. Nonetheless, she extends his analysis by introducing the concept of *lived experience*. McNay argues that the body is neither pure object nor pure subject since the body is the place of one's engagement with the world and because there is always somehow resistance to the dominant norms in some part of the subject. Her thoughts about embodiment and agency are largely influenced by Judith Butler. The idea of gender performativity, in her view, 'denotes both the profound corporeal inscription and also a fundamentally instability at the heart of dominant gender norms' (McNay, 2000:33). She claims that although there are given constraints that condition the gender acts, change is still possible because of the instability of the symbolic and discursive structures which inform the body with meaning which implies a space for agency.

McNay's later work (2004) further highlights how lived experience is important in the account of agency. She argues that an 'idea of experience is essential to an account of agency' which must be understood in relational terms rather than in an ontological sense as the absolute grounds of social being (McNay, 2004:175). Using this idea, McNay (2004:185) argues that normative identities such as gender can be understood as *lived social relation*. Thus, the process of negotiations on the part of the subject is only possible from the perspective of experience. In other words, a person cannot think of new meanings, concepts and actions beyond her/his reality. This means that agency is still largely influenced by the field and social space but actions and behaviour can be unanticipated and innovative because agency is inherent in every individual.

Following the arguments of McNay (2000; 2004), women and men are positioned in a social space where their identities are not just shaped by performing certain norms according to structures but there are other social forces, such as class, ethnicity and race that affect their identities. Therefore, changes in social relations and practices are possible especially during some kind of *crisis* when social structures are *temporarily*

disrupted and are susceptible to change. The idea produced due to these changes, however, cannot be easily translated into new practices since 'practical expression of old familiar discourses always come more readily to hand' (Davies, 1991:50). Davies elaborates agency:

Agency is never freedom from discursive constitution of self but the capacity to recognise that constitution and to resist, subvert and change the discourses themselves through which one is being constituted. It is the freedom to recognise multiple readings such that no discursive practice, or positioning within it by powerful others, can capture and control one's identity. And agency is never autonomy in the sense of being an individual standing outside social structure and process. Autonomy becomes the recognition that power and force presume sub-cultural counter-power and counter-force and that such sub-cultures can create new life forms, which disrupt the hegemonic forms, even potentially replacing them (Davies, 1991:51).

In summary, agency is having an authority to clearly see what subjects a woman and what dominant discourses she should accept and refuse in a way that she can still control her own self. This is not outside the influence of structure, however. By refusing any patriarchal dominations or altering any social relations, the proposed changes should become a way of speaking and this is not possible through an individual's effort alone. Going back to the feminist strategy, collective action is needed to affect change.

4.7. Conceptual framework

Having now discussed the key concepts relevant to my research, I would like to explain further how these interrelated concepts will be used to understand how the process of adaptation produces new practices and how they are reinforced as women and men face extreme weather events due to climate change. As argued, our practices are influenced largely by the structure of the society. Our ways of life and responses to changes in our environment are in relation to the structures or patterns of a given society. I view **gender** as one of the structures that informs actions that are generally approved by the society. Dominant discourse influences the way men and women behave, and promote particular kinds of gendered identities and ways of doing things in regard to gendered roles, including the way we view different situations that reflect gender perceptions. Thus, I view the gender effects in adaptation strategies as influenced by the dominant discourse

and power relations and social political and economic structures. Responses to climate change then are likely to reflect gendered norms and traditions.

I use the concept of **power** based on its three dimensions: power as resource, domination and empowerment. I argue that power is a resource since it is something external and gained through the resources that men and women possess or control. An individual who has more access to and control over important resources such as land, financial and social capital is more likely to take control of herself/himself and even have greater chances of influencing the current social, political and economic structure, including gender norms and roles. She/he may have better bargaining power, and be better able to make the structure favourable to her/him. Having less control of resources means power structures may have a negative effect on her/him, in which case power becomes a form of domination. Anyone who is subject to power is dominated or subjugated and might have to perform some actions against her/his will. Oftentimes, this domination is embedded in the structure existing in the society and the individual might be unaware of its influence. However, men and women can capacitate themselves to change their situation through empowerment. This kind of power refers to the ability of women and men to take control over their lives, and can be enhanced by training, education and exposing an agent to new discourse, or viewing the world from a different perspective.

I argue that being empowered is something internal to the person being capacitated. An individual becomes aware of herself/himself and tries to *think outside the box* and engage in new possibilities. As one continues to live in a given social structure, one encounters new discourses and situations. The lived social relations, as argued, enhance one's **agency**. New opportunities or crises allow for different ways of thinking and an innovative agent may be able to introduce *new practices* into the structure. Although an agent is still subject to the structure, she/he is capable of being innovative as the structure is simultaneously formed by individuals who reinforce social practices. Drawing from this perspective, gender practices, for instance, can be viewed as changing based on given social conditions and thus, gender becomes a situated accomplishment. Furthermore, as men and women adapt to climate crisis, new gender practices are introduced.

I view structure and agency as having a causal relationship. One cannot think of something new without referring to the influence of the social, political and economic structure, but structure is also formed and reinforced by individual actions, thus, the social, economic and political structure can be transformed by the agents. However, the new practices being introduced at an individual level should become part of the discourse. In other words, new practices should become part of the thinking of not just one individual but must be adopted by many individuals. Collective actions exerted by individuals can change or challenge the existing power structure. To demonstrate the causal relationship of structure and agency, I sketch the interrelations of the gender, power and agency in a conceptual framework (Figure 1). This framework is a work in progress, in any future work I will further develop this.

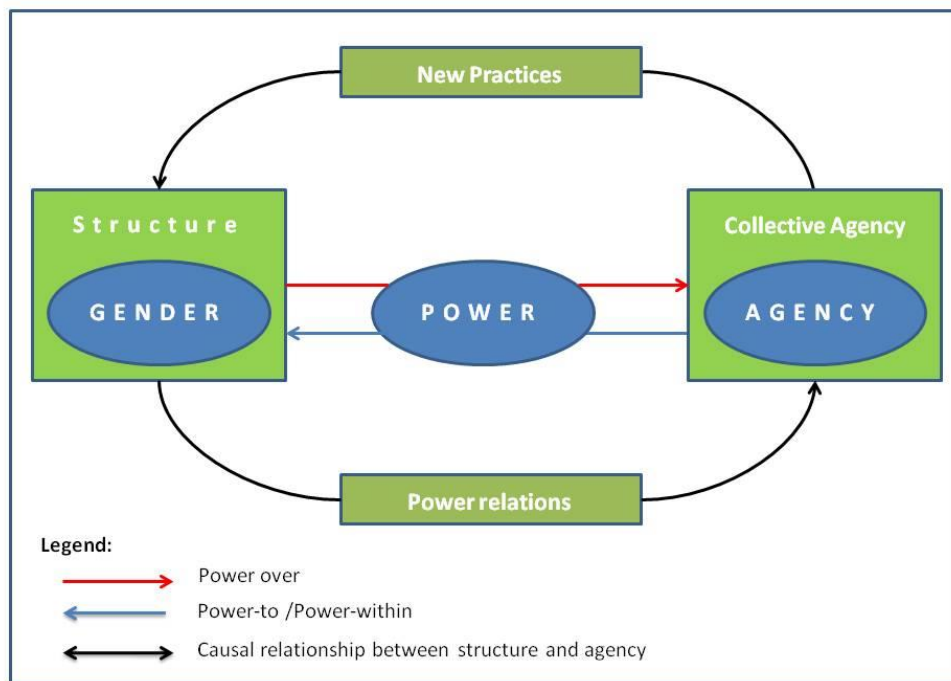


Figure 1. Conceptual Framework of the Study

The framework is conceptualised in two levels so that my research could simultaneously analyse the *phenomenon* of climate change in both a small and a large scale. I take the view that experiences, particularly the adaptation strategies undertaken by individual women and men in the rice farming communities, are a reflection of the influence of the

larger external social factors such as economy, politics and even dominant gender structures. Thus, aside from the individual and household level perspective, I need to be aware of the existing power structures in some of dominant institutions that could largely affect the responses of men and women to climate change challenges. Also, since climate change is a form of *crisis*, I am keen to investigate any new practices emerging from crisis as part of the adaptation strategies undertaken by men and women. Furthermore, I want to analyse whether these changes can become part of the current economic, social and political structure and what the potential is for altering or challenging the existing power structure, especially in relation to gender roles, perceptions and norms.

4.8. Summary

In this chapter I outlined the theoretical framework of my study and provided information as to the rationale behind employing such a framework. I discussed practice theory in general, emphasising the practice approach conceptualised by Pierre Bourdieu. I aimed to include enough information to clearly outline how I use this theory in answering the questions raised in this study. In section 3, I discussed the rationale of using the practice approach in analysing the process of adaptation to climate change. Succeeding sections presented the concepts of gender, power and agency. In section 4, I discussed gender, defining this concept as both situated accomplishment and structure. I also discussed the concepts of gender of regime and gender order to explain how gender as structure affects the affairs of women and men in the micro- and macro-levels of society. In section 5, I discussed the concept of power, including the three forms of power: resource, domination and empowerment. These notions of power are relevant to my study as they clearly explain how power operates within society and how it might affect the actions of the individuals in given social relationships. In section 6, I presented the concept of agency. By using this concept, I highlighted how men and women can be innovative and creative in responding to their physical and social environment. However, I also pointed out that agency is still influenced by the existing structure. Each of these concepts was used to sketch a conceptual framework, presented in section 7 that guides this research. Through exploring the application of these conceptions of gender, power and agency, I explored how gendered adaptations take place in relation to flooding events in the Philippines. I also examined how gender adaptation is informed by gender

perception, roles and practices and dominant norms and structures. I discussed how agency is possible in times of crisis and whether it can be an opportunity to challenge the status quo. From a feminist perspective, it is of particular interest to explore whether the responses to these climate change challenges can lessen women's vulnerability particularly during extreme weather events.

CHAPTER FIVE: METHODOLOGY

5.1. Introduction

This chapter provides a detailed discussion of how the research was conducted. The chapter is composed of thirteen major sections, including the introduction. The section following the introduction outlines a discussion of what a feminist research is and how a feminist framework was used in the study. This is followed by a discussion of the case study research method. The next three sections discuss the mixed-method research design used for the case study, focusing on mixed-method exploratory sequential design and its procedural issues. This is followed by discussions of the two distinct phases: the qualitative phase and the quantitative phase. The section on the qualitative phase discusses the different qualitative methods used in collecting the qualitative data, while the section on the quantitative phase discusses the survey method used in the study. The following sections then present the data analyses used with detailed discussions of the qualitative and quantitative analyses. Gender analysis is presented as an integrated approach used to analyse and interpret the data from the qualitative and quantitative phases. The last four sections of this chapter tackle ethical considerations, how trustworthiness was established, limitations of the methodology and finally concludes in a short summary of the chapter.

5.2. Feminist research

This study adopts a feminist approach – ‘advocating on behalf of women and taking gender as the center of analysis’ (Winkler, 2009). It locates gender at the centre of analysis with the purpose of exposing gender differences and inequalities experienced in areas affected by climate change. This approach enhances the capacity for social change and exposes ways to empower and improve the position of women. This agenda is highlighted as I attempt to examine how gendered adaptation practices are produced, reinforced and changed in response to climate change.

There is no distinct and single correct feminist methodology identified in past feminist studies (Maguire, 2001; Reinharz, 2002; Reid, 2004). Thus, instead of offering defining sets of feminist methodology, Doucet and Mauthner (2007) provide an understanding of a

few common aims or characteristics of feminist research. They outline three of the most distinct characteristics and add the notion of power and reflexivity as important characteristics. First, they advocate that feminist research should be not just on women, but *for* women and, where possible, with women. Second, feminist methodological challenges involve a diversity of methodological approaches (Ramazanoglu and Holland 2002:2). Feminist researchers have actively engaged with methodological innovation through challenging conventional or mainstream ways of collecting, analysing and presenting data (Code, 1995; Gelsthorpe 1990; Lather, 2001; Lather and Smithies, 1997; Mol, 2002; Naples, 2003; Richardson, 1988; 1997), including challenging the positivist frameworks and dominance of quantitative methods and experimenting with documenting and representing women's experiences or views. More recently, however, quantitative methods have been accepted and adopted (Oakley, 1998; McCall, 2005). Feminist methodological challenges therefore include a diversity of methodological and epistemological approaches (Ramazanoglu and Holland, 2002:2).

Third, feminist research is concerned with issues of broad social change and social justice (Fonow and Cook, 1991; 2005). Ramazanoglu and Holland (2002:2-3) note that 'feminist research is imbued with particular theoretical, political and ethical concerns that make these varied approaches to social research distinctive'. Aside from the three abovementioned characteristics, Doucet and Mauthner (2007) add that power differentials should be minimised by developing non-hierarchical and *friendly* relationships with respondents. Thus, recent feminist studies use participatory approaches in collecting and analysing data (Reid, 2004; Gouin et al., 2011). Links to participatory research and feminist research are attempted since both kinds of research cohere ontologically and epistemologically as both seek to shift the centre from which knowledge is generated (Hall, 1981). Moreover, they share an avowed intent to work for social justice and democratisation (Greenwood and Levin, 1998; Lather, 1991; Maguire, 2001). Lastly, feminist research involves the notion of reflexivity. Most feminist research is reflective of its social location and the role it plays in co-creating data and in constructing knowledge (Harding 1993; Hertz 1997; Wolf 1996; Doucet and Mauthner, 2007).

The principles of feminist research cited above are used and presented in my thesis in many ways. These principles have guided my research and established the rationale for the selection of data collection techniques and analysis. First, this study was conducted for and with women and was studied in relation to men. In fact, one of the aims of this study was to address the issues of social change and social injustice. Second, I have actively engaged in methodological innovations by adapting a mixed-method research design for this study. This was intentional as I was aware that qualitative and quantitative methods can show different findings in very distinct ways. Third, I also used a collaborative and participative approach in conducting my research, with the aim of minimising the power differentials existing between the researchers and the respondents. This approach also created a friendly relationship which made it easier for me to closely study actions and perceptions and examine lives in a more personal way. Lastly, this study is influenced by my personal background and experience and thus I am aware of my influence in creating the knowledge generated in my study.

5.3. Case study

This study is a case study of gendered experiences of climate change of rice farmers in two small communities in the Philippines. Case study as a research method is now widely used in many social science disciplines (Gerring, 2007). Case study is commonly characterised as contextualised, bounded, focused and using multiple sources with the aim of understanding a phenomenon or event with the purpose of connecting the single case or the activities of individuals to large-scale social structures and processes (Neuman and Kreuger, 2003; Gerring 2007). Alternatively, the logic of the case study is to demonstrate a causal argument about how general social forces shape and produce results in particular settings (Walton 1992:122). In this sense, the purpose of the case study may be to provide descriptions through a detailed example or to generate or test particular theories (Bloor and Wood, 2006). Given such purposes, this approach to data collection and analysis suits the objective of my study as I aim to examine the experiences of men and women of the impacts of climate change in a local context. Although findings of this kind of study might not be generalisable for a wider area, they can help to understand the general social forces that shape and produce the gendered vulnerability,

adaptations and impacts of climate change. Also, results of this study can be comparable to other societies with something of the same social setting and social problems.

My case study uses a mixed-method approach in data collection and analyses. It encompasses other methods, particularly qualitative methods such as in-depth interviews, focus group discussions and participatory methods, to elucidate some underlying social processes in the communities, and surveys, to define the prevalence or frequency of such processes. The case study focuses on two villages as sites. Qualitative data collection was conducted first to understand the process of adaptation and, from the results of the case studies; surveys were conducted to highlight the occurrence of the process.

Yin (2009:18) describes the technical aspects of a case study as two-fold, in terms of its scope and other technical characteristics including data collection and data analysis, which guided me in doing this case study:

1) A case study is an empirical inquiry that:

- investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.

2) The case study inquiry:

- copes with the technically distinctive situation in which there will be more variables of interest than data points, and as one result
- relies on multiple sources of evidence, what data is needed to converge in a triangulating fashion, and as another result
- benefits from the prior development of theoretical propositions to guide data collection and analysis.

Drawing from Yin's (2009) definition of case study, I use multiple sources of evidence and integrate those sources to come up with analyses. Also, Yin (2009) particularly introduces the importance of theory development in guiding data collection and analysis. Theory development prior to the conduct of any data collection is a point of difference from related methods such as ethnography and grounded theory, which avoid specifying any

theoretical proposition at the outset of the inquiry (Yin, 2009). The role of theory is very much reflected in this piece of research as I explicitly state that I am using practice theory from a feminist standpoint. Further I use the concept of agency to further understand the changes in men's and women's responses to climate change. My theoretical framework is reflected in my data collection methods which allow me to show how adaptation responses are informed by gender roles, norms and relations and that these can be oppressive to women. On the other hand, the case study also shows how adaptation can provide opportunities to women to change their situation.

5.3.1. Rationale for a case study

Yin (2009:2) suggests that a case study is preferred when *how* or *why* questions are being posed, when the investigator has little control over events and when the focus is on a contemporary phenomenon within a real-life context. These three features are present in my research study. My main research question relates to a *how* question: How are gendered adaptations strategies produced, reinforced and changed in rice communities in the Philippines as a response to increasing flooding events? Second, with the nature of the behavior I investigate, I have little control over the events. I examine the adaptation responses of women and men to the natural disaster of flooding. To examine men and women in this context, I ask the people within the community to narrate their experiences. This is done in separate groups of men and women and in some instances with men and women together. Finally, the question of adaptation to climate change is a contemporary issue within a real-life context. The impacts of extreme weather events such as flooding and typhoons on women and men, specifically those who rely on climate for their livelihood are real-life experiences. This is critical to understanding the differential impacts of climate change on women and men. The many issues that may impact particularly on women's adaptation (e.g. access to and control over resources, gender roles and relations) can be best understood through a case study. Further, the case study's unique strength is its ability to deal with a full variety of evidence (Yin, 2009). Putting up all evidence from different data collection methods increases the validity and reliability of the findings generated by the case study.

5.3.2. Case study design

My research uses a *two-case-sites* study design, mainly because doing more than one case study can produce more compelling results. Flooding can have varying impacts depending on its extent and the socio-economic condition of the particular community. These differences influence the possible adaptation strategies undertaken in a particular community. Each of the two villages in my study is treated as a separate case. It would have been much better to have done a multi-case study but due to budget and time constraints, I resorted to conducting a two-case study. This kind of study is more appropriate if the researcher aims to compare two unique cases that have contrasting conditions (Yin, 2009). Consequently, two villages with contrasting conditions were chosen. The two case studies selected were from the province of Nueva Ecija in the Philippines. Papaya is a more progressive village than Cama Juan mainly because of its proximity to the main town which makes it more accessible and thus different businesses and institutions such as schools and medical clinics are found there. Cama Juan, on the other hand, is a remote village which is usually isolated during floods. The roads are at times muddy, making it harder for other agents (government and NGOs) to reach the village. Few business opportunities are found in the area, which makes the people heavily dependent on farm-related activities. Cama Juan is a less densely populated village than Papaya mainly due to having fewer livelihood opportunities, its remoteness and its relatively smaller size. However, small active groups and strong family ties are observed among the people of Cama Juan. This makes them resilient to changes in their farming systems and the climate.

The same set of field work activities were undertaken in each village, following the same data collection protocols. Data analysis was integrated by comparing and contrasting the vulnerabilities of, adaptations taken by and impacts on women and men from each community.

5.3.3. Rationale for the selection of study sites

In the Philippines, one of the most climate sensitive sectors is the agricultural sector, particularly rice farming. As discussed in chapter 3, most of the people are dependent on

rice farming for subsistence and livelihoods. Thus, rice farming is literally *life* for most Filipinos in rural communities in the Philippines. Moreover, climate change is evident in the Philippines in recent years. More devastating typhoons and severe flooding than before have been experienced in many parts of the country. Consequently, to better understand the process of adaptation responses of women and men to climate change, I have chosen to focus my research study on areas in the Philippines where rice farming is the main livelihood and where flooding is frequently experienced due to changes in climate. These communities are heavily dependent on livelihoods which are sensitive to changes in climate. Thus, they are constantly coping with the social and economic changes brought about by erratic climate.

Nueva Ecija province is considered to be the rice granary of the Philippines. Most of the rice farming is located in its low lying areas and are consistently visited by typhoons. The province is also considered to be the second most flood-prone province in the Philippines (Manzanilla et al., 2008). One of the most affected municipalities/towns of Nueva Ecija is San Antonio. The town is considered to be the water catchment basin of the neighbouring provinces, such as Pangasinan, Tarlac and Pampanga, that flood water crosses before draining to Candaba Swamp. Of the 16 villages of San Antonio, 10 are considered to be low lying *barangay* or villages. These villages are near or bounded by rivers or creeks which make them more susceptible to flooding during intense rainfall and typhoons. I chose San Antonio for these reasons as the site for this study.

Taking advantage of my connection with the farmers and authorities of the municipality of San Antonio during field work in a past project with IRRI, I made contact with them to do my research study. My first field work started on the last week of April 2011 when I met with key informants to introduce the purpose of my study, contact the key persons for interviews and meet farmers for group discussions. The Municipal Agricultural Officer (MAO) helped me to identify the two villages with rice areas most affected by flooding. Barangay Papaya and Barangay Cama Juan were identified as good sites for my study (see Figure 2); farmers there are experiencing frequent flooding and the authorities and farmers organisations are very cooperative. Also, as explained in previous subsection (5.3.2), these two villages are characterised by having distinct socioeconomic conditions.

Given the different and contrasting socioeconomic conditions of the two study sites, different adaptation responses were observed across the villages (see chapters 6 to 8).

5.4. Mixed method within the case study

Mixed method is an approach to inquiry that combines or associates both qualitative and quantitative forms; it involves the mixing of the philosophical assumptions and the use of qualitative and quantitative approaches in a study (Johnson and Onwuegbozie, 2004; Cresswell, 2009; Galt, 2009). Its core characteristics include collecting both quantitative (closed-ended) and qualitative (open-ended) data, the rigorous and persuasive methods associated with both forms of data, and the integration of the two data sets through merging them or connecting them sequentially, with one building on or extending the other (Sweetman et al., 2010:441).

The use of mixed-methods research created contention and debate about whether this approach to research was even possible (Teddlie et al., 2008). The essence of the debate was whether or not quantitative and qualitative methods could be combined when each method was based on a different world view, quantitative methods on a post-positivist world view and qualitative methods on constructivism, and were therefore incompatible (Teddlie et al., 2008). Although there are still ongoing debates about this, many researchers have discussed the appropriateness of a world view of pragmatism as a foundation for mixed-method studies (Pansiri, 2005; Friedrichs and Kratochwil, 2009; Cresswell, 2009; Galt, 2009; Kupers, 2011).

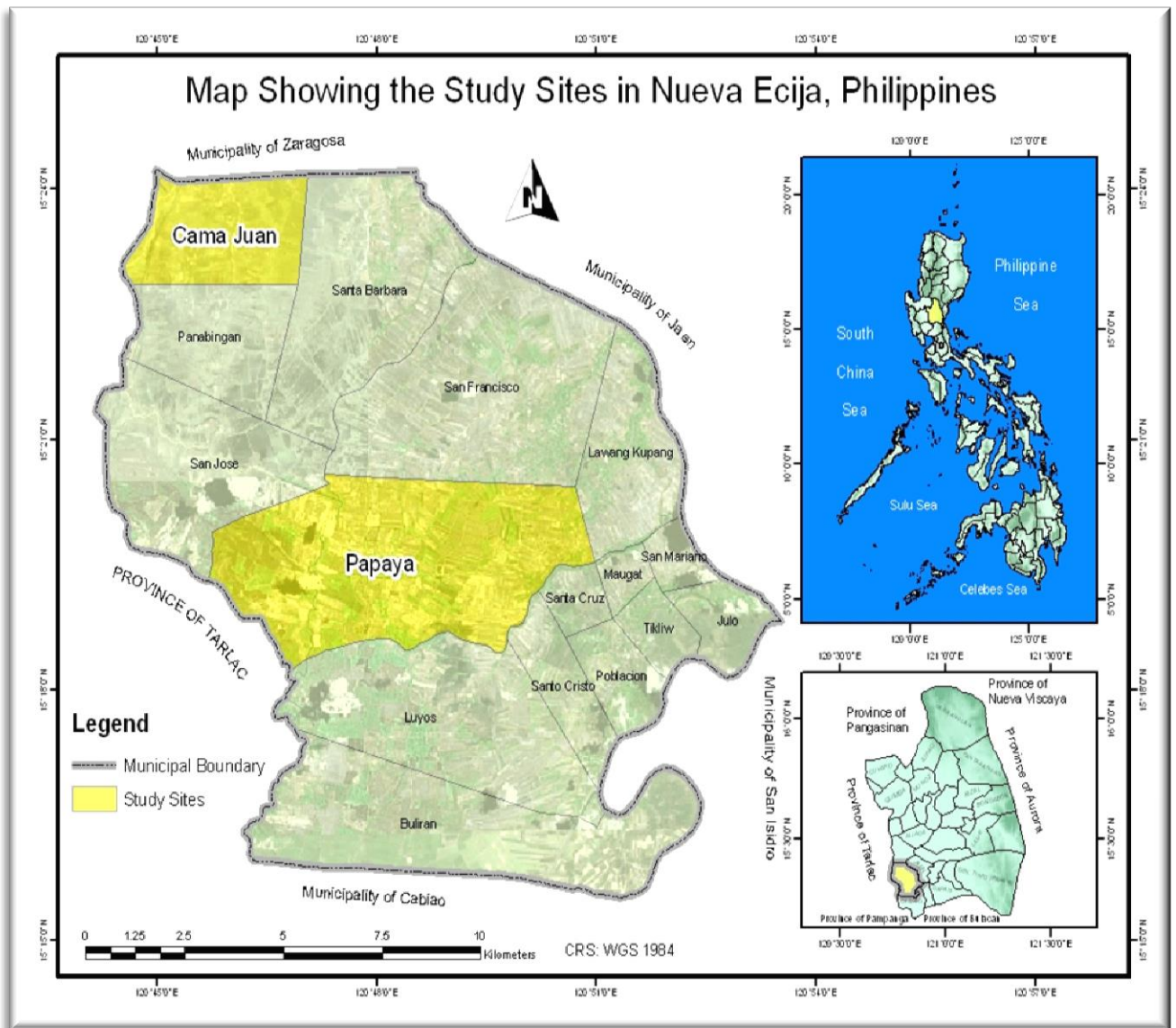


Figure 2. Map showing the study sites, San Antonio Nueva Ecija, Philippines

Creswell (2009) explains this world view, which arises out of actions, situations and consequences rather than antecedent conditions. It is not committed to any one system of philosophy and reality. Instead, this world view focuses on the research problem and uses all approaches possible to understand the problem. Pragmatists agree that research always occurs in social, historical, political and other contexts. In this way, mixed-methods studies may include a theoretical lens that is reflective of social justice and political claims. Moreover, studies are beginning to emerge that use mixed methods to study gender, race or ethnicity, disability, sexual orientation and other bases of diversity

(Cresswell, 2009; Mertens, 2003; Sweetman et.al, 2010). Mertens (2003) describes these studies as adopting a transformative framework. In this framework, a person's world view is recognised and implicit value assumptions are included, such as knowledge not being neutral but influenced by human interest. Knowledge creation reflects the power and social relationships within society, and one of the objectives of knowledge constructions is to aid people to improve society (Sweetman et al., 2010:442). Studies framed within the transformative paradigm place a priority on social justice and human rights (Mertens, 2010).

Given that a mixed method with a transformative perspective recognises my agenda as researcher, this approach to collecting and to analysing the data is deemed appropriate to understanding my research problem. By identifying the social structures, socioeconomic conditions and power relations that exist in the community, I am able to examine how climate change can have differential impacts on women and men and how extreme climate events can have the effect of oppressing women. Understanding women's and men's experiences and processes of coping and adapting can show how women can alter, change and open opportunities to change their oppressive situation.

Moreover mixed method as an approach to inquiry is advantageous on several counts. It is useful when the strengths of both quantitative and qualitative research can give a better understanding of the community under study (Clark et al., 2008; Creswell, 2009). This understanding can be gained through the complementary strengths of the quantitative (numbers, trends, generalisations) and the qualitative (words, context, meaning) (Clark et al., 2008). If a phenomenon is examined using multiple perspectives that represent different but complementary views, gaining a better and more complete understanding is more likely (Clark et al., 2009). Since a mixed-methods research approach offers numerous methodologies, it also brings value to a study in terms of its overall persuasiveness and emphasis on practical application. This method of research provides more persuasive accounts of a phenomenon because it can provide both statistical results and qualitative quotes and stories that are more appealing to a broader audience. It is also well received by practitioners and policymakers who base their policies on numbers and stories of experiences. Given such advantages and to better understand my research problem, I opted not to commit to one world view, but instead to

use the strengths of each methodology by examining my data in two phases: qualitative and quantitative. It is an innovative method to understanding my research question. The qualitative phase reflects the gendered experiences to climate change and at the same time incorporates my own reflections on and knowledge of the research matter. The quantitative phase, on the other hand, balances the findings in a more objective manner and adds rigour to my analysis.

5.5. Mixed-method exploratory sequential design

This study used a mixed-method exploratory sequential design. Clark et al. (2008) describes the process involved in this kind of research design. It is defined by two phases. It begins with the collection and analysis of qualitative data to explore a topic and then builds to a second phase in which quantitative data are collected and analysed. The second, quantitative phase of the study is designed so that it builds on or is connected to the results of the initial qualitative phase. Since this design starts with a qualitative phase, the researcher usually places greater emphasis on the qualitative methods. This design is appropriate when a researcher needs to develop or modify an instrument or to identify important as yet unknown variables. This design is also suitable if a researcher aims to generalise results to different groups, to test some aspects of an emergent theory, or to explore a phenomenon in depth and measure its prevalence (Clark et al., 2008).

This research design was adopted mainly for the purpose of acquiring data from different sources. Firstly, I conducted the qualitative phase of the study. This is logical as my study mainly aims to understand a *process*, specifically to examine how adaptations are produced and reinforced by men and women in the context of rice farming in the Philippines.

I employed complementary qualitative and quantitative methods. For the qualitative phase, I conducted key informant interviews, focus group discussions, participatory rural appraisals (PRA) and in-depth interviews. Since I wanted to understand the process of adaptation strategies within the real-world context, it was appropriate to collect data in natural settings. Thus, study participants were asked to recall and share their past and current flooding experiences. Moreover, quantitative data is also relevant to my research interest because I am trying to understand the process of adaptation within the rice

farming community (not just its rice farmers). Thus, to explore, describe or explain events at community level, it necessary to use both qualitative and quantitative data (Yin, 2009). I used surveys to collect data for the quantitative phase of my study.

The qualitative data were collected and analysed and became the basis for further investigation for the second phase of the study. The quantitative phase aimed to further explain and elaborate the findings from the first phase of the study. Since I was studying a *community*, quantitative results gave me a more generalised understanding of the research problem, which was more of a representation of what was happening within the community. The qualitative and quantitative phases were connected to each other as respondents and questions involved in the quantitative phase were also involved in the first phase.

Figure 3 gives an overview of how mixed-method exploratory sequential design was used in the study. It shows that separate data collections were conducted for each study site using the same data collection protocols and survey questionnaire. Also, given the different purposes of each phase, separate analyses for each study site were conducted in the qualitative phase while a combined analysis was done for the quantitative phase. The qualitative phase was conducted to give an in-depth understanding of the process of adaptation while the quantitative phase was conducted to provide more general results that are representative of the views and responses of men and women in rice farming communities.

5.6. Procedural issues

In conducting a mixed-method sequential approach, several procedural issues were accounted for, such as which of the quantitative and qualitative approaches had more emphasis in the study, what the sequence of data collection and data analysis is and how to mix or integrate quantitative and qualitative approaches (Ivankova et al, 2006).

5.6.1. Priority

At the start of the field work, I decided to give priority to the qualitative data collection and analysis in order to have a broader and deeper understanding of men's and women's experiences of climate change before conducting the quantitative phase. In this phase, the

goal was to understand the different views of people of different socioeconomic status on how gender practices, perceptions and reflections on their experiences during severe flooding affect the way they respond to climate change. Qualitative methods such as in-depth interviews enabled me to further explore and examine the lives of my participants in their natural setting. Also group discussions and participatory activities created a space for the participants to be more open and share their experiences. Although I considered the data collected in this phase as rich already, the results could have been biased towards the participants' views and might not be representative of others, thus a survey of a large number of participants was conducted in order to make more generalised claims about the rice farming communities. Also, quantitative data strengthens the results of the qualitative analysis, which further enhances the main results of the study.

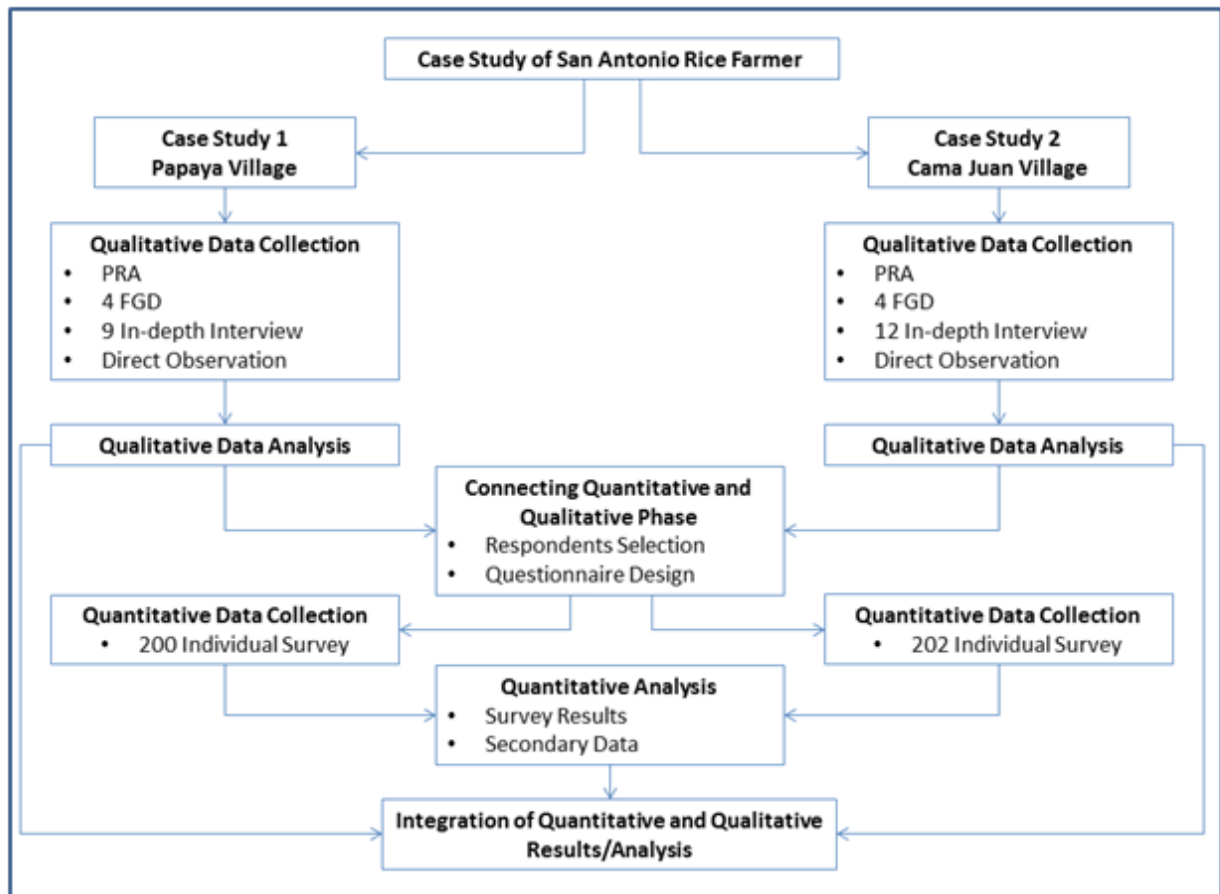


Figure 3. Mixed-method sequential design used in a case study of the rice farming communities in Nueva Ecija, Philippines

5.6.2. Implementation

In the sequential explanatory design, the data were collected over the period of time in two consecutive phases (Ivankova et al., 2006). I initially did the qualitative phase of my study from May to July 2011. Analysis of the data collected from the qualitative phase was conducted right after the field work. A discussion of data analysis procedures is discussed on the latter part of this chapter. Initial outcomes from the qualitative analysis became the basis for the survey design and questionnaire. The quantitative data collection was conducted from November to December 2011. Five field assistants were trained and deployed to conduct face-to-face surveys with female and male rice farmers in the two villages of San Antonio, Nueva Ecija, Philippines. Data collected were then analysed from January to February 2012 using Statistical Product and Service Solutions (SPSS) software. This is the most widely used program in the social sciences. I used SPSS to generate analysis that could identify significant differences in women's and men's adaptation strategies and to cross-tabulate frequency tables and the prevalence of vulnerabilities and impacts of climate change on women and men.

5.6.3. Integration

Quantitative and qualitative research can be combined at four different stages of the research process: formulation of research questions, sampling, data collection and data analysis (Bryman, 2006). In this study, I connected the quantitative and qualitative phases during the process of selecting the respondents to the survey. The results from the qualitative study largely informed the survey questionnaire. I then integrated the results from the quantitative and qualitative phases.

5.7. Qualitative phase

The qualitative phase of the study draws on an interpretative orientation that focuses on the complex and nuanced process of the creation and maintenance of meaning. Qualitative research aims to elicit the contextualised nature of people's experience and action, and attempts to generate analyses that are detailed, thick and integrative (Rice and Ezzy, 1999). Qualitative data can be considered as reliable because they document the world from the point of view of the people studied. Qualitative research assumes that in order to understand people's behaviour we must attempt to understand the meanings and interpretations that people give to their behaviour (Rice and Ezzy, 1999). Qualitative

methods such as interviewing people provide insights into how people make sense of their experiences that cannot be easily provided by other methods.

During the qualitative phase, fewer people were initially engaged in the study so as to gain a deeper and in-depth understanding of the behaviour of the people in the rice farming communities in relation to adaptation. Several qualitative methods were used to gather all relevant information about the community being studied. Collection methods included participatory rural appraisal (PRA), focus group discussion, key informant interviews and in-depth interviews and direct observation. PRA mainly provided an overview of rice farming activities, and the extent and impacts of flooding in rice farming communities. Focus group discussions on the other hand, provided insights into how men and women were impacted by severe flooding. In-depth interviews were open-ended interviews which captured personal views of the flooding, how respondents came up with decisions and pressing issues brought about as a consequence of flooding. I made notes, took some photos, audio taped, transcribed each interview and translated the interviews from the local language to English. Translations were done by three people, including me and two researchers from IRRI. Each of the transcribed interviews was verified by the three translators to ensure the quality of the translations.

5.7.1. Data collection techniques within the qualitative phase

Different data collection techniques were conducted in order to have a richer and stronger array of evidence than could be collected using a single method alone and to answer the three parts of the thesis question. This sub-section discusses each of the data collection methods, their rationale and how the data collection techniques were conducted. Table 1 shows the data collection methods and the sample sizes for each method.

Table 1. Study sample size by data collection methods within the qualitative phase, Papaya and Cama Juan villages, 2011.

Data collection method	Number of activities			Number of participants		
	Papaya	Cama Juan	Total	Men	Women	Total
Key Informant Interview	4	5	13 ^a	7	6	13
Focus Group Discussion	4	4	8	26	26	52
PRA Activities	1	1	2	13	6	19
In-depth interview	10	13	23	14	12	26 ^b

*Notes: a- 4 of the 13 Key Informants are from government agencies who were not from both villages
b- 3 of the 23 in-depth interviews were done with couples (husband and wife)*

Aside from the data collection cited, direct observation was done throughout the duration of field activities; field notes and photos were documented to take note of important observations and informal conversations with residents of rice farming communities. Also, documents such as statistics and village profiles provided by key informants were used to make a clear picture of the case study sites. All qualitative data such as adaptation strategies to climate change, men’s and women’s experiences of severe flooding and changes in gender roles and positions were then used to generate a survey questionnaire and later on compared with the quantitative data collected from the second phase of the study to come up with an integrated analysis.

Key informant interviews

A key informant is an expert source of information. Key informants, as a result of their personal skills, or position within a society, are able to provide more information and deeper insights than others into what is going on around them (Marshall, 1996). Key informants also serve as gatekeepers in their community through sponsorship or through the extensiveness of their social networks. Moreover, their rich knowledge because of their seniority or their specialist roles in the setting may mean they provide important understandings (Bloor and Wood, 2006). Key informants might also not represent, or even understand, the majority view of the individuals in their community. Bearing this potential bias in mind, data gathered from key informants was used together with other qualitative data.

Key informant interviews were carried out with representatives of key institutions from the two villages and from the town of San Antonio. Key individuals were selected based on

their extensive knowledge of the flooding situation in the study sites and their institution's potential influence on the farmers' livelihood, activities and coping/adaptation strategies. The main objective of these interviews was to map out the institutional context from which farmers form their perceptions and decisions about their adaptation strategies during flooding. A guide question was developed to ease the facilitation of the interview (see Annex 1).

The information gathered also helped me to cross-reference the information provided to me by the farmers. Government officials and heads of different associations/institutions served as key informants.

Key informants who were interviewed are as follows:

1. Village head (*barangay* captain): *Barangay* Papaya
2. Village head (*barangay* captain): *Barangay* Cama Juan
3. Head of rice farmers' association: *Barangay* Papaya
4. Head of rice farmers' association: *Barangay* Cama Juan
5. *Barangay* Health Worker: *Barangay* Papaya
6. *Barangay* Health Worker: *Barangay* Cama Juan
7. Head of women's association: *Barangay* Papaya
8. Head of senior citizen's association: *Barangay* Cama Juan
9. Agricultural Technician; *Barangay* Cama Juan
10. Municipal Agriculture Officer : Municipality of San Antonio
11. Municipal Welfare and Development Worker
12. Civil society: Knights of Columbus of San Antonio
13. Research institution: (PhilRice)

Focus group discussions

Focus group discussion (FGD) is a rapid assessment and semi-structured data collection method in which a purposively selected set of participants gather to discuss issues and concerns based on a list of key themes the researcher/facilitator has earlier drawn up. It has the primary aim of understanding a particular issue from the perspectives of the group participants (Rice and Ezzy, 1999). Interaction is a unique feature of the focus

group discussion (Cronin, 2011; Gilbert, 2001). It helps the participants to explore and clarify their points of view which produce insights that would be less accessible without the interaction within the group (Rice and Ezzy, 1999).

Four focus group discussions were conducted at the initial stage of the study that provided insights into the topic and informed the development of the questionnaire for the survey conducted in the second phase of the study. The first four focus groups were conducted in April 2011. Another four focus groups were conducted on 23 to 24 May 2012. The objective of the second lot of four focus groups was to confirm the results of the survey and clarify and verify the initial analysis performed for both the qualitative and quantitative parts of the study.

Focus group discussions were conducted to elicit men's and women's perceptions of and attitudes to climate variability, impacts of flooding on their livelihood and welfare and their strategies for coping with and adapting to flooding events. Since village heads and farmer leaders knew the farmers in their village personally, participants were recruited with the help of these local officials. Participants were grouped according to their gender. It was important for my research to conduct FGDs separately for male and female farmers in order to compare the differences between their perceptions and experiences in a changing climate. Also, in this manner, the dominant gender group was prevented from influencing the voices of the inferior group. There were six to ten participants of the same sex in each FGD, an ideal size for a focus group (Rice and Ezzy, 1999; Gilbert, 2001). This size is ideal mainly because it allows an in-depth flow of discussion.

The criteria used to select the participants in the FGDs in the two villages were as follows:

- male and female farmers from rice-based farming households which represent different socioeconomic groups
- from farming households who rely primarily on rainfall
- men and women aged from 35 years and up
- from households with at least 10 years' engagement in farming.

Since I am keen to understand the changes in climate and farming through time, I needed to have respondents who are well advanced in years and have extensive experience in

farming. Men and women aged from 35 years and up were chosen as I am interested to interview the head of the farming households with at least 10 years of experience in farming. Their long exposure to farming makes them a credible source of knowledge on how they have responded to changes in climate. All meetings were conducted either at the village hall or farmer's organisation meeting places and lasted for at least an hour. For the first four FGDs, I facilitated all the discussions with a research assistant as a note taker. For the second four FGDs, in May 2012, researchers from IRRI facilitated all the discussions. I was not present during the second group of FGDs, but I analysed the voice recordings and transcripts of all the FGDs conducted.

Questions for the two sets of FGDs were quite similar to ensure the consistency of the response from the different groups of people.

Discussions evolved using the following guide questions.

1. Do you notice any change in the rainfall pattern over these last few decades?
2. Do these changes affect you, your family, your community? In what ways?
3. What are the adaptation strategies of men and women farmers in order to minimise the effects of flooding at household level?

Additional questions were added for the second FGD conducted:

4. Describe how you determined your adaptation strategies.
5. Are there changes in your gender roles due to your decision to adapt to flooding?
Please describe.

Although there were eight focus group discussions conducted, only five were analysed as there were some problems with raw data. Audio recordings were not of a high quality, which led to data loss. Some written notes were secured but direct transcriptions of quotes were not possible for three of the FGD conducted.

Participatory rural appraisal

Participatory rural appraisal (PRA) is a qualitative research method (Chambers 1991) that allows the people in the research study to be involved in the collection and analysis

of information being collected by the outside researcher. It is known to be a good data collection method as the researcher, while seeking out local knowledge and interacting with local people, is able to probe the context in which a particular problem or issue occurs (Buburuga, 2010).

PRA is a good approach with which to initially assess the vulnerabilities of a given community of men and women to climate change. For instance, through discussions with farmer groups and individual key informants, researchers can learn about first-hand experiences and perceptions of historical climate changes and its effect on their livelihood activities, on food security and on gender roles as well as coping responses. Specifically, with gender-sensitive approaches, researchers can learn about the impacts of climate change on men's and women's gender roles and relations within the community.

One unique feature of PRA as a data collection technique is that the researchers can use diagramming and visual sharing to communicate ideas with farmers. This allows every participant not only to hear what is happening but also to 'see the discussion taking place' (Läderach et al., 2011). Thus, PRA as a data collection technique is highly recommended in rural communities where some, including women, are illiterate, to allow them to fully engage in the discussion. Although illiteracy is not a problem in the community, PRA activities helped me to facilitate the discussion in a more visual and interactive way.

Quality data is dependent on the participants involved in the data collection. Since the aim of the PRA is to characterise the local climate conditions and to compare how climate conditions, particularly flooding, affect welfare and labour/tasks structures, both men and women farmers were involved in one group to do the different PRA activities. The same criteria for selecting participants for FGDs were used to select PRA participants. There were 8 to 10 participants in each group and each activity lasted for 30 minutes to one hour. I conducted the PRA in each village in their village halls and farmer's meeting places in May 2011. The PRA activities were separate from the focus group discussions, but there were some participants involved in the PRA activities who were also involved in the FGDs (see Annex 2 for the PRA protocols used in this study).

The activities I conducted in villages of Papaya and Cama Juan follow.

1. Time Line

A time line helped to identify important events in the study area. This activity was done with the groups of men and women. It helped me to visualise significant changes in the frequency of flooding in the last 10 years that has had an impact on the lives of the local people. This kind of information helped me to identify the potential risks of these extreme events affecting the natural resources and livelihoods of the people. It also helped me to understand how male and female farmers dealt with past extreme weather events. As they recalled the past typhoon and flooding events, men and women shared their experiences of those periods of calamity.

2. Seasonal Calendar

The primary objective of doing a seasonal calendar was to show the wet and dry seasons and the occurrence of flooding throughout the year. Cropping patterns also showed the range of planting and harvesting dates for cropping sequences. Developing this calendar helped to identify the months of greatest difficulty and vulnerability, or other significant variances that had impacted on people's lives (Cavestro, 2003). In this study, I was particularly interested in finding out farmers' constraints; for example, the time of flood labour scarcity and technology needs. This helped to identify the gender division of labour in the farming households and the adjustments they made during the flooding period.

3. Problem Tree Analysis

Problem tree analysis is concerned with the assessment of a given problem situation. The main purpose of doing this PRA activity was to capture the farmers' perceptions of the causes and effects of a major past flooding event. Problem tree analysis starts with the identification of a major problem, and then a core problem is defined. The causality (cause-effect relationships) of the complex problem environment is investigated and presented. This process facilitates not only the analysis of symptoms or superficial phenomena but also probes the problem to its root cause (Paris et al., 2011). This activity informed me of the real cause of flooding and its consequences for men and women in the

farming communities. Results were discussed and verified on the spot with male and female farmers as the diagram was made together.

4. *Gender Division of Labour*

Women play crucial roles in rice-based farming systems, particularly in the rain-fed rice ecosystems. They work as both unpaid labour and paid labour in rice farming. They are responsible for household food security and the nutrition of their children. Despite their crucial roles, however, they are seldom consulted and seldom included by agricultural scientists in training and extension services. Eliciting information regarding the gender division of labour in rice farming allowed me to identify all the relevant productive, reproductive and socio-political tasks and to answer the questions of who does what, how resources are distributed, and who has a say over their use during and after flooding.

In-depth interviews

In-depth interviews aim to explore the complexity and in-process nature of meanings and interpretations. In-depth interviews are more like conversations than structured questionnaires (Rice and Ezzy, 1999). In this sense, interviewers are not passive and distanced but actively involved in encouraging the respondents to talk and to converse about the research issue under discussion (Rice and Ezzy, 1999), which means that the interviewer is a co-participant in the discourse. This method might be criticised as intentionally biased, but since it draws from the interpretative theoretical framework, it does not presume that there is only one correct answer or version of events but emphasises that meanings are continually constructed and reconstructed in interaction. Thus, in-depth interviews allow aspects of social life, such as social processes and negotiated interactions, to be studied that could not be studied in any other way (Rice and Ezzy, 1999).

In-depth interviews were carried out in each village separately with men and women, who were engaged in rice farming and whose fields were frequently being flooded. In-depth interviews provided deeper insights into how men and women experience the effects of flooding and how they adapted to this extreme weather event. A key interview guide was developed (Annex 3).

Participants were recruited based from different socio-economic backgrounds.

- Type of family: from nuclear and extended family
- Marital status: married, single male/female, widow/widower
- Tenure status: owner cultivator, tenant, land less farmer
- Age: young, old farmer

Following are the topics discussed from the in-depth interview:

- Socio demographic information;
- Productive assets;
- Extent of involvement in rice farming; constraints and opportunities that shaped involvement with such activities;
- Access and control over resources (e.g., asset, income, information, training, etc);
- Decision making power within the household;
- Consequences/vulnerabilities;
- Coping/adaptation strategies taken before, during, and after flooding

In-depth interview is an excellent way of discovering the subjective meanings and interpretations of their experience of flooding events and how they come up with different adaptation responses to floods.

5.8. Quantitative phase

Quantitative research is broadly described as entailing the collection of numerical data as exhibiting a view of the relationship between theory and research as deductive and related to positivism worldview having an objectivist conception of social reality (Bryman, 2008). This phase mainly aims to describe the trends described in the first phase of the study. It also highlights the effect of gender to perceptions about climate change, impacts of flooding and their adaptation strategies. In this sense, the quantitative phase is a complementary and extension phase of the first phase of the study. Quantitative data gathered from survey is a complementary data collection method within the case study. Thus, the survey was conducted within the same rice communities but with larger samples.

The survey was conducted with the support of and funded by International Rice Research Institute (IRRI). It was administered to representative men and women rice farmers but not random samples from two case study sites. Male and female principal members from the same households were interviewed separately. Views from members of the same households were gathered to control for the variability of responses between household and to isolate the gender dimension. A total of 201 households participated in the survey with a total of 402 individual surveys.

5.8.1. Survey

Survey is the primary data collection technique in quantitative research. It provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of that population (Creswell, 2009). The purpose of doing a survey in this study is mainly to compare/contrast the male and female perceptions, experiences and adaptation responses to increasing flooding events in their communities. The survey was conducted through face-to-face interviews. It is appropriate to conduct this kind of interviews as some of our respondents were old and some can hardly write their own response. Interviewers were provided with questionnaire which consists of pre-coded questions. Participants were recruited from different socioeconomic backgrounds:

- type of family: from nuclear and extended family
- marital status: married, single male/female, widow/widower
- tenure status: owner cultivator, tenant, landless farmer
- age: young, old farmer.

The following topics were discussed in the in-depth interview:

- socio-demographic information
- productive assets
- extent of involvement in rice farming; constraints and opportunities that shaped involvement with such activities
- access and control over resources (e.g., assets, income, information, training)
- decision-making power within the household
- consequences/vulnerabilities
- coping/adaptation strategies taken before, during, and after flooding.

In-depth interviews were an excellent way of discovering the subjective meanings and interpretations of the interviewees' experience of flooding events and how they came up with different adaptation responses to floods.

5.9. Quantitative phase

Quantitative research is broadly described as entailing the collection of numerical data and exhibiting a view of the relationship between theory and research as deductive and is related to a positivist world view (Bryman, 2008). The quantitative phase mainly aims to describe the trends that emerged in the first phase of the study. It also highlights the effect of gender on perceptions about climate change, impacts of flooding and adaptation strategies. In this sense, the quantitative phase complements and extends the first phase of the study. Quantitative data gathered from the survey is a complementary data collection method within the case study. Thus, the survey was conducted within the same rice communities but with larger samples.

The survey was conducted with the support of the International Rice Research Institute (IRRI) and was funded by that organisation. It was administered to representative male and female rice farmers but not random samples from two case study sites. Male and female principal members from the same households were interviewed separately. Views from members of the same households were gathered to control for the variability of responses between households and to isolate the gender dimension. A total of 201 households participated in the survey with a total of 402 individual surveys.

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response. Interviewers were provided with a questionnaire that consisted of pre-coded questions (see Annex 4). For the effective execution of the survey, all interviewers were trained two weeks before the survey was conducted. Five interviewers were convened to discuss how the questions should be asked, techniques in probing and definition of concepts and structure of the interviews. A survey guide containing guidelines for asking the questions was also provided to the interviewers (see Annex 5).

My approach to a face-to-face interviewing was similar to *conversational interviewing* (Conrad and Schober, 2008) in which interviewers were able to ask questions as in ordinary conversation. My approach was also like a standardised or structured interview with the same questions asked in the same order from one interview to another, with the emphasis on uniform interpretation rather than uniform wording. Conrad and Schober (2008:186) provide evidence that allowing interviewers to choose their wording in order to make sure that the respondents interpret the questions the same way and as intended can dramatically improve the response accuracy, particularly when question wording is ambiguous. This kind of interview takes much longer than standardised interviews (one hour to two hours).

A local guide in each village was deployed to inform the potential respondents of their scheduled interviews. Having a local guide helped me to introduce myself and the study and enabled me to build rapport with the respondents. Local guides worked with us throughout the duration of the survey. All interviewers recorded the responses in the questionnaire, encoded them in Excel format and analysed them using the SPSS program.

5.9.2. Survey sampling

The sample from this survey was obtained from the list of farmers given by the rice farmer's organisation head and village leaders. The list contains all the names of the rice farmers in the village who own the land or are tenants. Recent records of the Municipality of Agriculture Office of San Antonio showed that there are only 106 and 210 rice farmers in Cama Juan and Papaya respectively. When the team was about to conduct the survey, however, some of the names listed were no longer farming as some had pawned or sold their lands. There were also some individuals who were landless farmers but had been farming for most of their lives. These included women who were not recognised by the

government agency because of the lack of access to land. Consequently, aside from the list given by the rice farming organisation and the government agency, I purposively included landless farmers. As I have argued, having control of and access to land is critical to rice farming and the farmers' capacity to adapt to changes in climate. It is of particular interest to me how farmers with land adapt compared to those without. The survey was conducted at the time of the planting season when most of the farmers were busy cultivating their fields. Consequently, although the study initially executed a random sampling, due to unavoidable circumstances there were some biases during the sampling process. Thus, a purposive sampling was adopted. This is a special kind of sampling for special situations, where the judgement of an expert is used to select cases with a specific purpose in mind (Neuman and Kreuger, 2003). Where the researcher's aim is to generate theory and a wider understanding of social actions, the representativeness of the sample may be of less importance and the best sampling strategy is often focused or judgemental sampling (Gilbert, 2001). In this case, the main purpose of doing the survey with specific samples was to further enhance the results of the case study. The results of the survey were limited to the villages of Papaya and Cama Juan. Due to time and budget constraints, 100 and 101 rice farming households from Papaya and Cama Juan respectively were selected as part of the survey. Bearing in mind that purposive sampling tends to be a bias sampling, participants were recruited mainly based on the recommendations of the local guides, farmer leaders and village leaders as to who were representative samples of their community.

5.9.3. Survey respondents

In selecting the possible survey respondents, I initially looked for pairs of men and women from the same rice farming households. A pair from the same household was of a great importance to my study as I was keen to compare men's and women's perceptions about climate variability, impacts of flooding and their adaptation responses. Aside from this, I also required the households to have at least 10 years' engagement in farming and with rice farms that were affected by flooding. The respondents were to be principal male and female members whose age was at least 18 years old and who had the main influence in making household and farming decisions.

In the village of Papaya, we surveyed 93 couples, one brother and sister and six widows with their sons, a total of 200 people made up of 100 pairs of men and women from the same household. In the village of Cama Juan, we interviewed 202 people (101 pairs), composed of 100 couples and one brother and sister. Based on the socioeconomic profiles generated from the survey, sample male and female respondents had an average age of 48 and 46 respectively. In terms of the level of education, both women and men had had seven years in school, which means that both only received elementary education, a common situation in rural areas in the Philippines. Both women and men have equal access to education, but in rural areas, where economic progress was slow during the 1960s to the 1970s, parents just sent their children for elementary education. In terms of experience with farming, however, men had an average of at least 23 years in rice farming, while women had an average of only 11 years of experience in farming. This is due to the fact that men were exposed to farming at an early age and were trained to manage the farm with their fathers, while women engaged in farming once they had married a farmer. There were a few old women who had been trained to do farm work at early age, but this was an exception rather than a common norm in the rice farming system in the Philippines.

5.9.4. Survey design

The survey questionnaire was composed of four major sections. The first section asked for the characteristics of the respondent and the household. These questions were asked of the male and female respondents together. If the male and female respondents were not together during the interview, the questions in this section were asked of the household head. The second section questions were asked of the principal male and female member of the household in two separate interviews. This section focused on their perceptions of climate variability and the consequences of flooding and their individual responses to flooding. The third section of the survey referred to the support a respondent got from the government and other institutions, including sources of information. Aside from the adaptation identified by the respondent, the last section asked the respondents to rate the likelihood of their adoption of different technology interventions listed. Training needs were also covered in this section.

5.10. Data analysis

Central to this study is the analysis of gender and how this socially constructed identity produces and reinforces the different adaptations taken by men and women farmers in the rice farming communities in the Philippines. Thus, the qualitative and quantitative analysis used gender as the main category in analysing the data collected from multiple sources. Results of the analyses from qualitative and quantitative analysis were then integrated and are presented in chapters 6, 7 and 8. Sections below provide detailed discussions of the analysis involved in this study.

5.10.1. Qualitative analysis

Yin (2009) describes five techniques for analysing case studies: pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis. In this particular study, I use the explanation-building technique to analyse qualitative data. In this technique, explanations about the case reflect some of the theoretical propositions. Social science propositions, if correct, can lead to major contributions to theory building (Yin, 2009:141). Further, this technique applies a series of iterations as case study evidence is examined, theoretical positions are revised and the evidence is examined once again from a new perspective. This process of refining set ideas is important to entertain other plausible explanations.

In order to present sets of explanations of the case studied, I opted to present it by theme, and therefore I used a hybrid approach of thematic analysis (Fereday and Muir-Cochrane, 2006), which incorporates both the data-driven inductive approach and the deductive a priori template of codes approach. This hybrid approach allowed the theoretical propositions to be integral to the process of deductive thematic analysis while allowing for themes to emerge direct from the data using inductive coding.

The coding process in this approach involved recognising (seeing) an important moment and encoding it (seeing it as something) prior to a process of interpretation. In addition to the inductive approach, I used a template in the form of codes developed a priori, based on the research question and the theoretical framework. Following data collection from key informant interviews, PRAs, focus group discussions and in-depth interviews, all

interview transcripts and documents were entered into the QSR NVivo data management program. A comprehensive process of data coding and identification of themes was undertaken. Although it is a time consuming and quite complex process, using computer software like this helps to ensure rigour in the analysis process since it can include a more complete set of data for interpretation than doing the work manually (Bazeley, 2007).

5.10.2. Quantitative analysis

Given that the survey was conducted with another research institution, the data collection was quite extensive. Some of the questions were intended for the purpose of another socio-economic study which is related to my study but not part of the scope of my study. Thus, the analyses of the data collected from the survey are limited to the purpose of my study.

The quantitative analysis was conducted using SPSS version 13. The analyses of the quantitative data were in various forms 1) univariate analysis, 2) bivariate analysis/cross tabulation and 3) different statistical tests. In the first instance, descriptive statistics were compiled and a univariate analysis was conducted. Following this, a cross tabulation or bivariate analysis was used to examine possible relationships between variables. Statistical tests such as the chi-square test of independence, the student's paired t-test and the Wilcoxon signed-rank test were used to test the significant differences particularly between men's and women's responses. The chi-squared test of independence is used for two categorical variables from a single population. It is used to assess whether there is a significant association between two categorical variables. For this study, gender was the main categorical variable (male, female). The test is usually presented with the contingency table, a two-way table for examining relationships between categorical variables. The student's paired t-test was applied to determine if there were significant differences in the means of numeric variables such as household income and rice production before and after flooding. In this way, I was able to analyse how much the rice farming communities were economically affected by flood, which can aggravate existing social problems. Finally, a Wilcoxon signed-rank test was used to examine whether there were significant differences between the perceptions of principal men and principal women. This test is deemed appropriate with the kind of data in likert

scale (ordinal variable) generated from two related samples (man and woman from the same household).

5.10.3. Gender analysis

Gender analysis is the integral part of the analysis stage of this study. It combines the essential results from the qualitative and quantitative phases of the study. Thus, instead of results being presented by type of analysis, they are presented in themes in the succeeding chapters. I use gender analysis to identify the gender differences and inequalities that might cause different vulnerabilities and adaptation strategies, such as how men and women have different access to and control over resources, carry out different social roles and face different constraints and receive different benefits as set by existing institutions and practices.

There are five commonly used gender analysis frameworks used by development organisations and gender practitioners: Harvard Analytical Framework, also known as the Gender Roles Framework; Moser Gender Planning Framework; Gender Analysis Matrix (GAM); Women's Empowerment Framework (WEP); and Social Relations Approach (March et al., 1999). For the purpose of this study, I used the Social Relation Approach developed by Naila Kabeer as a guide to gender analysis (Kabeer, 1994). I used this particular approach as it is similar to the assumptions and perspectives used in this study. It explicitly draws on the feminist structural perspective, locating family and household within the social relations connecting the community, market and state. This approach intends to show how gender and other inequalities are created and reproduced within the structural and institutional factors. In the same vein, I argue in this study that such gendered differentials and inequalities lead to differential adaptation responses to climate change which cause gendered vulnerabilities and impacts. Recognising such underlying structural causes of gender differentials and inequalities, this approach also asserts the need to examine policy needs and actions that need to be taken to enable women to change their positions and other factors that constrain them. This kind of analysis is also reflected in my study, as I identify climate change as a space for women to negotiate their roles and relations and thus effect social change.

5.11. Ethical considerations

All participants of the studies were provided with a copy of the Explanatory Statement (see Annex 6). The document contains the purpose of the study, the extent and manner of participation and use of the data to be collected. These were also discussed and explained prior to the conduct of each activity. Written consent of the participants was sought which formally permitted the researcher to involve them in the activities. It was explained that their participation was voluntary and that they could choose to withdraw their participation at any time without being penalised and disadvantaged in any way. Also, participants were informed that the data to be gathered would be used for reports or published findings but it would not contain names or any identifying characteristics.

5.12. Establishing trustworthiness

In establishing the trustworthiness and quality of the research study, it is important to address the issues of validity and reliability. Validity means truthfulness. It refers to the bridge between a construct and the data (Neuman and Kruger, 2003:184). In terms of qualitative research it means that the researcher checks for the accuracy of the findings by employing certain procedures (Creswell, 2009:190). Reliability refers to the consistency and dependability of the approach used by the research across different researchers and different projects (Rice and Ezzy, 1999; Creswell, 2009). In other words, the methods used in conducting the study or analysing the results from it means it can be reproduced or replicated by other researcher (Neuman and Kruger, 2003:185).

Four tests have been commonly used to establish the quality of any empirical social research. They are summarised as follows (Yin, 2009:40):

- construct validity: identifying correct operational measures for the concepts being studied
- internal validity: seeking to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships
- external validity: defining the domain to which a study's findings can be generalised

- reliability: demonstrating that the operations of a study, such as the data collection procedures, can be repeated, with the same results.

In addition to the abovementioned test, Yin (2009) suggests several different tactics for using these tests with case studies which I adapted to show the validity and reliability of my research study. In terms of the qualitative phase, two tactics were used to increase construct validity. The first was the use of multiple sources of evidence which essentially provide multiple measures of the same phenomenon. I triangulated the data to establish the themes based on converging several data and the different perspectives of the participants. The second tactic was to establish a chain of evidence, wherein I used case study protocol particularly during data collection stage. I used the NVivo program to create a database of the documents and transcripts collected from my field work. This thesis makes sufficient reference to the relevant portion of the case study database such as portions of documents and interviews which are the basis for the major themes presented in this thesis. In this sense, the database upon inspection should reveal the actual evidence and also indicate the circumstances under which the evidence was collected, for instance the time and place of an interview (Yin, 2009:123).

For internal validity, I used the explanation-building technique as part of my data analysis. Adapting the procedure in conducting this technique helped me to deal with the threat of internal invalidity as I employed an iterative process in generating explanations of the case study. Moreover, external validity deals with the problem of knowing whether a study's findings can be generalised beyond the immediate case study. Since I used a general theory of practice and agency in formulating the propositions in my case study, I can identify other cases to which the results can be generalised. Also, I conducted two case study sites wherein I employed the same set of data collection methods and protocols in two different villages. This case study design provides more robust findings than a single-case study. Further, to ensure reliability of the case study, I used case study protocol to deal with the documentation problem and developed a case study database. In this way, anyone can produce the same results if the same procedures are followed.

In terms of the quantitative method used in the study, the validity and reliability of the method used and its findings were demonstrated during the conduct of survey and analysis. First, the survey questionnaire was developed mainly with the collaboration of

IRRI researchers and social scientists. It has undergone a modification period wherein I not only pre-tested it with our potential sample but I also received information from the staff of the IRRI who worked with me in this research study. I also knew that the sample had to be representative of the rice community, and given that there is no complete list of male and female farmers in the community, local staff hired during the research and village leaders helped me to recruit participants that would best represent the views and experiences of their community. Also, the surveyed farmers are much more than the number of farmers listed in the official records of the Municipal Agriculture Office (MAO). Thus, purposive sampling is an acceptable sampling technique in this case. Survey protocol was also developed to ensure that all interviewers followed the same survey procedure and had the same understanding of the questions being asked. After that, a coding guide was generated for the encoding of the survey response. This is also part of the documentation of the study so others can check the reliability of the survey procedures and the variables/concepts used in the survey. Moreover, since the data were analysed with the aid of the SPSS program, others can perform the same set of data analysis and arrive at the same results.

By using a mixed-method research design, I was able to do methodological triangulation to increase the validity of the overall findings of my research. The purpose of triangulation is to fully explain the richness and complexity of human behaviour from more than one standpoint (Cohen and Manion, 2000). It also gives a more detailed and balanced picture of the situation (Altrichter et al., 2007). I also used a member-checking technique (Creswell, 2009) to determine the accuracy of the qualitative and quantitative findings. This was done in the final stage of the study. The group from the IRRI conducted another focus group discussion, this time to present the findings of our study from both qualitative and quantitative methods and to validate with the participants the accuracy of our findings. This involved presenting polished products such as themes from the qualitative methods and tables generated from the survey. Feedback from the participants was elicited during the focus group discussion.

5.13. Limitation of the methods of the study

One of the major limitations of the study is the translation issue from the local language to English. Meanings of spoken words are quite different when translated into English, mainly because there is often no exact translation in English of the words used by the participants. To reduce the inaccuracy, some important local words spoken are presented in closed parentheses and interpreted words are translated into English. Given that I have a limited capacity to analyse enormous amounts of data, constant feedback about the interpretations and analysis were sought from supervisors and co-researchers from the IRRI. In this way, the biases in the analysis of the data were reduced. Detailed steps of the analysis were also recorded in the NVivo and SPSS programs for other researchers to check and verify the data and the analysis conducted.

5.14. Summary

This chapter presented the methodology used in this study. A feminist structural framework guided the data collection and analysis. A case study of the rice farming communities in the Philippines was used as a research method to closely examine the gendered adaptations of men and women to climate change. Within the case study, a mixed-method data collection was used which allowed me to draw data from different sources. An exploratory mixed-method sequential design in particular was adopted to highlight the rich information taken from qualitative data and to enable me to have a deeper understanding of the experiences of men and women of climate change in their local context. This then became the basis for the quantitative phase. The quantitative phase added rigour and balance to the qualitative findings, as a larger number of men and women within the selected farming communities were studied. Data collection methods used in the qualitative phase were key informant interviews, focus group discussions, participatory methods and in-depth interviews, while for the quantitative phase I surveyed 201 households, from which men and women were interviewed separately using a structured questionnaire. I also discussed how qualitative and quantitative analyses were done and integrated into a single gender analysis. This chapter finally discussed the ethical considerations, trustworthiness and limitations of the methodology.

CHAPTER SIX: RICE FARMING AND CHANGING CLIMATE

6.1. Introduction

Sabi ng bukid, sige mangutang ka nang mangutang pati yung pagkain mo, basta sagot ko lahat, pero kung ako ay malunod, problema mo na yun (The farmland said, keep on taking loans even for your food, I will take care all of these, but if I got drowned [in flood], that will be your problem) – Man in Papaya focus group #3

The above quote reveals many of the issues associated with rice farming in the Philippines and the burdens of the ordinary farmer. It also shows the uncertainty and risk of farming in the midst of climate change. What is the life of an ordinary farmer in the Philippines? Why does a farmer need to take a loan out even for her/his own food when in fact she/he plants her/his own food? What does it mean for farmers to be faced with climate change? In this chapter, these issues are tackled, focusing on rice farming and how extreme events such as flooding can impact rice farming systems and the lives of male and female farmers. I examine the farming systems and how they are intertwined with family relations and the norms and traditions of farming families. Also presented are how family relations and their norms and traditions affect men and women enter into, participate in and experience life in rice farming.

This chapter serves as a background to the results presented in succeeding chapters (chapters 7 and 8); that is, how men and women experience the impacts of flooding, how they became vulnerable and how they respond to severe flooding. Since gendered vulnerabilities and adaptations are mainly influenced by the natural and social environment, it is important to initially understand how the existing *structures* have shaped men's and women's lived experiences. This chapter draws on focus group discussions, participatory rural appraisal (PRA) activities, interviews and surveys conducted with male and female farmers from the villages of Papaya and Cama Juan in 2011. Initially, I present a brief overview of the farming situation in the municipality of San Antonio where the two villages are located and then discuss in detail their farming systems. The last two sub-sections then discuss flooding and climate change and their

consequences for the rice farming communities. Finally, the chapter ends with a summary and conclusion about the findings presented.

6.2. Farming in the municipality of San Antonio, Nueva Ecija province, Philippines

The municipality of San Antonio is a first-class⁷ municipality in the province of Nueva Ecija. It is located in Central Luzon in the Philippines. It has a total land area of around 17,000 hectares, 76 per cent of which is devoted to agriculture. Crops grown are rice, corn, vegetables, mango and sugarcane. Agricultural land is also used for orchards and fishponds. Rice is the major crop grown in San Antonio. Of the roughly 13,000 hectares of agricultural land, 84 per cent is planted to rice (MAO, 2008). San Antonio has a population of around 73,074 (NSO, 2010). There are around 12,761 households in the municipality, about 90 per cent are engaged in farming activities, 45 per cent have non-farming income sources, and roughly 2 per cent of the households fish (Mariano et al, 2008).

The municipality is in a low-lying area which serves as a catchment basin for its neighbouring provinces, including Pangasinan, Tarlac and Pampanga. Also, during rainy season, excess water from nearby dams like the Pantabangan dam in Pantabangan, Nueva Ecija, is released to irrigation system and rivers of San Antonio which cause big flooding in the municipality. Of the 16 villages under its jurisdiction, 10 are identified as being in low-lying areas and prone to flooding and submergence. From June to October, rice farming is the main activity of the farmers. During the month of June, when rice farming has just started and the school year opens, farmers spend more and food begins to get scarce. Moreover, during this wet season, floods become more frequent, which makes the lives of farmers more difficult. Consequently, borrowing of resources and money have become part of the routines of farming households. Payments of debts are due for the next dry season when farmers have more harvest and more sources of income. Aside from rice, they also farm vegetables and livestock during the dry season. Due to fair weather and a more secure living during this period, more households are engaged in non-farm livelihoods, such as selling different kinds of goods. This is in a way a preparation for the

⁷Municipalities are divided into income classes according to their average annual income during the previous four calendar years. First class municipality has an average annual income of PhP55 Million or more.

next wet season when farmers expect to have less harvest and fewer sources of possible income.

Based on a past household survey (Mariano et al., 2008) conducted in the municipality of San Antonio in 2008, rice farming households of five to six family members cultivate an average of one hectare of land. Farming households have sources of irrigation, enabling them to grow two crops of rice in the year. Farmers use short-duration, photoperiod-insensitive (long-day plant), high-yielding varieties which enable them to grow two crops of rice in a year. Rice is the only crop grown during the wet season (July–October) and the dry season (November–March) (Mariano et al., 2008). When farmers were asked about their cropping season during the data gathering period in 2011, however, their cropping seasons had changed. For instance, farmers are now planting earlier in the wet season. In Cama Juan farmers plant as early as May and harvest in October, while for Papaya farmers, the wet season starts in June and ends in November (Figure 4 and Figure 5).

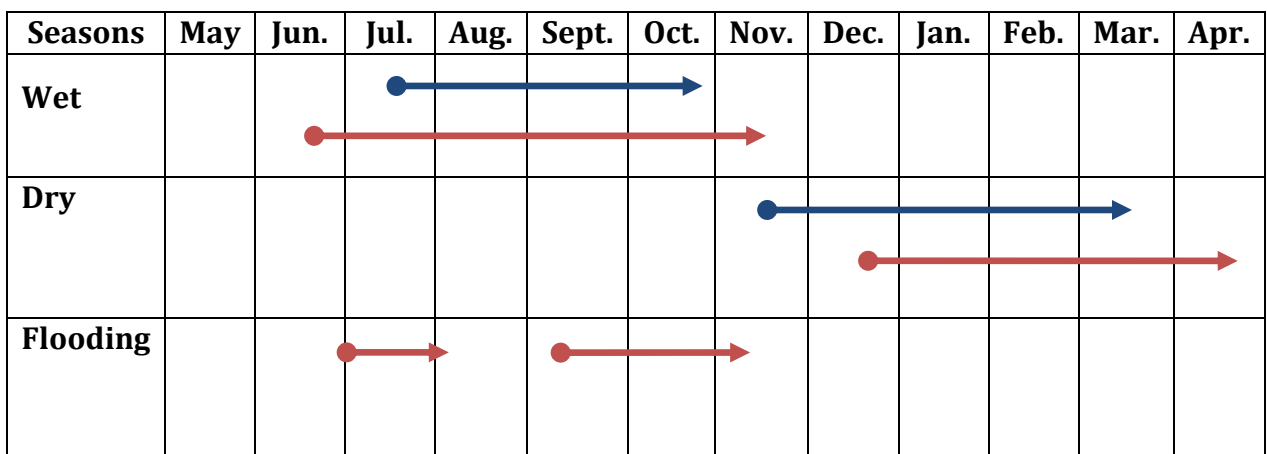


Figure 4. Occurrence of wet, dry and flooding season in Barangay Papaya, Nueva Ecija, Philippines, 2011

Note: ● → : Year 2008
 ● → : Year 2011

Source: Mariano et al., 2008; PRA activity, 2011

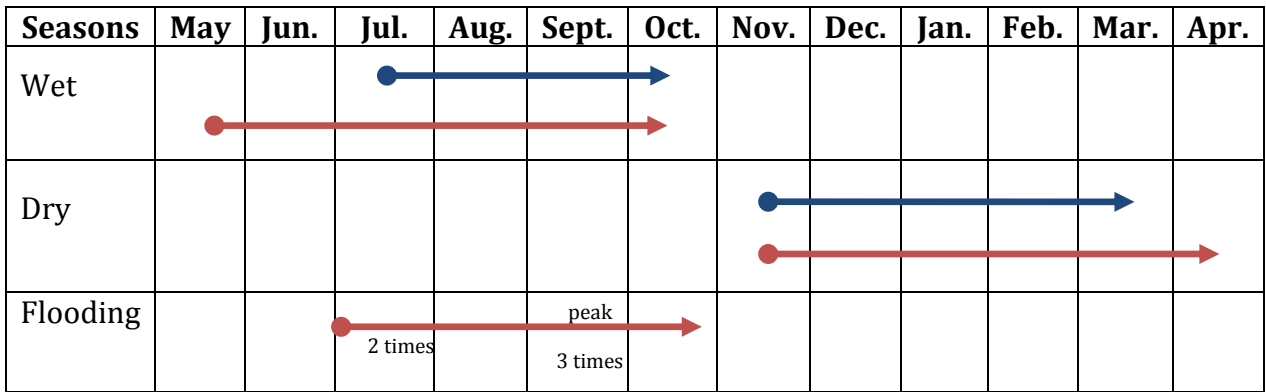


Figure 5. Occurrence of wet, dry and flooding season in Barangay Cama Juan, Nueva Ecija, Philippines, 2011

Note: ● → : Year 2008
 ● → : Year 2011

Source: Mariano et al., 2008; PRA activity, 2011

Farmers adjust their farming activities according to the onset of rain. Flooding is now observed to occur as early as July and thus farmers needed to plant early during this season so that when flooding comes their crops are already mature or they have already harvested them. Moreover, as shown in Figure 4 and Figure 5, the duration of the seasons was longer in 2011 than in 2008. These longer duration of seasons reflect the additional activities done by the farmers in order to adapt to the devastating impacts of flooding. Additional activities include re-sowing, replanting and delaying other activities such as harvesting, which prolongs the season's duration.

6.2.1. The two farming villages

Barangay Papaya has a total land area of 2,005.5 hectares and has a total population of 7,382 (NSO, 2010) with 1,572 households. Seventy-nine per cent (1,578 hectares) of its total land area is devoted to rice farming of which more than 60 per cent is subject to flooding. According to farmers, flooding depends on the number of typhoons and rainfall intensity and thus flood occurrence varies each year. Farmers also emphasised that there has been an increasing amount of flooding in the last 10 years. The average number of floods ranges from two to three during the wet season, usually in July, and from September to November. Farmers recalled that flooding can also occur during the dry season; in 2009 dry season flooding caused huge production losses. With two to three

days of heavy rains, fields may remain submerged for up to 14 days, while those fields in very low-lying areas can be flooded for a month. Flooding devastates not only the fields but also the residential areas. If heavy rain occurs, people have to walk in chest-high floods, particularly when large amounts of water are released from the dam.

Barangay Papaya has a larger land area and population than *Barangay* Cama Juan. Cama Juan has only 510.66 hectares of land, a population of 2,444 (NSO, 2010) and 469 households. Since *Barangay* Cama Juan is located in a more low-lying area, however, people consider flooding to be more damaging to their livelihoods and household welfare. Farmers describe flooding as a part of their life. In fact, the name of the village originated from a story of a flooding event. The head of the village told the legend of their village. Back in the Spanish colonial period, the village experienced a heavy flood. The water entered the Roman Catholic chapel where a Filipino sacristan, named Juan, and a Spanish friar used to stay. Because of the big flood, all of their furniture including the bed, which they called *cama*, started to float away. Then the friar screamed at the top of his voice, 'Ang *cama*, Juan' ('The bed, Juan'). Since then, the village people have called their village *Cama Juan*. To this day, flooding is frequent and damaging to their village. Flooding may happen from July to October, which makes it impossible for some farmers to plant rice during the wet season. The dry season is their only time to plant and earn from other farm-related activities. Compared with Papaya farmers, Cama Juan farmers plant earlier for the two cropping seasons. Since Cama Juan farmers expect to have a long flooding period, from July to October, they plant early so that their crops have matured enough to withstand the long flooding period. On the other hand, the floods in Papaya are flash floods and when farmers are fortunate, flooding either doesn't occur, or it clears after a few days and therefore has less impact on crops.

Papaya and Cama Juan are quite different in terms of their economic conditions. Since Papaya is near the town proper, economic progress is faster than in Cama Juan. More commercial and service-oriented businesses are found in Papaya. Thus, more people are progressive in terms of their economic condition in this village. This can be seen by the elevated concrete houses, secure from flooding, that farmers in Papaya have compared with the ordinary *nipa* huts of Cama Juan farmers (Figure 6 and Figure 7).



Figure 6. Elevated and concrete house of Papaya farmer



Figure 7. Nipa house of Cama Juan farmer

Aside from the fact that Cama Juan is farther than Papaya from the main town, the transportation system is poor in Cama Juan. Most roads are not in good condition, making it more difficult to reach during flooding periods (Figure 8 and Figure 9). A poor transportation system contributes to the slow provision of services such as agricultural extension and medical and social services being provided by the local government unit, thus, economic progress is quite slow.



Figure 8. Paved (asphalt and concrete) road going to Papaya



Figure 9. Unpaved (gravel and earth) road going to Cama Juan

6.2.2. Land ownership and tenure status

Land ownership in the Philippines has a long history of struggle among small farmers. Because land distribution was concentrated on elites and the favoured classes during the Spanish colonial period, large numbers of peasants were displaced and became landless (Vargas, 2003). Several initiatives have launched land reform programs since the United States administration but because of unsustained political will and landlord resistance, the impacts of the initiatives were limited (Dolan, 1991). One of the important land reform programs developed in 1988 is the Comprehensive Agrarian Reform Program (CARP). This land reform program is still being implemented to this day by the Department of Agrarian Reform (DAR).

Legal ownership of land

The Philippines has a land area of 30 million hectares of which approximately one-third is classified as agricultural land. The ownership of and/or control over this land has been largely monopolised by the landed classes-the rich and elite families. The Department of Agrarian Reform is mandated to carry out the CARP reform in 10 million hectares of the country's farmland via land redistribution, with an estimated number of beneficiaries of up to four million landless and poor households, which accounts for up to 80 per cent of the agricultural population (Boras, 2006). According to the Comprehensive Agrarian Reform Law (CARL) of 1988, however, each qualified farmer beneficiary can only own no more than three hectares (DAR, 2012). Borras and Franco (2008) report that six million hectares of land were redistributed between 1972 and 2007 to three million poor households.

Because of the land distribution situation in the Philippines, different tenurial arrangements exist in the two farming villages studied (Table 2). Only 32 per cent of the farmers own their farmlands, while 33 per cent and 35 per cent are share tenants and farm workers, respectively. Share tenants already have long-term tenancy arrangements with land owners, which have been passed down through generations. Usually, tenants give 10 per cent of the harvest per season to the land owner as a share or lease of the farm land. They pay all the farming expenses and usually have greater control than land owner in terms of managing the farmland except that they cannot sell or lease the land. Farm

workers have the opposite arrangement with the land owner. They have a 12 to 15 per cent share of the harvest, since they are only farm workers, and all farm expenses and land management is controlled by the land owners.

Table 2. Tenure status of surveyed farming households in San Antonio, Nueva Ecija, Philippines, 2011

Tenure status (%)	Papaya (n = 100)	Cama Juan (n = 101)	Both (n = 201)
Owned	23	40	32
Tenant	42	25	33
Farm worker	34	35	35

Source of raw data: 2011 Survey

During my informal interviews with farmers, some claimed to have only the certificate of land title (CLT), a document issued by DAR and acquired by the farmer through CARP. It is a document signifying ownership but it does not give the right to transfer, mortgage or sell the land until the amortisation has been fully paid into the Land Bank of the Philippines. Thus, some farmers interviewed are not yet *legal* owners of their land. Despite this situation, group discussions, particularly with male farmers, revealed that some farmers have violated the provisions of the program. Through informal arrangements, they have *pawned* their rights to their neighbours or relatives. This is also done by tenants who, at times of crisis, let their relatives or close co-farmers cultivate their farmlands over a certain period of time in exchange for an agreed amount of money. This usually involves large amounts of money with a contract duration of at least a year. Because of the existing land ownership or rights arrangements in the community, it becomes hard to monitor who has the legal rights over and ownership of a particular piece of land.

Land inheritance practices

In terms of ownership among family members, Filipino families have a bilateral family system in which sons and daughters have equal roles in supporting their parents and both men and women have equal rights to inherit property (Estudillo et al., 2001; Godquin and Quisumbing, 2008; Yamauchi and Tiongco, 2011). Since farming remains a man's domain, however, farmland is traditionally given to sons. Men usually learn the hard work of the

farm in their youth and, when a man gets married, it is customary in the community for a father to give a portion of his farmland as a gift to his son. The land is not necessarily transferred to the son's name but he has the right to cultivate and harvest the farm. Another reason why men usually inherit the land is because of the traditional role ascribed to them. Since men are expected to be the provider for their own households, they need to have the main source of livelihood and thus this inheritance of land is not questioned by the family members.

I inherited my skills from my parents; I started farming when I was still 8 years old. We are still using *carabao* then, there's no hand tractor yet ... When I got married, my father gave the 7,500 square metres to support me when I started to have my own family. – Farm man #4

I was just Grade 6 then, the plough is bigger than me. I am obliged to learn about farming because I need to go with my father in the farm. I was the one bringing food in the farm. I was taught how to plow the field, at first I really liked it but when I learned about it, I don't like it anymore, it's like learning how to ride in a bicycle, it's so interesting at first, it's the same feeling I have about ploughing. – Farm man #22

Women, on the other hand, are also exposed to farming but for a different purpose. Since they will be helping their husbands when they get married, they need to know about farming and farm labour. They are expected to cultivate their husband's land and so when they get married, they do not necessarily inherit land but they can be given other important assets such as *carabao* (water buffalo) by their parents.

When I was still young, I used to go out with my family to the farm, when they are farming I was helping them out. Whenever I go to the farm, I used to bring meals with me and not go home anymore. I am just watching what they are doing. When we [family members] plant rice, we really need to go out in the field. We all know how to plant and harvest [rice]. Since, if time will come that you are about to get married and you married to a farmer, you should know how to farm. – Farm woman #11

We are 7 siblings in the family; all of us are girls so we do the farm labour. I even learned how to ride in a *carabao*. I am the third daughter in the family. When I got married my father gave me two *carabaos* (one mother with a young buffalo). – Farm woman #25

Even in modern farming, customs in land inheritance still persist. Land is still an important asset in farming but *carabao*, being replaced by tractors, have become a less important asset. Moreover, education these days has become an important way to elevate one's livelihood and thus is an important household investment outside farming. Estudillo et al. (2001) shows that farms are preferentially given to men in rural Philippines while for women education is the favoured investment. As land and education become two of the most important inheritance parents can give to their children, parents tend to equalise the intergenerational transfer among their children where land and education are given according to tradition and *efficiency* (Estudillo et al. 2001). Since rice farming is still a labour-intensive livelihood, men's skills and experience in farming give higher returns among male heirs. On the other hand, land held by households has declined and household income sources have been diversified towards human capital-intensive non-farm jobs (Estudillo et al. 2001). Thus, parents invest more in their daughters' schooling because returns on female schooling have risen. Parents expect to have a larger income share from daughters who become educated in adulthood (Yamauchi and Tiongco, 2011). This is consistent with the traditional roles of women in the Philippines. Aside from being a support to their husbands and provider of care for their own family, it is also a responsibility of a woman to support and care for the elderly. Since women are not the *farmers* of their households, being educated can help both their own family and their extended family through non-farm income.

Both men and women reinforce the traditional farming arrangement. This can be observed in the way they teach their sons and daughters about farming responsibilities. Usually it is the father who exposes their sons to farming but even mothers who have been exposed to farming and have the opportunity to manage the farm still perceive that the rightful owner and manager of farms should be men. It is seldom that women are taught about farming. They are expected to help minimally with farm work, and to stay at home and study hard to help their family in the future.

Researcher: Does your daughters know how to farm?

Husband: Ah, no, they don't know how to farm since they are all girls.

Researcher: Didn't you teach them how to farm?

Husband: Not at all, I just want them to study but our budget can't afford it so they married early. Before they used to work in Mariveles [town in other province] in a factory but now they already married.

– Interview with couple #3

As of now, my son and I live together. My husband already died. So now, my son takes the farming responsibility and makes decision for that matter ... In the past, I used to decide for our farmland; but now, my son took over. It's like he has his own family now. We exchange position – I am now the daughter and he will be the father. – Woman in Papaya focus group # 1

Land ownership situation in the villages

Because of the history of land distribution in the Philippines and the customary practice in land inheritance, land owned by an individual is expected to be small. Table 3 shows the average area of land registered or inherited by household members and landlords in the study sites. Land is still predominantly owned by *non-farmers* and/or other large farm owners. Fifty-seven per cent of the farmlands being cultivated by farming households are owned by landlords. These lands are larger (1.67 ha) than the land owned by the members of farming households (0.51 to 0.10 ha). Landlords who either inherited land from their elite families or bought vast lands do not usually engage in farming but hire tenants or farm workers to cultivate their lands. Thus, tenants usually cultivate bigger land areas than owner-cultivator farmers. Within farming households, a family member might only have less than a hectare of land. This stems from the fact that the land a farmer beneficiary is entitled to under the land reform program must be less than three hectares; as the land is divided among the children who inherit, each farm becomes even smaller. Moreover, since land ownership and rights are usually transferred through inheritance, some of the lands are not being transferred properly to the new owner's name. Some farmlands are still under the name of the elders who have passed away or are still living but too old to cultivate the land (20 per cent). Husbands (19 per cent) are expected to have larger portions (0.42 ha) of land than wives (0.06 ha). The percentage of women who own and control land is small. Only 2 per cent of farming households reported that the farms being cultivated were under the name of the wives, while 2 per cent revealed that their land was owned by both husbands and wives.

Given the low percentage of land ownership and the small portion of land owned by farming households, farmers are exposed to greater uncertainty and risk under climatic changes and structural changes in the farming system. Land is the most important asset in farming but because of the land distribution situation in the Philippines and the patriarchal system of inheriting the land, farmers, particularly women, are denied full access to the land.

Table 3. Average area registered/inherited by landlords and household members, Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Family member	Percentage of total (%) (<i>n</i> = 201)	Average area (ha)
Husband	19	0.42
Wife	2	0.06
Joint husband and wife	2	0.10
Elder(s)	20	0.51
Landlords	57	1.67

Source of raw data: 2011 Survey

Shortall (1999) argues that land ownership is the central source of power in farming. Just as in most of Western Europe and North America, customary practices dictate the inter-generational transfers of land to the male heir of the family. Consequently, women have limited independent access to land and to the economic resources and consequent status, prestige and political power that land ownership can bring. In the same vein, farmers in rice farming communities who do not own the land have limited power. This is worse for women. They have limited power to control their livelihood and cannot take action for themselves, or are limited in the action they can take for themselves and for their household and the community, because of their lower status in the community.

6.2.3. Participation in farming

Men and women enter into farming from different pathways. Both men and women are exposed to farming at an early age mainly because they come from traditional farming communities. Men and women participate in farming differently, however, mainly because of the traditional roles they are expected to play. While men are trained to do

farm work at an early age, women are not directly involved in farming. As a male farmer said:

All of the wives here know about the farming even if they just stay in the house. For example, I will ask her [wife] to prepare for the food, because someone with the machinery went in our farm, so she will cook some meal. – Farm man # 22

For some men, women being involved in the farm is *just* taking meals to the farm – an extension of the household responsibility of a woman. It is enough for women to know and see that men are doing farming activities. The lives of some of the women in the farming communities are far from the farm. Their labour contribution remains under the control of men and because farm work is commonly defined as the work of the owner and manager, women's work is not considered to be real work as most of it is focused on assisting men as the need arises (Brandth, 2002). Women accept this kind of role and the norms of farming. Thus, when the time comes for them to be directly involved in the farm, they still see themselves as a supporter and a farmer's wife and do not consider themselves to be farmers, although they may be doing almost all the the farm work and management. A widow farmer shared her experience about farming:

When my husband is still alive, I used to help him in every farm work. It was only operating hand tractor that I did not do. Even I already have rashes all over my body, it was just so itchy but I just endure it since I'm a farmer's wife. – Farm woman #25

What is worse, some women do not see the value of their work and find themselves to be invisible in the farm. When a wife was asked about her involvement in the farm she simply responded:

Nothing, I am just helping him in the farm. – Farm woman #5

Generally, women's direct involvement in farming begins when they get married to farmers. Women's participation in rice farming has been minimal in the past but recent study reveals that their participation increases with poverty and unfavourable rice

environments (Paris, 2009). The study mainly refers to the micro-level studies conducted by the Women in Rice Farming System (WIRFS) Network based at the IRRI. Women's participation in farm labour in rice production ranged from 27 per cent to 84 per cent in the Asian region. This variation is attributed to the gender roles of women, agro-ecological systems, types of farming systems, crops grown, links with livestock and fish production and opportunities for off-farm occupations for family members. For instance, female labour participation in Thailand, Nepal and India was found to be higher than in other countries. The labour participation of women was found to be highest in the rain-fed rice ecologies in eastern India which suffer from abiotic stress (physical stress) such as drought, floods and salinity and where the majority of women are illiterate. Except for land preparation, irrigating fields and spraying chemicals, women dominate in rice operations. This clearly shows that if households are experiencing poverty and women don't have other income opportunities, they will increasingly be providing labour inputs and most of the labour will be tedious, hard and uninteresting work (Paris, 2009).

Changes in farm activities

Over the last few decades, women have been more visible in agriculture mainly due to their increasing responsibility for household survival and their response to economic opportunities in commercial agriculture (Lastarria-Cornhiel, 2006). This is now happening in the rice farming communities in this study. Because of poverty, men have expressed the need for women to participate more in rice farming. In interviews with husbands and wives, they talk of their poverty and the need for the wife to be physically involved in their rice farming:

Wife: There's no other livelihood here, that's [referring to rice farming] where we get our living.

Husband: She is just following what I do. She is helping me out because of this hard life [*dahil sa hirap ng buhay*].

– Interview with couple #3

Those women who have not been much exposed to farming endure hardship because of extensive farm labour. A woman expressed her hardship in this way:

All my life, I never felt this kind of hardship. This where [referring to farming] I only experienced being obliged to go out in the fields and plant. When I was still single, I don't need to do farm works. I just seat and relax in our home sewing. This is only where I experienced all kinds of hardships. – Woman in Papaya focus group #2

Because women lack skills and training in farming, they are expected to obey the instructions of their husbands and, as they get used to the farming activities, they become regular companions in some important farming activities. Based on the PRA conducted with men and women in both villages, women are increasingly involved during the planting and harvesting periods however, their contribution to other farming activities is still less compared to men (Table 4). This is because they are doing other works aside from their own farming activities. They are even engaged in off-farm labour, planting and harvesting on farms belonging to others to contribute to their own household's income. Men, on the other hand, still do most of the activities that require more physical labour and that require skills such as land preparation, raising seedlings and applying fertiliser.

Table 4. Percentage of labour contribution of men and women in rice production activities, *Barangay Papaya* and *Barangay Cama Juan*, Nueva Ecija, Philippines, 2011

Rice production activities	<i>Barangay Papaya</i>		<i>Barangay Cama Juan</i>	
	Men	Women	Men	Women
Land preparation	90	10	98	2
Raising of seedlings	100	0	100	0
Transplanting of seedlings	10	90	40	60
Fertiliser application	100	0	100	0
Hand weeding	-	-	50	50
Spraying of pesticides	100	0	100	0
Manual harvesting	50	50	50	50
Manual threshing	10	90	60	40
Winnowing	-	-	30	70
Drying	50	50	70	30
Selecting and storing of seeds	100	0	100	0
Selling rice paddy to market	50	50	50	50

Source: PRA activity, 2011

The different ways men and women are involved in the farm has implications when it comes to the decision-making activities of the household. Because women are not just observers of farming, they now have greater power to negotiate with their husbands

about farming and household activities. As shown in Table 5, most of the farm-related activities are now being jointly decided by husbands and wives, but when it comes to which variety of rice to grow, the men usually decide. This happens because training and seminars about rice varieties are still preferentially given to male farmers, as they are *formally* and *legally* recognised as farmers by government and other institutions. Moreover, based on the separate FGDs conducted with men and women in both villages, men still dominantly influence the decisions of the household in farming operations mainly because they are the *farmers* and they manage the farm.

There are also some changes in household activities. Because women are now spending more time outside the house, men are starting to be involved in household activities. Although the house is still the domain of the woman, the man, as the head of the household, is being consulted about things such as the education of the children and implementing household activities. Raising livestock is another important decision for the livelihood of farming households. Usually, small to medium livestock, such as poultry, hog raising and goats are taken care of by women. In Papaya, women still dominate the decision-making when it comes to this activity, while in Cama Juan this is now being decided by both men and women.

Table 5. Decision-making activities of men and women, Nueva Ecija, Philippines, 2011

Decision-Making Activities	<i>Barangay Papaya</i>			<i>Barangay Cama Juan</i>		
	Men	Women	Joint	Men	Women	Joint
<u><i>Productive-related decisions</i></u>						
1. What variety to grow	✓			✓		
2. Buying inputs			✓			
3. How much to sell			✓			✓
4. When to do the farming activities			✓			
5. Where to get finances						✓
<u><i>Reproductive-relative decisions</i></u>						
1. Education of children			✓			✓
2. Food		✓			✓	
3. Animal farming		✓				✓
4. House implements			✓			✓

Source: PRA activity, 2011

Changes in non-farm activities

More men in Cama Juan are observed to be more involved in household activities as more women are now engaged in productive activities outside the home. Aside from farming, more women in Cama Juan than in Papaya are involved in off-farm and non-farm activities (Figure 10 and Figure 11). Consequently, more men are now helping in reproductive activities such as rearing children, cleaning and doing the laundry. Although women are now allowed to negotiate with their husbands, it should be noted that the household's resources and decision-making are predominantly controlled by men. This is due to the fact that women have less access to and control over the land and skills that are needed to manage a farm, which is the main source of livelihood of the household.



Figure 10. Woman selling meat, vegetables and other products by roaming around the Cama Juan village as non-farm employment.



Figure 11. Woman doing manual harvesting in a field owned by someone else in Cama Juan as off-farm employment.

In the rare cases where women have gained access to land, for instance when the land is jointly owned by husbands and wives, household decision-making is quite different. Women who are given equal access to resources such as land are in a better position in

the family and can have a voice in farming decisions. Wives who co-own the farm said in interview:

Of course, we both decide. We consult each other, you can't decide on your own, so if you had mistakes in your decisions you can't blame each other. Now, we can also consult our children regarding our livelihoods. All of what we have right now had been acquired by us and we're together in these. Like when we were to plant melon, he is asking me first if we have some money to spend. I am still the one who looks for the capital. – Farm woman #2

In regular farming activities it's my husband who decides, and if there are just minor concerns in the house, I can decide it myself. If we need to make a decision regarding farming that's a sensitive matter like how much would be spending for the farm, then we need to talk about it ... He cannot take loans on his own, because the property [land] is a conjugal property, so he needs my consent – Farm woman #16

This subsection clearly demonstrates that women and men relate to and participate in farming according to the different pathways through which they enter into farming. Men are inherently dedicated to farming while women, if they do not come from farming families, enter into farming through marriage. Additionally, women's and men's relation to farming is influenced by the resources and skills they bring with them. Since men usually inherit the farm and are trained at a young age, they are in a better position to manage the farm. Thus, men have control of and access to most of the household resources. Women, on the other hand, who are deemed to *support* their husbands, participate less in farming. They also lack the skills to manage the farm as they are not usually trained in this kind of livelihood. This has implications for how they participate, negotiate and even how they perceive themselves in the farming sphere. Because of changes in the farm structure, however, poverty has pushed men to let the women be involved in the farm and other productive activities. This has caused changes in farming activities and thus, household decision-making. Women can now jointly decide with men about most of the farming activities, but this privilege is still limited due to adherence to the norm of honouring men as the head of the household. Moreover, since women still lack access to resources such as land and training, their voices can still be discounted in the long-run. Women's decisions are well-recognised when they have equal access to resources and opportunities. As shown in the latter part of this discussion, a few women

are already expressing the benefits of having a greater voice in farming, indeed land ownership endows an individual with power and higher status within the family and the community.

6.2.4. 'Loan is like a chain, it does not end and it's all connected'

Access to formal credit is limited in the countryside. In fact, only a mere 5 per cent of the total loan portfolio of the banking sector is used in the agriculture, fishery and forestry sector (Torres, 2005). Due to lack of financial capital and a formal credit system in the Philippines, ordinary farmers are obliged to acquire financial assistance in any way they can in order to continue farming. Moreover, rice farming is becoming a capital-intensive enterprise, mainly due to the high cost of inputs such as seeds, fertiliser and diesel, which are the main expenses that eat up the capital of an ordinary farmer. On average, the cost of rice production reaches up to PHP39,300⁸ (AUD898) that can only have a net return of PHP14,559 (AUD333) per hectare, per season (BAS, 2012).

Although the Philippine government has made efforts to increase the access of smallholder farmers to formal credit, informal sources such as friends and moneylenders remain the main sources of credit (Corpuz, 2008). This situation is reflected in the case of rice farming in San Antonio. Farming mainly involves acquiring loans throughout the cropping season. Acquiring loans from different sources has become part of a *normal* way of life for farming households to strengthen their food and financial security.

The farmers here are willing to pay, to be honest. The farmers will bring their harvest to you to pay for the loan. The willingness to pay is there but the source [money] that the farmers can use is not available. This is the reality. That is why farmers are in hardship and it's like after you harvest, it's nothing. What we need here is financial assistance from the government and non-government organisations to uplift the lives of the people in our village. I hope you could help. – Farm man #20

Acquiring loans is a never-ending cycle to which farmers are bonded or chained. If they have good production throughout the year, they can easily recover their farming expenses and at the same time pay the interest of their loans. Bountiful harvests seldom happen,

⁸Exchange rate used: AUD1= PHP43.75

however, and thus they cannot pay off their debts. To make the repayments easier, they take and pay loans gradually. As explained by most of the female and male farmer-respondents, the initial loan is for part of the capital costs of rice production and will be partially paid on harvesting. To fully pay the initial loan, farmers will seek another loan from another lender to cover the unpaid debt. This implies that the bigger portion of repaying the initial loan comes from another loan, especially if the farmer experiences crop loss. Either way, the rice harvest is still the main source of repaying loans, especially the harvest from the dry season crop.

It's good, it's good to do farming although you will have problem if you lack some finances, you will end up taking loans, loans will not end. It's like a chain, it does not end, and it's all connected. If you are not able to pay the loan, you need to take another loan. Sometimes when you are about to harvest you might think you should be glad that you are harvesting but we're having head ache because we just need to divide it to pay our loans. That's why sometimes you just think we just give this portion to him/her then the other will be for these and that, so it is really hard, if you don't have your own capital for farming. Just like now, it's not yet harvest season and yet we don't have anything left for our everyday expenses. What we have harvested will not be enough for the next harvest season; we need to buy at least 2 *cavans* of rice. I just milled some rice; I don't know now if that would be enough until the next season. – Farm woman #25

It is really burdensome for farmers to acquire loans when they know that they are unsure of their harvests for the next season. This prevents the farmers from acquiring loans from formal sources and encourages them to seek loans from their relatives, friends and people they know in the village. Because informal lenders know the farming situation in their village, they are more understanding if farmers incur losses. Although the interest rate is higher (10 per cent interest), there are fewer requirements and terms of repayment can be flexible. Trust and personal relations are important in this kind of lending system as no collateral is given and spoken promises are the only requirements.

As long as we cultivate our land, the lenders trust us. Time will come that we will have harvest and we can repay them [*Hanggang ginagalaw namin ang lupa, pinagtitiwalaan kami ng mga nagpapautang, pasasaan ba't aani din yan, makakabayad din*]. – Farm man #4

There are also farming expenses that are not paid in cash [straight away] so what I do is just pay for the wage of the machine operator first. With the owner of the machine, I will just talk to him that I will pay him the rent next time, and then other expenses will be paid during harvest season. – Farm woman #18

Moreover, acquiring loans from formal institutions was reported to be becoming more difficult. Previously, male farmer-respondents acquired loans from a formal lending cooperative, under the regulation of the BUTIL organisation, a farmer party list in the Philippines. It offers a low interest rate of 2 per cent per month. Maturation of the loan is five months, until the harvesting period per season. More farmers are now resorting to informal lending, however, even if they incur a higher interest rate. A male farmer-respondent shared the following in the group discussion:

It's difficult now to acquire loan in BUTIL. In the past, we just need to give a sketch of our farmland and the neighboring farms, but now, we need to submit different documents such as certification, *barangay* clearance, etc. before approving our loan. It takes time and effort. In addition, upon acquiring, my wife must accompany me because it is also required by the agency. – Man in Papaya focus group #3

This situation is consistent with the study by Poliquit (2006) in Davao del Norte, Philippines, where access to credit was restricted by collateral requirements and lengthy and complicated procedures. Thus, farmers' choices and preferences were not well served which led to borrowing from informal lenders. As shown in Table 6, both male and female farmer-respondents acquire loans for their farming needs. When it comes to sources of loans, however, women tend to be more resourceful. Women have access to both formal and informal sources. Although most women do not own farmland, a non-government microfinance organisation, ASKI (*Alalay sa Kaunlaran, Inc.*), provides loans to women in Cama Juan. Consequently, 13 per cent of women were able to avail themselves of loans from this organisation. Moreover, 95 per cent of women reported that they acquired loans from informal resources. They are active in seeking loans to support their farm as they are expected to take loans on their husband's behalf, particularly when seeking loans from informal sources. More female farmers than male farmers sought help from their family and relatives (35 per cent). This is explained by women feeling that they are

entitled to some support from relatives, friends and neighbours who they feel are better off than them (Dalisay, 2008). This sense of entitlement can be explained by the support provided to family members and friends by women themselves. Thus, when women are in need, they can be confident in seeking support in return for the favours they have done.

Table 6. Proportion of male and female farmers acquiring loans from different sources , San Antonio, Nueva Ecija, Philippines, 2011

Sources of loan	Male (n = 188)	Female (n = 182)	Both sexes (n = 370)
Formal sources	23	26	24
Bank	9	9	9
Cooperative	2	3	2
Microfinance organisation	0	13	12
Government institution	12	1	1
Informal sources	89	95	88
Family/Relatives	26	35	30
Friends	21	19	20
Co-farmers	6	3	4
Private money lenders	36	38	34

Note: multiple responses

Source of raw data: 2011 Survey

Men tend to be shy of seeking assistance from others, thus they let their wives negotiate with private lenders and other people they know. Consequently, borrowing money becomes another female gender role, mainly because it could bring shame to a man to ask a favour from other people and hurt their identity as provider. This kind of attitude is confirmed by separate discussions with male and female farmers.

We acquire loans, our husbands just tell us the amount. There are husbands who are too shy to ask for loan/money. Women are used to that kind of system, wherein we are the one who ask or borrow money. – Woman in Cama Juan focus group #4

I think, women are responsible in borrowing money. Like in our household, my wife usually borrows money because I am shy to negotiate on money matters. – Man in Cama Juan focus group #5

Informal credit arrangements in the village

Female farmers explained that there are usually three batches of loans acquired during the rice production period. The first loan is for hiring labourers and to pay for inputs for land and seedbed preparation. The amount borrowed is approximately PHP30,000 (AUD686). The second loan is for the application of fertiliser, which is done twice in a season. The amount needed ranges from PHP10,000 to PHP15,000 (AUD229 to AUD343). Lastly, farmers need additional money for hiring labourers for harvesting and threshing the harvests. As the rice crop reaches its harvesting stage, fewer inputs such as fertilisers and pesticides are needed. Thus, farmers only borrow around PHP3,000 (AUD67) during this period. At the same time, however, food becomes scarcer, so the excess money from the loaned amount is used for household expenses. In short, a farmer needs a capital of PHP45,000 (AUD1,028) per hectare during the dry season and around PHP30,000 (AUD686) per hectare during the wet season. The difference in the cost for the two seasons is mainly due to the input use. The dry season is more costly because farmers use hybrid seeds, more fertilisers and diesel for irrigation. Without any of their own capital, farmers end up borrowing the total amount.

Because of the need for money throughout the rice cropping season, farmers have created different informal lending arrangements. One of these arrangements is called *taling-giik*. This arrangement operates in both villages but is more popular among Papaya farmers. Within the inter-locked arrangement of *taling-giik*, there are also other arrangements being offered. One arrangement is that the farmer can borrow PHP5,000 (AUD115) cash per hectare from the thresher-owner and the thresher-owner will be assured that his threshing services will be used during the harvesting season. The payment of the rent for his thresher will be in the form of a share of the harvest, which is equivalent to 6 sacks (*cavans*) of *palay* per every 100 *cavans*. After harvesting, the farmer will repay the PHP5,000 (borrowed money) without interest. If a farmer is in need of additional capital, he/she can ask for an additional cash advance from the thresher-owner but this loan will carry an interest rate of 5 per cent per month. In *taling-giik* arrangements, farmers can also choose to have fertiliser/pesticides instead of money, without interest, as long as the lender will be the one to thresh the farmer's field.

The other offered arrangement is for land preparation, wherein a farmer can borrow from a hand tractor owner on the condition that the hand tractor owner will be the one to do the land preparation of the farmer's field from seedbed preparation until the field is ready for transplanting. There is no maturation period for the loan, especially if the harvest is poor. A farmer could rent a hand tractor for PHP4,500 (AUD103) per hectare that could be used for a period of four months.

Because women are the main custodians of the cash of the household, they have learned how to be resourceful in managing the finances of the family. A group of women in Cama Juan came up with a savings/loan arrangement called *paluwagan* to help each other in times of need or to save up for some important occasion. Each member of the group gives PHP25 (AUD0.57) each week to the assigned treasurer. The total deposited amount is then collected by each member at the end of each year. Being a member in *paluwagan* has an advantage. The accumulated funds can be loaned to members and non-members at 10 per cent interest per month. The accumulated interest gained is equally distributed among members together with the principal amount deposited for the whole year.

As the above discussion shows, it is clear that borrowing money has become part of the farming system of the communities being studied. In the absence of formal sources of capital and credit, farmers rely on their existing social relations in the community to acquire capital and loans from informal sources. In other words, farmers use their social capital to gain economic capital. This concept comes from Bourdieu's concept of social capital. He argues that social capital is mainly used by individuals to attain economic capital. Bourdieu emphasises that since economic capital is the fundamental resource, social capital can be instrumental in increasing an individual's economic capital (Winter, 2002). By continuously investing in social relationships, through mutual support, reciprocity and trust, one's social capital can be used to engage in economic exchanges with lower transaction costs, such as paperwork and required collateral, than more formal exchanges. These kinds of economic exchange are observed in the farming communities, where lending arrangements are usually based on existing social relationships. Because most of the farmers do not have their own economic capital to use

in farming, they rely on their social capital to gain financial capital by taking loans from informal sources to continuously cultivate their lands.

This study also demonstrated the gendered nature of social capital existing in the communities. Men and women are invested in social capital in quite different ways and so the gains from social capital vary in some degree. For instance, women provide more mutual support than men to their family and friends because of ascribed roles as a caregiver and constant support. Also, the lack of material capital motivates women to form themselves as a group to access financial and material capital. Their continuous support with each other build trust and reciprocity which make them entitled for available help in unfortunate situations. On the other hand, men tend to have less social capital investments as they are less dependent from others for capital and support than women. Consequently, in times of difficult situations, when capital and other farm resources are becoming scarce, women seek assistance from their informal networks. Men tend to ask their women to take loans on their behalf. Nowadays, acquiring loan is becoming a gender role for women particularly among small farming households with no financial capital of their own.

The dense social networks existing in the communities are the result of strong family ties within the community. In small communities like the villages studied, most if not all of the people know each other. Kinship still exists where help and support are extended to family members. The social capital, which is mainly produced among family members, facilitates the existing lending arrangements in the farming communities. Farmers use their existing social capital with their relatives, neighbours and friends to borrow money for their farming expenses. This finding is contrary to previous studies which claim that the elevation of family and kinship can limit the social capital within civil society. In this sense, family ties are deemed to be so strong that family allegiance crowds out other ties in the community (Fukuyama, 1999; Winter, 2000; Johnson et al 2003). I argue, however, that since each household adheres to the same idea of *family ties*, the *family culture* extends to the community where neighbours and friends are seen as part of a larger family to which trust and support should be extended. More detailed discussions on family ties will be presented a later sub-section.

6.2.5. Access to information, training and external support

Having good access to information about farming and weather is very important for farmers to be able to better manage their farming, as is access to training and external support from government and other organisations to enhance their capacity and skills. Even though farming communities are considered *rural* and far from the economic centre, they can still have good access to information through the media, such as television and radio. Improvements in communications, such as the introduction of mobile phones and the internet are also proven to be effective in enhancing communication among farmers. Moreover, the farming villages are situated in Central Luzon, the centre of learning and rice research in the Philippines. In fact, the Philippine Rice Institute (PhilRice), the government's rice research centre, is located in Munoz, a nearby town in Nueva Ecija. This centre being so near to the farmers means that they can get up-to-date information about rice farming. PhilRice also conducts training, studies, demonstration trials and research with the farmers in the villages in this study. Also, international organisations such as the IRRI and non-government organisations (NGOs) have extended support to farmers in terms of training and financial assistance through grants and donations. Aside from this, government agencies, mainly through agriculture extension workers, provide services to the farmers such as introducing new farming techniques, seeds and other farming inputs. Farmers heavily rely on extension workers because they are supposed to provide extension services on a regular basis. Farmers showed dissatisfaction on how extension services are implemented, however.

Government, LGU [Local Government Unit] needs to really keep their eyes on the farmers. What's happening here is that even technicians, don't care about the farmers. Agricultural technician seldom visit our farmers and farmers do not believe their technician. Some farmers compare the performance of their technician's field and they will see that their fields are better than him/her. When the technicians instruct them to do some farming practices, farmers don't believe or follow. – Farm man #14

When government agents were asked about their services, however, they complained about the lack of budget provided by government to implement projects and provide services to the farmers.

The problem of my co-ATs [agricultural technician] when they are assigned here is that it's too far from their house or even in our office in San Antonio, that's why they're having a hard time in attending all the needs of the *Barangay* [Cama Juan village]. – Key informant #8

We don't have enough finances, for supplies, travel expenses. Imagine your salary will be your travelling expenses. – Key informant #10

Access to information varies across gender. Based on Table 7, men and women have different sources of information on farming practices and mostly the same sources of information about weather conditions.

Table 7. Sources of information about agricultural practices and weather condition (in per cent) by gender, Nueva Ecija, Philippines, 2011

Sources of information	Male (<i>n</i> = 201)	Female (<i>n</i> = 201)
<u>Agricultural practices</u>		
Government agency and personnel	28	26
Private organisations	10	8
Research institutions	26	17
Media	11	8
Social network	17	32
Traditional knowledge	26	16
<u>Weather conditions</u>		
Government agency and personnel	2	2
Private organisations	1	0
Media	96	98
Social network	2	4
Traditional knowledge	3	0

*Note: There are multiple responses.
Source of raw data: 2011 Survey*

Men rely on formal sources of information such as government agencies (28 per cent) and research institutions (26 per cent), and on their own traditional knowledge (26 per cent). Since men are recognised *farmers*, they have greater access to formal sources of information and, drawing from their experience, they have developed an indigenous knowledge about farming. Their social network of friends and neighbours is another relevant source of information. They exchange ideas and information with their co-

farmers.

On the other hand, 30 per cent of female farmers rely heavily on their social networks. They receive information on agricultural practices from their friends, neighbours and family members. Since women *informally* enter into farming, they also rely mainly on informal sources for their information. Some women specifically mentioned that they learned about farming practices from their husbands. Additionally, child rearing and household responsibilities limit their mobility. It is harder for them to attend farmers' meetings and attend seminars and training, so they simply enquire of their neighbours and friends about the latest farming technique and technologies. These findings are consistent with the study of Tatlonghari et al. (2012) of rice farming communities in Laos PDR and Indonesia where women rely more on their close social networks such as friends and neighbours within the village to exchange information about new rice varieties. Particularly in Indonesia, the study reveals that male farmers are more mobile than female farmers due to customs and reproductive activities. Nevertheless, female farmers use both informal and formal sources to seek out information about farming practices. They are active seekers of information as they also rely on extension services and research institutions for information at the same time as using their social networks. As observed by Meinzen-Dick and Zwarteveen (2003), women use their formal and informal networks to cope with shocks and to make sure that their views are represented, particularly if formal rules limit their participation. Women can relay their views through their husbands and close friends who have greater mobility and access to formal institutions.

Meanwhile, both male and female farmers largely depend on radio and television for information about weather conditions. Most households in rural areas have access to radio and television and so government agencies use these media to widely spread information and announce warning alerts. Since rice farming is a climate-sensitive livelihood, farmers adjust their farming activities according to the weather. Whenever weather forecasts are inaccurate and weather alerts are not announced, however, it can have adverse impacts on their farming.

What's most important is that the forecast should not be wrong. [There was a time when] the forecast was wrong and a lot of people got angry then. The forecast was not true, and we are one of those people [who got angry]. –Woman in Papaya focus group #1

Just like last year the flood came in when our crops are mature already but now it came in just right after we sow our seedlings. Maybe in the next year [it will be more frequent], I just don't know, PAGASA [Philippine Atmospheric, Geophysical and Astronomical Services Administration] are also wrong in their prediction. – Farm man #12

It was in 2004, it was a sunny day. They [authority] did not advise us that they will release water from the dam. We were harvesting then because we know it's a sunny day and we did not expect [the flooding] it was sunny then. [Because of that] we incurred losses. – Farm man #9

The devastating impact of inaccurate and inadequate information has a wide and long-term effect. It does not only affect a single farmer but can affect the whole region. Because of frequent losses due to wrong weather forecasts, the government finally responded to the problem. In 2012, the government bought and installed 100 new weather gauges and four new Doppler radars which can monitor clouds and gauge the amount of rainfall in a particular area (Zambrano, 2012). The government called this project Project Noah (DOST, 2012). It provides information about potential floods and storms. Ordinary people now have access to an almost real-time monitoring of the weather through the government website. This enables them to make sound and informed decisions about their activities (Reyes, 2012). Those farmers who do not use the internet on a daily basis can still access updated information through radio and television announcements which are now expected to be more accurate and timely.

6.2.6. The *close family ties* – its ups and downs

One of the distinct features of Filipino families is their close family ties. Lives of Filipinos basically revolve around their families. These traditions are clearly manifested in the way they live their lives and how much they value relationships within their families. It is common among rural communities to see extended families living together in one house or building their houses near each other to maintain their closeness. It is also common to

observe families supporting each other even when they have their own family to support. Parents feel that they are obliged to continue to support their grown children and be part of their lives. Children in turn are taught to love, respect and support their parents' old age. Also, because of the difficult life in rural communities, educated sons and daughters are expected to support their siblings' education at the same time as sending money to support the family's other expenses. Farming households have different ways of supporting their loved ones depending on the resources and agreed arrangements within the family. Some choose to have several families live together while others choose to support their children's families by taking care of the grandchildren or by giving a piece of land as a source of livelihood. All these arrangements entail sacrifice for family members as they take responsibility for others and share their limited resources. Farmers interviewed reflected on their own situations:

It's really not enough, what we have earned from farming is not just for us. We share the profit among us. If only it will be just for us, then there would be big difference in our way of living. If in terms of cost of living if we are on our own and no one is relying from us, we [couple] would have a decent living, since we are just two. I am still strong and able so I think we can still save but since I only have one son, I told him not to build his own house and to live with us with his family. – Farm man #17

I also have one granddaughter living with us. Her parents are living in San Nicolas, Bulacan [other province]. They are having difficulty with their lives. My son doesn't have a job. She is [granddaughter] with us since she was still young. – Farm man #8

I have a younger brother who is studying in Palawan [other province]. He is asking for some money, I feel like crying. I just said to him to ask for some money to our brother who's in abroad, but he got nothing too. If I just have money, they don't need to ask twice (*di kayo magdadalawang salita*). – Farm man #12

Meanwhile, a young married farmer shared his arrangement of living with his partner together with his parents and other siblings:

When my mum goes to the market, she brings us the food, then one will cook it, and all will share for the cooked food. The other one, will prepare the table. The finances is shouldered by my mum but if there's no enough money, it's not just us [couple] who will eat but all of us will [shell out money] so there will be food for the rest of my siblings, we are not living on our own. – Farm man #9)

Migration among members of the farming households

Another change in rice farming communities brought about by poverty and the pressure to provide for the family is increasing migration among members of the farming household. Several farmers I interviewed reported that they used to work abroad or that one of their family members is working abroad to support the family who are left behind. This situation is confirmed by the study of Paris et al. (2010) among rice farming households in Thailand, the Philippines and Vietnam. It shows that migration often occurs because of lack of economic opportunities, land shortages, poor infrastructure in rural areas, perceived better employment prospects elsewhere and improved communications. The study shows that remittances from migrants comprise a significant share of total household income in all three countries. Income from remittance is highest in the Philippines (59 per cent), mainly due to international migration.

As of 2011, the Philippines is the fourth highest recipient of global remittances (US\$ 21.3 billion) next to India, China and Mexico, while India tops the list (US\$55 billion) (World Bank, 2010). Remittances are closely watched by the Philippine government as it largely fuels household consumption which in turn serves as the key driver of the Philippine economy. According to estimates, remittances are equivalent to 10 per cent of the country's total economic output. Remittances saved the economy in the 2009 global financial crisis as they remained resilient. Indeed, working abroad is popular not because of the comfortable living in the host countries but because it sustains and offers a comfortable living for the family left behind (Dcart, 2010). Thus, it is also part of the dream of some of the farmers to go abroad to seek better paying jobs to uplift his/her household's situation. As one male farmer shared:

I have also dream of going [to work] outside the country. Like my brother in Qatar, he is salesman there. He is encouraging me to go there. I am just saving up for it. But for now I don't have any savings, our income is just enough for the kids. So we really need to tighten our belts to survive. – Farm man #12

Usually, it is the children of the farmers who are able to go abroad since they are still young and are more educated than their parents. Children who go outside the country for

work also feel the pressure of supporting their families back home even if that means sacrificing their own enjoyment. A young farmer shared his experience when he was still working abroad:

I sent remittance to my mum to buy medicines [for my dad] and that is what I have earned from there [pointing to a variety store] ... Sometimes when I talked about my life [in Bahrain], I am like a slave there, but here I am like the son of a king. Life is better, my life is better here. Even if every day, I was staying in an air-conditioned room while sleeping there, here, I am happy because I am with my family. I always miss laughing all day. They have different moods/culture. They think that they are rich, and since they have lots of money they can do anything. In there, I saw my co-worker's [bad experience], an Arab client did not like the taste of the coffee, it was thrown to his face. They look down on you. The small amount of money there, it's already big for us. That is why they belittle us. – Farm man #9

Family members left behind shared how remittances received from their loved ones help their family in their everyday expenses and other important expenses such as education and farming. This finding is consistent with study of Paris et al. (2010) where remittances sent by Filipinos were mainly invested in food, followed by children's education and farm inputs.

Two of my children are already married, but when they are still single they sent us some support. The other one went to Taiwan, she is a registered nurse but she was not able to use her profession since it's hard to apply for a job abroad. I cannot say that she is really supporting us since when she went there she is saving up her own money, so she is not really supporting us. When my daughter was still studying the other siblings are supporting us, but now that they are married you cannot expect her to give some support. – Farm woman #16

My son in Singapore sends remittances to support his sibling's expenses for her review for the licensure exam. He gives monthly support to his mother since her mother got sick. He is indirectly supporting me, but it helps me in a way. The additional support would be if I am short with my farming expenses. – Farm man #22

Women's traditional roles

Women in the Philippines are strongly tied to their traditional roles as mother, wife and housekeeper (Santiago, 2008). Consequently, altruistic behaviour is observed among Filipino women because of the expectation that they will support their parents and

siblings. Wives and mothers play the fullest role possible in safeguarding the wellbeing of their families, even at the cost of being away from loved ones (Brickell and Chant, 2010). This is reflected in one of the farming households in Cama Juan. The husband used to work abroad but because of old age he is not qualified anymore for the job he used to do. Consequently, he and his wife decided that the wife would leave the country and work as a domestic helper in Singapore. Usually it is the father who seeks employment overseas, especially when the household has small children to look after. When the opportunity is presented to the mother, however, it is commonly taken with the motive of lifting the socioeconomic condition of the household (Dalisay, 2008).

There's no other choice, but to let my wife work outside the country to start a new life. We don't have any resources. Now, she's sending PHP8,000–PHP10,000 (AUD183–229) per month. It's difficult and challenging – I need to take on woman's role. My wife extended for another two years, she was supposed to finish her two years contract in March ... When I was in Saudi, I built a house in my mother-in-law's lot. That time my family was living together with my mother-in-law. Then my sister-in-law's family came to live here. Now it's difficult, we are displaced. We cook separately; we only stay here [in the house] at night with my mother-in-law. – Farm man #20

Even if women decide to work to have additional income, their essential roles as mothers and caretakers makes their breadwinner role a secondary one, leaving women's lives increasingly full of anxieties, pressures and work burdens (Angeles and Hill, 2009). For instance, when someone in the family gets sick it is usually the responsibility of the woman to take care of the sick person. This particular situation is reflected in the example of one farmer participant in a focus group discussion. Although his daughter was earning abroad and could support the family through her income, she was forced to go home just to take care of her sick mother.

My wife runs a small business canteen in a school. But unfortunately, she was confined last two months ago. She had undergone bypass operation. She also has diabetes. Her wounds took time to heal. I have a daughter working in Taiwan, but due to the current situation of her mum, she was obliged to take care of her – Man in Papaya focus group #3

The gender role of women as primary caretakers and supporters of family members is passed down to younger generations. The pressure to adhere to these gender roles is reflected in women working to support the needs of the family or taking care of the sick family members. Chant (1996) points out this situation in her study in Mexico and the Philippines. Despite women's economic contribution during recession by taking on activities traditionally undertaken by men, gender relations seem to be characterised by considerable continuity. Similarly, Indonesian case studies illustrate that regardless of women's entry into previously male-dominated migration streams and the formal work sector, their positions as daughters within their kin networks remain largely unchanged (Silvey and Elmhirst, 2003).

Norms and traditions as well as gender roles clearly influence how men and women relate to their family. How well they adhere to these current *practices* somehow dictates their worth as a man or a woman. Thus, instead of questioning the current norms and gender status, they see them as part of their being and these cuts across economic status and marital status. Likewise, the strong family ties among Filipinos sustain the traditional gender roles of women and men. It seems like a double burden for them to adhere to the Filipino traditions and gender roles.

The 'familist' culture

For most Filipinos the reason for all their hardships and efforts is their family. In this way Filipinos can be considered to be *familist* where family and kinship ties are above all other types of social obligation (Fukuyama, 1999; Winter, 2000).

When my sister was married to another man, I took care of my niece, I raised her up since she was a baby and now she's 26 years old. I sent her to school with the help of my other siblings ... We are 11 siblings and I am the oldest ... It is not because of poverty that I did not get married, the desire just gone out of my system. I just don't like it anymore [to get married] – Farm woman #11

I have plans of getting married, but I haven't met yet the person who will like me and right now I really want to help my family. – Farm man #19
We don't stop working, sometimes I'm not feeling well but still I go to farm. Our Lord God sees that we didn't stop, so what He sees is what He gives to you, that's

why we both tried so hard ... As I told you I want our rice farming to be more progressive for our children, what they are seeing right now in us, they can be more successful. If they have more capital, they can have more income than us – Farm man #3

Having close family ties has positive and negative consequences for farming households. According to the findings of this study, close family ties significantly help family members in their everyday lives through financial support and the extension of help with reproductive chores and farm labour. Support given by family members also serves as a *safety net* during crisis situations. Consequently, the material and emotional support shared freely between family members generates an implicit willingness to return such support (World Bank, 2011). Moreover, support given by each member of the household neutralises the negative impacts of crisis and to some extent can really improve the economic standing of the household. As observed from the lives of farming households, mutual support is highly patronised to the extent of sacrificing one's self-comfort and resources. Some family members are even prepared to go abroad to seek a better life for their family. Having dense family networks has also its downside, however. The heavy obligation of supporting all family members can limit a family member's economic freedom and therefore prevent that family member's welfare from improving. Instead of just looking after his/her own family's welfare, the expectation that he/she will support the rest of the extended family obliges the family member to share his/her available resources with the extended family members when they need it. Such negative consequences are not openly discussed by the farmers interviewed; mainly because helping each other is a family obligation and fulfilling the needs of the family give them self-worth. Moreover, because the existing norms are very much tied to the identity of an individual, acting according to the ascribed norms and traditions is deemed to be *normal* and *appropriate* behaviour.

6.3. Climate change and flooding in the two villages

Flooding in *Barangay* Papaya and Cama Juan has almost the same cause. Since the two villages are in low-lying areas, they serve as a catchment basin whenever there is heavy rainfall and typhoons. Moreover, the villages are located near dams which release water

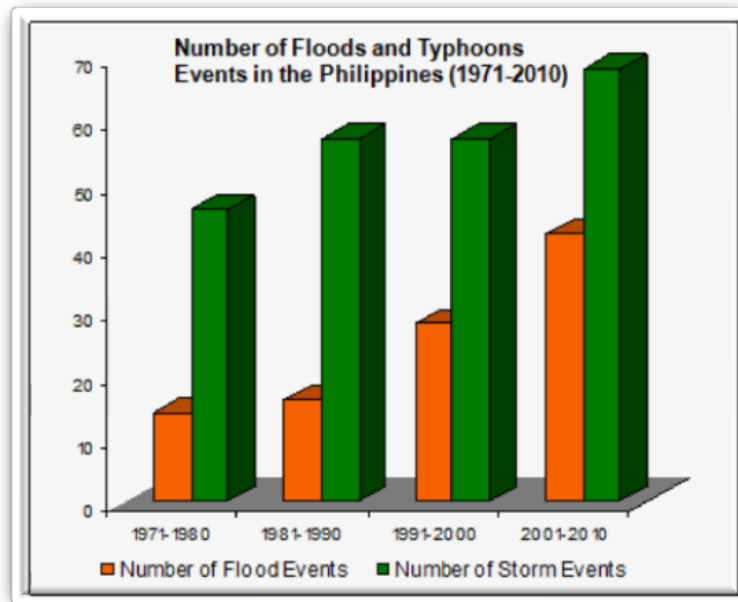
through rivers and creeks and cause occasional flooding. Flooding is also caused by infrastructure problems. Farmers emphasised that if only there were good dikes and a good floodway system, flooding could be minimised in their villages. Irrigation canals particularly in *Barangay* Papaya are not maintained properly and cause flooding in residential areas. Because of natural and man-made causes, flooding is seen to be a normal and occasional problem in the farming villages. As farmers and village leaders commented:

Oh, it's always flooding, it just really natural to have flooding here in our place. – Farm man #10

Flooding is an old music here. This is something that doesn't disappear. – Key informant #3

The people are used to flooding. For them it's not a big deal anymore – Key informant #4

Although flooding regularly occurs in their communities, farmers have observed some changes in flooding occurrence. Because of climate variability, frequent flooding and irregular rainfall patterns are becoming unpredictable. Extreme weather has been observed in recent years which have caused severe flooding. Farmers emphasised that typhoons and flooding have increased in the recent years. These observations coincide with recorded flooding events and typhoons for the last 30 years. Within a 10-year period, flooding increased by 200 per cent (from 14 to 42 floods), while storm events increased by 42 per cent from 1970 to 2010 (see Figure 12).



Source of raw data: EM-DAT database, 2011

Figure 12. Number of floods and typhoon events in the Philippines, 1971–2010

In the town of San Antonio in particular, time series records from 1951 to 2005 show that 50 per cent of the rainfall was brought about by tropical cyclones that passed through the province (Manzanilla et al., 2008). Consequently, there were increases in rainfall in those years which caused severe flooding in the town. These findings support the recent claim about the relationship of extreme events such as flood to climate change. 'Changing climate leads to changes in the frequency, intensity, spatial extent, duration and time of extreme weather and climate change events, and can result in unprecedented extreme weather and climate' (IPCC, 2012:5). Climate change has triggered the rise of temperature and the variability of rainfall and super typhoon events in the Philippines (CCC, 2010).

In both villages, men and women demonstrated awareness of climate variability and change. Their understanding was mainly based on experience and observations. Male and female farmers shared their experiences about extreme weather events and flooding during group discussions and individual interviews.

We are aware of the climate change. We even felt the wrath of the extreme climatic variability in our location. – Farm woman #15

We don't have any choice but to still go to our farm and work. We are obliged to do so even if we vomit due to extreme heat. If we can't bear the heat, we will just look for a shade and rest for awhile. – Women in Cama Juan focus group #4

Our climate is not the same anymore. Unlike before when you say wet season, it is only wet season. But now, when it is dry season, it's raining and with typhoon. In old days, we just have two seasons, according to elderly folks, the climate is like an old folks, it has been forgetful [*Sabinga matatanda, ang panahon ngayon ay parang matanda, uyanin na*]. – Woman in Papaya focus group #1

In general, men and women make the same observations about climate change (Table 8). Intense rainfall during the wet season was observed by 46 per cent and 59 per cent of men from Papaya and Cama Juan respectively. Similarly, more than half (51 to 54 per cent) of women from Papaya and Cama Juan reported this change in rainfall. Moreover, both men and women from the two villages experienced extreme heat and extreme weather events. These observations are consistent across gender.

Table 8. Observed changes in climate variability and flood occurrence for the last 20 years in two rice farming villages by gender, San Antonio, Nueva Ecija, Philippines, 2011

Change	Papaya		χ^2 test	Cama Juan		χ^2 test
	Male (n = 100)	Female (n = 100)		Male (n = 101)	Female (n = 101)	
Climate variability						
Temperature	26	20		21	21	
Rainfall	46	51	1.058	59	54	0.773
Extreme weather events	28	29		20	25	
Flood occurrence						
Frequency of flooding	3	3		30	29	
Intensity of flooding	84	87	1.234	32	50	9.888 **
Duration of flooding	12	10		38	20	
Other observed changes	1			1	2	

** significant difference at 5%

Source of raw data: 2011 Survey

On the other hand, results of the study show that responses concerning flooding occurrence significantly vary across gender in Cama Juan but not in Papaya. A large proportion of men (84 per cent) and women (87 per cent) from Papaya agreed that flooding was more intense in recent years. The differences in responses between men and

women in Cama Juan, however, reveal that more women perceived the risk and threat of the increase in intensity of flooding, while more men observed a longer duration of flooding that could greatly devastate their farming activities.

There's a creek near here, you would hear the trembling, and the current is very strong, and then suddenly our electric wiring was cut, we were so frightened ... My prayers were continuous [*abot-abot*] I said, Oh my God, I hope that our house would not be washed away, our house was shaking because of the strong wind and water [current]. Once the water in the creek, overflow, it would go inside of our house. That's why when there's flood, we cannot go down [at the first floor]. We are stuck in our second floor ... People are running and swimming as much as they can. – Woman in Papaya focus group #1

Before, we can predict that flood occurs from July to August. However, now it is more difficult to know when typhoons will occur. What we did not anticipate is the continuous rainfall for several days which is equivalent to the rainfall for a month. The duration of flooding is longer and this causes much damage on our crops. – Man in Papaya focus group #3

Farmers are now aware that changes in climate are not just caused by the natural changes in the environment but most significantly because of human activities. Male farmers (69 per cent to 70 per cent) and female farmers (57 per cent to 71 per cent) mentioned different human activities as contributing to the changing climate. These activities include deforestation, burning of household and agricultural waste and changes in land use. They also mentioned that infrastructure problems cause more flooding in their villages. Few men and women are aware that a weaker ozone layer and global warming have influenced climate change. When asked about the causes of a weaker ozone layer and global warming, they attribute it to human activities that cause pollution and degradation of the natural environment (Table 9).

Farmers are fully aware of the changes in climate, mainly because their livelihood is dependent on weather and changes in their physical environment. They constantly adapt to changes in climate, but climate change which brings extreme weather conditions can have devastating consequences even for farmers who have experienced flooding in the past. The next section provides more evidence that climate change is now a reality on the ground.

Table 9. Observed reasons for climate change (in per cent) by village, by gender, San Antonio, Nueva Ecija, Philippines, 2011

Reason	Papaya		Cama Juan	
	Male (n = 100)	Female (n = 100)	Male (n = 101)	Female (n = 101)
Weaker ozone layer	5	10	8	11
Global warming	11	4	2	4
Natural climate change	13	6	12	14
Human activities	70	71	69	57
Others	1	3	3	6
No answer/no comment/don't know	7	9	11	11

Note: There are multiple responses.

Source of raw data: 2011 Survey

6.4. Consequences of severe flooding on farming communities

Rice productivity is directly affected by extreme flooding, which has adverse impacts on the income and food security⁹ of farming households. This commonly happens during the wet season when flooding occurs three to five times depending on the typhoons that pass through the villages. Flooding in 2011 caused by typhoons had more devastating effects on farmers of Papaya as they did not just incur crop losses but also had negative income, which means they needed to acquire loans or find other sources of income to make up for their losses from farming. Most of them did not harvest anything and their crops were buried in mud. One male farmer narrated his experienced during that flooding:

I just asked myself why such losses happened to us. It was just so untimely that flood came in October when our crops were in flowering stage, so we really incurred crop loss. The lost is more of a personal thing to me. I already lost the harvest that I was hoping for, it's already gone. – Farm man #22

Although Cama Juan also experienced extreme flooding during the flooding year¹⁰, the farmers had positive income. At this point, it is worth comparing the two villages in terms of effects of flooding. Papaya farmers are faced with flash floods, an unpredictable type of flood. They expect to be able to harvest something if the flash flood is just for one or two

⁹In a general sense, this paper adopts the basic definition of food security as 'availability and affordability of food to all the citizens in a country' (Cabanilla, 2002: 5)

¹⁰Rice production during wet and dry season of 2011

days; most of them hope the flash flood will not come. Thus, they continued to increase the area planted with rice (2.16 hectares) in 2011. However, extreme flooding came during the harvest season that really devastated their crops. On average, a farmer had a yield of only 0.68 t/ha, which is four times lower than their normal yield (2.97 t/ha) (Table 10). On the other hand, farmers in Cama Juan know that they are usually faced with stagnant and deep flooding. When they increased the area planted, they chose elevated areas in their own field or borrowed a piece of elevated land from their relatives during the wet season. Moreover, it was reported that flooding in Papaya was deeper and wider than in Cama Juan, thus flooding in Papaya reached not just the farmlands but also the residential areas (Figure 13 and Figure 14). Thus, unpredictable and more devastating flooding caused greater devastation to farming and livelihoods in Papaya.



Figure 13. Flood during typhoon Pedring, in Papaya, 2011



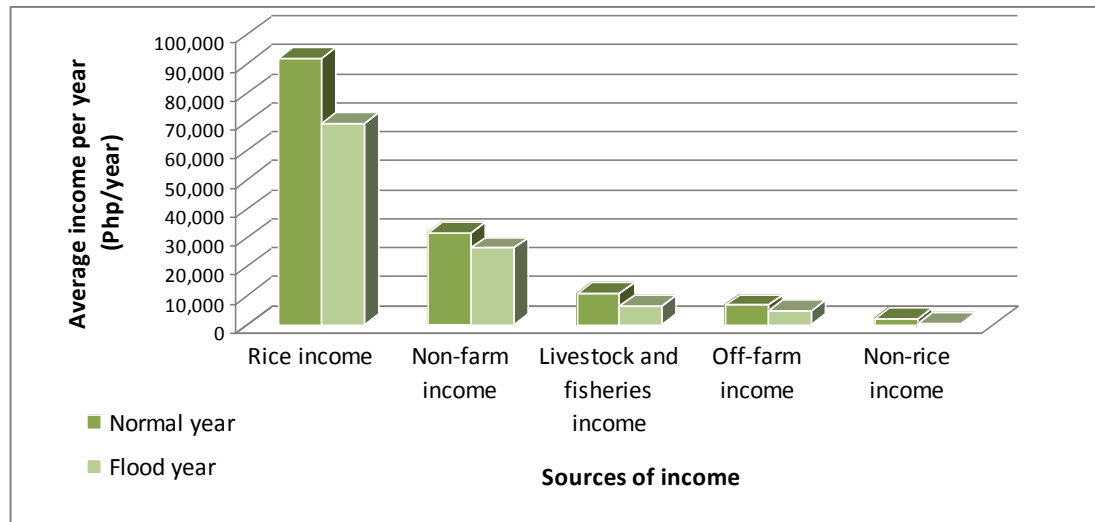
Figure 14. Flood in town proper of San Antonio, Nueva Ecija, Philippines, 2011

As for the dry season, rice production and income did not significantly vary during a normal year¹¹ and a flood year. The reduction in yield and returns during the dry season in a flood year was mainly attributed to a decrease in the area planted with rice. During the dry season, farming expenses are relatively higher than during the wet season because of the additional cost of irrigation. Farmers reported that they have experienced extreme dryness during the dry season in recent years which has increased the need to

¹¹Year that farmer had normal production, which varies across farmer respondents

irrigate their fields. They pump up water from rivers, canals or underground which entails high fuel costs. Moreover, farmers plant hybrid seeds, which are high-yielding but expensive. As a coping strategy, some farmers have opted to decrease the area of land they plant during the dry season in recent years.

In terms of income sources, farming households did not change their livelihood sources between normal and flood years. Rice farming remains the main source of income of households during both normal and flooding years (Figure 15). Although farmers incur many losses during flooding periods, they can have a very high income during the dry season (Table 10). This also explains why most farmers are still hopeful about their farming.



Source of raw data: 2011 Survey

Figure 15. Income sources of the farming households, during normal and flood years, San Antonio Nueva Ecija, Philippines, 2011

Table 10. Average rice production and income, Nueva Ecija, Philippines, 2011

Parameter	Normal year		Flood year		t-test	
	Wet season	Dry season	Wet season	Dry season	Wet season	Dry season
Papaya						
Area (ha)	2.13	2.74	2.16	2.72	0.620	0.832
Production (kg)	6,015	13,340	1,376	13,524	0.000 ***	0.612
Yield (t/ha)	2.97	4.80	0.69	5.15	0.000 ***	0.240
Income (PHP)	21,543	63,101	- 5,021	63,399	0.000 ***	0.935
Cama Juan						
Area (ha)	1.74	2.45	1.85	2.43	0.079 *	0.622
Production (kg)	5,307	13,937	2,492	13,568	0.000 ***	0.472
Yield (t/ha)	2.95	5.77	1.35	5.58	0.000 ***	0.152
Income (PHP)	18,306	81,171	1,637	78,283	0.000 ***	0.508
All						
Area (ha)	1.93	2.59	2.00	2.58	0.110	0.678
Production (kg)	5,659	13,640	1,937	13,546	0.000 ***	0.766
Yield (t/ha)	2.96	5.28	1.02	5.36	0.000 ***	0.641
Income (PHP)	19,916	72,181	- 1,676	70,878	0.000 ***	0.647

Note: *significant at 10%, **significant at 5%, ***significant at 10%

normal year: normal production year, which varies across farmers; flood year: 2011

Source of raw data: 2011 Survey

Farmers still anticipate that they can recover from their losses once they have an abundant harvest in the next dry season. This was pointed out by a male farmer during an in-depth interview:

If you incurred losses and you stop farming you will not be able to recover from your losses. Just like now our son sows some seedlings again, [after the flood subsided]. Those who quit never win. If you quit there's nothing left for you. – Farm man #3

Since the studied villages are rice farming communities, other economic activities such as off-farm and non-farm labour and businesses are related to farming, and thus income from these sources was also expected to decrease during the flooding period. Moreover, because flooding is a disaster in the community, all other sources of livelihood such as livestock, fishing and other non-rice production were also devastated by flooding (Figure 15). Meanwhile, when impacts on other livelihoods are compared between Papaya and

Cama Juan, the decline in income from different sources was higher among Papaya farming households than among Cama Juan households. Since flooding in Papaya was more destructive and intense it did not only devastate their rice crops but also their other sources of livelihood. Furthermore, fewer farmers in Papaya than Cama Juan are diversifying their income sources. As shown in income generated during normal and flood years, Cama Juan farmers had more income from non-rice crops, livestock and fisheries, off-farm and non-farm sources (Appendix Table 1). This is again related to the nature of and perceptions of flooding. Since Papaya experiences flash floods and floods of short duration, they tend to take more risks with rice farming. Many of the Papaya farmers still concentrate on rice farming instead of engaging in other sources of income, hoping that their farms will not be devastated by flooding. On the other hand, since Cama Juan farmers expect that flooding in their area will stay for long periods of time, they are more prepared to look for sources of livelihood other than planting rice. Some leave their farms idle during the wet season and say that this is the time of the *gawat* (scarcity) period; consequently, both men and women are engaged in different off-farm and non-farm sources. By seeking other sources of income, Cama Juan farmers can augment the loss of income from rice farming and at the same time are less vulnerable to the impacts of flooding.

Since most of the farming households studied are engaged in subsistence farming, crop losses mean food insecurity and, for some, hunger. As lamented by one female farmer:

All the families are very sad because we don't have anything to eat. You are fortunate if you have stock food in your house but if you don't have, you are pitiful. You just have to survive by drinking warm water – Farm woman #7

Other food sources and health are also affected by flooding. Both men and women reported that there was a decrease in basic food such as meat, fish and rice and less drinking water for consumption during severe flooding. Most of the respondents mentioned that there was less rice, the staple food, during those difficult times. Also, more women reported that human health worsens during flooding (Table 11), which affects young children and women. Extreme weather events often create conditions conducive to outbreaks of infectious diseases, athlete's foot and common sickness such as colds, cough

and fever brought about by changes in weather. These changes are observed in both villages.

Table 11. Percentage reporting decrease in food sources and health status due to severe flood by village, by gender, San Antonio, Nueva Ecija, Philippines, 2011

Impacts	Papaya		Cama Juan	
	Male (n = 100)	Female (n = 100)	Male (n = 101)	Female (n = 101)
Decline in meat consumption	30	30	31	37
Decline in fish production	15	15	38	24
Decline in availability of drinking water	29	34	12	15
Decline in availability of rice for consumption	61	54	44	60
Increase in susceptibility to illness/diseases	73	81	61	67

Source of raw data: 2011 Survey

In general, perception of the impacts of severe flooding does not vary across gender. Table 12, however, shows that 47 to 53 per cent of Cama Juan farmers reported that flooding resulted in low yields of their rice crops, while Papaya farmers reported that flooding caused crop losses (32 to 35 per cent) rather than low yields (29 to 33 per cent), making flooding more destructive for Papaya farmers. Increased indebtedness among households was reported by both Papaya and Cama Juan farmers.

Table 12. Men's and women's perception of the most important impacts of severe flooding by village, by gender, San Antonio, Nueva Ecija, Philippines, 2011

Impact	Papaya		χ^2 -test	Cama Juan		χ^2 -test
	Male (n = 100)	Female (n = 100)		Male (n = 101)	Female (n = 101)	
Low yields	33	29		47	53	
Food insecurity	5	3		4	5	
Increase indebtedness	24	34	2.817 ^{ns}	29	26	1.081 ^{ns}
Crop loss	35	32		16	13	
Others	3	2		4	3	

^{ns} – no significant difference across gender

Source of raw data: 2011 Survey

Increased indebtedness is caused by loss of income due to flooding coupled by increased interest. Because most of the farmers borrow the capital they invest in rice farming, income losses mean that they will not be able to pay the principal amount loaned plus the interest. These loans then continue for the next season until they can pay their debts:

I am praying that it won't flood anymore, if that would happen my loans will be tripled, because my loan is doubled already. I hope it won't happen again, that's what I am praying for to the Lord. – Farm woman #7

The loan will be higher, the interest is continuous. For instance if you were not able to pay your loans (PHP1,000), since our cropping season will be for five months, then it will be PHP1,500 already, if you will not be able to pay then it will be 1,600, 1,700, 1,800 and so forth. – Farm woman #25

Indebtedness is reported to have greater impacts for those who are just tenants or farm workers. Because they do not own the land, it is hard for them to take out another loan if they incur losses due to flooding. Land is an important asset and serves as *collateral*, even in an informal lending system. It assures the lenders that the farmers will be able to pay because they are tilling their own land. Furthermore, in cases where multiple losses are incurred for several farming seasons, informal arrangements are made which entitle the lender to cultivate the land until the farmers are able to pay their debts. Consequently, farmers end up taking loans with higher interest rates which increases the risk of being in debt for long period of time.

If you have your own land, you can easily acquire some loans, if they [money lenders] knew you have your own farm, but if you don't own one, it will be hard for you to acquire some loans. Like us, they knew that we have our own farm, somehow you are confident to take some loans because you have your own farm. They will lend you, that's how it is. – Farm woman #25

Although there was a decrease in food available for consumption among the households, only 3 to 5 per cent of them reported that there was food insecurity during flooding periods (Table 12). This can be explained by the continuous provision of food by their relatives and neighbours. The culture of cooperation and sharing of food and resources during crisis is strong among people in the community. No one needs to go hungry just because of the devastating flood. Moreover, informal lending is practised in the

community, thus farmers can just ask their neighbours and friends to lend rice and other needs to get them through the difficult times. The groups of women shared their experiences during these periods:

We are not like other people who don't mind each other. In our *barangay* we have unity. We are like brothers and sisters. When we are about to eat, the rest [of our neighbours] will eat, even if our food is only dried fish, we share and eat together. We are like this for a week. – Key informant #2

The above discussion demonstrates how climate change can have devastating effects on the livelihood and security of farming households. The physical environment, the nature of the flooding, existing socioeconomic conditions in the community and prevalent norms and traditions influence the extent of the effects of severe flooding. Farmers respond according to their physical environment and available resources. Climate change, however, has brought about greater risk and uncertainty in farming and consequently the adverse impacts are greater than ever before. Given the existing social and economic conditions of these farming communities, it is expected that climate change will have more devastating effects on farming communities in the coming years unless farmers learn how to adapt to their changing environment.

6.5. Summary

In this chapter, I have presented the current situation of farming in the villages of Papaya and Cama Juan in San Antonio, Nueva Ecija, and how climate change has been observed to occur and affect the rice farming communities. I initially presented the social and economic conditions of the rice farming communities, highlighting how the physical environment, institutional arrangements and norms and traditions shaped the farming systems and influenced the lived experience of male and female farmers. Results of the study mainly reveal that the physical conditions and the nature of flooding have direct effects on the livelihood of the farmers. Because the two farming villages are situated in low-lying areas in the municipality, they are more prone to flooding. Moreover, it was reported that the occurrence of flooding became more frequent and unpredictable which has made flooding more destructive than ever before. Analysis across the villages further revealed that Papaya farmers experienced more of the devastating impacts due to the

unexpected intensity of floods and inappropriate responses to flooding events. Papaya farmers are more tied to their rice farming than Cama Juan farmers. The livelihoods of Cama Juan farmers are more flexible and diversified which makes them less vulnerable to extreme flooding. Institutional arrangements such as the nature of land ownership, credit systems and the provision of services and information are also important factors that affect the ability of farmers to effectively farm and adapt to changes in their physical, social and economic environment.

As discussed in this chapter, the government inadequately provides basic rights and services to farmers. Land ownership is still an ongoing struggle for most of the farmers in the Philippines. As seen in the villages studied, less than half of the farming households can be classified as having land of their own; a large proportion of them are tenants and farm workers. This is the result of Spanish colonisers displacing poor farmers from their land during the Spanish period. Landless farmers are exposed to greater risk and uncertainty and have less control over their livelihood. Being a woman is twice as bad. Aside from the fact that land reform is still under way, the traditional transfer of land to male heirs limits the access of women to land. Although both genders in the Philippines are permitted equally to own property, parents still prefer their male children to inherit the farmland mainly because farming remains a male-dominated livelihood. Accordingly, access to land dictates the pathways through which men and women participate in farming. Men are the *farmers* and managers of the farms while women are the *support* and farmers' wives. There has been an increase in the participation of women in rice farming due to poverty, which has enabled them to actively participate in farm decision-making activities. I have noted, however, that women's voices and their control of and access to resources are still limited mainly because men are still the recognised 'farmers' and heads of households.

The insecurity of farmers does not end in matters of land ownership, but is coupled with and/or related to lack of capital and formal credit. The high cost of farming and frequent losses result in inadequate capital for farming. Access to formal credit is not readily available for farmers; it is hindered by several requirements and a long process of credit approval. Also, since most farmers do not have their own land to serve as collateral, they tend to shy away from formal sources of credit and prefer to seek loans from informal

sources such as private lenders, relatives and friends. Informal lending arrangements are very flexible and can meet the immediate needs of the farmers. The interest rates of private lenders, however, are higher than that of formal loans, and when crop losses occur, it leads to increased indebtedness.

The ability of farmers to adapt to climate variability is also related to the information they receive about farming and weather conditions. Farmers have different sources of information but the government's inattention to agricultural extension services and inaccurate weather forecasting has led farmers to make unsound decisions in rice farming. As expressed by farmers, wrong weather forecasting leads to direct losses in farming.

Despite the inadequate resources, rice farming persists and continues to be the main source of livelihood in the farming communities. Drawing from their dense social networks and strong family ties, farmers can cultivate land by relying on the tenurial arrangements available in their communities. They have developed informal lending arrangements which facilitate economic exchange within the farming communities. Moreover, information about rice farming is mainly provided by informal sources they believe in and rely upon. Thus, the social capital that stems from close family ties is critical in the formation of social capital in the farming communities. As observed in the farming villages, social capital is transformed into economic capital which makes farming feasible in the midst of changes in climate. Moreover, a family's support serves as a safety net as resources are pooled and made available for the family members and relatives. Results of the study also show, however, that strong family ties can have negative consequences. Pressures to adhere to this tradition are felt by family members as most of them are required to sacrifice their own enjoyment, comfort and resources. Nonetheless, burdens brought about by this norm are not discussed and voiced by the interviewed farmers, mainly because strong family ties are a norm that should be respected and abided by. I argue, therefore, that norms and traditions are openly adhered to rather than challenged and questioned. The same can be said of the gender roles discussed in this chapter. Men and women, even at a young age, know their place and their role in farming, and this often dictates how they participate, negotiate and behave in rice farming households. Although migration and increased education lead the way for women to

engage in income-generating activities yet they are still perceived as the main carer and supporter of their husbands inside the house. In the same way, a man as the main provider for the household is expected to provide and lead the household inasmuch as they can. Thus, when they lose their main livelihood they feel shame and under pressure. Both men and women are somehow *trapped* within their gender roles; the negative consequences are still evident and they are worse for women.

In this chapter I have also shown how farmers have observed and experienced climate change in recent years. As reported by farmers, flooding has changed from regular to extreme and unpredictable flooding. This study supports the claim of IPCC (2012) that climate change is causing the extreme weather events experienced by farmers. This became more evident in 2011 when farmers unexpectedly experienced the most devastating impacts of severe flooding. Major impacts reported were crop loss, low rice yield, increased indebtedness and food insecurity.

This chapter presents just the general impacts of climate change, particularly the economic impacts. Climate change, however, also has social impacts which vary across gender. Thus, the next chapter will tackle how men and women become vulnerable to climate change, how they adapt and how climate change impacts on them.

CHAPTER SEVEN: GENDERED VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE

7.1. Introduction

Climate change poses great risk and uncertainty. Scientific communities present climate change as a *crisis* that needs urgent attention and response. Research across the globe provides evidence showing that changing climate is having profound and disturbing impacts on ecological, physical and social systems. While individual and social-ecological systems are constantly adapting to different external disturbances, climate change brings new challenges as its impacts are interlinked with our everyday life. In other words, climate change is a global concern but responses to the expected impacts are local. As rational and social beings, people are expected to respond to this new crisis according to the best of their knowledge and capacity. But there are invisible *constraints* on an individual's capacity to adapt to a changing environment. As highlighted in the previous chapter, there are already existing institutional arrangements, norms and traditions that strongly influence how people within a community cope with and adapt to climate change. Thus, the impacts of climate change will vary across individuals and social groups. Some are more affected than others. For instance, based on my literature review, overwhelming evidence across the globe shows that climate change has differential impacts on women and men, with women being worse affected.

This chapter provides further evidence of the gendered impacts of climate change. In order to understand the gender aspects of climate change, I first address in this chapter how women and men are vulnerable to climate change and how they adapt to it. I also discuss the gendered impacts of climate change. Finally, a summary of the chapter is presented.

7.2. Gendered vulnerability to climate change

Vulnerability, as I defined in Chapter 2, is attributed to the physical and social conditions of a system or group of people. These conditions determine the degree of exposure to climate change, the degree of sensitivity to climate change and the degree of adaptive capacity to respond to it. For instance, physical location influences the degree of exposure of women and men to extreme flooding. Because the farming communities are located in

flood-prone areas, people experience more frequent and intense flooding. Moreover, sensitivity to flooding varies across households and groups (Zoleta-Nantes, 2004; 2007). For example, rich farmers have elevated and concrete houses to protect their families from extreme flooding and strong typhoons, while poor farmers do not have any choice but to tighten their *nipa* houses or evacuate to the safer elevated houses of their neighbours and relatives. Adaptive capacity can be attributed to an individual's relations, resources and roles within the household and community. Without adequate capacity to adapt, an individual is expected to be more vulnerable to climate change. Moreover, capacities vary within societies because individuals occupy different social spaces. Individuals are shaped by their various socioeconomic conditions such as class, age, racial/ethnic and cultural group, citizenship and gender; these undeniably affect their vulnerability to climate change.

There are many causes of vulnerability to climate change, but I particularly dedicate this section to the gender aspects of vulnerability to extreme weather events mainly because gender is a fundamental division in every society and its effects cut across individuals and societies. Gender also presents unique opportunities for us to understand how existing inequalities and differences can shape social vulnerabilities to climate change. Based on the findings of my study, mainly presented in this chapter, these inequalities and differences are evident in terms of existing power relations, access to and control over resources, and ascribed roles.

7.2.1. Power relations

Power exists in relation to others, so exercising power means that those who have direct and indirect relationships will be in some instances and to some degree affected by the actions of the one exercising the power. The effects of power relations are widely observed among men and women where social power accrues more to men than to women mainly due to gender stratification which distributes social rewards and power in ways that mostly advantage boys and men (Enarson, 2010). Moreover, institutional arrangements, norms and traditions entitle men to exercise power within household and livelihood activities. Because of men's position as head of the household and main provider for the family, they are entitled to make decisions not just about their livelihoods

but also about the affairs of all family members. Although Filipino families are said to have an egalitarian arrangement which allows all family members to voice their needs and concerns, men as the head of the family have the final say about the critical decisions that affect the whole household. This arrangement is recognised and respected by all members of the household. Discussion with women showed acceptance of this kind of power relation existing within the household and consequently conflict, particularly between husbands and wives, seems absent in the public sphere.

My husband has greater control in deciding on family concerns because he is the one who looks for our living [*siya ang naghahanap ng ikabubuhay namin*] – Woman in Papaya focus group #2

There's no conflict. Decisions must be mutual from both sides on every matter, especially when it is needed. We cannot progress if one of us has different sides about such a matter. That's the time that good communication plays a role so that everything goes well. – Woman in Papaya focus group #2

The kind of power being exercised in farming households in the studied communities is a classic example of Lukes' (2005) three-dimensional view of power which prevents grievances especially from the ones who are subjugated by power. Women's perceptions and preferences secure the acceptance of the status quo since no alternative choices seem to exist. Because most of the women in the farming communities do not have adequate sources of livelihood, they have less power and authority to negotiate with their husbands. Moreover, men also emphasised that they are in better position to decide about farming and household matters mainly because they have the skills and experience, particularly in farming. They understand how farming can support their family and what the family needs are, thus they tend to dominate both in farming and inside the households. This is more evident among farming households in Papaya.

We have more experience in the field and have sufficient knowledge on farm operations. On harvesting season, we make sure to keep a portion of our harvest, and then sell the rest. The stored harvest will be managed by the women for household consumption. – Man in Papaya focus group #3

The above discussion shows that subordination of women by men involves ruling by

consent. This constitutes the concept of hegemony of Gramsci (1971) and symbolic violence of Bourdieu (1984). Because of women's submission and intellectual subordination, women verbally affirm men's decisions and believe this state of affairs to be normal. This kind of power relation is seen to persist even when there are changes in farming conditions. This is demonstrated in interviews with a wife who became a farm manager because her husband migrated to look for non-farm work and another interview with a husband who was left behind when his wife went to work abroad to support their family. The authority and respect given to men and women does not necessarily change with physical absence in the farming community.

When it comes to household matters, I decide it myself, but when it comes to farming, I usually call him and consult it with him. – Farm woman #18

In the above situation, the wife still consults her husband about the operation of their farm. She cannot decide for herself, knowing her limited skills and limited experience in farming. Also, as head of the household, the husband is entitled to give his consent to major decisions about farming and household matters. On the other hand, when women are not around, men can decide by themselves about the affairs of their household. Communicating with the wife is mainly to inform her rather than to ask for her consent.

I decide on matters in a case to case basis. I still have the final decision in our household. I am just informing my wife about our situation. – Farm man #20

Women are aware that they can decide for themselves particularly when men are not around, but their marriage is another reason for their limited independence and their reliance on men. Submission of women is an unspoken arrangement in marriage. Wives are expected to respect, abide by and support their husband's decisions. With their submission to their husbands, they somewhat loss their independence to decide for themselves. Their freedom and power becomes limited. A woman reflected on her situation when she was single:

When I was still single, I'm earning my own money, I have my own money I can be independent. – Farm woman #24

The power and position of women remains the same during crisis. For instance, even though women are fully aware of the devastating impacts of climate change and have the capacity and resources to affect change, they do not decide for themselves and their households on their own. Consequently, they lose the opportunity to lessen the impacts of climate change and they tend to be more vulnerable to climate change. This is clearly illustrated by a farm woman who really wanted to take action for herself and the household:

If only I would think of myself, I really want to have extra income. If only I will decide for myself, I really like it [to work] since I am still young and strong. But I have children to look after. If I can find a job where I can work as a sewer, I know how to sew, but my husband doesn't like it because my mother is too old already and no one will take care of my kids. – Farm woman #18

Moreover, the ascribed roles clearly hinder women from acting upon their situation. Sometimes, they are so overwhelmed with their gender roles that they tend to act based on what is expected of them rather than what they think they should do in a particular situation. I argue that women do not have false consciousness nor have they lost their knowledge of where their real interest lies, but they are just limited by their position and in a way trapped with the concept of what being a *woman* is.

The existing social system generates unequal exposure to climate change by making some people more prone to risk and less able to resist it. It is largely due to the power relations operating in a society (Bankoff 2003:96). In particular, one's gender can dictate one's position within power relationships. Patriarchal domination is still evident across livelihoods and societies in the Philippines. Even during severe flooding, in the farming communities studied, men exercise control over households and this clearly limits women's ability to respond to extreme weather events. It is important to note, however, that what I have presented here simply the effects of power relations on gendered vulnerability to climate change. In the succeeding chapter, I present cases where women take the *abnormal times* as an avenue to negotiate and challenge the existing power structures and gender roles.

7.2.2. Access to and control over resources

Access to and control over resources is critical to a person's ability to anticipate, prepare for, cope with, respond to and recover from extreme weather events, but these resources are not equally available to women and men in any society (Enarson, 2010). Consequently, women are expected to be more vulnerable to changing climate compared with men (Terry 2009; Demetriades and Esplen, 2008; Alston 2007; 2010; Lambrou and Nelson, 2010). Obviously, women being more vulnerable to changing climate stems from existing gender inequalities manifested in the ownership and control of important assets such as land, education and credit. In the case of the farming communities in this study, inequalities were evidently caused by institutional arrangements and gender norms and traditions. For instance, land ownership is limited for both male and female farmers because of unfair land distribution during the Spanish period (1521–1898). The problem of land distribution was then exacerbated by the inefficient land reform program of the government which prevented many peasants from owning large pieces of land.

Moreover, traditional practice in farm inheritance makes it less possible for women to inherit land, whereas men, because of their status as the provider of the household and *farmer* are preferred by parents to inherit the farm. Because of this patriarchal system in farming communities, formal institutions including the government recognise men as the legitimate farmers who are entitled to receive information and support and thereby exclude women from access to important farm inputs such as seeds, fertilisers, training and seminars. Formal credit and extension services are more available to men than to women. On the other hand, women are said to be compensated by having access to higher education, but because of poverty most male and female farmers end up just finishing elementary or high school. Almost every village has its own elementary school facilities while high schools and universities/colleges are located in cities or urban areas. Thus, sending children to school for further education is a big investment for the household.

I attended high school somehow but because of poverty I was not able to finish and I have so many siblings. – Farm man #17

Table 13 shows results concerning the status of men's and women's access to and control

over different resources in the two farming villages. Because education is a big investment for the farming households, most farmers only attain primary schooling, while women in Cama Juan on average reached at least first year in high school. Both men and women are affected by low education. Men lack technical skills aside from farming and thus have low confidence about looking for work outside farming when extreme flooding occurs. They just cultivate the flooded farm instead of looking for an alternative job:

I did not finish my study and if I look for work, I would just get a low position with low income, so I will just continue on farming. – Farm man #19

In the same way, women feel the effect of low education. They have limited income opportunities to help the family during periods of scarcity. Furthermore, men will not allow their wives to work outside the village because of women’s responsibilities inside the house and child care:

She did not have high education, most of the people here lack education. If you don’t have enough education you cannot find a [decent] job. She [wife] will just end up working as a housemaid or doing some laundry for other people, so never mind. With just taking care of our children she doesn’t have enough time. – Farm man #10

Table 13. Access to and control over resources of men and women in two rice farming villages in Nueva Ecija, Philippines during flooding period, 2011

Indicators	Papaya		Cama Juan	
	Male (n = 100)	Female (n = 100)	Male (n = 101)	Female (n = 101)
Average years in school	7	7	7	8
Average years in farming	24	10	23	11
Land ownership (%)	15	2	22	2
Who decides on:				
What varieties to grow (%)	73	2	80	1
Livestock management (%)	42	23	66	54
Who has rural employment				
Off-farm labor (%)	45	22	53	28
Non-farm labor (%)	11	6	12	16
Who has access to extension services (%)	24	17	31	31
Who acquired loans (%)	45	34	38	46
Who repaid loans (%)	51	19	48	16
Who received support (%)	86	88	88	95

Source of raw data: 2011 Survey

As expected men have more experience in farming compared with women as farm management and labour is one of the ascribed roles of men. Because men were trained at an early age, they acquired at least 23 years of experience of farming, while women are only exposed to farming when they are married to farmers thus their farming experience is less than half of men's experience (10 years). Aside from the fact that men customarily inherit the land, their long exposure to farming further legitimates them as the heir of the land. Results of the study shows that men inherited more land compared to women. Only 2 per cent of women cultivate their own land compared with 15 to 22 per cent of men who manage and own the land (Table 13). Women really feel the effect of having a small piece of land to cultivate

We could also grow other crops but the problem is that we don't have enough land and in my case, I am already old. – Woman in Papaya focus group #2.

It would be better if we have bigger land to cultivate. If your land is small you will have small earnings. – Farm woman #7

Control and power inherited from owning the land and farming are enjoyed by men. For instance, decisions on what varieties to grow in the rice field are made by 73 to 80 per cent of men, while livestock management decisions were made by 42 to 66 per cent of men. Moreover, as the head of the household and main provider of the family, men have more opportunity to access other income sources such as off-farm work (45 to 55 per cent), while in terms of non-farm employment, Cama Juan female farmers had the highest percentage (16 per cent). This is higher than Papaya male farmers (11 per cent) and Cama Juan male farmers (12 per cent). This is mainly due to the increased access to credit provided by the microfinance system set up by the ASKI Foundation. This foundation provides credit to Cama Juan farmers at very low interest. The increased access to credit is reflected in 46 per cent of the Cama Juan female farmers having access to credit (Table 13). Because female farmers do not have stable income sources, however, some female farmers still rely on their husbands to repay their loans.

The ASKI Foundation organised female Cama Juan farmers into a woman's farmer organisation which they called *Sandalang Pangmasa ng Kababaihan Tungo sa Kaunlaran*, or SAMAKA. Since female farmers became organised in Cama Juan village, some of them

have been able to attend training and seminars about rice farming. They were eventually recognised by government agencies as association members, and thus were able to access agricultural extension services. Thirty-one per cent of Cama Juan female farmers reported that they have accessed extension services, the same percentage as their male counterparts and an even higher percentage than among Papaya farmers.

Receiving external support is another factor. High percentages of both men and women receive support when they experience extreme flooding. This support is received mostly in terms of relief goods from government agencies and NGOs, while monetary support is provided by close family members and relatives. As indicated in Table 13, more women than men in both villages received support during periods of distress. Ninety-five per cent of Cama Juan female farmers and 88 per cent of Papaya female farmers reported that they had received some support; these percentages are higher than their male counterparts. This does not necessarily mean, however, that women have more access to support from external sources than men. It was reported that more women went out of their way to receive support because men were too shy to ask for help from others and some men asked their wives to receive support on their behalf.

It is also important to note the differences in access to and control over resources of women across the two villages. Based on the various indicators provided in Table 13, women from Cama Juan have relatively more access to and control over resources than women from Papaya. Cama Juan female farmers are more educated, have more farming experience, have control of livestock management and have more rural employment. They also have access to credit, extension services and external support during extreme flooding events. Two important factors paved the way for their increased access to and control over such resources and thus gave them more ability to negotiate with their husbands in terms of managing these resources and making decisions about the activities of the household. As mentioned, the Cama Juan women's association opened many opportunities for women to access important capital such as credit and training. Although the women were not highly educated, their membership of the organisation increased

their capability to search for off-farm and non-farm employment¹². Their membership also increased their social capital. This is consistent with several studies (Glaeser et al., 2002; Tatlonghari and Sumalde, 2008) which indicate that membership in organisations increases the interaction and networks of an individual and so increases their social capital. Their social capital, as argued in the previous chapter, is used to access important resources from formal and informal resources. This must also be the reason why most Cama Juan female farmers receive external support during periods of distress unlike Papaya female farmers, who are less organised. A male farmer explained how his wife is disconnected from other people mainly because she is not from the village and not part of any group, which limits the support and help she has access to in their farming activities:

She just cooked for me [food to be taken to the farm]. Firstly, my wife is not from this village, she's from the other village. It's hard for her, she doesn't know much about our place – Farm man #22

Another reason why Cama Juan women have more access to and control over resources compared with Papaya female farmers is because of the difficulties Cama Juan women experience in rice farming particularly during flooding periods. Since they experience hardship in the long periods of flooding, both men and women are pressured to look for alternative income sources at those times. Consequently, more Cama Juan women are engaged in productive activities than Papaya women. The contribution of women to the income of Cama Juan farming households is reflected in their higher income compared with Papaya farming households during flooding periods (see Appendix Table 1).

Although there are a lot of factors that could affect the income of households during flooding periods, still it cannot be discounted that women's involvement in different kinds of livelihoods makes the Cama Juan farming households less susceptible to the effects of flooding than the Papaya farming households. This also reveals that if women were to be given access to and control over resources equal to men, women and even the whole farming household would be less vulnerable to changing climate.

Aside from other resources, access to and control over financial capital is a critical

¹² Non-farm employment/income refers to any source of employment/income not generated through farm/agricultural activities; off-farm income refers to any source of agricultural income that is earned away from the family farm, as in the case of agricultural wage labour. Definition adapted from J.P. Leones et al., 1998.

resource that causes differential vulnerability to climate change between men and women. Financial capital is a big problem in farming communities. Both men and women are affected by lack of capital but they are affected differently. Men, because they are perceived to be the provider of the family, are under more pressure to seek an alternative income for the family, but because they have limited capital, they cannot easily engage in alternative livelihoods or increase their rice production. Moreover, because most of their capital is acquired through loans, few of them dare to invest in more than their usual rice production. Effects of lack of capital were expressed during focus group discussions with male and female farmers:

Even if we want to venture in rearing of animals, specifically pigs, we cannot afford the capital needed to start the production. It requires big amount of money. – Man in Papaya focus group #3

There's no change in the time of crop planting. Farmers have two cropping season. It's difficult for them to take risk. They are waiting for others to take risk and start third cropping. However, only one or two farmer has the strength to do third cropping. It is really difficult for us to venture in third cropping during the month of August because our capital was acquired through loan. I think, if the capital is not from loan, then we might have enough courage to take risk in growing third crop. – Woman in Cama Juan focus group #4

Women perceived the lack of capital differently to men. Since most of the women are just involved in acquiring loans and managing the financial needs of the farming and household expenses, they feel stressed when they cannot repay the loans because of lost production during flooding periods. A woman reflected on their situation:

It's hard for us now, because we cannot get out of debts because we don't have capital. Say, you harvested today, your harvests will just be used to pay for your debts for your old debts so you are still left with your new unpaid debts. I don't know when we can get out of this cycle of debt because if you have old debts it's just so hard to get out from it. – Farm woman #25

Both men and women are aware of their need to have additional financial capital and they have experienced what it means to have inadequate resources, especially money, to

prepare for anticipated flooding. The lack of financial capital does not only limit them from engaging in potential livelihoods but also restrains them from providing even for the basic necessities of their households. Thus, most of the farmers feel trapped in their situation and they have no choice but to face the brunt of the changing climate, which means risking the security and safety of their households.

We also don't have fuel tank as an alternative [for wood]. We don't have a tank, [liquefied petroleum gas] LPG, as an alternative because, to tell you truth, we cannot afford to buy even one tank. That's how poor we are. – Man in Papaya focus group #3)

Researcher: Did you build your house in such a way it won't be submerged in flood water?

Respondent 2: We don't have money.

– Man in Cama Juan focus group #5

It is expensive, one boat cost, PHP10, 000 (AUD228.67). You might think it is cheap because it is made of wood but it's not. Since we only use that during flooding, so better not to buy. It's like it's not our priority. It will cut down our budget, our money will just goes to that boat. – Woman in Papaya focus group #1

We don't do anything about it [flooding] and even if we thought of something, since we don't have capital, we cannot change our situation. – Farm man #10

The lack of access of farmers to financial capital is brought about by different factors. Poverty is one of the main causes of lack of financial capital complicated by frequent losses in rice production due to flooding. As emphasised by farmers, however, if they were to be given financial support and an efficient credit system, they could be more prepared for unpredictable flooding. Moreover, women who have less income opportunities are very much dependent on their husbands. Consequently, they have less adaptive capacity to prepare for climate change.

7.2.3. Ascribed gender roles

The ascribed roles of men and women in the rice farming communities are mainly based on the gender norms, farming systems and socioeconomic status of the farming households. Farming is the main task of men, but because of poverty, coupled with

increasing losses from flooding, women are pushed to increasingly participate in different farming activities. The additional role of providing income for the household is secondary, however, because the essential role of mother and caretaker remains the main task of women. This leaves their lives increasingly full of anxieties, pressures and work burdens (Angeles and Hill, 2009). Women in rice farming communities feel the burdens of the different roles they need to take as food preparer, mother, wife and a farmer:

In terms of food [expenses and preparation], I take care of it, and sometimes it's my daughter-in-law. Every time that we have something to cook, I will do all the preparation, if there's nothing to cook, I will go out to look for something to cook. – Farm woman #25

Being a BHW [*barangay* health worker] does not require an eight hours of service, what I do is before I go to the *barangay* [village] hall I already wake up as early as 4 o'clock then prepares and cooks for my children and husband. – Key informant #4

It is too painful, I was in the middle of the field, and the field is still so hard, how can we able to plow it? I wanted to cry. You would see those fields where the water pipe passed through were already wet, but for the field of the ones who exerted efforts to irrigate their own fields like me, were still so dry. – Farm woman #18

Another traditional task of women in the Philippines is being the cash custodian of the household. It is often observed that men hand over their wages to their wives. The amount of money held by women, however, may be insufficient to cover all the family's expenses, leaving them struggling with money shortages and little opportunity to make economic planning decisions (Eder, 2006). In the case of the two farming communities, insufficient money for household and farming expenses pushes women and men to acquire loans and look for alternative sources of income. These roles, however, are still based on their gender identity as men and women. For instance, men as the provider for the family are shy to take loans or ask for help from other people. Consequently, most men ask their wives to take loans on their behalf. Repayments of loans are usually taken care of by men. Even if men and women are pressured whenever they have loans to repay it seems as if the burden is shouldered more by men. Not being able to repay brings shame to their masculine identity:

In our case, my wife will look for a lender and I will be the one to look for income generating activity to repay the loan. – Man in Cama Juan focus group #5

We don't really mind about the weather/climate. Our priority is to survive and have something to eat. So even the machine/engine is already submerged in flood water, we will still work so to have something to eat, plus the fact that, we have obligation to pay our loan on a weekly basis. We really can't just stop and do nothing. – Man in Cama Juan focus group #5

Men are vulnerable due to their gender role in different ways. For instance, in the context of agricultural decline, men's self-esteem being tied up with their livelihoods and with their ability to maintain a family sets up men to poverty and (Angeles and Hill, 2009). Although men in the rural Philippines have more leeway than women to seek fulfillment in their economic lives, they find it hard to look for other jobs, aside from the main occupation as farmers, simply because it does not suit them (Eder, 2006). Moreover, Bacalla (2010) reports that men take a bit to recover because they are fixated on what they used to do and thus it takes them longer to shift to an alternative livelihood. This perception among men is reflected in my findings. Men's attachment to rice farming led them to cultivate their land even when rice farming did not seem to be a profitable livelihood, especially during flooding periods. Most male farmers still see rice farming as a good source of livelihood and believe that someday they can recover from their losses:

Even if we want to work, no one will hire me ... We are greatly dependent on rice production. – Man in Papaya focus group #3

If you incurred losses and you stop farming you will not be able to recover from your losses. Just like now, our son resows [because of flooding]. Just like what Manuel Uy [popular businessman] say, those who quit don't win [*ang umaayaw ay di nagwawagi*]. If you quit, there's nothing left for you. – Farm man #3

Farming is good. I will not leave this [profession]. I will stay in the farm. – Farm man #4

Their attachment to the land and their profession as a farmer can place emotional stress and burdens on men. This is more evident when farmers incur losses in their rice production:

The loss is more of a personal thing to me, since I don't spend much for my children anymore so I don't have much [financial] difficulty but I already lost the harvest that I was hoping for, it's already gone. – Farm man #22

Moreover, whenever men take alternative work such as fishing to have additional income, they usually ask their wives to support them in their endeavour. Women are expected to sell the fish and other seafood. Since selling of products is seen as a woman's *traditional* task, both women and men easily take on their gender roles without any conflict. Moreover, men emphasised that roles reversal brings shame to their identity as a man.

My husband is responsible in catching fishes while I am responsible in selling the caught fishes. In our place, female is responsible in selling whatever products. – Woman in Cama Juan focus group #4

Our female counterpart does the selling. Males are shy to do it. Just imagine a male carrying a *bilao* [circular basket] on the street. We will just plant and harvest but they will do the selling part. If the male do the selling, it just means that the women dominate the male counterpart, you are *Andres* [under the dress of a woman]. – Man in Cama Juan focus group #5

Although there are already changes in farming and socioeconomic conditions in the farming communities, it is evident the traditional gender roles persist. The gender regime in the farming communities is a patriarchal structure where men's domination and leadership is recognised. This gender structure influences the gender order inside the households where men lead and decide on what should be the roles of women; this is seen in the farming communities in this study. Moreover, due to adherence to gender identities, women and men performed according to their gender. Because their gender roles are fixed to their gender identities, men and women seem not to see the pressure to adhere to their gender roles.

Gender effects have an underlying influence on men's and women's economic wants and needs. Men and women perceived that their economic status constrains them from performing their major gender roles. Thus, they see that in order for a man to be called a good provider, he should have an alternative source of income, while a woman, in order to better perform her obligations as housewife, mother and financial custodian, also needs

to have extra or additional sources of income. Table 14 shows the responses of men and women in separate PRA activities conducted in the two farming villages.

Table 14. Constraints and opportunities in performing gender roles, San Antonio Nueva Ecija, Philippines, 2011

Constraints and Opportunities in Performing Roles	Papaya		Cama Juan	
	Men	Women	Men	Women
Major roles	To be a good provider	To do budgeting	To be a good provider	To perform obligations as housewife and a mother
Constraints	Lack of financial sources	Lack of income	Lack of financial sources	Financial stability
Opportunities	To have alternative source of income (e.g. swine or poultry)	Extra/additional livelihood income for housewives	Alternative/extra income	Alternative livelihood program

Source of raw data: PRA activities conducted, 2011

Even if men and women recognise that they have different major roles, it is interesting to observe that they see financial instability or lack of income as a constraint in fulfilling their roles. Both want to have alternative income or extra income to provide for their family's needs. Instead of challenging their traditional roles due to their socioeconomic conditions, they perceive inadequate economic resources as a constraint that needs to be addressed in order to better perform their roles. Interestingly, climate related factors such as flooding does not seem to be a major constraint in performing gender roles, but such factors cannot be discounted as lack of financial resources is one of the major effects of changing climate in farming households.

7.2.4. Constraints on adaptive capacity

Vulnerability to climate change is caused by different factors. Previously, I have described how power relations, resources and ascribed roles can lead to a differential vulnerability to climate change. In this sub-section, I further identify which of these factors limit men's and women's capacity to adapt to extreme flooding by asking them about this in a survey. Although the results cannot indicate to what extent these factors constrain men and women from adapting to climate change conditions, it is noteworthy to see which of them have differential effects on their ability to adapt. Also, these factors are interrelated with each other which makes it more difficult to assert which of them have directly contributed to men's and women's adaptive capacity. Since I was able to conduct in-depth interviews with male and female farmers, however, their stories have provided some insights into how the different factors identified have affected their lives and experiences differently. Finally, the Wilcoxon signed-rank test was used to determine whether there were significant differences in the responses of men and women for each factor identified.

Table 15 shows that men and women have different constraints on responding to severe flooding. For women for instance, their responsibilities inside the house such as taking care of the children, elderly and sick (2.77–2.97) and household chores (3.10–3.39) are considered to have a significant influence on their inability to effectively respond to severe flooding compared to their male counterparts (1.94–2.09 and 1.89–2.84 respectively).

On the other hand, men complained about having too much to do on the farm (3.62–3.77) which hinders them from preparing for flooding. Moreover, Papaya male farmers felt more pressured to perform gender roles (3.41) than their female counterparts (2.93). Due to frequent flooding, men felt the burden of providing more for household food. The losses in rice production also explain why low income (4.14) for them is another constraint on their capacity to adapt. This clearly shows that traditional gender roles have a significant effect on how men and women may respond to extreme weather events such as flooding.

More Cama Juan male farmers than their female counterparts complained about their access to credit (3.45 versus 3.04). Fewer Cama Juan male farmers have formal access to

credit and most of them rely on their wives' formal and informal sources of credit. This is also related to less institutional support (2.94 versus 2.54) received by men in their village. Limited institutional services (e.g. credit and training) affect more men than women as reflected in their differential responses. Men felt that this is a real constraint as they feel they should be receiving more institutional support because they are the farmers.

Table 15. Constraints on adaptive capacity of men and women to respond to extreme flooding, Nueva Ecija, Philippines, 2011

Constraints	Papaya (<i>n</i> = 90)		Wilcoxon signed-rank test (<i>p</i> -value)	Cama Juan (<i>n</i> = 89)		Wilcoxon signed-rank test (<i>p</i> -value)
	Male	Female		Male	Female	
Stay at home to care for children, elderly and sick	2.09	2.77	0.002 ***	1.94	2.97	0.000 ***
Too many household chores	2.84	3.39	0.021 **	1.89	3.10	0.000 ***
Too much to do on the farm	3.77	2.08	0.000 ***	3.62	2.27	0.000 ***
Pressure to perform gender roles (father/mother)	3.41	2.93	0.024 **	2.92	2.97	0.832
Low income	4.14	3.84	0.076 *	3.99	3.93	0.790
Less capital	4.09	4.00	0.598	4.11	3.93	0.333
Less access to credit	3.29	3.23	0.792	3.45	3.04	0.048 **
Less access to inputs	2.76	2.57	0.308	2.56	2.49	0.730
Less support from others (relatives, neighbours)	2.49	2.40	0.560	2.28	2.27	0.942
Less institutional support (from govt /or assoc.)	2.94	2.69	0.193	2.94	2.54	0.085 *
Less access to education and information	3.47	2.96	0.007 ***	3.11	2.71	0.058 *
Less access to appropriate technology	2.89	2.56	0.108	2.75	2.44	0.123
Less power over family finances and assets	1.69	2.18	0.013 **	1.80	1.67	0.345
Less power to decide on household strategies	1.77	1.93	0.381	1.75	1.75	1.000

*Wilcoxon signed-rank test shows differences in scores/responses are significant : *** significant at 1%, **significant at 5%, *significant at 10%, (see Chapter 5, for detailed discussion of Wilcoxon signed-rank test)*

Note: low score means less affected while high score means highly affected. See Appendix Table - Appendix Table 5 for detailed scoring

Source of raw data: 2011 Survey

Furthermore, both Papaya's and Cama Juan's male farmers are more constrained than women when it comes to access to education and information and appropriate technology that can be used in responding properly to severe flooding. Results showed that Papaya's male farmers are most affected by this constraint (3.47). Access to information concerns more male farmers than women since they are the ones who are responsible for rice farming. They wanted to know how to improve their rice farming and to learn about new farming techniques to better adapt to climate change. Also, low education has greater impacts on men than women because men are perceived to be the providers and the ones

who decide the affairs of the household. Low education means they cannot easily understand the high technology relevant to rice farming. Also, inadequate education constrains men to look for alternative jobs whenever rice production fails. This does not mean, however, that women do not need to improve their access to and control of information, but since they are more responsible for their household's safety and food security, they perceive that they are less affected if they have less access to education and information.

Power over family finances and assets has differential effects on the men and women of Papaya. Although both men and women seem not to be highly affected by the lack of power to make decisions about family finances, significant differences in their scores means that more women (2.18) are affected than men (1.69) by the lack of authority to make decisions in this area. Papaya male farmers are almost unaffected. They control family finances and assets mainly because they are the head of the household and control almost all the assets of the household. On the other hand, both male and female farmers of Cama Juan are not affected by their existing power relations mainly because women now have more access to household resources due to their increasing participation in productive activities. Power in this sense can be viewed as power inherited from increasing access to and control over resources. As argued by Shortall (1999) and Alston (2000), power is shaped by the ownership and control of important resources.

Finally, based on the information presented in Table 15, low income, less capital and less access to credit highly affected both men and women in their ability to respond to extreme flooding. These results are expected as I had already established that these limited resources are the results of the existing farming condition of the communities.

7.3. Gendered adaptations to climate change

Differences in men's and women's gender roles and their access to and control over resources not only creates specific gendered vulnerabilities and risks but also generates gender-specific capacities that influence their adaptation strategies to climate change. I present in this section the different adaptation strategies of male and female farmers as a response to extreme flooding. It is observed that men's and women's varying responses are often dictated by their ascribed roles, gendered norms and relations. It must be noted,

however, that because of the burdens and pressures brought about by extreme flooding, new roles are taken on and new activities are performed by men and women to make up for the losses and survive during the period of distress.

In this section, adaptation strategies are initially presented according to different categories generated mostly from qualitative data from focus group discussions and in-depth interviews with men and women. Next, I summarise these adaptation strategies by comparing the responses of men and women based on a survey conducted with 402 male and female respondents from 201 farming households. In this way, I am able to further examine their differential responses and attempt to explain the reasons behind their variable response.

Generally, adaptation responses are carried out by male and female farmers together. Thus, adaptation responses are presented by major adaptation categories rather than by gender roles. Major adaptation categories identified are changing farm practices, changing financial resources, ensuring safety and food security, seeking external support and changing attitudes. These major categories are presented in this section together with their sub-categories.

7.3.1. Changing farm practices

As expected, farmers make some changes to their farm activities and practices in response to their changing environment. Although men and women are both involved in farming, it was observed that changes in farm practices are mostly carried out by men due to their status as the *farmer* who has the main control of farming and has access to resources. Also, because men are the main provider for the family, they decide whether they will engage in rice farming during flooding periods or not. Men usually plan their farming activities by preparing their fields for the upcoming flood. They build dikes, change cropping systems or change the area being planted, adjust their planting and harvesting activities, and so on.

1. Preparing rice fields and the rice crop

In terms of rice production, men and women are both concerned about the severe production loss due to submergence. But because men do most of the farm labour, they

are the ones who prepare their rice fields in anticipation of extreme flooding. They make their dikes higher to prevent flood water from coming in to their rice fields (Figure 16). Farmers cannot fully gauge the effectiveness of building higher dikes as abrupt floods can easily submerge the plots, nonetheless they still do this to somehow lessen the impact of flooding on their crops.

When we know that it will flood, we will build higher dikes but if the flood will be so large, we don't have any choice. Sometimes I asked my siblings to put sacks of soils and stack it around the plots so that our fields will not be reached by floods. – Farm man #12

Farmers also plan what rice variety to plant during the flooding season. In 2008, the IRRI developed flood-resistant rice varieties that can withstand flooding for up to 14 days. But flooding occurs at different stages of the rice crops and at varying depths and of varying duration, which makes it difficult for the rice crops to tolerate the flood-related stress. Although the rice plant itself can withstand flooding, rice grains remain empty which results in low yields. Thus, farmers still choose high-yielding varieties despite its intolerance to flooding.

The variety not tolerant to flooding is more marketable so they favour [those varieties] with higher return. They say, is it not possible, like RC160 or RC222 which are high yielding and are marketable will be made to be submergence tolerant varieties? – Key informant #10

On the other hand, some farmers see the benefits of planting varieties that are tolerant to flooding; at least they can expect to harvest something. These farmers felt, though, that this newly-introduced variety should be tested for farmers to really adapt and learn the technique of growing it.

I've heard about the submergence rice variety and I encouraged other farmers to try it. But unfortunately, they've already bought seeds for that season, but they will try to buy and grow the new variety. A co-farmer told me that the submergence rice variety is really good. When he tried it during the wet season, there was a minimal crop loss from his harvest. Crop loss was due to some area, which was severely affected by flood – deep flood water. Another farmer got 7 *cavans* (350 kg) and I harvested 125 kg only during that season. That's why I'm telling other people how good the new variety is by sharing our experiences. There are huge

areas used for seedbed preparation but after two to three days submerged to flood waters, seedlings can't survive. There is this variety which was studied, observed, and researched with positive effect. Most probably, we will grow the new variety by next year. – Farm man #20

It will be nice if we really have that kind of variety that's also high yielding. The variety should be tested since we need to get use to it. We were bit disappointed, because we don't know yet its performance so we really need some experience. We suggested that the seeds should be given to one farmer so we can really test it. Farmers gets lazy [to test] if they will only plant 2 kg of seeds. We cannot really test if has good yield and it's hard to pull the seedlings, it becomes fragmented. – Farm woman #25



Figure 16. Dikes made of sacks of soil built around the rice plot

Figure 17. Rice fields left idle because of stagnant flooding

2. Changing the cropping system and/or rice area

Because flooding had adversely affected the farmers' rice production, some farmers learned to adjust their cropping system by leaving their fields idle during the wet season. This is being practised by more men in Cama Juan than in Papaya due to their long experience of stagnant and long flooding (Figure 17). Some farmers only plant rice in elevated areas while others plant other crops aside from rice. Changes in cropping systems, however, were only practised by a few farmers due to a lack of alternative sources of livelihood and lack of capital. Some farmers still risk planting rice, expecting that their fields will not get flooded anymore; others cannot shift to other crops due to lack of knowledge.

In terms of our farming, there are certain areas that are prone to submergence but there are areas which are elevated. We will grow rice on those fields in the upland, but we will leave the lowland fields as fallow. – Man in Cama Juan focus group #5

But in fairness, I noticed my son growing vegetable crops rather than *palay* such as *sitao* (string beans) and bottle gourd during those months that still has low to moderate rainfall. I think he realised that he needs to take risk for us to have something to eat during distress periods. You cannot ignore that fact that growing any kind of crop, you need to take risk. As of now, no one can predict the climate. – Woman in Papaya focus group #2

3. *Adjusting farming activities*

Adjusting farming activities in response to flooding is one of the common strategies taken by farmers. Since farmers are so dependent on climate, they somehow learn to anticipate the changes and adjust their activities accordingly. Recent climate, however, has become unpredictable. Consequently, it has become more difficult for farmers to adjust their activities and they have shorter times in which to do so. They end up postponing some of their activities when flooding or storms are expected:

There should be timing. We know already when the water will come to our fields so we should adjust our farming activities. For instance, we know that flooding comes in June so we will plant our crops after June so that flood already subsided when we are about to plant. So we should adjust according to the weather. – Farm man #9

In terms of our farming, it's hard to adjust our activities once you have planted because you cannot control the weather. – Farm man #19

In terms of farming activity, we postpone the threshing even the crops are about to harvest, we just let it standing there. We just wait for the typhoon to pass by, then if the sun shines, no more rain and the water subsided that's the time that we harvest our crops. – Woman in Papaya focus group #1

For example, we already harvested it and there's typhoon coming, we will bundle our harvests and then stock it in one place. Since we already experience to lose our harvests because it had been washed away by floods and we did not even get anything, it's all gone ... We just bind the harvested grains with its rice straws to make a big bundle and then stock it in one place. It will not be washed away anymore. – Farm woman #7

If their rice seedlings or rice crop has been flooded, farmers resow or replant by buying

new seeds. This entails additional expense and for most farmers means they need to acquire another loan to buy the new seeds. Some farmers just get some of the portion of grown crops left standing after flooding and plant them out in areas which were devastated by flooding. These strategies were reported by farmers from the two villages. By doing this, farmers can still expect to harvest something for the season.

If it's needed and we have planted, and if there are some grown portion already, we fertilised it and we will just get some portion from the grown crops at least just two grown seedlings [*suwe*] to be planted on some areas that were damaged [by floods]. – Farm women #13

My sons who were working in the farm just replanted to replace the plants that were destroyed. They patiently planted again to keep pace with the other's rice crops. – Farm man #21

7.3.2. Changing financial resources

Loss of livelihood due to flooding has a direct impact on the financial situation of farming households. Thus, both men and women adopt several strategies to make up for the losses incurred. Their responses are both anticipatory and reactionary in nature. For instance, to secure them from further losses, male farmers take out crop insurance. Reactionary responses are undertaken by farmers mainly because they are forced on them by the critical situation. Some of these strategies include acquiring loans, pawning assets and migrating to look for alternative jobs. These are mainly considered to be coping strategies that can be detrimental to households in the long run (Sultana, 2010). However, farmers, particularly women, are left with few choices during these tough times and thus sacrifice their welfare and to some extent the welfare of the family. On the other hand, men and women learn to engage in different kinds of livelihood activities during severe flooding. Because of this, women to some extent came to realise that they can do something for themselves and their households.

1. Acquiring crop insurance

Men can acquire crop insurance mainly because they are the *legal* owners of the farm and are able to pay insurance. Also insurance companies only recognise legitimate owners, which makes it less possible for women to acquire crop insurance. Although farmers

recognise the benefits of having crop insurance, because of lack of capital only a few of them are able to secure their crop. They choose to take the risk of not securing crop insurance, hoping that their farms will not be devastated by calamity.

When typhoon *Ondoy* came, I got PHP14,000 (AUD320), I was able to recover my expenses. – Farm man #8

Before we are not doing this [acquiring crop insurance], we just thought so we can be compensated with the loss. What we have spent, will be returned to us. Before I was able to do that [insuring his crop], but ... I harvested that time, so it's like nothing. – Farm man #4

The decision not to secure crop insurance is not due to their lack of belief in the insurance system but mainly because such investment is not the main priority of the farmers. They would rather spend it on other important expenses such as food or farming expenses.

2. Acquiring loans

Both men and women reported that they acquire loans during flooding, but from different sources. Men acquire loans from close friends and from formal institutions such as banks, while women acquire loans from relatives and informal money lenders. Women are more restricted in acquiring loans from formal institutions such as banks because they lack collateral and because they often do not own their land. As previously discussed, acquiring loans is normal in the farming communities, but flooding doubles farmers' problems with loans. Their rice production losses lead to lost income and a decline in food intake. These are the main reasons why farmers are obliged to acquire loans – to compensate them for the loss of farm production costs and loss of nutritional intake. In other words, loans are their remedy during periods of distress.

In reality, our cash-on-hand were immediately spent without even realising that there is nothing left for our household needs. As we work in our farm, money is also moving – moving as fast as we speak. – Woman in Cama Juan focus group #4

Our life here in the village is full of hardship. Sometimes, we will look for someone that will lend us money for food. For one bulk of harvested *palay*, we can just get 3 *cavans* (150 kg) of *palay* during harvesting season. – Man in Cama Juan focus group #5

Based on the survey conducted (Table 16), 92 per cent of farming households acquired loans in cases of severe flooding and 76 per cent of them increased their loaned amount during this period. Sixty per cent of farmers reported that they used the loans for rice farming operations, while 39 per cent said they used it for household expenses and 18 per cent said that they used it for food expenses. Others spent the loans on education (16 per cent), medical expenses (5 per cent), food for livestock (4 per cent) and as payments for other forms of credit and capital for other livelihoods (e.g. vegetable farming and non-farm livelihoods) (7 per cent).

Table 16. Changes in acquiring loans (in per cent) during flooding conditions by gender, Nueva Ecija, Philippines, 2011

Item	Response
Take a loan in case of severe flooding (%)	(n = 402)
No	8
Yes	92
Changes during severe flooding (%)	(n = 370)
No change	24
Increase	76
Purpose of loan* (%)	(n = 370)
Rice farming	60
Household expenses	39
Food expenses	18
Education expenses	16
Medical expenses	5
Livestock	4
Other	7

*Note: * There are multiple responses. Other: payment of credit, capital for other livelihoods*
Source: 2011 Survey

3. Pawning of assets

To pawn assets in cases of emergency and during crisis periods is a decision made by both husbands and wives. Men, however, have the final say as they control most of the important assets of the household, such as land. They do not actually pawn their land, as this is the most important asset of the household. But men reported that they let others use their land for a certain period of time in exchange for a loaned amount. Pawning of assets is reported to be the responsibility of women, since it can degrade men's identity as 'men'. Personal assets such as jewellery were reported to be pawned by women. Most

female farmer-respondents pawned their belongings mainly to cover the education expenses of their children.

Both participate in deciding [when it comes to pawning assets] but husband has greater say in land titles. We pawn ['lend'] our land if we don't have anyone to borrow money from. As of now, we didn't experience such case but we can pawn/lend our land asset, especially during distress periods. As long as we can find other sources of money [lender], we will not pawn or lend our land asset.. – Woman in Cama Juan focus group #4

I was able to pawn my jewellery to have money for the education of my children. I pawned it to MLhuiller [pawn shop] for PHP35,000 (AUD800) but unfortunately, I cannot redeem it [*hindi natubos*] because of the low rice production. – Woman in Papaya focus group #2

Table 17. Proportion of assets pawned and the reason for pawning by gender, Nueva Ecija, Philippines, 2011

Asset	Male	Female	Both sexes
Asset pawned	(n = 188)	(n = 182)	(n = 370)
None	91.0	89.6	90.3
Jewellery	6.0	6.5	6.2
ATM card	0.5	0.5	0.5
Appliances	0.5	1.0	0.7
Land	2.0	2.0	2.0
Vehicle		0.5	0.2
Reason for pawning (%) *	(n = 24)	(n = 25)	(n = 59)
Emergency need/medical needs	21	8	14
Household expenses (i.e. utility)	25	28	27
Food expenses	25	20	22
Farm expenses	33	12	22
Payment to credit	8	4	6
Education expenses	8	12	10
Capital for tambo making		12	6
Livestock management		16	8
Acquiring additional land		4	2
No response	4		2

* multiple response

Source of raw data: 2011 Survey

As shown in Table 17, pawning of assets is not a common practice among farming households, mainly due to the limited assets households own. Only 9.7 per cent of the surveyed farmers pawned their assets such as jewellery, land, appliances, vehicles and

even ATM cards. The most common reasons for pawning land are for household expenses, food expenses and farming expenses. There are also instances of assets being pawned for medical expenses when a member of a household got sick during this period.

4. Migrating

Migration of household members is a response to a lack of alternative livelihoods in farming communities. It is considered a *push* migration that most of the household choose to take when they have the opportunity to work outside the village. Migration is observed to be temporary and just for a certain period of time, particularly when rice farming is not possible in their village. This is the same response observed in India, where male farmers temporarily migrate to cities for construction work during the non-agricultural season (Lambrou and Nelson, 2010). As both male and female farmers reflect, they don't have any choice but to let one of the members of their household stay away for a while from their families.

Whether we like it or not, we don't have any choice but to ask or make them work to other places to survive in the village. – Woman in Cama Juan focus group #4

There are no choice but to migrate and seek other income generating activity such as construction worker, thresher, and tricycle driver. But there is no income from being tricycle driver. – Man in Cama Juan focus group #5

Not only the principal man and principal woman feel the devastating effects of abrupt and extreme climatic variabilities, other household members, specifically the grown children, are also affected and are realising that climate change is something to get serious about. Of the 201 farming households surveyed, 27 respondents were identified with household members who migrate to look for off-farm and/or non-farm work. As expected, husbands take the risk to go outside the village to look for alternative work, but if there are work opportunities for wives, their husbands allow them to take non-farm work. Of household members who migrate, 56 per cent are husbands, 19 per cent are wives, 4 per cent are female grown children and 4 per cent are elders (Table 18).

Women are usually left behind (26 per cent) to look after the children and elderly and manage the farm while men are working outside the village. Grown children, especially

those who are working outside the village, contribute to their family's capacity to cope with climate change not only by giving money, but also by investing or providing a livelihood for the household member left in the village.

Although migrated grown children are not obliged by their parents to help and contribute to the family's income, they voluntarily help their family because they are well aware of the devastating effect of climate change or poverty on their families. One female farmer was given a refrigerator by her grown son and she quoted her son as saying:

Now that I already have a work, I could help lessen your burden, specifically during wet season. You can store food and start a new business using the refrigerator. – Woman in Papaya focus group #2

Table 18. Percentage of family members migrating and family members left behind, San Antonio, Nueva Ecija Province, Philippines, 2011

Impacts	Family member migrate (n = 27)	Family member left behind (n = 27)
Husband	56	19
Wife	19	26
Both husband and wife	22	22
Male grown children		19
Female grown children	4	
Elders	4	7
Other relatives		11
No response		4

*There are multiple responses.
Source of raw data: 2011 Survey*

5. Looking for alternative/additional livelihoods

Due to climate change, rice farming is becoming a risky livelihood for farming households. They cannot only rely on rice farming as there have been frequent losses in recent years. Thus, both men and women have been engaging in livelihoods other than rice farming. More farming households in Cama Juan were observed to have alternative or additional livelihoods than those in Papaya. Cama Juan farmers are already accustomed to long and severe flooding so some tend not to plant their rice farms during the wet season.

Consequently, they need to look for alternative livelihoods during this period. Papaya farmers, however, mostly still heavily rely on their farming because their floods are usually less predictable flash floods of short duration and each year they hope they will not happen.

More women than men in both villages look for alternative sources of income during periods of distress; this is due to them being less involved in the farm than men. Women are involved in non-farm livelihoods such as selling products or venturing into small business (e.g. small variety store, buying and selling of rice, etc.) and livestock raising such as hogs and poultry. Non-rice farming, mainly of vegetables, as an income source is managed mostly by men. Women also plant vegetables in small plots near their houses mainly for household consumption, the surplus being sold around the village. Both men and women are also involved in off-farm employment, where they work for others in their fields in exchange for cash or a share of the harvest. The following sub-sections show how men and women are involved in different livelihood activities as part of their response to severe flooding.

Non-farm livelihoods

Women are engaged in non-farm employment depending on the work opportunities available in the village and on the skills and capital they have. For instance, most women from Papaya village make brooms. The broom industry is relatively near to their village and some businessmen employ women who stay in the house to make brooms (Figure 18). Meanwhile, some women reported that they work for other households as house helper and some work for or manage variety stores and canteens/eateries. Women from Cama Juan on the other hand sew, sell products and offer manicures and pedicures in the home.



Figure 18. Broom-making being done by women inside their house as a non-farm income source



Figure 19. Tools used in catching shrimps

I engaged in broom-making and I work as household helper. I do this because my children are all attending school. If I will not do this, household income is not enough. – Woman in Papaya focus group #2

We just plant string beans, but just in the sides of the rice fields but we earn somehow from it. It can support our daily expenses. Just now it died, so we don't have anything to support us anymore. – Farm woman #25

Meanwhile, men fish and cultivate seafood, such as shrimp (Figure 19). Both Papaya and Cama Juan farmers fish during the wet season as some rice fields become fish ponds due to long and stagnant flooding. Fish are abundant during flooding since many of the fish ponds from other towns are destroyed by floods. Men reported that they also catch farm rats and frogs (see from Figure 19 to Figure 22). They eat them and they also sell them for additional income. Some plant vegetables such as string beans and chili around their rice plots. They ask their female partner to sell any farm products, fish and livestock around the village or at the nearby markets.

By engaging in non-farm livelihoods, a household's income and food security becomes less dependent on rice farming. Not only does it make up for the lost income from farming but it also serves as a source of cash to repay their loans. A woman spoke of the pressure to seek additional sources of income to repay her loan:

I also have to bear the responsibility of repaying my loan and to find other sources of income, aside from farm income. So I told myself, I need to have an additional income just to pass through this. – Farm woman #15



Figure 20 (above). Men catching rats and frogs for selling



Figure 21 (above right). Farm rats being sold in the market



Figure 22 (right). Frogs being sold in the market

Furthermore, planting non-rice crops, such as fruit-bearing trees, around their rice fields and around the house does not only become a source of food and additional income but it also serves as a shield and protection from strong winds and flood water. More women, particularly in Papaya, are now planting different fruit trees:

I planted different fruit trees such as *pomelo*, mango, tamarind, and *calamansi* [citrus] on the edge of the stream and it serves as fence of house. This will lessen the current of flood water and prevent the water to enter our house. Fruits will then be sold to market. – Woman in Papaya focus group #2

Livestock raising

Livestock raising is another source of income and food for the farming household. This source of livelihood can be either large- or small-scale, depending on the capital of the farming household. Most families only have backyard livestock such as hogs, chicken, ducks and goats. These are usually managed and reared by the female members of the household as men are busy working on the farm, while large farm animals such as

carabao (water buffalo) and cows are the responsibility of the male members of the household. Some households engage in medium- to large-scale production and are thus managed by both husbands and wives, with husbands having greater control over the livestock investments.

Farmers are aware of the benefits of having livestock (Figure 23 and Figure 24). Some even increase the number of poultry in order to have enough for home consumption and a greater gain during periods of distress. Both male and female farmers, however, reported that their reared animals, such as chicken, ducks and even *carabaos*, are being washed away and killed during intense flooding. Consequently, most of the households are not able to sell any reared animals because the number of animals left is just enough, sometimes not enough, to satisfy the needs of the whole household. Male farmer-respondents perceived that the rearing of animals is an additional burden for they need to have additional capital to acquire and manage them. They also need to look after their animals and even relocate them to higher places. Without good facilities, livestock are expected to suffer and even die during flooding periods. Some households also suffer as they put their livestock inside their house when the water is high.

When we were flooded in 2009 [during typhoon *Ondoy*], we have some hogs. We put our 12 hogs inside our house. We suffered so much then. We were so tired and our hogs were not used to it too. Then we put our chickens inside the house too. We raised 45-days chicken then, we raised like a thousand of it. – Farm woman #16

Many of the female farmers interviewed were really keen to raise backyard hogs, but they believed that raising such an animal was inappropriate in their place. Flooding is so frequent that they would need elevated pig pens to secure the animals. Duck raising is another possibility, but most of the farmers only raise their ducks along the irrigation canals or creeks. When flooding is intense, if the ducks are not drowned they are washed away. It is clear that limited capital is a big concern for farmers as they cannot risk their limited resources on livelihoods that can be lost during flooding.



Figure 23. Duck raising near rice field irrigation in Cama Juan village

Figure 24. Goat raising in Cama Juan village

Off-farm employment

Off-farm employment, or working on another's farm in exchange for money or a share of the harvest, is one of the important sources of livelihood for farmers. Since most of the farmers do not own vast rice farms, they have enough time to work on others' farms. This kind of exchange of labour was popular even in the old days, but the exchange of labour then was free of charge. It was like a *bayanihan*, a spirit of communal unity or effort (Bankoff, 2007), where each farmer from the village works together for one person's farm, particularly if that person has announced that he/she is about to transplant or to harvest the fields. Because of poverty and the scarcity of livelihood, the exchange of labour is now commercialised. Farmers now work in others' fields in exchange for money or *palay* (rice grains). This is now popularly termed off-farm employment.

The demand for manual labour is less than in previous periods however, as some farmers invest in machines such as tractors and threshers which they rent out to other farmers. Thus, most male farmers work as machine operators and some still do manual labour during transplanting and harvesting. Female farmers, due to their limited physical ability, do manual labour on the farm as transplanters and support during harvest. A female farmer explained how she and her husband are involved in off-farm labour:

He [husband] operates thresher. For every 100 *cavans* of rice he threshed, he can have 1 *cavan* as his payment. So during dry season he can have at least 10 *cavans*

of rice while in wet season he can have just half of it, 5 *cavans* ... When it is harvest season, and I am gleaning [picking up some grains from the threshed stalks], I have extra income. I can have at least 10 kg of *palay* [grains] so that would be my income. – Farm woman #26

Off-farm employment is limited during the wet season due to flooding. Either the rice fields are damaged by flood or the farmers reduce the area they cultivate because of the danger of floods; either way, the demand for off-farm employment decreases. Groups of female farmers in Cama Juan, however, are very resourceful during this period. Since their farms are affected during flooding, they look for off-farm employment outside their village and even in other towns. This kind of income-generating activity is the *upang tayo* system. *Upang tayo* is an arrangement between a landlord and one labourer, a *kabisilya*. The *kabisilya* is like a middle-woman who hires a group of farmers, mostly women, as off-farm workers. She acts on behalf of the group and supervises them on the farm. The *kabisilya* also does farm work but her main responsibility is to supervise the other off-farm workers. She is paid PHP100 per hectare (AUD2.29). She organises everything from the selection of workers to transportation, food and payment. A cash advance is provided by the landlord for the initial expenses, such as transportation to the land and food or *merienda* (snacks). Activities involved in this kind of off-farm arrangement include pulling of seedlings, transplanting, harvesting and threshing. According to the FGD with Cama Juan female farmers, they went as far away as Gapan and Cabiao (other towns of Nueva Ecija). There were many of them and so they were transported by a small truck. For those farms within Zaragoza (a nearby municipality) and in some villages in San Antonio in Nueva Ecija, they were involved mostly with harvesting and threshing activities. Total hired labour cost per hectare increased from PHP3,400 (AUD77.71) to PHP4,200 (AUD96), which was divided among the off-farm labourers. This kind of work is all-day work. The women therefore prepare for the needs of their household before they leave and ask other members of the household and even neighbours to look after their children while they are busy working on others' farms.

7.3.3. Ensuring safety and food security

Farming households mainly prepare for typhoons and flooding by ensuring the safety and food security of the household and protecting valuable assets. Men and women perform

different tasks in anticipation of the calamity. Men, for instance, secure their farm machines and large animals by putting them in elevated places, and fix their houses to make them stronger against winds and floods. They also collect wood and move their heavy appliances to the second floor or to higher ground. Women on the other hand, store food and pack clothes and other important valuables and put them in elevated places. For some households that are located on low ground, women encourage the whole household to relocate to other places. It is observed that more women than men are receptive to warning signals and take action to ensure the security and safety of their loved ones. They take more seriously the warning signals they receive from neighbours, the authorities and the media (Fothergill, 1998; Brody, 2008; Ho et al., 2008; Terry 2009). This is confirmed by female farmers in the two farming communities:

When you heard a gun fired, that means the Pantabangan dam already released some water and it would just take few hours to reach our village. When you heard another gun fired that means there will be a flash flood and you need to put your stuff at elevated position because the flooding will be deep. – Farm woman #16

Of course if you don't have rice, then you need to secure to mill some rice, it should be more. Then if there's stock of bamboo we need to build it as ladder and it should be high. For instance we have something to put in higher place we have bamboo ladder in place. We don't have second floor but we have a ladder made of bamboo for us to go in an improvised second floor. – Farm woman #25

We make sure that we have enough fuel wood, salt and rice. Salt is used as our side dish for rice. However, rice is the most important among these things. We can still eat rice and feel full without any side dish on it. But in general, these three things are the most important for our survival, specifically during distress periods. – Woman in Cama Juan focus group #4

Sometimes, it can reach the flooring of our house. When it happened, then we have to go to our neighbor's house. And if it happened, then will leave this place and moved to our house in Zaragosa [neighbouring municipality]. – Farm woman #13

In that case we just leave our house. We go to our landlord's place and sometimes in my in-law's house, that's where we bring our animals too. – Farm woman #26

Some women stated that they are already aware of the effects of climate change and they want to lessen their contribution to climate change. They even plant more trees to mitigate its effects.

We are aware of the climate change. We are trying to contribute to lessen the impact of climate change. So now, I am reminding everyone regarding our 10 trees that need to be monitored by the end of this month. – Farm woman #15

Male farmers are also aware of the effects of flooding on the household's food security. As the main provider and the one who has control over the harvest of the household, they already keep and store a portion of harvested rice for home consumption, even if the production is lesser than the expected. As explained by one farmer in the group discussion:

Our system of livelihood here is that, we make sure that there is a certain amount of food from our harvest, which will be automatically allotted for our home. Regardless of knowing or unknowing and kind or intensity of calamities to come such as flooding and heavy storms in our lives, we make sure that we could feed our family from our lands. – Farm man #17

From the kept produce women ensure that the rice for consumption will be enough until the next harvest season, but in most cases some of it is sold as unexpected household expenses arise. For some households the harvested rice is not really enough for the whole household and they find themselves taking out loans again to support the household needs. As a farm women shared:

The truth is that we are not spending less or consuming less because in the first place, we don't have anything to spend or consume less. With the devastating impact of flooding in our place, we already need to find someone who can lend us money after harvest. This means that the borrowed money before is not yet fully paid but yet again, we still need to borrow money. Thus increasing our debts by 100 per cent. – Woman in Papaya focus group #2

Meanwhile, it is also observed that households from Papaya are more prepared for flooding in terms of changes in infrastructure and facilities than households from Cama Juan. Papaya farmers have already raised their physical infrastructure upon building and renovating concrete establishments, especially their houses (Figure 25).



Figure 25. Elevated house of a Papaya farmer



Figure 26. Elevated concrete path from the road to the house of a Papaya farmer

Some residents have also built a narrow concrete road, 38 centimetres up from the ground starting at the edge of the stream and extending more or less 20 metres along from house to house. This serves as a footpath to nearby residents. It is also a way of lessening the volume and intensity of the flood water that may enter their properties (Figure 26).

Papaya farmers who have medium-scale livestock have also built elevated pig pens. The pig pens are as high as 2 metres above the ground to ensure that flood water will not reach the animals. An example of an elevated pig pen is shown in Figure 27 and Figure 28.



Figure 27. Elevated pig pen in Papaya village (outside)



Figure 28. Elevated pig pen in Papaya village (inside)

In comparison to Papaya farmers, Cama Juan farmers have limited resources. Some households who choose to raise animals during flooding periods suffer as they are forced to put their animals inside their houses. The lack of elevated pens makes it harder for them to take care of their animals during floods.

We put them in a cage, which is relatively high so that they cannot be reached by flood water. We also give priority on pig's safety. But for some households, you can see pigs inside their houses and are sleeping on the floor while people are on the table. – Woman in Cama Juan focus group #4

Moreover, more Papaya farming households have invested in transportation they can use in case of emergency and during flooding periods. They have plastic boats that can be used during flooding to transport people to different places (Figure 29). Also, more farmers own a tricycle (Figure 30) which they use as a common mode of transportation.



Figure 29. Plastic boat used to transport people to the other side of the Papaya village when there is flooding



Figure 30. Tricycle used by households as their usual means of transportation during normal days and in emergencies

In our place tricycle is like our usual transportation. If in urban cities, car is the usual private vehicle used by the people, but here in our province, tricycle is our car. Having a tricycle doesn't really mean we are involved in an income-generating activity. It is one of our necessities. It is our car, which provides us transportation, especially during emergency situations. – Man in Papaya focus group #3

From the above discussion, ensuring the safety and food security of the household is the prime responsibility of the men and women in farming households. Because of differences in perception, and the roles and resources available for men and women, however, men and women take different adaptation strategies. I also emphasise that differences in economic status across villages have influence on how the farming households react to changing climate. Thus it is anticipated that climate change will have differential impacts on the two farming villages studied.

7.3.4. Seeking external support

Support from either informal or formal sources is important during flooding periods. Government agencies, as part of their reactionary response to flooding and other calamities, are always sending relief goods to affected villages. Although the relief is limited and eases the hunger of the affected households only for a short period of time, it is still recognised as important assistance during flooding periods. More men than women expressed their disappointment in government assistance; they felt that they should be assisted and supported more by the government.

It's good when relief goods are coming in [to our place] even if we are not affected we are still been given. However, the next day, you need to shell out more than what you receive because you need to give to others who are less fortunate. – Farm woman #24

We are experiencing extreme flooding almost every year and there is an overflowing help and importation of goods from other countries, which if we look in a more detailed perspective, they weren't able to reach those people, who are really in need ... Yes! We are able to get some of the relief, but it was just a handful of rice and a pack of instant noodles! – Man in Papaya focus group #3

Aware of the limited support that can be expected from the government, farmers are relying more on their social networks for support during flooding periods. More men than women reported that they received support from other family members in a form of remittance for their farming expenses. Although women are reported to seek help and loans on their husband's behalf, in rare cases male farmers are pushed to seek help from the government. Men seemed to be better equipped to talk to authorities about their

situation, or more credible since they are the head of the household. Some men also observed that women are too shy to talk to higher authorities because of their incompetencies.

Every month she [daughter] sends remittance. Actually, I am waiting for her support so that I can buy fertiliser. – Farm man #17

I am not asking for anything from the government. There are so many processes that must be undergone. But, there was a case when my child was so sick and we don't have any money for her hospitalisation, that's the time that we will ask for their help. I asked help from mayor, governor or congressman. This is the time that our courage is needed. Females are shy to go directly to ask for help.- man in Cama Juan focus group #5

On the other hand, women emphasised the importance of helping each other during flooding. They are more active in doing community work as it makes their work lighter and they can rely on each other even for the basic needs of their households. They usually seek support from friends, relatives and a small religious organisation, who give them food assistance in times of difficulty, especially during and after the flood occurs.

Fortunately, we have this organisation [*kapatiran*] within our community that gives food support to us. – Woman in Papaya focus group #2

There's a *bayanihan* [collective effort] in our place, because we are relatives. Like in the electric wiring, if one wiring of the household was cut, all the rest of the households would not have electricity. So each and every one of us are looking for the electric wiring so we can fix it together since we have just one source of electricity. – Woman in Papaya focus group #1

7.3.5. Changing attitudes

It was identified that adapting to uncertainty brought about by extreme weather involves emotional and psychological adjustment (Bankoff, 2004; 2007, Dalisay, 2008, Gaillard et al., 2008). As mentioned earlier, women are more receptive than men to climate warnings and are more cautious about the possible effects of extreme weather. This causes them to take more action to lessen the effects of calamity on their households. Men also prepare for the coming hazard by securing their shelter and other important assets. Because of their limited resources, however, men and women can only do so much to secure the

welfare of their household. Thus, they cling to their faith and trust to their luck during calamities.

Filipinos are known as religious people. Because of the Catholic religion brought by the Spaniards, families involve God in their everyday lives. This is shown by them mentioning God as the one who is their main source and provider. They also consider God as the one who controls their lives. Despite the hard life of rice farming, farmers have a positive outlook about their lives mainly because of their strong faith in God.

I think if I am with God, I am blessed, I am provided. – Farm woman #7

God taught us to have other sources of income, when my children are still in high school, we did duck raising, then we planted melons and then transport our goods to other place. When we had some profits then we buy it for farm machineries. – Farm woman #2

What makes me young is the love of the Lord. I realised the true happiness is with the Lord. – Farm woman #25

Religiosity is more observed among women. Women cling into their faith and lift up to God their situation. More women reported that they pray more during tough times. Women believe it to be effective as they observed that flooding stopped as they unceasingly prayed. Although for some it is a fatalistic position to take, for women who have placed their faith in God it is a purposeful praying as they wait upon God to act on their behalf. Also, they practise the *bahala nasentiment*. Though this concept has an element of 'leave it to fate', they are somewhat influenced by their faith to leave the rest in the hands of God (Bankoff, 2004).

There's nothing else that we can do than to call His name for our safety because He is the only one who could help us on that day. With the prayers from each one of us, flood water stopped rising, because if not, everyone will be in danger. The flood is already knee-high. – Woman in Papaya focus group #1

As we are saying, God will take care of it [*Bahala na ang Diyos*]. Only God knows ... There are times that flooding is shallow, while other times it's deep so sometimes, I think we get it through prayers. There are a lot of people praying, 'Oh God we hope that the typhoon will not come to our place.' – Woman in Papaya focus group #2

Meanwhile, male farmers stated that they also prepare themselves for the possible consequences of flooding in their households and farming. Since rice farming is becoming a more risky livelihood, farmers are exposed to greater uncertainty than ever before. As a response, more men than women stated that they prepare themselves even for the worst situation:

It's just like this, I willingly accept it in my heart, although it's painful since you are expecting for it [harvest] that's why you planted. If you planted you are hoping and dreaming that you earn what you have invested. But you have to accept it because it's a calamity. – Farm man #22

You should always be ready because you cannot tell when the flooding is coming. – Farm man #8

I really prepare myself, to lose or gain. – Farm man #23

7.4. Gendered adaptations: a closer look

The adaptation strategies discussed above mostly comes from different qualitative sources. To further examine which of these strategies were taken by most of the farming households in the two farming communities, I asked male and female farmers to respond to a survey. In this section, I present the results of the survey and analyse statistically the gendered adaptation strategies undertaken by farmers. In this manner, I establish the robustness of my results and further support the results of my qualitative analysis.

Table 19 shows the adaptation strategies undertaken by men and women in the two farming villages in response to severe flooding. As shown in this table, most of the changes in farm practices are undertaken mostly by men. Men are expected to take more responsibility for changing their farming practices as *farmers*. For instance, 59 to 66 per cent of the men mentioned that they have changed the rice variety they plant as a response to flooding. Adjusting the planting activities and changing the area of rice cultivated during flooding is a response reported by more Cama Juan male farmers than Papaya male farmers. As explained earlier, this is due to extent of flooding being experienced in their village. Resowing, replanting and building dikes were also undertaken mostly by men. It is worth noting that more Cama Juan female farmers

resowed and replanted seedlings when their fields were damaged by flood. This is due to the fact that more women in Cama Juan are engaged in farming than in Papaya.

Table 19. Adaptation strategies undertaken by male and female farmers as a response to severe flood (in per cent), Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Adaptation strategies	Papaya		Cama Juan	
	Male (n = 100)	Female (n = 100)	Male (n = 101)	Female (n = 101)
Change rice variety	59	51	66	52
Adjust planting activities	28	23	48	30
Cultivate smaller area than usual	9	4	43	27
Resow when crops damaged	40	28	48	42
Replant when crops damaged	42	23	43	42
Build higher dikes around the rice plots	43	32	64	50
Look for wage labour	18	12	32	32
Go fishing for food and/or extra income	20	10	54	31
Acquire loan	72	56	61	60
Take support from relatives/friends	16	23	19	24
Secure all valuable items in elevated position	74	66	60	58
Spend less	79	81	79	74
Store food and other basic necessities	84	73	77	74

Note: There are multiple responses.

Source of raw data: 2011 Survey

In terms of alternative work, both male and female Cama Juan farmers (32 per cent) are active in seeking non-farm and off-farm employment. Fishing was reported by 54 per cent of the male Cama Juan farmers, while women supported them by selling their catch.

Men also dominantly decide about the security of their households. A high percentage of men were securing all valuable items (58 to 74 per cent), practising frugality (74 to 81 per cent) and storing food and other basic necessities (73 to 84 per cent). While securing food and other necessities for the household are said to be the main responsibility of women, men as the main controller of the harvest decide on how much will be stored for household consumption, and in the same way spending patterns are still controlled by men. Their adaptive actions within the households, however, were done hand-in-hand with women.

Men's control over land also implied that they have a greater capacity to acquire loans (61 to 72 per cent) than women (56 to 60 per cent). When it comes to taking support, however, women consider family and friendship networks as their main capacity during flooding. Only 23 to 24 per cent of them, however, were able to receive support from their relatives and friends since most of their friends and relatives were also affected by floods. Nevertheless, it is important to note that more women than men took support from their relatives and friends. Most of this support is in the form of monetary support and in-kind support, such as food and shelter during flooding.

Using the Wilcoxon signed-rank test, differences in the scores of men's and women's adaptation responses are shown in Table 20. For instance, the table shows that decisions about changes that concern farming activities are taken more by men than women, such as changing rice varieties, growing more cash crops, adjusting planting activities, cultivating a smaller rice area than usual, and resowing and replanting crops when damaged.

Table 20. Wilcoxon signed-rank test on adaptation strategies/changes done by male and female farmers as response to severe flood, Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Strategies	Mean Score		Wilcoxon- signed ranks test (Z)	p-value
	Male	Female		
Change rice variety/ies	3.68	3.28	- 3.428 ^a	0.001 ***
Change cropping pattern	1.16	1.13	- 0.780 ^a	0.435
Shift from crops to livestock	1.22	1.22	- 0.099 ^a	0.921
Grow more cash crops	1.78	1.42	- 3.423 ^a	0.001 ***
Grow more kinds of crops	1.59	1.67	- 0.932 ^b	0.351
Grow input-saving crops	1.84	1.72	- 1.257 ^a	0.209
Adjust planting activities	2.58	2.12	- 2.958 ^a	0.003 ***
Cultivate smaller area than usual	2.14	1.76	- 3.228 ^a	0.001 ***
Resow when crops damaged	3.22	2.96	- 2.540 ^a	0.011 **
Replant when crops damaged	3.15	2.84	- 2.753 ^a	0.006 ***
Build higher dikes around the rice plots	2.96	2.69	- 1.639 ^a	0.101
Leave as fallow	1.59	1.51	- 0.531 ^a	0.595
Migrate	1.38	1.20	- 1.660 ^a	0.097 *
Look for wage labour	2.24	2.04	- 1.670 ^a	0.095 *
Acquire loan	3.70	3.48	- 1.818 ^a	0.069 *

Strategies	Mean Score	Wilcoxon-	p-value	
Take support from relatives/friends	2.52	2.60	- 0.706 ^b	0.480
Secure all valuable items in elevated area	3.66	3.57	- 0.899 ^a	0.369
Mortgage land	1.21	1.18	- 0.720 ^a	0.472
Sell assets	1.13	1.12	- 0.198 ^a	0.843
Go fishing for food and/or extra income	2.57	1.98	- 5.340 ^a	0.000 ^{***}
Spend less	3.93	4.07	- 1.702 ^b	0.089 [*]
Seek assistance from government support	1.53	1.26	- 3.651 ^a	0.000 ^{***}
Store food and other basic necessities	4.00	3.88	- 1.225 ^a	0.221
Acquire crop insurance	1.47	1.53	- 0.615 ^b	0.539

*Wilcoxon signed-rank test shows differences in scores/responses are significant : *** significant at 1%, **significant at 5%, *significant at 10% (see Chapter 5 for detailed discussion of Wilcoxon-signed rank test)*

^a Based on negative ranks, ^b Based on positive ranks.

Note: low score means less frequently undertaken while high score means more frequently undertaken.

See Appendix Table 6- Appendix Table 9 for detailed scoring, Source of raw data: 2011 Survey

Moreover, since men are more responsible for providing for the family, they are more likely to migrate to other villages, look for wage labour and go out fishing either for household consumption or for extra income. Men were more likely than women to take out loans when they had no financial capital for their farming since they are the *farmers* and recognised owners of the farms and even seek government support in times of periods of distress. On the other hand, significant difference is observed in terms of spending. More women than men reported they were spending less during flooding periods. This is reasonable as women are the custodians of the household's budget. When men need to spend more for their farming activities, however, women are more inclined to spend less on other household expenses such as food and recreation.

Results of the survey confirmed the findings of the qualitative analysis that more men than women responded to the effects of severe flooding. The result is expected as more men than women control the resources of their households. Also, the existing power relations inside the households and within the community limit the actions that can be taken by women. Aside from the fact that women possess limited resources to use to respond to climate change, their opportunities, for instance to work outside the house, must be permitted by their husbands. Even inside the house, men as the main providers and decision-makers control the actions that can be taken by the household.

7.5. Gendered impacts of climate change

Men and women are affected by floods in different ways because they have different roles and resources, including control and power, which are shaped by cultural rules and norms (CARE 2010). Therefore their experiences are varied, which should be given due attention when investigating the social impacts of extreme weather events. Based on the results of the study, almost the same impacts are being experienced by both men and women but in varying degrees. This result is observed in the two farming villages studied and thus a summary table is presented for both villages (Table 21). The top three impacts for each are summarised as follows:

Perceived impacts of severe flooding on men:

- (1) pressure to acquire a loan (34 per cent)
- (2) increased pressure to provide food for the family (27 per cent)
- (3) increased pressure to seek other income source (10 per cent)

Perceived impacts of severe flooding on women:

- (1) increased pressure to acquire loans (20 per cent)
- (2) more stressed/anxious (18 per cent)
- (3) physical isolation (18 per cent)

Table 21. Men's and women's most significant perception (in per cent) about the impact of severe flooding on their lives, Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Impacts	Male (n = 201)	Female (n = 201)
Increased health problems	5	11
Increased violence	1	1
Increased disagreements among family members	1	2
Increased pressure to provide food for the family	27	10
Decreased quality of food	1	1
Decreased quantity of food	3	5
Pressure to hire labour and machines	3	3
Pressure to acquire loans	34	20
More stressed/anxious	7	18
More alcohol intake	0	5
Physical isolation	2	18
Increased workload	6	6
Increased pressure to seek other income	10	11
Total	100	100

Source of raw data: 2011 Survey

One of the major impacts of severe flooding is the pressure to acquire loans because of losses due to flooding. Both men and women felt the burden of acquiring a loan just to have capital for the next planting season. Because men are deemed to be the provider of the family, men felt the pressure to provide food for the family (27 per cent) but because of the production losses due to flooding, they are also under pressure to seek other source of income aside from rice farming. Meanwhile, women mentioned that they became more stressed and anxious (18 per cent) during severe flooding. This is due to their increased concern for the safety of their family during flooding. Moreover, they become more anxious when their rice fields are destroyed. Crop losses mean that the family will not have any income or food to eat.

Crop losses are also the main cause of increased debt during flooding. Many households continue to plant rice and take the risk of losing their crop due to anticipated floods. Consequently, those households without enough capital are trapped in a cycle of debt. They borrow money during the planting season which they repay during the cropping season, and then they acquire another loan for the next planting season. More women than men expressed this as a burden as it is women who manage the finances of the farm and budget household expenses. One farmer, a widow, described her loan as *chains* that do not end. A female farm manager related her experience of borrowing money.

Due to floods, we did not harvest anything. Seeing our crops ready to be harvested being swept by floods and disappearing was too painful for me. – Woman in Papaya focus group #1

My worst experience was when the money lender took away the entire paddy which I harvested because I couldn't pay my loan. I cried and cried due to lost income. In this village the interest rate is high. If you borrow 8 *cavans* [456 kilos equivalent to AUD156.00], you need to pay the money lender three times [the borrowed amount]. – Farm woman #15

Women's role in securing loans from private money lenders does not mean that they are empowered. In fact, they bear the stress and pressure to make ends meet while, at the same time, endeavouring to secure the health and nutrition of their children. One female farmer lamented:

All the families are very sad because we don't have anything to eat. You are fortunate if you have stock food in your house but if you don't have, you are pitiful. You just have to survive by drinking warm water. – Woman in Papaya focus group #1

Furthermore, more women (18 per cent) than men felt the physical isolation brought about by high flood water and they felt the burden of spending more time inside the house. On top of women's daily household chores, they bear the burden of caring for the sick and elderly. The increased pressure on men to take on extra off-farm and non-farm work during and after severe flooding means that women do most of the work inside the house.

Men and women were also asked about their perceptions of the impact of severe flooding on themselves and their partners. Using the Wilcoxon signed-rank test (see Table 22), men's responses were compared to women's responses regarding the impacts of severe flooding in men's lives. Their responses reveal that there are significant differences in perception among men and women in terms of the following:

- **Pressure to acquire loans:** Men and women of Cama Juan differ in their perceptions of the effect on men's lives of acquiring loans. Men felt that they are more pressured to acquire loans; this was less perceived by women. Although both men and women are obliged to take some loans for their farming expenses, the repayment of the loans is more of a burden to men since they are the main income earner of the family and the owner of the land. They are the ones who take the risk of using the land as collateral when acquiring loans from banks and other lending institutions.
- **More alcohol intake:** Men and women of Papaya differ in their perception about alcohol intake. Men perceived that they had increased their alcohol intake while women did not observe that men were affected in that way. In the in-depth interview conducted, however, a wife mentioned that her husband took up drinking because of frequent losses in flooding. Flooding also caused more emotional stress in men than women. In one interview with husband and wife, the

woman expressed her concern about her husband's health and emotional condition:

My husband just had a mild stroke this year. When we lost our crops due to flooding, my husband used to go out drinking to forget our loss and unpaid debts. – Wife, couple #1

The husband, on the other hand, described how his wife endured during crop loss.

My wife doesn't seem to have a problem whenever we lose our crops. She seems happy every day. – Husband, couple #1

The woman interviewed disagreed with the husband's opinion, however, explaining that she also felt stressed about their situation, but she just stood strong to handle their loss. This suggests that more often men are more emotionally affected by the stress due to crop loss while women are more resilient during tough times. Similarly, Brody et al (2008:15) confirms that women are more receptive to taking on behavioural changes than men, as more women believe that environmental problems cannot be solved without changing lifestyle.

Both men and women have almost the same perception of some of the impacts of flooding. Men experienced considerable stress as they were left with little economic and livelihood opportunities during and after extreme weather events. This is manifested in the increased health problems such as high blood pressure and increased physical stress. Moreover, men were increasingly exposed to risky situations as they dared to walk in flood water and thus are reported to have athletes' foot and rheumatism is reported among elderly men. As pointed out by Aguilar (2009), men are usually exposed to risky situations and even die because they believe that they are the *stronger sex* that needs to take heroic action. Also, due to a perceived failure to make the masculine grade, men, particularly young men, tend to suffer emotional tension and internal conflict expressed through fear, isolation, anger, self-punishment, self-hatred and aggression (Mishra, 2009).

Table 22. Wilcoxon test on perception of men and women about the impacts of severe flooding to men’s lives, Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Impacts	Papaya		Wilcoxon signed-rank test (p-value)	Cama Juan		Wilcoxon signed-rank test (p-value)
	Male	Female		Male	Female	
Increased health problems	3.17	2.99	0.373	2.63	2.61	0.911
Increased violence	2.78	2.45	0.128	2.94	2.83	0.570
Increased disagreements among family members	2.05	1.95	0.517	2.06	1.89	0.297
Increased pressure to provide food for the family	4.03	3.97	0.794	3.99	3.80	0.338
Decreased quality of food	3.40	3.32	0.625	3.26	3.07	0.307
Decreased quantity of food	3.41	3.17	0.267	3.21	2.93	0.179
Pressure to hire labor and machines	2.35	2.29	0.925	2.58	2.50	0.643
Pressure to acquire loans	4.31	4.18	0.281	4.03	3.50	0.004 ***
More stressed/anxious	4.13	4.09	0.967	4.09	3.93	0.318
More alcohol intake	1.59	1.35	0.060 *	1.46	1.53	0.562
Physical isolation	3.52	3.81	0.111	2.77	2.70	0.618
Increased workload	4.06	4.14	0.445	3.54	3.51	0.856
Increased pressure to seek other income	3.83	3.84	0.830	3.66	3.53	0.497

*Wilcoxon-signed rank test shows differences in scores/responses are significant : *** significant at 1%, **significant at 5%, *significant at 10%, (see Chapter 5, for detailed discussion of Wilcoxon signed-rank test)*

^a Based on negative ranks, ^b Based on positive ranks.

Note: low score means less impacted while high score means more impacted.

See Appendix Table 10- Appendix Table 13 for detailed scoring

Source of raw data: 2011 Survey

As shown in Table 22, anxiety and stress experienced by men can cause them to become violent and agitated. More men than women also reported that there were increased disagreements among family members. This was observed by both men and women and no significant difference in response for this impact was established.

Male and female respondents were also asked about their perceptions of the impacts of severe flooding on women’s lives. Again, by using the Wilcoxon signed-rank test, a significant difference in perception between men and women of the increase in women’s workloads and of the pressure on women to acquire loans was observed among Papaya farmers, while a difference in perception of physical isolation was reported among Cama Juan farmers (see Table 23).

Table 23. Wilcoxon test on perception of men and women about the impact of severe flooding to women's lives today, Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Impacts	Papaya		Wilcoxon signed-rank test (p-value)	Cama Juan		Wilcoxon signed-rank test (p-value)
	Male	Female		Male	Female	
Increased health problems	3.07	3.20	0.486	2.48	2.52	0.785
Increased violence	2.58	2.49	0.637	2.85	2.88	0.856
Increased disagreements among family members	2.02	2.00	0.873	2.10	2.17	0.622
Increased pressure to provide food for the family	3.53	3.57	0.847	3.22	3.46	0.196
Decreased quality of food	3.44	3.35	0.867	3.17	3.16	0.652
Decreased quantity of food	3.31	3.29	0.645	3.07	2.98	0.968
Pressure to hire labor and machines	1.77	1.78	0.810	1.70	1.82	0.471
Pressure to acquire loans	3.91	4.21	0.043 **	3.87	3.85	0.850
More stressed/anxious	4.03	4.10	0.654	3.94	3.98	0.815
More alcohol intake	1.03	1.05	0.577	1.11	1.08	0.586
Physical isolation	3.79	3.70	0.648	3.10	3.43	0.097 *
Increased workload	4.05	4.27	0.098 *	3.52	3.79	0.148
Increased pressure to seek for other income generating activities	3.21	3.23	0.934	2.98	3.08	0.626

*Wilcoxon-signed rank test shows differences in scores/responses are significant . *** significant at 1%, **significant at 5%, *significant at 10%, (see Chapter 5, p. for detailed discussion of Wilcoxon signed-rank test)*

^a Based on negative ranks.

^b Based on positive ranks.

Note: low score means less impacted while high score means more impacted. See AppendixTable 14-Appendix Table 17 for detailed scoring

Source of raw data: 2011 Survey

- **Increase pressure to acquire loans:** More Papaya female farmers felt that they are also pressured to acquire loans. Men are less aware that women also felt the burdens of acquiring loans. Even though women are not primarily responsible for taking and repaying loans, they are as pressured and stressed as their male partners.
- **Increased workload:** More women from Papaya village felt that their workload increased due to severe flooding. The difference between men's and women's perception of women's workload can be explained by men's perception that women just stay in the house and men do more of the farm labour. Flooding caused adverse effects on the welfare of the household, however, such as increased health

problems, food shortage and loss of livelihood. Women needed to respond to these problems, particularly by spending more time inside the house.

Physical isolation: More female Cama Juan farmers felt the physical isolation than their male partners. Because men usually go outside their houses even during flooding to look for food and extra income, women are left behind to do most of the household work, take care of the children and look after the elderly. Thus, women felt physically isolated from their social environment due to flood and household responsibilities.

Based on Table 22 and Table 23, men and women agree that, regardless of gender, loss of livelihood means loss of food for consumption. Both men and women reported that there was a decrease in the quality and quantity of food taken by men and women during severe flooding. Moreover, both men and women are pressured to provide food for the whole family which further increases stress and anxiety. Although both men and women are stressed and anxious about the food security of the household, more women expressed their concern about the lack of food during flooding. As women are expected to prepare food for the household, they were more burdened than men when there was not enough food for the whole household. Moreover, based on the group discussion, more women in Papaya complained about food insecurity during flooding periods. Fewer women in Papaya than in Cama Juan were doing something to secure food during flooding. This can be explained by the limited capacity of Papaya women compared to Cama Juan women. Since more Cama Juan women than Papaya women have alternative financial sources, they also have more control of financial assets and provide more for the family.

7.6. Impacts of climate change on young men and women

The impacts of climate change are not only experienced by adult male and female members of the farming households but also by their children. During severe flooding, there was an observed increased sickness among children due to sudden changes in weather. Based on the survey, 30 per cent of the interviewed respondents reported that

their children got sick during flooding periods. Common sicknesses were flu (22 per cent) and colds (23 per cent) (Table 24).

Table 24. Most common health problems and most affected family members (in per cent) due to severe flood in Papaya and Cama Juan villages, San Antonio, Nueva Ecija, Philippines, 2011

Health problems	Percent Response (<i>n</i> = 402)
Common health problems	
None (no response)	29
Flu	22
Colds	23
Cough	4
High blood pressure	3
Diarrhoea	4
Athlete s foot	5
Fever	5
Others	5
Most affected among family members	
None	29
Husband	7
Wife	9
Both husband and wife	9
Children	30
Elders	8
All members	8

Note: Other health problems include hyperacidity, asthma, arthritis, headache, pigsa (boil), body pain and nervousness/insomnia

Source of raw data: 2011 Survey

A few farmers also reported incidences of diarrhoea, cough and fever. Other illnesses, such as athletes' foot and high blood pressure, were commonly encountered by adult members of the household. Increased health problems inside the household burdened women as they cared for the sick member of their household.

Children's education was also affected by severe flooding, primarily because they were sick and the roads and schools were flooded. Consequently, school-going children had to stay home and wait for the flood water to subside. Moreover, some grown children attending college or university had to stop attending for a while because of loss of income due to flooding. Some households could not send their children to school but instead had

them help their parents either by working inside the house or on the farm. This happened on rare occasions and parents made sure that their children would continue with their education. However, the possibility of discontinuing their education worries the grown children. A farm woman shared the story of her niece:

There is still one semester remaining before her [niece] graduation. She was crying then, because she is so worried that she might stop her schooling. But I said no, and my siblings and I helped each other. – Farm woman #11

For some households, loss of livelihood led them to increasing debt and poverty. Thus men and women could hardly provide for the basic needs of their families. There are rare instances (two cases from my interviews) where children needed to stop their schooling permanently. They were both young women who were just waiting for nothing, so they ended up marrying at an early age:

Researcher: So you are really hoping that you could send your children to school?
Farm man: Yes, but they can't wait anymore and they got married. They got tired of waiting. – Farm man #4

The above discussion shows that the consequences of climate change not only affect adult members of a household, but the whole household. Women and men need to be more adaptable to lessen the impact of climate change on their household.

7.7. Summary

In this chapter, I showed how climate change can have devastating impacts due to existing vulnerabilities created by the economic and social conditions of the farming communities. I also showed how gendered vulnerabilities were exacerbated by climate change, where women become more vulnerable due to the unequal power relations, limited access to and control over resources, and ascribed gendered roles. The existing inequalities have great implications for how men and women respond to climate change. As shown in the previous sections (7.3 and 7.4), adaptation responses to extreme flooding are gendered. Men and women respond differently based on their gender roles, identity and relations. Moreover, I also found that men take more actions than women during severe flooding. This can be explained by their status within the household and community. Men have greater power and thus make the decisions on how the household responds and how

household resources are used. Their power extends by influencing and somehow limiting what women can do for themselves and for their households. Consequently, women have limited power and are therefore constrained from having access to possible resources they could use to adapt to climate change. It is thus clear that gender inequalities are exacerbated in the case of the farming communities studied. This is mainly due to the existing patriarchal structure that exists even during severe flooding events.

Results from qualitative sources were further highlighted as I examined gendered adaptation using quantitative analysis. Results show that changes in farming activities are taken more by men than women. Moreover, since men are more responsible for providing for the family, they are more likely to migrate to other villages to look for wage labour and more likely to go out fishing either for household consumption or extra income. They are more likely than women to take out loans when they do not have financial capital for their farming because they are the *farmers* and the recognised owners of the farms. They are also more likely to seek government support during periods of distress. On the other hand, more women reported spending less during flooding periods than men. This is reasonable as they are the custodians of the household budget.

Impacts of climate change on men, women and younger members of households were also discussed in this chapter. The three main impacts of severe flooding on men are pressure to acquire loans, increased pressure to provide food for the family and increased pressure to seek other income sources. On the other hand, women are impacted by increased pressure to acquire loans, increase in feeling stressed/anxious and feelings of physically isolation. Moreover, when men and women were asked about their perceptions of the impacts of severe flooding on themselves and their partners, differences in perception were observed in a few impact categories. For instance, men and women of Cama Juan differ in their perceptions about the effect of acquiring loans on men's lives. Cama Juan farmers felt that they were more pressured to acquire loans; this was less perceived by women. Men and women of Papaya differ in their perception of alcohol intake. Men of Papaya perceived an increase their alcohol intake while women did not observe that men were affected in that way. On the other hand, when men and women were asked about their perceptions of the impacts of severe flooding on women's lives, differences in perception were observed when it came to perceptions of pressure to acquire loans,

increased workload and physical isolation. More Papaya female farmers felt that they were pressured to acquire loans and that they have increased their workload. These impacts were less perceived by their male counterparts. Meanwhile, differences in the perceptions of men and women of the impact of severe floods on the lives of female Cama Juan farmers were only observed in terms of their physical isolation. More Cama Juan women felt the isolation due to long periods of flooding and increased household responsibilities but their male counterparts did not realize that they did. It is important to show the differences in men's and women's perception of the impacts of climate change in their lives to better address how to lessen the identified impact. It also shows that even though men and women are living together in the same communities, climate change impacts them differently because of different gender roles and relations which largely shape their lived experiences.

Lastly, this chapter identified the impacts of climate change on young men and women. Sickness due to severe climate conditions, pressure to work inside the house and disruption in their education are the main impacts of climate change on children. Because of inadequate resources and the limited capacity of households, the whole household feels the adverse impacts of climate change. Thus, in order to lessen the vulnerabilities to and impacts of climate change, particularly on women, gender roles and relations must be negotiated and challenged. This issue will be tackled in the succeeding chapter.

CHAPTER EIGHT: CLIMATE CHANGE: OPPORTUNITY FOR SOCIAL CHANGE?

8.1. Introduction

Climate change responses have the potential to challenge existing gender power imbalances and, by doing so, can contribute to the realisation of greater gender equality and women's rights – they can play a *transformative* role. There are unique opportunities for the newly emerging climate change-focused institutions and processes to take a gender-aware approach that contributes to gender and social transformation. (Skinner, 2011:4)

Previous chapters clearly show that climate change has not only had devastating economic impacts on the livelihoods of farming households, but has also had social impacts on both women and men. Climate change has brought unprecedented impacts which expose farming households to greater risk and uncertainty than ever before. Moreover, because of existing power relations, ascribed roles and limited resources, women have become more vulnerable to climate change. Climate change as *crisis* (Pelling, 2011), however, also presents a window of opportunity, particularly for women, to challenge the existing power relations, roles and social arrangements. Because women are revealed to be in a vulnerable situation at the onset of climate change, mainly due to gender relations and unequal access to resources, increasing disaster studies provide insights into how gender roles and existing power relations might change due to the disruption of power structures and norms (Enarson, 2000). Moreover, gender and climate change studies (Nelson et al., 2002; Lambrou and Nelson; 2010; Mishra, 2009; Sultana, 2010) argue that climate change and extreme weather events serve as a window of opportunity to alter existing social arrangements and power relations.

In this chapter, I present some evidence supporting the proposition that gender as a socially constructed identity can be challenged because of climate change. This evidence comes mainly from the in-depth interviews conducted as reflections and experiences can only be captured by this kind of data collection method. I further extend my analysis by arguing that changes in gender roles and relations might persist and eventually become *new norms* as men and women learn to adapt to climate change. Unlike any other climate disaster event, changes in climate are happening through time and should be adapted to

in the long run. Thus, climate change offers a different scenario and opportunities to challenge the existing power relations and other social arrangements.

8.2. Woman: a thinking agent

Like any crisis, climate change requires individuals to reflect on themselves, their situations and their experiences at that critical moment (Enarson, 2010). Crisis can be an avenue for self-knowledge and personal growth and for this to happen, an individual must look at how his/her agency works to understand himself/herself and his/her environment. For a woman who is undergoing crisis, for example, agency is reflected as she gains authority and clearly sees what subjects her and what dominant discourses she can accept or refuse so that she can have control of her own self. In this sense, experience is essential to an account of agency (McNay, 2004). The process of negotiation to alter her situation becomes possible once she has 'reflexive practicing of gender' (Martin, 2003; 2006). The process of negotiation is, however, still largely influenced by the existing structure, but the actions and behaviour can be unanticipated and innovative because agency is inherent in every individual.

Women, given their oppressed situation, are also thinking agents. They reflect on their situation and want to take action to change their situation (Martin 2003). According to my interviews with the women in the rice farming villages, they refuse to be limited by their problems and failures, and choose to rise above the crisis. Crisis becomes an opportunity for them to take action, such as in the case of two female farmers I interviewed:

The one that really challenge me to do rice farming is our frequent losses in farming that was the time that my husband was the one who's managing our farm. We always incur losses. We came up to the point that my husband got sick and he gave up farming. He doesn't like to do farming anymore. He said to me to look for tenant to till our land. I said to myself, I can't accept this, it is just farming. What do they have, I'm sure, I also have. – Farm woman #15

I am the kind of person who does not dwell on my failures [*Ako ang taong di nagtatagal nakadapa*] according to my mum. I rise up immediately. I don't usually give up. I am strong. – Farm woman #24

These women became aware of their potential and wanted to change themselves and their situations. This happens when women's consciousness changes and becomes a

foundation to call for collective action. This was observed in the case of the female leader I interviewed in Cama Juan. Her self-awareness gave her the strength to take on new roles as farm manager and seek external help from government and other formal institutions. Her actions were contagious among female farmers and led them to eventually establish a women farmers' group which could formally help other women in their village.

We need to wake up, that what men can do, women can also do. Because here, I have seen that organisations are usually for men. Women are left behind, what have felt and my experiences have taught me to rise up, even for the other women.
– Farm woman #15

Enarson (2010) points out that those who live through disasters often speak of how the event changed their expectations of themselves and others (Enarson, 2010). Also, because of constant hardships on the farm, they learn to adapt to hard labour and some women even look for an alternative livelihood, not just to have an additional source of income, but to give them a sense of fulfilment:

Since I had been married for a long time of course I miss my partner. In terms of our livelihood, I don't miss him so much since I am used to work. I am accustomed to work even without him. It's fine with me, because I know farming, I am not that burdened with our livelihood I'm used to farm work. Unlike other women, they are so dependent with their husband. In my case, though he died already, I am still very much alive, I'm blooming, I'm serious, I'm not having a hard time. It's still the same, I'm used to this kind of lifestyle. – Farm woman #25

In my case, I am not contented that I don't have any source of income, I am not used to it, I get bored [staying in the house] ... There is a lot of possible livelihood but others instead of being creative tend do gambling [bingo] as their pass time. But if there will be a livelihood that can be done even if you are just inside the house they would not afford to gamble. – Farm woman #16

Agency is a very important to cause of individual and collective action. Many of the women I have met in the farming villages have learned to negotiate with their husbands about their access to and control of resources and even about their roles as they start to realise their potential and that their situation needs to change. This has caused changes in power relations, access to and control of resources and changes in gender roles. These changes are presented in the following sub-sections.

8.3. Changes in power relations

Because of frequent production losses, lack of food and consequential poverty, men and women need to act to lessen the effects of climate change. Any action, particularly inside the household, requires negotiation between the men and women involved. Existing power relations are at work and are manifested in the way they make decisions, even during climate change. Because of women's limited resources and limited power, women cannot help themselves on their own. Crisis brought about by climate change, however, opens up opportunities for women to seek help and support outside their comfort zone, while poverty and constant severe flooding in their communities catches the attention of organisations which have begun to extend help, particularly to women.

Such new opportunities were observed among the female farmers of Cama Juan. The establishment of a women's organisation and microfinance for women in 2008 helped them to realise their potential as farmers. Through their organisation, formal institutions such as extension agencies and banks started to recognise them as *farmers*. Trust gained from formal institutions permitted more female farmers to attend training and seminars about rice farming which increased their self-confidence and self-worth. Moreover, men in their lives, particularly their husbands, started to recognise their abilities and their contribution to the farm and families. Men started to view women differently and allowed them to make important decisions about farming. Some female farmers shared their experiences with pride:

What happened was, people listen to you because of your knowledge, you serve as example to your husband or your brother. He [brother] listens, he follows what I said. – Farm woman #11

I applied what I have learned in farmers' meetings and training activities in managing our 11 hectare farm land, which we mortgaged. In just one harvest, I was able to recover our fields we were forced to mortgage. As a consequence my husband has learned to recognise my skills. He told me 'Abay [referred to as partner], I entrust to you our farm land' ... and I was able to prove to them [husband's relatives] that I am a farmer. – Farm woman #15

It must be noted that negotiation of power is not an easy task, particularly for women, as they constantly need to prove themselves to be equally able and able to make important

decisions for themselves and their households. There were instances where they experienced conflict with men because of changed roles and power relations. Changes in women's status also threatened men's status and identity as they needed to follow women's instructions:

To gain respect from our hired labourers, hands on management is a must. We must be very knowledgeable in every aspect of rice farming from acquisition of inputs to different farming activities. With my experience, it is somehow difficult to gain their respect because I am a woman. There is also a case that some hired labourers cheated and stole bulk of harvested *palay*. When I found it out, the hired man labourer replied with anger to intimidate me. – Woman in Cama Juan focus group #4

It must be an uneasy decision for men to give up more power to women, yet the increased knowledge and contribution of women undeniably changed their household position during extreme flooding. Men shared their views about women and their contribution:

If not for *Mare* [the woman leader in the community] who really pursue with ASKI (to provide loan for us), our fellow farmers will end in nothing. Honestly, she is very persistent to have a better life. She is focusing on their goal to uplift the lives of the women here in our area and through the help of the government ... That is why, I am telling these to them [other women], you are very lucky to have someone like her. – Farm man #20

Wife: I'm usually the one who always attend seminars because he is always busy here in our house and in farming ... I monitor our farming expenses, buy the fertiliser and choose what varieties to grow. My husband does all the field work. I share my knowledge and skills I gained from the training with him.

Researcher: What can you say about the knowledge that she'd learned?

Husband: It's ok, it's effective. If you'll just follow what she've learned, I think it will be effective.

Wife: We witnessed it for ourselves. Because before we only harvest 80 *cavans*/hectares but after we've tried the new variety and techniques, we were able to harvest 224 *cavans*/hectares.

(Source: interview with couple #2)

Changes in power relations in terms of decision-making are also reflected in the changes made by men and women in their livestock management during severe flooding. As mentioned in previous discussions, medium- to small-sized animals are the main responsibilities of women. Men and women were asked about the household decision-making during normal years and flood years in matters of livestock management. Women's role as livestock managers does not necessarily mean that they have direct control over and benefit from this resource. As shown in Table 25, men from Papaya tended to increase their control over this important livelihood resource during a flooding period. Men either solely decided or involved their wives in decision-making but the final decision was made by husbands. Men's response to an extreme flooding event can be explained by their position within the household. They are expected to be on top particularly during difficult times and, since they are the main income earner of the household, they are in a better position to decide how to allocate the limited resources during such periods. Because women of Papaya are still dependent on men for capital and inputs for livestock production, women still have limited control over their livestock. Thus, it is expected that men will be more concerned with sources of livelihood such as livestock during periods of distress.

Table 25. Participation in decision making of men and women in animal raising, Papaya, Nueva Ecija, Philippines, 2011

Livestock	Normal Year			Flood Year				
	Husband only	Wife only	Both (H>W)	Both (W>H)	Husband only	Wife only	Both (H>W)	Both (W>H)
Large animals								
<i>Carabao</i>	64		24		65		26	
Female <i>carabao</i>	80				75			
Cow								
Medium animals								
Goats	67		33		50		50	
Pigs	29	14	57		33	8	58	
Poultry	52	14	27		56	13	27	

Source: 2011 Survey

A different story can be told in the case of Cama Juan. As shown in Table 26, women's control over medium to small livestock was not dominated by men during periods of flooding. The decisions made by women about animal raising during periods of flooding actually increased or were jointly made by husbands and wives. This reveals that power relations changed as the *crisis tendencies* (Connell, 2002) created new situations that changed the existing power structures.

Table 26. Participation in decision making of men and women in animal raising, Cama Juan, Nueva Ecija, Philippines, 2011

Livestock	Normal Year				Flood Year			
	Husband only	Wife only	Both (H>W)	Both (W>H)	Husband only	Wife only	Both (H>W)	Both (W>H)
Large animals								
<i>Carabao</i>	77		15		89		11	
Female <i>carabao</i>	67		33		67		33	
Cow	75		25		100			
Medium animals								
Goats	64	9	27		40	7	53	
Pigs	35	47	18		33	52	14	
Poultry	55	12	25	5	54	13	25	4

Source: 2011 Survey

Changes in power relations lie in empowering the marginalised social groups (Hillhorst and Bankoff, 2004; Phillips and Fordham, 2010). This is reflected in the case of Cama Juan female farmers who were empowered mainly through their association with the women's farmers group which enable them to access and control important farm inputs and thus put them in a position to better negotiate with their partners and to make decisions for their households even in critical situations. Moreover, during *abnormal times* (Shortall 1999; Lukes, 2005), such as times of severe flooding, power structures were relaxed, which allowed women to exercise power and act in different ways. This reveals that although gender arrangements often appear to be unchanging, in reality power structures can be challenged and changed by women. Under these circumstances, opportunities finally open for women to negotiate their power relations and their access to different resources.

8.4. Women learning to adjust their roles in farming and households

One of the major effects of seasonal flooding is the loss of livelihood opportunities in rice farming. Since men and women know that flooding usually occurs during the wet season, they maximise their opportunity to earn during the dry season and save their earnings for the wet season. Men also recognise the need to involve women in on-farm and non-farm activities, which allow women to contribute to household income. Consequently, women are increasingly engaging in different productive activities, especially in rice farming. Their involvement in productive activities not only opens new roles and opportunities for women but also is one of the major adaptation strategies of the farming household during flooding.

8.4.1. From farmer's wife to farm manager

Due to the threat of crop loss because of flooding, many women began to assume managerial responsibilities. Some of the women interviewed said that they had convinced their husbands not to sell or mortgage their lands. Land is one of the major household assets that farmers are not willing to forgo, even in tough times. Female farmers pointed out that there were several factors that paved their way to becoming farm managers:

- ***Mechanization:*** Traditionally, the principal male ploughs the land with the use of water buffalo (*carabao*) while the principal female helps clean the dikes. With mechanisation (tractors and hand power tillers), however, the principal female no longer deals with arduous and dirty jobs but instead supervises hired workers in land preparation. Similarly, harvesting is now an easy task because of mechanisation and thus both men and women are now actively involved in this activity.
- ***Membership in farmers' associations:*** Traditionally membership in farmers' associations is exclusive to men. Due to the strong advocacy of local governments and non-government organisations for empowering women and reducing gender inequalities in access to resources, however, more female farmers are now officially accepted as members of farmer organisations. Female membership in farmers' organisations automatically gives women access to training, credit and

farm inputs. Moreover, the principal woman is now allowed to substitute for or represent the principal man if the principal man cannot attend meetings due to his busy schedule on the farm. Women who have better access to training and credit through membership in farmer associations are more empowered to manage farms.

- ***Long-term experience in farming:*** Most women farm managers were engaged in rice farming when they were young and unmarried. Thus, they are repositories of the indigenous knowledge and skills required to manage farms efficiently. As active members of the household, community leaders and members, and stewards of natural resources, women can offer different resources, indigenous knowledge and understanding of the causes and consequences that could significantly contribute to responding to extreme climatic events (Peralta, 2008:18).
- ***Education:*** Research shows that in the Philippines land is preferentially given to sons, while schooling is given to daughters (Estudillo et al., 2001). Parents invest more in daughters' schooling because returns from female schooling have risen in the non-farm sector, while land is given to sons because rice farming is perceived as involving male labour. On average, female farmers who participated in my study had completed six years in elementary school or dropped out of high school. Highly educated female farmers are more capable of managing their farms, despite their withdrawal from field work. Furthermore, educated women who take over managing the farm are more willing to take risks and to experiment and participate in adaptive research activities because they can easily understand the concepts behind complex technological innovations.

8.4.2. From budget keepers to entrepreneurs

Due to climate change, women bear the burden of allocating or stretching the limited budget for different expenditures and also of saving in anticipation of emergencies. Thus, they seek different sources of cash income, such as fattening swine, raising poultry, growing vegetables for consumption and selling in the village, engaging in small trade (e.g. buying and selling rice), or acquiring land through mortgaging (*sanglaan*). They are increasingly becoming entrepreneurs using agricultural products. This is not possible, however, without the approval of their husbands. Female heads of households (widows

and separated women) tend to be more entrepreneurial, or under more pressure to be creative in finding alternative sources of cash.

I have only have PHP1,000 (AUD22.86) for my *palay* business, when I started, and luckily it multiplied and was able send my children to school. – Farm woman #13

I am selling salted eggs. I sell it to the stores in the town proper and then we also go to Manila. I am doing the salted eggs. It's better than doing nothing while in the house. We also have 14 fatteners and we just have one sow. It's our plan to have hog raising because I cannot travel anymore, I always get dizzy. – Farm woman #16

8.4.3. From supporters to decision-makers

Flooding brought about changes in the roles of men and women in many rice farming households. These changes influenced decision-making and consequently livelihood security. As women are becoming more involved in farm management, most husbands and wives agree that they should participate jointly in making decisions related to farming and investments. Some of these major decisions are:

- to plant or not to plant during the wet season
- where and how much to borrow as capital for rice farming
- what other non-farm income sources they should engage in
- how much rice to store for food consumption for the whole year.

We both make decisions on matters related to farming and our business. We do not let one dominate or not be informed about the decision made. – Couple #4

Involving female farmers in decision-making allowed their voices to be heard. Moreover, they gained more access to and some control over resources that were not available before. Through their participation in agricultural training programs, they had more access to seeds, fertiliser and technical knowledge. In fact, women's influence now extends beyond household decisions to farming and the productive sphere (Reyes-Cantos and Bernabe, 2007). If women are given equal opportunities to men, they can help improve farm management by, in particular, reducing farm expenses. These benefits are now being experienced by some trained female farmers:

We were taught what insects we should look for in the rice fields, so we just spray sparingly. So we save from what we have learned. It is really important to attend to something like that [training/seminar]. Because you can see the things that you need to do. That is why it is not a loss to attend to training/seminar. So if my husband is not available, I am always be the one to attend, but I relay what I have learned. That's how we are as husband and wife. – Woman in Papaya focus group #1

One of the benefits of both husband and wife working together is being able to save money by not hiring labourers. – Farm woman #6

8.5. Men learning to take on *traditional* women's roles

Increasing engagement of women in productive activities requires an increasing participation of men in reproductive roles. Alteration of gender roles is necessary in order to help each other in times of crisis. Changing climate presents opportunities for women to go and work outside the house, while some men increase their time doing the household chores and rearing the children. As shown in Table 27, daily activities of men and women have not only changed in the productive sphere but also in reproductive activities. Surprisingly, 95 per cent of men were already involved in different household chores and child rearing even before severe flooding. Although both men and women increased their time spent inside the house doing different household chores during flooding, it is worthwhile to note that men reported that men increased their participation in child rearing (29 per cent), cleaning of the house (62 per cent), doing laundry (39 per cent). Both men and women decreased their time spent cooking during flooding due to less food being available for consumption and less fuel being available for cooking. This shows that household responsibilities are no longer solely a woman's job. Reproductive roles remained the main responsibility of women, however, and the burden of doing these tasks still increased during severe flooding.

Table 27. Change in men’s and women’s involvement in reproductive activities due to severe flood, Nueva Ecija, Philippines, 2011

Activities	Male (n = 101)			Female (n = 101)		
	Involvement	Increase	Decrease	Involvement	Increase	Decrease
Reproductive activities	95			100		
Child rearing	74	29	3	84	36	3
Cleaning the house	91	62	2	100	79	4
Washing the clothes	83	39	3	99	64	5
Cooking	91	14	24	100	10	38

Source: 2011 Survey

Men shared their experiences of doing the household chores. The absence of women inside the house required men to take on women’s tasks and in some instances the increased workload inside the house brought about by severe flooding meant they needed to help their wives:

Just like now, after I did my laundry I went to my farm and fix the dikes of our rice plots, I already fertilised my crops before I did my laundry. – Farm man #17

I am the one who prepares food and my children will sell those to their school. – Man in Papaya focus group #2

Sometimes I do household chores. Like when I arrived from farm and I see her doing laundry, I’m taking the water from the well. It is not possible that she is washing the clothes then taking the water, so I do that. They [neighbours] see me doing that. – Farm man #12

Women also see changes in the responsibilities inside the house. Men can no longer just sit and relax while women are doing the household chores as both of them go outside to do work in the farm or search for alternative work:

In term of doing household chores, it is now improving, men are helping out. Like my husband, early in the morning he would be the one to sweep the floor. Now, it’s not based on gender, what’s for women or for men, but who is available. Like my son, my neighbours see him, doing the laundry. Men are also now doing the marketing. – Farm woman #15

Clearly, alteration of gender roles is now occurring in the rice farming communities in this study. These changes are now being accepted by men and women not just inside the

household but increasingly by the communities. Social change is bound to happen as climate change not only disrupts their traditional livelihood but also causes men and women to respond to the disruption, inevitably altering the existing social norms, gender and relations.

8.6. Climate change: necessary but not sufficient for climate change

In the beginning of this chapter, I initially asked if climate change can be an opportunity for social change. Now, after presenting all evidence from the field, results of the study supports the claim that climate change can opens up a space for social change. I argue that aside from being a space where vulnerabilities are merely address, it also provide a space where gender inequalities can be challenged and changed. Since women became active agents during and after severe flooding, it caused some changes in their gender roles and relations. In this sense, uncertainty and crisis brought about by climate change can provide the impetus for empowerment and radical change. Much of the success stories presented in this chapter, however, happened in the gender regime of the family, wherein women were able to negotiate more equitably with men regarding access to resources and decision-making. It must also be noted that, the drive for radical change was not just brought about by women thinking and acting differently during and after severe flooding but more so because of the external support of the NGO and local government. Thus, I argue that climate change was a necessary condition but not sufficient condition to affect social change.

Furthermore, in order to sustain the alteration of gender roles and relations and further empower women, radical changes must also be seen in the gender order in terms of the changes in the systems, e.g. laws, land inheritance, credit system and other dominant structures. In this way, women and men are assured of radical social transformation. This will take not just a climate change to happen but more so it requires a change at state and at the institutional level. Adequate support from government and agricultural research institutions through agricultural technological interventions, training programs and policies are necessary in order to empower women. There is also a need for global women's movement to assist women at local levels who have made mental shifts to have their rights addressed for them to become more resilient to climate change.

8.7. Summary

In this chapter I tackled the opportunities for women to challenge the existing power relations under climate change. The results of my study provide additional evidence to show that changes in existing gender relations and roles can be brought about by climate change and that therefore climate change provides an opportunity and space for social change. Women came to realise their potential and ability to adapt as they started to reflect on themselves and analyse their situations. This is more evident in the case of the Cama Juan female farmers who, because of poverty coupled with extreme flooding, went out of their way to seek help from others. At the same time, their poverty and the constant and severe flooding in their communities caught the attention of some government agencies and non-government organisations which started to extend help, particularly to women. Through the help of community developers, women were organised into an association and this enabled them to gain access to different resources such as credit, training, seminars and other farming inputs. Consequently, this increased their sense of self-worth and confidence. These changes were evident in the case of female farmers, particularly of Cama Juan.

This empowerment of vulnerable women increased their confidence in negotiating power relations and increased their access to and control over the household's resources. There was also an increased role in making important decisions about farming and affairs of the households. Cama Juan female farmers undoubtedly contributed to the increased resilience of their households as they started to engage in different productive activities as part of their adaptation responses to climate change. Men, on the other hand, started to recognise women's abilities and worth which made them willing to relegate power to the women in their lives. Although it was not an easy decision for men to take, the need to respond to crisis made them realise that women can contribute at that critical moment. Men even took on additional responsibilities inside the house as a trade-off for women's increasing participation in economically productive activities.

In the latter part of this chapter, I further argued that climate change was a necessary condition but the not sufficient condition to social change. Although, climate change can provide an impetus for women empowerment and radical change, alteration of gender roles and relations did not happen because of women who think and act differently

during and after the climate crisis. As the observed changes only affected the gender regime in the family, there are a lot of changes needed in the state and at the institutional level in order to transform the gender order in terms of changes in laws and existing social structures. Thus, this chapter concluded by stressing out that adequate support by government and other institutions is needed in order to empower women. Global women's movement is also needed to assist the local women to better negotiate their rights and thus make them more adaptable to climate change.

CHAPTER NINE: SUMMARY AND CONCLUSIONS

9.1. Introduction

In this concluding chapter to the thesis, I discuss the implication of my findings. This chapter is presented in several parts. The first part is a brief summary of the main findings, which I compare and contrast with other studies discussed in chapters 2 and 3 of this thesis. In the second part, I discuss the contribution of this thesis generally, and its contribution to academia, policy, the rice sector, and male and female rice farmers. The chapter also discusses the limitations of the study, offers some suggestions for future research and finally ends with some concluding remarks.

9.2. Key findings of the study

The aim of this thesis is to understand how gendered adaptations are produced and reinforced in the rice farming communities of the Philippines as responses to severe flooding. My study reveals that the adaptation strategies of men and women are largely influenced by the existing social structure. Using a practice theory approach, gender and power relations were viewed as broad conceptual categories of *structure*. These structures are influenced and defined within the broader systems of culture, social and economic systems and even the physical environments within a society. While gendered practices such as gender roles and relations are deemed normal and unchanging, I argue that these structures are socially constructed and therefore are not universal and can be challenged and changed. In the same way, men and women learn to adapt to climate change according to their own reflections and experiences. To demonstrate such adaptation responses, I use the concept of agency, acknowledging that individuals as social agents can be innovative and deviate from the known structures in the society. Climate change is seen as a time and space where gendered roles and relations are unstable and thus can be reshaped as men and women respond to climate change.

My findings provide evidence that highlights that severe flooding is caused by climate change and is now a reality. My study also shows how existing social systems have influenced the vulnerabilities and impacts of climate change in rice farming communities. Moreover, my findings provide numerous examples of how broader *systems* and

structures influence the gendered vulnerabilities and adaptations of men and women. Finally, my study demonstrates how climate change can provide space for women's empowerment and social change. Specifically:

- **Climate change has led to changes in frequency, intensity, duration of severe flooding events in two farming communities**

The frequency and severity of typhoons and floods occurring in the Philippines has dramatically increased over the last 30 years. This has been observed by male and female rice farmers of Cama Juan and Papaya as severe and unpredictable flooding has become more frequent in recent years. Based on the survey conducted, 50 per cent of the men and women interviewed observed that there was increased rainfall, particularly during the wet season, which caused heavy flooding, and extreme heat during the dry season. Moreover, farmers are now aware that changes in climate are not just due to natural changes in the environment but are significantly affected by human activities. This supports the findings of the IPCC (2012) that climate change has led to changes in frequency, intensity, spatial extent and duration of extreme weather events, specifically flooding.

- **Climate change has devastating consequences for rice farming communities**

Severe flooding in rice farming communities brought about by climate change has had direct consequences for rice productivity and income. Because of crop loss and/or low productivity, many farming households were faced with increasing debts as they were not able to repay their existing loans and also needed to recapitalise for the next cropping season. Other sources of livelihood, such as livestock, non-farm and off-farm employment, were also affected by severe flood, which further increased the pressure to look for alternative livelihoods during this period. Moreover, available food was reported to be inadequate and led to food insecurity for some. Both men and women reported that there was a decrease in basic food such as meat, fish, rice and drinking water during severe flooding. Health problems are aggravated during flooding, which affect young children and women. Extreme weather events often create conditions conducive to outbreaks of

infectious diseases, such as athlete's foot, and common sickness such as colds, cough and fever brought about by changes in weather.

- **Climate change has differential impacts on the two farming communities mainly due to nature of the floods and varying responses to them**

Papaya farmers experienced more devastating effects of flooding due to its unpredictable timing and intensity in recent years. The lack of alternative livelihood resources made them unable to cope with the unprecedented consequences of severe flooding for their rice farming. In Cama Juan, on the other hand, poverty, isolation from the central town where external support comes from, and long experience of severe flooding made male and female farmers learn to be independent by securing their households and livelihoods during extreme weather events. By diversifying their sources of income, Cama Juan farmers could compensate the loss of income from rice farming at the same time as being less vulnerable to the impacts of flooding. It must be noted, however, that impacts also varied across households, depending on the resources available for them to use to adapt to flooding. This shows that aside from the existing social and economic structure that could limit the household's response to climate change, perceptions about flooding and the household's capacity also influenced the level of responses and thus the impacts of climate change.

- **Poor institutional systems make the rice farmers worse off under climate change**

Marginal land ownership, poor financial and credit support systems, poor extension services and poor access to information about farming and weather are existing problems for rice farmers in the Philippines. Their capacity to adapt to the changes in climate are structurally limited by these existing institutional arrangements and thus, when climate change strikes through extreme weather events such as flooding, farmers incur crop losses, low productivity and indebtedness.

- **Existing gender practices cause the differential vulnerabilities of men and women to climate change**

Institutional sexism¹³, ascribed roles and gendered norms cause women to be adversely affected during severe flooding. Existing gender inequalities manifested in the ownership and control of important assets, such as land, education and credit, cause women to be more vulnerable to climate change. Traditions in farm inheritance, where men, because of their status of being the provider of the household and *farmers* are preferred by parents to inherit the farm, make it more difficult for women to inherit land. Because of this patriarchal system in the farming communities, formal institutions, including the government, recognise men as the legitimate farmers who are supposed to receive information and support and thereby exclude women from access to important farm inputs such as seeds, fertilisers, training, seminars and formal credit.

Women became more vulnerable to climate change due to unequal power relations, ascribed gendered roles and limited access to and control over resources. The power and position of most women remained the same before and during crises. Even if women were fully aware of the devastating impacts of climate change, they were not able to decide alone for themselves and their households. Consequently, they lost the opportunity to lessen the impacts of climate change, and thus tended to be more vulnerable to climate change.

- **Gendered inequalities are exacerbated during climate change**

Inequalities in terms of power, status and access to and control of resources among men and women are evident in rice farming communities. The existing inequalities were observed to persist and in several accounts were observed to be exacerbated due to the varying responses of men and women to severe flooding. First, the decrease in the resources and assets of the farming households led to household members, particularly women, having a limited capacity to respond to changes in climate. Second, it was observed that more men than women took

¹³I defined institutional sexism as discrimination against one's gender (in particular women) due to set rules by the formal and informal institutions.

action during severe flooding. This can be explained by men's status within the household and community. Men have greater power and thus make more decisions as to how the household responds and uses the household resources. Finally, the loss of livelihood forced men and women to look for alternative income but women, due to their traditional gender roles, were expected to stay in the house to look after the elderly and the young children. Moreover, the workload inside the house was reported to have increased during severe flooding as the household needed to recover their property and the assets that were saved from the floods. Their immobility limited their capacity and the time they had to look for alternative livelihoods, thus they became more dependent on their men for survival.

- **Male and female farmers adapt to extreme flooding based on their roles and relations**

Men's position and experience as farmer and provider of the household is reflected in their responses to severe flooding. Most men did not alter their behaviour as they still decided what adaptation responses the household should take particularly in adjustments in rice farming. Their experiences in farming and farm management were recognised by the household and rice farming community, leaving women with limited space to express their opinions and experiences which could have contributed to the household's adaptation strategies. Moreover, women were expected to fit their expectations and activities around men. As expressed by most of the female farmers, responses to severe flooding involved increased support to their partners and farming. Many women reported that they were going out in the field to do different farming activities to support their husbands. Some reported that they increased their borrowing on behalf of their husbands as men were reported to be too shy to ask for help and support from other people. The patriarchal relations in farming communities put further pressure on men as well as women to conform to certain gendered norms. This provided little room for alternative versions of masculinity and femininity in rice farming communities even under climate change.

- **Severe flooding has differential impacts on male and female farmers**

Men experienced considerable stress as they were left with little economic and livelihood opportunities during and after extreme weather events. This was manifested in increased health problems such as high blood pressure and increased physical stress. Moreover, hegemonic masculinity encouraged men to take risky behaviour that could endanger their health and lives. Men were reported to have increasingly exposed themselves to risk by walking in flood water and contracting athletes' foot and, among elderly men, rheumatism. Also, due to a perceived failure to make the masculine grade, young men in particular tend to generate emotional tension and internal conflict (Mishra, 2009). Findings of my study also revealed that more men reported that there were increased disagreements among family members. This coincided with the increased alcohol intake. This was observed among male farmers, particularly in Papaya, where some men were drinking in order to cope with stress due to flooding. Women on the other hand, experienced pressure to acquire loans, were more stressed and anxious and felt the physical isolation due to severe flooding.

Although women are not primarily responsible for taking and repaying loans, increased responsibilities to take loans from informal resources burden them rather than empower them. The stress and pressure were coupled with an increased concern for the safety of their family during flooding. They also became more anxious as they incurred crop losses which had a direct impact on their income and the food available for household consumption. Moreover, women felt their isolation from their loved ones and community. Aside from the fact that floods separated the neighbouring households physically, men and other members of the households went outside the village to look for alternative livelihood. Consequently, women had to stay inside the house to attend to most of the household responsibilities. Dependence on men to take action to recover from losses due to flooding meant that, for some households, the recovery period took some time. As a consequence, even children and young adults felt the impact of lost livelihoods and resources. The incidence of dropping out of school and early marriage were reported by a few households.

- **Men and women learn to accept and take on new roles in response to extreme flooding as part of their adaptation to climate change**

One of the necessary changes in rice farming in response to severe flooding is the increased involvement of women in different productive activities. Men in particular recognised this need which, in the process, not only allowed women to contribute to household income but also opened new roles and opportunities for women to explore new space and status inside the household and in rice farming communities. Women took on new roles as they engaged in productive activities, such as the role of farm manager, entrepreneur and decision-maker and, as a consequence, gender relations were observed to somehow change as men relegated some of their power to women, recognising women's contribution, abilities and experience. Changes in roles and relations did not happen overnight, however. Resistance was observed among men while women needed to negotiate and continuously prove that they were capable and worthy of their newly earned roles and positions. Moreover, as a result of the increased participation of women in productive activities, men were observed to take more responsibilities inside the house. Participation of men in childrearing, cooking, cleaning and doing the laundry were observed to increase during and after severe flooding.

Sharing reproductive responsibilities with women has become a normal practice for most of the households interviewed rather than being only seen in isolated cases. This implies that gender as a socially constructed concept can be challenged and changed. Gender as *situated accomplishment* (Fenstermaker et al., 2002) was reflected as men and women responded to *crisis* and to current material conditions. The household's depleted resources and livelihoods caused women and men to take on new roles and relations which overrode the traditional gendered practices. The financial and economic conditions of the households clearly influenced men's and women's adaptation responses to climate change.

My findings cannot be generalised beyond the communities under study, however, as several studies point out that crisis, such as economic recession in Mexico and

the Philippines, did not necessarily alter gender roles and relations (Chant, 1996). Climate change studies also suggest that dominant gender roles and relations persist under climate change. A study from Ghana suggests that adaptation strategies taken by farmers had little to do with the material outcomes of their actions but were linked to their existing gender roles (Carr, 2008). Despite the less optimal and inequitable outcomes of the actions they took, their adaptation strategies were legitimised by their existing gender roles and relations in the community. This also true in the case of a Nicaraguan study where Bradshaw and Linneker (2009) argue that women's involvement in community efforts and outside their domestic sphere did not change their gender roles and relations during and after disaster. Given that past studies have findings that contrast with my study, it is recommended to further examine how social change occurs. Nevertheless, this study provides a benchmark for replicating this kind of study in other countries.

- **Climate change was the necessary condition but not a sufficient condition for women to achieve radical change**

As observed from the experiences of farm women in the rice communities studied, their reflection on themselves and their situation starts with the refusal to be beaten by constant losses and poverty coupled with climate crisis. Their pressing situation indeed became an 'avenue for self-knowledge and personal growth' (Enarson, 2012). Women started to go out of their way to seek external support from people and institutions around them. The aspired changes were not the result of their own effort, however, but of the institutions around them paving the way for them to be finally empowered and causing change. One non-government organisation that organised women in Cama Juan played a critical role in reshaping women's perceptions of themselves and their potential capacities. As women became organised, they were formally recognised as *farmers* by formal institutions. Collective actions to seek training and support became possible and thus increased their capacity as farmers and agents of change. They became empowered as they were able to access different resources, such as credit and farm inputs, which increased their economic contribution.

The findings of my study suggest that climate crises indeed alter the gender roles and relations which were uniquely observed in the rice farming communities studied. In contrast with past studies conducted (Carr, 2008; Bradshaw and Linneker, 2009), new roles and relations are taken up and accepted by men and women in rice farming communities. Also, the enhanced economic contribution of women increased their power in gender negotiations as more women were able to decide how to contribute and support the livelihood and affairs of the household. This is also a deviation from the study of Alston and Whittenbury (2012) which argues that the expected increase in power did not necessarily occur as women's contributions were viewed as just part of the farm's survival strategy and thus in the long run women were deemed likely to return to their traditional farm roles.

Various and contrasting findings of different studies seem to suggest that climate change was a necessary condition but not a sufficient condition to cause or sustain changes in gender roles and relations. As changes in gender roles and relations are mostly observed in the gender regime level of the family, climate crisis did not adequately cause changes in the gender order. Therefore, radical transformation not only requires women to think and act differently but also requires change at the state and institutional level— to the gender order of society. Adequate support by government and other institutions is needed in order to empower women. I would further argue the need for a global women's movement to assist local women to better negotiate their rights and thus assist them to adapt to climate change.

9.3. Contribution of this thesis

This thesis has added to the existing gender and climate change studies particularly in the Philippines literature. Also, findings of my study are considered relevant in informing policy and other stakeholders such as the rice farming sector and farm men and women.

9.3.1. Relevance for academia

This study has contributed to a growing body of literature on gender and climate change and has significantly added to the existing work in the Philippines. Gender is commonly included in climate change vulnerability assessments but is rarely integrated in adaptation research. Thus, by examining how gendered adaptation practices are accepted and reproduced by men and women who are living with climate variability, my study provides a deeper understanding of the adaptation strategies taken by men and women. Moreover, I developed an innovative methodological approach for studying gender and climate change. This study used mixed methods to capture the perceptions and voices of men and women at the same time as quantifying the degree to which men and women are impacted by and have responded to climate change. Consequently, my study generates a more quantitative and gender-segregated set of data which is not available from most of the past gender studies. This kind of innovative method provides an effective and rigorous approach to studying gender and climate change.

9.3.2. Relevance for policy

My study, with its gender-based approach to assessing the adaptation strategies of men and women, can influence policymakers to develop more gender-sensitive climate policies and regulations. In this study, I have identified the differential vulnerabilities of women and men to extreme weather events brought about by climate change. Such findings would enable policymakers to put measures in place to combat environmental degradation with the aim of minimising the vulnerability of the women and men affected by it. Also, I have highlighted that the gendered adaptations of men and women to climate change are affected by their adaptive capacity. Thus, this study also provides a rationale for creating more policies and programs to support male and female rice farmers with the aim of increasing their adaptive capacity to climate change. Moreover, my study draws policymakers' attention to the climate-sensitive sector of rice farming. Without proper government intervention to supply basic support such as land ownership, credit systems and extension services, rice farming would not be a viable and sustainable form of livelihood.

Men and women are aware of the uncertainty of climate conditions and the future of their farming activities and the risks involved. Their increased awareness of their situation makes them more conscious of their need to adapt to secure and sustain their livelihoods. In my discussions with male and female farmers, they suggested the following strategies for the consideration of policymakers:

- Provide more accurate weather forecast to rural areas. It is important for farmers to have accurate weather forecasts as rice farming is fully dependent on climate. With accurate weather forecasts, farmers can reduce the anticipated negative effects of floods by adjusting their cropping calendar or growing short-duration varieties that can enable them to escape or avoid typhoons and flooding months.
- Introduce rice varieties for various types of floods, such as deep and stagnant flooding. For example, while the International Rice Research Institute (IRRI) and Philippine Rice Research Institute (PhilRice) have developed and introduced rice varieties which are tolerant of long submergence (14 days), farmers still look for varieties which are not only tolerant of stagnant and deep flooding but which also have higher yields than the varieties they use, command a good price and have good eating qualities.
- Give women access to credit and training. Most women expressed their need to have access to formal credit at lower interest rates. They also want to be trained on all aspects of rice production until post harvest to improve their yields. Women should be given technical knowledge and skills to enable them to know what rice varieties to grow in stress prone environments. Moreover, women's potential talents as key agents of change and their resourcefulness in adapting to climate change should be enhanced by providing them with opportunities to participate in other agricultural training programs and extensions as well as in livelihood programs.
- Provide better irrigation canals and floodway systems to regulate the flow of water to the rice fields.
- Regulate the price of farm inputs and fuel. This would enable farmers to increase their profits and encourage more farmers to continuously cultivate their lands.

- Provide alternative income-generating activities. To supplement their rice farming expenses, farmers require other livelihood activities that are suited to their environment. Women in particular would like to have other livelihood activities during the wet season when rice farming is not possible. They want income-generating activities that can be undertaken in their homes or near their homes. Proximity is still a major concern for women as they need to take care of the household chores and child care. Men also would like to engage in other livelihood activities but they are constrained by lack of capital and skills. Vegetable farming and livestock raising (e.g. duck raising) are potential sources of income. Farmers need to learn about livestock management as well as opportunities to earn off-farm and non-farm income.
- In times of extreme climate variability, gender roles change out of necessity. Thus, there is a need to remove gender-specific barriers to building up assets (e.g. gendered norms of land inheritance and access to formal credit systems and land acquisition) so that men and women can better adapt to the effects of weather shocks.
- Key agricultural agencies need to coordinate their activities to address the impacts of climate change. This is to avoid duplication and to accelerate the dissemination of technologies and information to farmers, both men and women.
- Stakeholders need to commit to carry out and sustain good projects and new technologies that farmers can use as part of their adaptation strategies.

9.3.3. Relevance for the rice farming sector

Findings of this study highlight the devastating impacts of climate change on the rice farming sector and show that its impacts vary between male and female farmers. Also, findings of the study reveal that agricultural policies such as land reforms and provision of credit has been biased towards men thus causing women to be more vulnerable to climate change. This alerts the rice farming sector to the institutional arrangements that impede the capacity of women to respond to climate change. Moreover, this study emphasises the valuable contributions of women in responding to climate variation and also in sustaining rice farming as the main livelihood in many of the rural communities in

the Philippines. Thus, rice farming associations and individual farmers must lobby for more equitable distribution of resources among male and female farmers.

9.3.4. Relevance for male and female farmers

My study reveals that climate crisis encouraged self-reflection and personal growth for a few of the women I interviewed. It also increased awareness not only among female farmers but also among male farmers of their capacities and limitations during climate change. Studies like this support farm women to be more radical and act collectively to challenge the existing roles and relations. For farm men, studies like this serve to open their eyes to the potential and economic contributions of women. Studies like this can also influence the way the outside world perceives male and female farmers as they offer an understanding of how to approach and support these farmers in a more equitable ways. The findings need to be disseminated through seminars, workshops, conferences and training programs to different stakeholders such as government agencies, development workers, international organisations and policymakers.

9.4. Limitations of the study

The findings presented in this thesis relate to the rice farming communities of the Philippines. Particularly, they relate to the male and female rice farmer respondents – the research sample. Since this is a case study for specific groups of people in local communities in the Philippines, the specific results of my findings cannot be generalised to people in other locations. Although I also used a mixed method for this research, quantitative results can still only be generalised for the respondents studied. Notwithstanding, some of the general findings in terms of concepts, such as influence of gender, power and agency on the adaptations of men and women may be applicable to other localities that are similar to this Philippine case study. The rice farming communities studied are similar to other rural communities in the Philippines which are heavily dependent on agriculture and are constantly faced with severe flooding. Also, the rice farming communities of this study can be compared to other rural communities in many developing countries in Asia where unpredictable flooding is becoming a major

hazard faced by poor farming households. My findings may be of methodological and theoretical use to a research study similar to this one.

Moreover, my study mainly focused on the livelihoods of men and women to examine the gender practices and adaptation strategies taken by them. By doing so, it may have excluded some other gender aspects. I also recognise that there are many ways of studying the adaptation strategies of men and women. For instance, examining how men and women respond to climate change as influenced by existing climate policy is an aspect not included in this study.

9.5. Suggestions for future research

There are several possible avenues for further research that arise from this thesis and they include the following:

- As demonstrated by this study, gender is an important aspect of the study of climate change and should not be viewed as an intrusion or just an intervening variable in climate change research. Thus, there is a need for a gender-based approach to climate change to further understand the differential effects of extreme climate events on men and women as well as their adaptation strategies.
- Viewing gender as a socially constructed behaviour, with roles and relations appropriate for men and women, implies that it can be challenged and reconfigured depending on the situation or condition of a given society. Moreover, gender is not a universal concept and thus varies across class, race and other social categories. This has been proven by several past gender studies. This study proves that men and women indeed respond according to their material condition and the crisis they are confronted with and thus alter existing gender roles and relations. Rather than merely complying with the *traditional* concept of gender, they reshape their gender roles and relations. Drawing from the view of gender as situated accomplishment, it is worth exploring how material conditions and crisis influence the conception of gender.
- This study provides evidence that external support and institutions play a critical role in enhancing women's empowerment, and thus reshaping gender roles and

relations, but the evidence is limited. Thus, further study could examine the causal linkages of climate crisis, institutions and other drivers of development.

- Findings of my study are particularly relevant to the individuals in the rice farming communities studied at a given time and location. In other words, my findings are location and time specific. Findings such as whether alteration of gender roles and relations is caused by people's responses to climate change need further research and deeper study. Longitudinal study would be a good way to examine such life events of a particular society or group of people through a longer period of time. This would make observations more accurate as such a study would enable us to see patterns that are less likely to be the result of cultural differences across people. On the other hand, it is also recommended to conduct cross-sectional study to prove the phenomenon of changes in gender roles and relations under climate change. A multiple-case study would be a good approach to describing this process or to supporting inferences of cause and effect. More extensive studies could encourage development policymakers and development workers to further support policy and programs that promote gender equality and women's empowerment.

9.6. Concluding remarks

The rice farmers interviewed strongly claim that climate change is now a reality on the ground. Increasing flooding events in the rice farming communities studied brought about by increasing typhoons and heavy rainfall have made these communities more exposed to climate hazards. These kinds of extreme weather events have resulted in loss of livelihood and have escalated debt burdens that have long-term welfare consequences for farming households. It is likely that some rice farmers will be trapped in this kind of this situation under climate change. Differences in climate change perceptions, vulnerabilities and adaptation to climate change of men and women results in differences in the impacts of climate change. Although both men and women face the same extreme weather event, the lived experiences of women are different from men. Both men and women are affected by losses brought about by severe flooding. Women, however, became more vulnerable than men because of their unequal access to and control over resources that could be used to

reduce the impact of severe weather events. Consequently, their adaptation responses are limited in comparison with men. Men dominantly dictate what to do in their farming activities and what changes can be made in their rice farms. Moreover, men and women tend to continue in their gender roles and to adhere to gender norms and relations as they adapt to flooding. Prolonged exposure to flooding and continuous loss of livelihood, however, have made some men and women realise the need to alter their gender roles and relations. These gender role changes have resulted in increased access to resources and empowerment among women who take on additional responsibilities and change their roles in rice farming and in the household. This has also created additional burdens for women, however, as they become more concerned with managing their farms and at the same time taking care of household welfare. Thus, women's potential talent as key agents of change and their resourcefulness in adapting to climate change should be enhanced to help them effectively adapt to climate change.

Furthermore, this study provided an evidence that climate change crisis can provide a space for social change. Climate uncertainty served as an impetus for women to think and act differently. However, the observed changes in gender roles and relations were facilitated by external support. Therefore, I argue that climate change was a necessary condition but not a sufficient condition to affect social change. Also, changes in gender roles and relations were mostly observed at the gender regime, particularly within the households and immediate social relations. This suggests that newly formed gender practices might be temporary unless actions taken by women influence the gender order—that is the dominant gendered practices in the state and institutional level. Thus, it is important to organise a women's global network which can assist local women to negotiate their rights to important assets and resources and for them to influence social policies that will protect them to climate risks and increase their resilience to climate change. Moreover, there is a need for the government, development organisations, research institutions, civil societies and communities to act collaboratively in order to maximise access to recent information about the changing climate and to efficiently utilise their existing resources to combat the negative impacts of climate change. Coordination among stakeholders is needed for a faster and more sustainable adaptation among individuals and communities.

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APPENDIX TABLES

Appendix Table 1. Average agricultural production and income by village, Nueva Ecija, Philippines, 2011.

Parameter	Normal year	Flood year	t-test (p-value)
Papaya	(n = 100)	(n = 100)	
Rice production			
Wet season			
Area (ha)	2.13	2.16	0.620
Production (kg)	6,015	1,376	0.000 ***
Yield (t/ha) (n=91)	2.97	0.69	0.000 ***
Dry season			
Area (ha)	2.74	2.72	0.832
Production (kg)	13,340	13,524	0.612
Yield (t/ha) (n=98)	4.80	5.15	0.240
Livestock production			
Large animals	0.3	0.3	0.482
Medium size animals	1.4	1.1	0.080 **
Poultry	20.8	8.0	0.002 ***
Income (Php)			
Rice income	84,644	58,378	0.000 ***
Non-rice income	1,437	430	0.000 ***
Livestock and fisheries income	7,905	5,256	0.000 ***
Off-farm income	6,340	3,914	0.000 ***
Non-farm income	31,664	25,700	0.000 ***
Cama Juan	(n=101)	(n=101)	
Rice production			
Wet season			
Area (ha)	1.74	1.85	0.079 *
Production (kg)	5,307	2,492	0.000 ***
Yield (t/ha) (n=88)	2.95	1.35	0.000 ***
Dry season			
Area (ha)	2.45	2.43	0.622
Production (kg)	13,937	13,568	0.472
Yield (t/ha) (n=94)	5.77	5.58	0.152
Livestock production			
Large animals	0.3	0.3	0.566
Medium size animals	1.9	1.9	0.987
Poultry	35.3	22.9	0.000 ***
Income (Php)			
Rice income	99,476	79,920	0.000 ***
Non-rice income	2,563	890	0.001 ***

Livestock and fisheries income	13,985	7,760	0.000 ***
Off-farm income	7,167	5,311	0.000 ***
Non-farm income	31,864	27,205	0.000 ***
All	(n=201)	(n=201)	
Rice production			
Wet season			
Area (ha)	1.93	2.00	0.110
Production (kg)	5,659	1,937	0.000 ***
Yield (t/ha) (n=179)	2.96	1.02	0.000 ***
Dry season			
Area (ha)	2.59	2.58	0.678
Production (kg)	13,640	13,546	0.766
Yield (t/ha) (n=192)	5.28	5.36	0.641
Livestock production			
Large animals	0.3	0.3	0.399
Medium size animals	1.7	1.5	0.561
Poultry	28.1	15.5	0.000 ***
Income (Php)			
Rice income	92,097	69,203	0.000 ***
Non-rice income	2,003	661	0.000 ***
Livestock and fisheries income	10,960	6,514	0.000 ***
Off-farm income	6,755	4,616	0.000 ***
Non-farm income	31,765	26,456	0.000 ***

*Note: *significant at 10%, **significant at 5%, ***significant at 10%*

Source of raw data: 2011 Survey

Appendix Table 2. Male perceptions on farmer's constraints in responding to severe flooding (in per cent), Papaya village, Nueva Ecija, Philippines, 2011.

Constraints	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Stay at home to care for children, elderly & sick	60	11	0	24	5
Too many household chores	38	10	0	41	11
Too many work in the farm	16	4	3	41	35
Pressure to perform gender roles (father/mother)	24	4	2	47	22
Low income	7	2	3	45	43
Less capital	12	2	2	31	53
Less access to credit	23	10	2	41	23
Less access to inputs	33	14	3	41	9
Less support from others (relatives, neighbors)	41	11	7	38	2
Less institutional support (from govt /or asso.)	33	7	5	43	12
Less access to education and information	19	3	6	59	13
Less access to appropriate technology	31	10	7	44	9
Less power over family finances and assets	71	4	9	16	0
Less power to decide on household strategies	69	4	10	15	2

Appendix Table 3. Male perceptions on farmer's constraints in responding to severe flooding (in per cent), Cama Juan village, Nueva Ecija, Philippines, 2011.

Constraints	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Stay at home to care for children, elderly & sick	64	4	1	28	3
Too many household chores	59	10	3	28	0
Too many work in the farm	20	3	0	44	33
Pressure to perform gender roles (father/mother)	34	11	2	37	16
Low income	12	2	2	45	39
Less capital	9	4	2	41	44
Less access to credit	23	8	1	35	33
Less access to inputs	38	18	5	26	13
Less support from others (relatives, neighbors)	45	14	9	30	2
Less institutional support (from govt /or asso.)	36	7	3	39	15
Less access to education and information	24	12	7	42	14
Less access to appropriate technology	34	14	4	42	6
Less power over family finances and assets	72	1	7	17	2
Less power to decide on household strategies	72	3	7	14	3

Appendix Table 4. Female perceptions on farmer's constraints in responding to severe flooding (in per cent), Papaya village, Nueva Ecija, Philippines, 2011.

Constraints	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Stay at home to care for children, elderly & sick	38	8	3	36	15
Too many household chores	25	7	0	35	32
Too many work in the farm	60	10	1	17	11
Pressure to perform gender roles (father/mother)	33	8	3	43	13
Low income	17	2	1	39	42
Less capital	15	1	0	36	48
Less access to credit	31	6	0	34	28
Less access to inputs	41	7	13	30	9
Less support from others (relatives, neighbors)	46	15	1	33	5
Less institutional support (from govt /or asso.)	39	7	9	32	13
Less access to education and information	31	8	13	34	14
Less access to appropriate technology	41	10	9	34	5
Less power over family finances and assets	52	11	4	31	1
Less power to decide on household strategies	58	16	3	23	0

Appendix Table 5. Female perceptions on farmer's constraints in responding to severe flooding (in per cent), Cama Juan village, Nueva Ecija, Philippines, 2011.

Constraints	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Stay at home to care for children, elderly & sick	32	12	5	30	21
Too many household chores	32	8	3	35	23
Too many work in the farm	54	11	3	17	14
Pressure to perform gender roles (father/mother)	29	15	5	35	15
Low income	14	2	4	35	45
Less capital	12	2	2	47	37
Less access to credit	26	15	8	27	24
Less access to inputs	45	13	9	20	14
Less support from others (relatives, neighbors)	49	13	9	21	9
Less institutional support (from govt /or asso.)	42	10	14	21	13
Less access to education and information	36	11	4	40	9
Less access to appropriate technology	42	12	5	35	5
Less power over family finances and assets	66	12	12	10	0
Less power to decide on household strategies	65	11	10	14	0

Appendix Table 6. Adaptation strategies/changes (in per cent) done by male farmers as response to severe flood, Papaya village, Nueva Ecija, Philippines.

Adaptation strategies	Never	Very Seldom	Seldom	Often	Very Often
Change in rice variety/ies	3	4	34	42	17
Change in cropping pattern	89	2	8	1	0
Shift from crops to livestock	90	2	6	1	1
Grow more cash crops	74	1	10	12	3
Grow more kinds of crops	78	2	10	10	0
Grow input-saving crops	62	9	16	11	2
Adjust planting activities	45	6	21	26	2
Cultivate smaller area than usual	79	3	9	2	7
Resow when crops damaged	10	11	39	35	5
Replant when crops damaged	14	6	38	39	3
Build higher dikes around the rice plots	47	2	8	35	8
Leave as fallow	84	3	7	1	5
Migrating	90	0	8	2	0
Look for wage labor	57	7	18	15	3
Acquire loan	9	4	15	43	29
Take support from relatives/friends	28	13	43	15	1
Secure all valuable items	2	3	21	53	21
Mortgage land	90	2	8	0	0
Sell assets	94	3	3	0	0
Go fishing for food and/or extra income	53	6	21	17	3
Spend less	6	3	12	51	28
Seek assistance from the government support	70	10	16	4	0
Store food and other basic necessities	1	4	11	58	26
Acquire crop insurance	78	8	7	5	2

Appendix Table 7. Adaptation strategies/changes (in per cent) done by male farmers as response to severe flood, Cama Juan village, Nueva Ecija, Philippines.

Adaptation strategies	Never	Very Seldom	Seldom	Often	Very Often
Change in rice variety/ies	3	9	22	49	18
Change in cropping pattern	92	4	4	0	0
Shift from crops to livestock	89	1	8	1	1
Grow more cash crops	70	0	9	15	6
Grow more kinds of crops	74	2	12	8	4
Grow input-saving crops	64	3	16	17	0
Adjust planting activities	33	4	16	45	3
Cultivate smaller area than usual	47	1	10	19	24
Resow when crops damaged	12	2	39	40	8
Replant when crops damaged	15	3	40	34	9
Build higher dikes around the rice plots	24	2	10	44	21
Leave as fallow	72	3	10	5	10
Migrating	76	3	14	5	2
Look for wage labor	43	7	19	23	9
Acquire loan	6	7	26	43	19
Take support from relatives/friends	28	8	46	19	0
Secure all valuable items	13	9	18	43	18
Mortgage land	82	12	5	1	0
Sell assets	92	2	3	3	0
Go fishing for food and/or extra income	31	3	12	42	13
Spend less	5	3	13	51	28
Seek assistance from the government support	67	15	17	1	0
Store food and other basic necessities	1	1	21	56	21
Acquire crop insurance	79	4	9	5	3

Appendix Table 8. Adaptation strategies/changes (in per cent) done by female farmers as response to severe flood, Papaya village, Nueva Ecija, Philippines.

Adaptation strategies	Never	Very Seldom	Seldom	Often	Very Often
Change in rice variety/ies	26	2	21	35	16
Change in cropping pattern	89	2	6	3	0
Shift from crops to livestock	93	3	2	1	1
Grow more cash crops	80	4	5	10	1
Grow more kinds of crops	77	2	7	8	6
Grow input-saving crops	71	4	18	7	0
Adjust planting activities	63	2	12	22	1
Cultivate smaller area than usual	86	2	8	4	0
Resow when crops damaged	23	7	42	25	3
Replant when crops damaged	26	6	45	22	1
Build higher dikes around the rice plots	52	2	14	24	8
Leave as fallow	82	2	11	2	3
Migrating	96	0	1	3	0

Look for wage labor	70	3	15	11	1
Acquire loan	19	7	18	31	25
Take support from relatives/friends	28	12	37	19	4
Secure all valuable items	9	2	23	50	16
Mortgage land	86	8	5	1	0
Sell assets	96	0	3	1	0
Go fishing for food and/or extra income	73	3	14	7	3
Spend less	6	2	11	34	47
Seek assistance from the government support	86	3	11	0	0
Store food and other basic necessities	3	5	19	48	25
Acquire crop insurance	85	0	10	5	0

Appendix Table 9. Adaptation strategies/changes (in per cent) done by female farmers as response to severe flood, Cama Juan village, Nueva Ecija, Philippines.

Adaptation strategies	Never	Very Seldom	Seldom	Often	Very Often
Change in rice variety/ies	12	3	33	36	17
Change in cropping pattern	97	2	1	0	0
Shift from crops to livestock	86	2	8	4	0
Grow more cash crops	86	2	4	6	2
Grow more kinds of crops	70	4	14	9	3
Grow input-saving crops	64	4	19	11	2
Adjust planting activities	50	4	17	29	1
Cultivate smaller area than usual	58	0	15	16	11
Resow when crops damaged	19	4	36	29	13
Replant when crops damaged	25	5	29	28	14
Build higher dikes around the rice plots	31	4	16	31	19
Leave as fallow	77	1	11	6	5
Migrating	88	1	6	4	1
Look for wage labor	50	7	11	18	14
Acquire loan	5	9	26	42	19
Take support from relatives/friends	30	9	38	19	5
Secure all valuable items	12	7	23	35	24
Mortgage land	90	6	3	1	0
Sell assets	92	3	3	2	0
Go fishing for food and/or extra income	49	6	15	27	4
Spend less	2	2	22	42	33
Seek assistance from the government support	82	10	7	1	0
Store food and other basic necessities	4	5	17	47	28
Acquire crop insurance	72	5	8	10	5

Appendix Table 10. Men's perception about the impact of severe flooding to men's lives, Papaya village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	29	5	2	48	16
Increased violence	40	9	3	29	19
Increased disagreements among family members	58	10	5	23	4
Increased pressure to provide food for the family	12	3	2	36	47
Decreased quality of food	17	11	5	49	18
Decreased quantity of food	20	8	4	47	21
Pressure to hire labor and machines	56	3	3	26	12
Pressure to acquire loans	8	0	1	35	56
More stressed/anxious	5	2	5	51	37
More alcohol intake	76	6	3	13	2
Physical isolation	18	11	0	43	28
Increased workload	6	7	7	35	45
Increased pressure to seek for other income generating activities	15	4	5	35	41

Appendix Table 11. Men's perception about the impact of severe flooding to men's lives, Cama Juan village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	42	14	0	29	16
Increased violence	32	13	1	39	16
Increased disagreements among family members	51	20	4	21	4
Increased pressure to provide food for the family	12	5	2	35	47
Decreased quality of food	23	6	5	55	11
Decreased quantity of food	26	6	4	50	14
Pressure to hire labor and machines	46	7	4	31	13
Pressure to acquire loans	11	5	0	39	46
More stressed/anxious	6	5	1	50	38
More alcohol intake	79	8	3	8	2
Physical isolation	36	9	6	42	8
Increased workload	21	5	3	42	30
Increased pressure to seek for other income generating activities	22	3	4	30	42

Appendix Table 12. Women's perception about the impact of severe flooding to men's lives Papaya village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	30	14	1	37	18
Increased violence	51	7	2	26	14
Increased disagreements among family members	60	11	8	16	5
Increased pressure to provide food for the family	15	2	1	35	47
Decreased quality of food	25	6	4	42	23
Decreased quantity of food	29	7	4	38	22
Pressure to hire labor and machines	55	6	4	25	10
Pressure to acquire loans	9	4	0	34	53
More stressed/anxious	10	3	3	36	48
More alcohol intake	83	8	3	3	3
Physical isolation	14	5	0	48	33
Increased workload	6	6	0	44	44
Increased pressure to seek for other income generating activities	16	3	8	27	46

Appendix Table 13. Women's perception about the impact of severe flooding to men's lives Cama Juan village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	42	14	1	29	15
Increased violence	38	9	4	32	18
Increased disagreements among family members	60	14	5	18	3
Increased pressure to provide food for the family	12	9	2	42	36
Decreased quality of food	27	8	6	50	9
Decreased quantity of food	30	10	7	45	9
Pressure to hire labor and machines	47	9	6	26	13
Pressure to acquire loans	19	12	4	32	34
More stressed/anxious	10	7	1	45	38
More alcohol intake	76	8	3	12	1
Physical isolation	32	23	3	29	14
Increased workload	18	10	6	36	31
Increased pressure to seek for other income generating activities	20	7	6	35	33

Appendix Table 14. Men's perception about the impact of severe flooding to women's lives, Papaya village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	30	9	0	46	15
Increased violence	40	16	4	26	14
Increased disagreements among family members	60	10	3	22	5
Increased pressure to provide food for the family	17	8	4	47	24
Decreased quality of food	17	8	4	56	15
Decreased quantity of food	22	9	3	48	18
Pressure to hire labor and machines	70	7	4	14	5
Pressure to acquire loans	16	3	1	34	46
More stressed/anxious	5	6	3	53	33
More alcohol intake	99	0	0	1	0
Physical isolation	11	6	3	53	27
Increased workload	6	6	2	49	37
Increased pressure to seek for other income generating activities	27	5	5	46	17

Appendix Table 15. Men's perception about the impact of severe flooding to women's lives, Cama Juan village Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	45	16	0	27	13
Increased violence	34	13	2	38	14
Increased disagreements among family members	49	23	4	20	5
Increased pressure to provide food for the family	23	11	2	50	14
Decreased quality of food	25	7	4	55	9
Decreased quantity of food	30	5	4	51	10
Pressure to hire labor and machines	67	10	8	15	0
Pressure to acquire loans	15	5	0	39	42
More stressed/anxious	6	4	1	68	21
More alcohol intake	93	4	2	1	0
Physical isolation	25	14	4	42	16
Increased workload	20	7	3	42	29
Increased pressure to seek for other income generating activities	33	5	8	41	14

Appendix Table 16. Women's perception about the impact of severe flooding to women's lives, Papaya village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	24	13	2	41	20
Increased violence	45	13	3	26	13
Increased disagreements among family members	63	9	1	19	8
Increased pressure to provide food for the family	18	6	3	47	26
Decreased quality of food	24	6	4	43	23
Decreased quantity of food	26	9	3	34	28
Pressure to hire labor and machines	71	4	6	14	5
Pressure to acquire loans	9	2	0	37	52
More stressed/anxious	8	2	3	46	41
More alcohol intake	97	2	0	1	0
Physical isolation	16	7	1	43	33
Increased workload	4	7	0	36	53
Increased pressure to seek for other income generating activities	26	8	7	35	24

Appendix Table 17. Women's perception about the impact of severe flooding to women's lives, Papaya village, Nueva Ecija, Philippines, 2011.

Impacts	Highly unaffected	Slightly unaffected	Neither unaffected nor affected	Slightly affected	Highly affected
Increased health problems	43	16	2	26	14
Increased violence	35	12	4	30	20
Increased disagreements among family members	53	11	4	29	3
Increased pressure to provide food for the family	15	14	7	40	25
Decreased quality of food	25	8	7	48	13
Decreased quantity of food	30	10	6	42	13
Pressure to hire labor and machines	64	12	6	13	5
Pressure to acquire loans	11	12	2	32	44
More stressed/anxious	7	8	2	47	37
More alcohol intake	96	2	0	2	0
Physical isolation	21	9	1	46	24
Increased workload	7	14	6	40	34
Increased pressure to seek for other income generating activities	28	7	13	35	18

ANNEXES

Annex 1. Key Informant Guide Question

General areas/scope to be discussed with key informants:

1. The identification and design of institutional mechanisms and processes to support interventions in flood-prone rice communities, through a detailed knowledge of existing roles, responsibilities, capacities and incentives within key institutions/associations.
2. The identification of institutional factors that might enhance or inhibit the chances of project sustainability and success being implemented.
3. Understanding the potential for broadening the coverage and impact of projects through synergies with other institutions and their programmes.

Question 1: (Probing questions)

- As part of your organisation/division do you have formal involvement in addressing climate-related disasters like flooding in rice farming communities affected by flooding? (When I say formal, that would mean, you are mandated, with roles and responsibilities and programs or projects).
- What issues/problems are you trying to deal with? Does it increase/decrease in the recent years?
- If yes, can you identify how is your organisation/division involved in addressing-related disasters in flooded rice-farming communities? What is the scope of your projects/programs?
- If you have projects/programs, how do you implement it? (Please describe the process, usual implementation protocols in your organisation)
- Are there unwritten rules in implementing projects/programs expressed through norms, values, laws, tradition and customs?
- Are you being funded by external funding agency/association or being funded by your own agency/association?
- Are you being capacitated as you implement the projects/programs?
- Do you have any incentives in being involved with the projects/programs?
- How do you stay motivated, if no incentives are given?
- Who dictates how it is done and who should participate? Donor? Or the agency/association?
- Who are usual beneficiaries/participants? Do all individuals, households and groups have the same access and benefits?

Question 2 (Probing question)

- How do you describe the reaction/response of the beneficiaries of your programs/projects?
- Do you think the project is sustainable and successful?
- What do you think enhance or inhibits the sustainability of the project/programs?

Question 3 (Probing questions)

- Do you think, your projects/programs should be implemented/sustained with cooperation with other agencies/organisation?
- In what ways do you think coordination with other agency/institutions should be done?

Annex 2. PRA Tools Used in the Study

A. Time lines

Materials:

The people can use as symbols and feel comfortable with, Manila paper and markers (especially where the people are literate)

What to do:

1. Explain the purpose of the exercise.
2. The team and the community decide on a list of topics of interest for the trends.
3. Groups of villagers are organized according to gender, socio-economic status, age etc., depending on the topics selected and the community composition.
4. Explain the concept of trends using a simple graph. Explain how time (in years), moves from left to right along the bottom axis, and how the topic increases/decreases on the upright axis.
5. Ask the groups to draw their lines on the sand, or on the floor.
6. Quantification is not always easy. Ask questions if necessary e.g. 'when was the most, the least?'
7. Use the discussion of trends to probe for explanations of the changes. This will help identify underlying problems and traditional activities to correct the situation. For instance, if flooding is getting worse, ask why and find out what measures have been tried in the past and how well they have worked. Ask what they think might ease the situation.
8. Copy the trends and the explanations onto paper.

A. Seasonal calendar

Materials:

Flip chart paper, markers or large point felt-tipped pens (various colors)

What to do:

1. Draw a 12-month calendar as shown below. It is more useful to start the calendar with the beginning of a season, rather than the beginning of the year. Thus, the calendar need not start in January and should reflect the indigenous seasonal categories. Use farmers' indigenous calendar system.
2. Climate - Show the seasons, rainfall, temperature, time of occurrence of flood and drought/ moisture
3. When does flooding occur? What months, days of the year, at what stages of the crop plant cycle does it occur?
4. Cropping pattern - According to major ecosystem, ask farmers to indicate the range of planting and harvesting dates for cropping sequences. Show the

biophysical constraints (incidence of flood, drought, salinity, insect pests, and disease) that affect the cropping sequence.

B. The problem tree

Materials:

Flip chart paper, markers or large point felt-tipped pens (various colors)

What to do:

1. Identify “major problems” existing within the stated problem situation (brainstorming). Each member of the planning team first writes down just one problem which he or she deems to be the core problem.
2. Write up a short statement of the “core problem”. Then, a brief substantiation is given for each proposed core problem. Afterwards, the team agrees on the core persons, groups, and institutions involved. If a consensus cannot be reached, then make use of decision-making techniques; select the best decision by awarding points or deciding temporarily on one or several core problems. Continue work but return to discuss the core problem.
3. Write up the “cause” of the core problem. Direct causes of the core problem are placed parallel to each other under the core problem.
4. Write up the “effect” caused by the core problem. The substantial and corresponding effects of the core problem are placed parallel to each other above the core problem.
5. Make a diagram showing the “cause” and “effect” relationships in the form of a problem tree. “The problem tree offers the opportunity to go beyond monocausal structures and present complex interrelationships through multiple mentions of problems, arrow indicating relationships or numbering entry and exit points.” The cause-effect relationships of a problem can be illustrated differently, depending on cultural view under which they are considered. If possible, in a separate sheet of paper, provide a more detailed description of the problem. This will help in the identification of indicators in the future steps.
6. Review diagram as a whole and “verify” its validity and completeness. Once the planning team feels that the necessary information has been utilized to build a problem tree (a causal network explaining the main cause-effect relationships characterizing the problem situation), the problem analysis can be concluded.

C. Gender division of labour

Materials:

Flip chart paper, markers or large point felt-tipped pens (various colors)

What to do:

1. Show the relative proportion of labor contribution of men and women in each crop operation in rice and non-rice production activities. Ask the gender division of labor in household, farm, off-farm and non-farm activities. Ask women which crop, non-crop operations they are engaged in. If women are not engaged in rice field operations, ask if they participate in post harvest operations (seed selection, storage, etc) and non-rice operations (sowing, weeding, application of farm yard manure, etc)
2. Ask the constraints women face in performing their roles eg. lack of access to quality and improved seeds, lack of knowledge, too much work burden, etc. What solutions do they perceive or propose?
3. Ask women's participation in decision making matters related to crops, non-rice crops, livestock etc.
4. Identify gender discrimination in education between boys and girls, training programs and extension activities. Do women have access to information? What kind of training courses do they like?

Annex 3. Interview guide questions for in-depth interview

- **Socio demographic information**
 - Age (*Ilang taon*)
 - Civil status (if married/widow/er how many years?)(*Ano ang katayuan sa buhay, single, may asawa o balo?*)
 - How many children (*Ilan ang anak?*)
 - Size of household (*Ilan ang kasama sa bahay?*)
 - Years in farming (*Ilang taon nang nagsasaka?*)
- **Productive assets (household)**
 - Area cultivated (*Gaano kaluwang ang sinasaka?*)
 - Tenure status (*Kayo po ba ay may-ari, kasama, or buwisang magsasaka?*)
 - Other assets (machinery, carabao etc) (*Ano po ang inyong mga pag-aari bukod sa inyong sinasaka na ginagamit nyo sa inyong kabuhayan?*)
 - Other source of income (*May iba po ba kayong pinagkakakitaan bukod sa pagsasaka?*)
- **Extent of involvement in rice farming; constraints and opportunities that shaped involvement with such activities**
 - 1) How is a life of a widow farmer/ female headed-household/etc (characteristic of the respondent)? What makes your life light or difficult? (*Paki kwento po sa akin ang buhay na isang magsasakang (base sa katangian ng kalahok)*)
- **Perception of flooding**
 - 2) What can you say about the frequent flooding in your village? (*Ano po ang masasabi ninyo sa palagiang pagbaha dito sa inyong barangay?*)
- **Consequences/vulnerabilities to flooding**
 - 3) What are your experiences during flooding? How does flooding affect you and your household? (*Anu-ano po ang inyong mga dinadanas pag nagbabaha?Paano po kayo at ang inyong kabahayan naaapektuhan ng pagbabaha?*)
- **Access and control over resources (i.e., asset, income, information, training, etc)**
 - 4) Do you think you have enough resources to sustain your household? Why do you say you have enough/do not have enough? (*Sa tingin nyo po may sapat po ba kayong kakayahan o pagkukunan para matustusan ang inyong sambahayan? Paano nyo po nasabi na mayroon kayong sapat o di sapat na kakayahan at pagkukunan?*)
 - 5) When there is flooding, how do you use your resources, you have mentioned? (*Pag po may pagbabaha, paano nyo po ginagamit ang inyong kakayahan o yaman na nabanggit?*)
- **Decision making power**
 - 6) How do you decide on matter that would affect the welfare of your household particularly during flooding? What is your participation in the decision-making

of the household? *(Paano po kayo nagdedesisyon tungkol sa mga bagay-bagay na makakaapekto sa inyong sambahayan lalo na sa pagbabaha? Ano po ang inyong partisipasyon sa mga pagdedesisyon ng sambahayan?)*

- **Coping/adaptation strategies taken before, during, and after flooding**

7) Now that you will be affected by flooding how do you prepare for it? *(Ngayong nalalaman nyo na babaha, paano po nyo po ito pinaghahandaan?)*

8) How do you cope/adapt after flooding? *(Paano po kayo nakakabangon pagkatapos ng pagbaha?)*

- **Potential of submergence tolerant varieties as adaptation strategy during flooding**

9) What do you think about submergence tolerant varieties that IRRI, PhilRice introduced in 2008? Is it possible as adaptation response to flooding? Why or why not? *(Ano po ang masasabi nyo sabi nyo sa submergence tolerant varieties na inilunsad ng IRRI, PhilRice noong 2008? Posible po kaya itong maging paraan para pakibagayan ang pagbabaha? Bakit o bakit hindi?)*

- **Perception of the future flooding events and the potential adaptation strategies**

10) Do you expect flooding to lessen or worsen in the coming years? Why did you say so? *(Inaasahan nyo po ba na sa mga susunod na mga taon, ang pagbabaha po dito ay dadami o uunti na? Bakit po ninyo nasabi?)*

11) Do you realize that you can still do something to adapt to the frequent flooding? What are the way do you think you should do in order for your household to be more adaptable to flooding? *(Naisip nyo po ba na may magagawa pa kayo para makabagay kayo sa palagiang pagbaha? Ano po kaya ang dapat nyong gawin para makabagay kayo sa pagbabaha?)*

Annex 4. Survey Questionnaire

INTERNATIONAL RICE RESEARCH INSTITUTE

Social Sciences Division

And

Monash University

Assessing the consequences of severe flooding and adaptation of men and women in ensuring food security and sustaining livelihoods: a case study in NUEVA ECIJA, PHILIPPINES

CONSENT FORM

Introduction

Good morning/afternoon! My name is _____ from (name of institution). I am here on behalf of IRRI and Monash University. We are conducting a household survey of farm families to understand various issues men and women face during severe flooding.

Objective and Methods

This survey is being conducted in Brgy. Papaya and Cama Juan of San Antonio, Nueva Ecija, Philippines. Research findings will be used as part of Ms. Gerlie Tatlonghari PhD Research Study funded by IRRI and Monash University that will inform academe, development workers and policy makers on diverse issues raised by farmers in response to climate change. This interview was designed to be approximately a one hour in length. However, please feel free to expand on the topic or talk about related ideas. All information will be kept confidential and will not be reported individually. We are interested in your views and experiences, and so we want your honest opinion on the issues raised. There are no risks in participating in this survey. If there are any questions you would rather not answer or that you do not feel comfortable answering, please say so and we will stop the interview or move on to the next question, whichever you prefer. Your participation in this interview is voluntary. Do you agree to be interviewed?

Consent has been read to the respondent

Yes No

Name of Respondents:

Form A (male): _____

Signature male respondent

Form B (female): _____

Signature female respondent

Cell phone number(s):

Date: _____

District: _____

Village: _____

Time started: _____

State: _____

Time finished: _____

I. Characteristics of Respondent (Parts I, II and III should be asked together with male and female respondent)

No.	Question	Response
1	Age	
2	Years in school	
3	Years in farming	
4	Household size a. Number of elders (60 years old and above) b. Number of adult members (18-59 years old) c. Number of young members (6-17 years old) d. Number of children below 6 years old e. Number of household members (18 years old and above) who earn or contribute to household's income	[] [] Male [] Female [] Male [] Female [] Male [] Female [] Male [] Female [] Male [] Female
5	Farm size (in hectares) a. Type of ownership 1. Owned 2. Rented in b. Type of ecosystem 1. Rainfed 2. Irrigated 3. Partially irrigated	[] [] [] [] [] [] []
6	How many hectares of land are registered (can be amortized or inherited) under the following names? a. Husband's name b. Wife's name c. Joint (H & W) d. Son's name e. Daughter's name f. Elders g. Others (please specify)	[] [] [] [] [] []

II. Farm Characteristics

No.	Question	Response							
7	Crop production	Normal Year (_____)				Flood Year (_____)			
		Area (hectare)		Production (kgs)		Area (hectare)		Production (kgs)	
		Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
		Rice							
		2 nd most important crop (specify)							
		3 rd most important crop (specify)							
4 th most important crop (specify)									
8	Number of livestock owned and decision-maker	Normal Year (_____)		Flood Year (_____)		Remarks			
		Number	Decision-maker ^a	% Change	Decision-maker ^a				
		Cows							
		Female buffaloes							
		Bullocks							
		Goats							
		Pigs							
		Chicken							
		Others (specify)							
^a Code: Decision-maker (has the ability to decide whether to sell or not the animals) – 1-husband; 2-wife; 3-both H & W, but H>W; 4-both H & W, but W>H; 5-elders; 6-all members									

III. Household Income

No.	Question	Response				
9	What are your major sources of income? How much do you normally earn from each source during normal year (kindly recall)? What was the change in income from each source due to severe flood?	Source	Normal income per year (Php)	Change (Flood year____) Code: 1 – Increased; 2 – Decreased; 0 - No change	Percent change	Remarks
		Sales from rice				
		Sales from 2 nd important crop				
		Sales from vegetables				
		Sales from other crops				
		Sales from crop by-products				
		Sales from large animals				
		Sales from small animals/poultry				
		Sales from animal by-products				
		Fisheries				
		Wages from off-farm income				
		Non-farm				
		a) Remittances				
		b)				
		c)				
d) Other (specify)						

	<input type="checkbox"/> Elders			
	<input type="checkbox"/> All members			
Code: a: 1- Bank; 2-Cooperative; 3-Family/relatives; 4-Friends; 5-Co-farmers; 6-Input dealers; 7-Private money lenders; 8-Others (specify) b: 1-husband; 2- wife; 3-both H&W; 4-grown children; 5-elders; 6-all members c: 1-land sale; 2-crop sale; 3-sale of other assets aside from land; 4-sale of large animals; 5-sale of small animals; 6-sale of crop by-products; 7-sale of livestock by-products; 8- Child labor; 9-wage income; 10-remittance; 11-loan from SHGs; 12-land mortgage; 13-sale or pawning of valuable items; 14-others (specify)				
	3) For what purposes? (please write the most important purpose in number 1)		1) _____ 2) Other (specify) _____ _____	
	4) If assets were sold, what are your reasons for selling? (please write the most important reason in number 1)		1) _____ 2) Other (specify) _____ _____	

d) Do you provide labor in farm and non farm activities? Yes No If Yes, please specify which activities in crop production, livestock, off-farm, and non-farm do you do and indicate the change in time spent (A – increase, B – decrease, C – no change) in doing the activities due to flooding. Please tick.

Activity	Change			Remarks	Activity	Change			Remarks
	A	B	C			A	B	C	
Rice production <input type="checkbox"/> Not applicable					Non rice production <input type="checkbox"/> Not applicable				
<input type="checkbox"/> Seed selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Seed selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Seedbed preparation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Sowing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Land preparation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Land preparation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Pulling of seedlings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Planting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Transplanting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Weeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Broadcasting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Application of FYM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Weeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Application of chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Application of FYM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Harvesting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Application of chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Threshing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Harvesting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Grading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Threshing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Purchase of inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Drying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Selling of produce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Removing off-types	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Supervision of hired labor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Seed selection for next cropping season	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Bringing food to the farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Storing seeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
<input type="checkbox"/> Purchase of inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Livestock Management <input type="checkbox"/> Not applicable				
<input type="checkbox"/> Selling of produce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Collecting FYM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Supervision of hired labor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Cleaning the animal sheds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Bringing food to the farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Collecting green fodder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					<input type="checkbox"/> Preparing/chopping green fodder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Off-farm labor <input type="checkbox"/> Not applicable					<input type="checkbox"/> Grazing large animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Worked as agricultural labor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Milking milch cattle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					<input type="checkbox"/> Taking care of poultry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Non farm labor <input type="checkbox"/> Not applicable					<input type="checkbox"/> Taking care of goats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Selling large animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Shops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Selling of small animals (goats)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Service (government job)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Selling of poultry birds)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Salaried (private job)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
<input type="checkbox"/> Others (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Reproductive activities <input type="checkbox"/> Not applicable				
					<input type="checkbox"/> Child rearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					<input type="checkbox"/> Cleaning the house	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					<input type="checkbox"/> Washing of clothes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					<input type="checkbox"/> Cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					<input type="checkbox"/> Others (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

No.	Question	Response
	e) Irrigation water 1) Availability <i>Code: 1 - increased 2 - decreased 0 - no change</i> 2) Source of irrigation 3) Number of irrigation	<input type="checkbox"/> Not applicable [] Percent change: _____ [_____] Normal year [_____] Flood year [_____]
	f) Drinking water 1) Availability <i>Code: 1 - increased 2 - decreased 0 - no change</i> 2) Source of drinking water 3) Quality of drinking water (put remarks) <i>Code: 1 - better than before flooding 2 - worse than before flooding 0 - no change</i>	[] Percent change: _____ Before flooding [] After flooding [] []
	g) Food 1) Availability <i>Code: 1 - increased 2 - decreased 0 - no change</i> 2) Quality of food <i>Code: 1 - better than before flooding 2 - worse than before flooding 0 - no change</i> 3) Sources of food (Multiple responses possible. From the responses given, which is the most important source? Kindly encircle). 4) How many months rice was available? 5) Was the amount of rice you had in times of severe flood sufficient? 6) If No, why? (please write the most important reason in number 1) 7) Who among the family do you think gets sufficient food in times of severe flood?	[] Percent change: _____ [] <input type="checkbox"/> Crop production <input type="checkbox"/> Livestock production <input type="checkbox"/> Food from open market <input type="checkbox"/> Food aid <input type="checkbox"/> Public distribution system (PDS) ration <input type="checkbox"/> Others (specify) _____ Normal year [_____] Flood year [_____] <input type="checkbox"/> Yes <input type="checkbox"/> No 1) _____ 2) Other (specify) _____ _____ <input type="checkbox"/> Husband <input type="checkbox"/> Wife <input type="checkbox"/> Both H&W <input type="checkbox"/> Grown children <input type="checkbox"/> Elders <input type="checkbox"/> All members

	<p>h) Fuel (specify flood and normal year)</p> <p>1) Availability Code: 1 - increased 2 - decreased 0 - no change</p> <p>2) Source of fuel for cooking</p> <p>3) Source of fuel for energy needs</p> <p>4) Do you get enough fuel for cooking and energy needs?</p> <p>5) If wood is used for cooking, do you collect wood?</p> <p>6) Who among the family collects the wood?</p> <p>7) How many hours are spent in collecting fuel wood?</p>	<p>[] Percent change: _____</p> <p>[_____]</p> <p>[_____]</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Grown children</p> <p><input type="checkbox"/> Elders</p> <p><input type="checkbox"/> All members</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No (buy in the market) <input type="checkbox"/> Not applicable</p> <table border="0"> <tr> <td>During normal year</td> <td>During flood year</td> </tr> <tr> <td><input type="checkbox"/> Husband</td> <td><input type="checkbox"/> Husband</td> </tr> <tr> <td><input type="checkbox"/> Wife</td> <td><input type="checkbox"/> Wife</td> </tr> <tr> <td><input type="checkbox"/> Both H&W</td> <td><input type="checkbox"/> Both H&W</td> </tr> <tr> <td><input type="checkbox"/> Grown children</td> <td><input type="checkbox"/> Grown children</td> </tr> <tr> <td><input type="checkbox"/> Elders</td> <td><input type="checkbox"/> Elders</td> </tr> <tr> <td><input type="checkbox"/> All members</td> <td><input type="checkbox"/> All members</td> </tr> </table> <p>Normal year [_____]</p> <p>Flood year [_____]</p> <p>Remarks: _____</p>	During normal year	During flood year	<input type="checkbox"/> Husband	<input type="checkbox"/> Husband	<input type="checkbox"/> Wife	<input type="checkbox"/> Wife	<input type="checkbox"/> Both H&W	<input type="checkbox"/> Both H&W	<input type="checkbox"/> Grown children	<input type="checkbox"/> Grown children	<input type="checkbox"/> Elders	<input type="checkbox"/> Elders	<input type="checkbox"/> All members	<input type="checkbox"/> All members
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<input type="checkbox"/> Elders	<input type="checkbox"/> Elders															
<input type="checkbox"/> All members	<input type="checkbox"/> All members															
	<p>i) Education Code: 1 - increased 2 - decreased 0 - no change</p> <p>1) Number of boys</p> <p>2) Number of girls</p> <p>3) Do you send all your children to school?</p> <p>4) If No, how many among your children are going/have gone to school (at least 6 years)</p> <p>5) What are your reasons for not being able to send your children to school? (Multiple</p>	<p>[] Percent change: _____</p> <p>[] Percent change: _____</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Normal year [_____]</p> <p>Flood year [_____]</p> <p><input type="checkbox"/> Crop loss</p> <p><input type="checkbox"/> Illness</p>														

	<p>responses possible. From the responses given, which is the most important reason? Kindly encircle).</p> <p>6) Who is mostly affected by this circumstance?</p>	<p><input type="checkbox"/> Child labor <input type="checkbox"/> Low income <input type="checkbox"/> Others (specify) _____</p> <p><input type="checkbox"/> Male members <input type="checkbox"/> Female members</p>
	<p>j) Human health 1) Health status Code: 1 - improved 2 - worsened 0 - no change</p> <p>2) What are the common health problems in the family during flood period? (Multiple responses possible. From the responses given, which is the most common health problem? Kindly encircle).</p> <p>3) Who among the family are mostly affected with health problems mentioned above?</p>	<p>[] REASONS: _____</p> <p><input type="checkbox"/> Flu <input type="checkbox"/> Colds <input type="checkbox"/> Cough <input type="checkbox"/> Hyperacidity <input type="checkbox"/> High blood pressure <input type="checkbox"/> Heart attack <input type="checkbox"/> Dehydration <input type="checkbox"/> Diarrhea <input type="checkbox"/> Malaria <input type="checkbox"/> Arthritis <input type="checkbox"/> Skin problems (specify) _____ <input type="checkbox"/> Others (specify) _____</p> <p><input type="checkbox"/> Husband <input type="checkbox"/> Wife <input type="checkbox"/> Both H&W <input type="checkbox"/> Grown children <input type="checkbox"/> Elders <input type="checkbox"/> All members</p>

	Kindly encircle).	<input type="checkbox"/> Crop loss <input type="checkbox"/> Others (specify) _____																																																																																															
18	What changes in your farming activities did you do during flooding period due to climate variability? (Multiple responses possible. From the responses given, which is the most important change that you did? Kindly encircle).	<input type="checkbox"/> Change in cropping pattern (skip Question 22 if this response is not chosen) <input type="checkbox"/> Change in rice variety/ies (skip Question 23 if this response is not chosen) <input type="checkbox"/> Shift from crops to livestock <input type="checkbox"/> Grow more cash crops <input type="checkbox"/> Grow more kinds of crops <input type="checkbox"/> Grow input-saving crops <input type="checkbox"/> Grow water-saving crops <input type="checkbox"/> Cultivate smaller area than usual <input type="checkbox"/> Grow dry fodder crops <input type="checkbox"/> Leave as fallow <input type="checkbox"/> No change <input type="checkbox"/> Other (specify) _____																																																																																															
19	Who decides what rice variety(ies) to grow?	<input type="checkbox"/> Husband <input type="checkbox"/> Wife <input type="checkbox"/> Both H&W <input type="checkbox"/> Grown children <input type="checkbox"/> Elders <input type="checkbox"/> All members <input type="checkbox"/> Others (specify) _____																																																																																															
20	How important are the following factors in your decision to change the rice variety/ies which you commonly use? Kindly tick the most important factor that influences your decision?	<table border="1"> <thead> <tr> <th rowspan="2">Factors</th> <th colspan="5">Rating</th> </tr> <tr> <th>1 Very unimportant</th> <th>2 Unimportant</th> <th>3 Neither important nor unimportant</th> <th>4 Important</th> <th>5 Very important</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Good yields</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Tolerance to stress</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Recommended by the department of agriculture</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Recommended by university</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Recommended by NGO</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Capital</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Availability of water</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Market demand</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Suitability to soil type/land type</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Availability and access to inputs (seeds, fertilizer)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Others (specify)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Factors	Rating					1 Very unimportant	2 Unimportant	3 Neither important nor unimportant	4 Important	5 Very important	<input type="checkbox"/> Good yields						<input type="checkbox"/> Tolerance to stress						<input type="checkbox"/> Recommended by the department of agriculture						<input type="checkbox"/> Recommended by university						<input type="checkbox"/> Recommended by NGO						<input type="checkbox"/> Capital						<input type="checkbox"/> Availability of water						<input type="checkbox"/> Market demand						<input type="checkbox"/> Suitability to soil type/land type						<input type="checkbox"/> Availability and access to inputs (seeds, fertilizer)						<input type="checkbox"/> Others (specify)																							
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21	<p>How important are the following factors in your decision to change your cropping pattern? Kindly tick the most important factor that influences your decision?</p> <table border="1"> <thead> <tr> <th rowspan="2">Factors</th> <th colspan="5">Rating</th> </tr> <tr> <th>1 Very unimportant</th> <th>2 Unimportant</th> <th>3 Neither important nor unimportant</th> <th>4 Important</th> <th>5 Very important</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/> Good yields</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Tolerance to stress</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Recommended by the department of agriculture</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Recommended by university</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Recommended by NGO</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Capital</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Availability of water</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Market demand</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Suitability to soil type/land type</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Availability and access to inputs (seeds, fertilizer)</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Others (specify)</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		Factors	Rating					1 Very unimportant	2 Unimportant	3 Neither important nor unimportant	4 Important	5 Very important	<input type="checkbox"/> Good yields						<input type="checkbox"/> Tolerance to stress						<input type="checkbox"/> Recommended by the department of agriculture						<input type="checkbox"/> Recommended by university						<input type="checkbox"/> Recommended by NGO						<input type="checkbox"/> Capital						<input type="checkbox"/> Availability of water						<input type="checkbox"/> Market demand						<input type="checkbox"/> Suitability to soil type/land type						<input type="checkbox"/> Availability and access to inputs (seeds, fertilizer)						<input type="checkbox"/> Others (specify)																							
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22	<p>What coping strategies do you do in response to negative impacts of severe flood? (Multiple responses possible. From the responses given, which is the most important mitigation measure that you do? Kindly encircle).</p> <p>If migrate proceed to question 25. Otherwise, skip question 25.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Migrate <input type="checkbox"/> Wage labor <input type="checkbox"/> Go to neighboring villages for labor work <input type="checkbox"/> Shop keeping <input type="checkbox"/> Acquire loan <input type="checkbox"/> Take support from relatives/friends <input type="checkbox"/> Children drop-out from school <input type="checkbox"/> Mortgage land <input type="checkbox"/> Sell assets <input type="checkbox"/> Spend less <input type="checkbox"/> Store food and other basic necessities <input type="checkbox"/> Others (specify) _____ 																																																																																															
23	<p>Who among the family members are left behind?</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Husband <input type="checkbox"/> Wife <input type="checkbox"/> Both H&W <input type="checkbox"/> Male grown children <input type="checkbox"/> Female grown children <input type="checkbox"/> Elders 																																																																																															

IV. Institutional Support

24. Do you get support (columns A and B) from the government and other institutions during severe flooding? Yes No

Institution	Kind of support ^a (A)	Source of support ^b (B)	Kind of support expected from the government <small>(please write the most important support you expect from the government in number 1)</small>
i. Government			1)
			2)
			3)
			4)
			5)
			6)
			7)
			8)
ii. Other Institutions			

Codes:

^{a/} 1-housing; 2-pension; 3- relief goods ration; 4-Thrift and credit through SHGs; 5- Farmers' group; 6-Health insurance; 7-Training on new rice technologies;

8-supoort for farming activities (specify); 9-others (specify) _____ 0-none.

^{b/} 1-Department of Agriculture; 2-Deparment of health; 3- DSWD 4- NIA 5-PAGASA; 6- NIA; 7-bank; 8-cooperative ; 9-farmer's association;

10-Local government unit; 11-private input dealer; 12-civil society; 13-private organization; 14-agricultural universities; 15-PHILRICE;

16-NGOs (specify name) _____ 17-others (specify) _____; 0-none

25. Source of information about suitable cropping patterns/agronomic practices, livestock and fishing activities, and weather condition.

Item	Access to information (1-Yes; 0-No)	Source of information ^a	Recipient of information ^b
i. Cropping pattern/agronomic practices			
ii. Fishing activities			
iii. Weather condition			

Codes:

^{a/} 1-government organizations; 2-NGOs (specify name); 3-private organizations; 4-input dealers; 5-universities; 6-research institutions; 7-radio; 8-newspaper; 9-television; 10-neighbor; 11-family member; 12-traditional knowledge; 13-others (specify).

^{b/} 1-husband; 2-wife; 3-both H & W; 4-male grown children; 5-female grown children; 6-elders; 7-others (specify).

V. Mitigating Options

26. Other than the above coping mechanisms cited, how likely you will adopt the technology interventions mentioned below to reduce vulnerability to climate variability?

Factors	Rating					Remarks
	1 Highly unlikely	2 Unlikely	3 Neither likely nor unlikely	4 Likely	5 Highly Likely	
Use of stress-tolerant crop varieties						
Shift to improved cropping system						
Planting of early, medium or late varieties (please encircle) to avoid crop loss to variations in drought/flood occurrence						
Early production of rice to grow other additional crops						
New land management techniques (i.e., zero tillage for rice-wheat; resource conserving techniques)						
Changes in agricultural water-managed techniques (water harvesting, alternated wetting and drying method, <i>anicuts</i> (small- to medium-sized dams) to harvest rainwater and serve as reservoirs, underground tanks or <i>kunds</i> ; bamboo stems for drip irrigation)						
Pest and disease management techniques such as IPM						
Development and use of crop varieties resistant to pests and diseases						
New livestock breeds						
Improved animal health management						
Others (specify)						
None						

27. What trainings do you need to enhance your skills and knowledge to better adopt the abovementioned interventions?

- Seed health management
- Crop production management (specify) _____
- Water management
- Crop nutrient management
- Pest management (weeds, insects, disease)
- Post harvest including storage (specify) _____
- Animal management (specify) _____
- Other income generation (specify) _____

Thank You

Annex 5. Survey Guide/Protocol

GENERAL GUIDELINES FOR CONDUCTING THE INDIVIDUAL FARMER SURVEY

This study is an individual survey for male and female member from the same household in rice-based farming communities. This aims to compare/contrast the male and female perceptions, experiences and adaptation responses to extreme weather events such as droughts and flooding in their communities. Thus, it is important to note that most of the questions should ask the specific answers/views of male and female household member who chose to be part of the survey. Moreover, this guide refers and used examples from flooding events and so must be adjusted if the survey will be conducted in drought prone areas.

Consent Form: After giving an overview of the study, it is ethical to ask the consent of every participant who expressed their willingness to be part of the study.

Part I. Characteristics of Respondent and Household: This portion should be asked together with male and female respondents from the same rice-farming households. If they are not together during the interview, this part should be asked to the household head

- A. *Characteristics of Respondents/Household:* This provides the individual and household characteristics. Socio-economic variables such as age, years in school, years of farming and caste (if applicable) should be asked individually to male and female respondent. Household size, farm size and how many hectares of land registered under ones name pertains to households characteristics
- B. *Farm Characteristics:* Provides an inventory of the crop production and number of livestock owned by the household. It is important to ask their production during normal and flood/drought year to quantify changes in their agricultural production.
- C. *Household Income:* Asks the respondents to identify their sources of income during normal and flood/drought year and quantify the changes brought about the flooding/drought event.

Part II. Climate variability, flooding/drought consequences and men/women responses to severe flooding/drought: This part should be ask to men and female respondents separately

- A. *Perception of climate variability:* This is mainly a perception of the climate variability that they have noticed for the last 30 years. This part specifically

focuses on their perception of the flooding/drought events in their community

- B. *Consequences of severe flooding/drought:* This assesses the observed consequences of flooding/drought to different aspects of their lives. It is important to seek their individual answer, not the household's response in order to compare the differences in men and women's perceptions and experiences
- C. *Coping responses:* This asks the individual responses of male/female respondent or about the adaptation strategies in which the male/female has the main influence or considers a decision maker. Take note that we are after men and women's adaptation response not the household's response.

Part III. Institutional Support: This part asks the institutional support a male/female respondent gets from the government and other institutions, including the sources of information of male/female respondents

Part IV. Mitigation Option: Aside from the adaptation identified by the male/female respondent, this asks him/her to rate the likelihood of their adoption to different technology interventions listed. Training needs is also being asked in this section.

Questionnaire Descriptors

<i>Respondent number:</i>	A unique code will be assigned to each respondent for identification purposes. IRRI staff will be assigning this respondent number, and no need to be filled up by the enumerators/interviewers. However, after each survey, completed questionnaires of male and female respondents should be attached together to identify the two (2) questionnaires as coming from the same household. Collaborators can temporarily assigned respondent number as initial reference.
Consent Form	
	<i>Introduction</i> Before every interview, as courtesy please introduce yourself (interviewer) and about the survey.
	<i>Objective and methods</i> As part of the consent form, please explain the objective and methods of the study. Indicate (tick) if they both agree

		to participate in the interview and consent has been read to them.
	<i>Name of Respondents:</i>	This refers to the household male and female respondents, usually husbands and wives who are directly managing the farm during the time of interview and can give reliable information needed. A) Name of male respondent B) Name of female respondent
	<i>Signature of the respondents</i>	Please ask the signature of the male and female respondent before the conduct of the interview, as sign of their consent.
	<i>Cell phone number:</i>	Ask the cell phone number of the farmer if available. Please get their number so if there are lacking information and clarifications, we can easily communicate with them. A) Male respondent B) Female respondent
	<i>Name of the interviewer and date of interview:</i>	These are important information that should be filled up by the enumerator/interviewer since it will be very helpful in clarifying and tracking down questionable items particularly during data processing.
	<i>Village, district, state:</i>	This includes the village, district and state where the respondent lives.

Part I. Characteristics of respondents and household

A. Characteristics of Respondents

1.	<i>Age:</i>	This denotes the age (in years) of male/female respondents when the interview was conducted. Indicate the age for both male and female respondents.
2.	<i>Years in school:</i>	It gives the years of formal education of the male/female respondents. Indicate the years in school for both male and female respondents.
3.	<i>Years in farming</i>	It gives the number of years the male/female

		respondent/s involved in rice farming. Indicate the years in farming for both male and female respondents.
4.	<i>Caste</i>	This question if applicable to the study site, for some countries, this item is not applicable but just listed as the study covers several study areas (e.g. India)
5.	<i>Household size:</i>	<p>It is number of family and other non-family members living in the same house and taking food from the same kitchen during the selected reference period. However, if a member lives outside the village or country for more than one year, then he/she should not be included.</p> <ul style="list-style-type: none"> • Sum of a) to d) should be equal to the household size • e): can be equal to b) or sum of item a) + b) since there are household members over 60 of age who are still working for the household
6.	<i>Total rice are cultivated</i>	<p>a) Type of ownership: Indicate how many hectares of rice farm is owned, rented-in or rented out. The ownership of the farm can be classified as follows:</p> <ol style="list-style-type: none"> 1. Owned – parcels owned and cultivated by the respondent. Also, parcels which are owned but left unplanted or in some seasons are classified as Owned. Note: mortgaged- parcels that are being amortized by the respondents, which when eventually fully paid will be his/her own parcel 2. Rented-in: Generally classified as parcels cultivated by the respondent but rented from other owners like tenant through share cropping or from the government <ul style="list-style-type: none"> • Share-cropped – parcels cultivated by the respondent in which inputs and production are shared with the owners of the land • Government land – parcels cultivated by the respondent but legally owned by the government or state. 3. Rented-Out – parcels which are owned but rented-out to other farmers <p>Note: There might some households who are landless in the community but they not be excluded in the study as long as their main source of income is from rice farming</p>

		and relatively been farming for at least 10 years.
		<p>b. Type of ecosystem: Indicate how many hectares of the farm is rainfed, irrigated or partially irrigated type of rice farm. The type of ecosystem can be:</p> <ol style="list-style-type: none"> 1. Rainfed: if the rice farm fully rely on rainfall for water 2. Irrigated: if the rice farm is being irrigated through gravity-typed irrigation or shallow tube well, or motorized pumps, etc. 3. Partially irrigated: if the farm is not fully irrigated and there are season's that farm only rely on rainfall for water
7.	<i>Land registered</i>	Indicate how many hectares of rice farm are registered under husband, wife, joint (husband and wife), son, daughter, elders or others (indicate who). It is not necessary owned but it can be still being amortized or inherited by the member of the household but not yet under their name
B. Farm Characteristics		
B1. Crop production		
8.	<i>Crop</i>	<p>Since rice crop is the main crop of the household, every households should have answer to this portion</p> <p>2nd to nth crop can be an intercrop or cultivated in other land.</p>
	<i>Type of crop</i>	<p>Indicate what type of crop is being cultivated,</p> <ol style="list-style-type: none"> 1- intercrop: an alternate crop to rice or other crop 2- crop planted to other area: a crop that is being planted in a separate piece of land
	<i>Year</i>	<p>Indicate the most recent normal and flood year of the household. Since flood can be experienced by the households at different times due to the farm's elevation, some are in higher or lower elevation, it is acceptable to have varying normal and flood year</p> <p><u>Normal year</u>: recall when was the most recent year that the household had normal production during dry and wet</p>

		<p>season; It is the year the rice farms were not flooded. If they have always experienced flooding, just indicate the year that their production was not affected or slightly affected by flooding.</p> <p><u>Flood year:</u> recall when was most recent year that the household had loss production either during dry or wet season or both seasons due to flooding. Usually, this year should be the year that both farms and houses have been flooded. But if the household does have recent flooding experience in their house, then you can just ask the recent year when their farms were flooded.</p> <p>Note: In drought case study, normal year and drought year should be the same in one area, and must not be variable across respondents as extreme dryness can be experience in relatively large area.</p>
	<i>Area</i>	The total area in hectares cultivated by the household for each crop for normal and flood year during wet and dry season.
	<i>Production:</i>	<p>Indicate the household's crop production in kilograms (kg) for each crop for normal and flood year during wet and dry season. It is important to convert the production in kilograms as different countries use different measurements (e.g. cavans, tons)</p> <p>Note: if the household do not plant during flooding like in wet season for the villages under study, then the crop production automatically during flood year is zero (0)</p>
	<i>Total farm area:</i>	The farm area is the sum of rice area plus other crops planted in different areas aside from the rice area being cultivated by the whole household.
B 2. Number of livestock owned and decision-maker		
9.	<i>Animal</i>	Animals/ livestock owned by the household are already pre-listed but can be changed or added depending on the livestock owned by the household, just specify.

	<i>Year</i>	<p>Indicate the most recent normal and flood/drought year of the household</p> <p>Note: Normal year and flood/drought year should be the same year with normal and flood/drought year indicated under crop production portion (question 8)</p>
	<i>Number</i>	<p>Indicate how many of each animal/livestock are owned by the household during normal and flood/drought year, if so many (e.g. ducks or chicken) just ask the estimate</p>
	<i>Decision maker</i>	<p>Indicate who has the ability to decide whether to sell or not the animals. Please refer to the code indicated. Also ask if it change during flood/drought year.</p>
	<i>Percent change</i>	<p>Indicate what is the percent change in number of the animals/livestock during flood/drought year, it can be positive (+), which means it increased during flood/drought year or negative (-) which means it decreased during flood/drought year or no change, which means the number was not affected during flood/drought year.</p>
	<i>Remarks</i>	<p>Indicate the reason for change, possible reason can be: an increased because they have the number of livestock due to suitability during flooding (e.g. ducks); or decreased since they sold it to have extra income or it died during flooding, etc. Also indicate if the livestock owned and affected were the young ones (e.g. chicks, piglets, etc.)</p>

C. Household income		
10.	<i>Source</i>	<p>Identify first the sources of income of the household during normal. Then ask if there are changes in sources of income during flood year. Indicate whether yes or no in letter c) question. There might be some changes in their sources of income and so indicate (tick) the new or similar income source during flood/drought year.</p> <p>Note: income source should correspond to the same normal and flood/drought year previously indicated in</p>

		crop production portion (question 8)
	<i>Net Income/year</i>	Indicate how much are the net income from each sources during normal and flooding/drought years in local currency Note: income should correspond to the same normal and flood year previously indicated (question 8)
	<i>Percent change</i>	Percent change can be can positive (+), which means income increased during flood/drought year or negative (-) which means income decreased during flood/drought year or no change, which means the income was not affected during flood/drought year. Note: It is possible that income change (-)100% , which means that it is no longer a source of income during flooding/drought year or income change (+) 100% since it is a new source of income
	<i>Remarks</i>	Indicate the reason for change in income, it can be as noted as above or others

Part II. Climate variability, flooding/drought consequences and men/women responses to severe flooding

A. Climate variability perception

11.	<i>If you noticed changes in weather</i>	Ask the male/female respondent if they have noticed any change in weather/climate during the last 30 years from 1980- 2011(present). Tick yes or no.
12.	<i>Changes in weather</i>	Indicate the observed changes in weather; it can be according to change in temperature, amount and timing rainfall, or occurrence of weather events. Respondent can have <u>multiple responses</u> but please encircle the most significant change.
13.	<i>Reason for change</i>	Indicate the reason for change; make the response short and precise. Respondent may mentioned several reasons but indicate under number 1) , the most important reason of the respondent
14.	<i>If you noticed</i>	Ask the male/female respondent if they have noticed any

	<i>changes in flooding event</i>	change in flooding event over the recent years (10 years). Tick yes or no. Note: for drought case study, change the question about drought
15.	<i>Describe changes in flooding event</i>	Indicate the observed changes in flooding event in the community/village. Several options are specified, just tick all possible answers. Respondent can have <u>multiple responses</u> but please encircle the most significant change. Note: for drought case study, change the question about drought and change the choices of answer
B. Flooding/drought consequences		
16a.	<i>Livestock</i>	This portion asks the male/female respondent about their own livestock. 1) <i>Meat</i> : ask if the meat available for home consumption during flooding increase, decrease, or did not change due to flooding/drought. If no meat from own produce, then indicate N.A. (not applicable) 2) <i>Milk</i> ; ask if milk from livestock (e.g. cow, goat) available for consumption and sell during flooding increase, decrease, or did not change due to flooding/drought. If no milk from own produce, then indicate N.A. (not applicable) 3) <i>Fodder</i> : ask if fodder available for feeding animals increase, decrease, or did not change due to flooding/drought. If fodder is not being collected, then indicate N.A. (not applicable) 4) <i>Livestock disease occur</i> : indicate if he/she observed that livestock disease occurred due to flooding/drought, tick yes or no. 5) <i>Livestock mortality</i> : indicate he/she observed that livestock mortality became higher due to flooding/drought, tick yes or no.
16b.	<i>Fish</i>	Ask if male/female respondent if he/she observed if there is an increased, decreased, no change in fish catch or production due to flooding/drought for home consumption
16c.	<i>Credit/loan</i>	1) Ask if the male/female respondent or any of their

		<p>household members took loan in case of severe flood/drought, tick yes or no, if NO, don't answer the rest of the questions about credit/loan. If the answer to this question is yes, then indicate fill in the table:</p> <ul style="list-style-type: none"> • Indicate (tick) who borrowed, • what are sources of loan, (refer to the code specified) • who repaid the loan (refer to the code specified) • how did they repay the loan (refer to the code specified) <p>2) Indicate if the loaned amount increased or decreased, and then indicate the percent change</p> <p>3) Ask them why did he/she or other member of the household take the loan during flooding? For what purpose was the loan? Respondent may mentioned several reasons but indicate under number 1), the most important reason of the respondent</p> <p>4) Aside from taking loans, the male/female respondent or any member might sold/pawned some assets during flooding. Indicate what kind of asset sold or pawned. Respondent may mentioned several reasons but indicate under number 1), the most important reason of the respondent.</p>
<p>16d.</p>	<p><i>Time spent in activities</i></p>	<p>Asked if there are changes in male/female usual activities due to flooding, tick yes or no.</p> <p>Tick first the activities being taken by male/female activities</p> <p>If YES, indicate if the time spent increased, decreased or did not change devoted for each activity.</p> <p>If NO, then just tick which activities are being undertaken by male/female respondent</p> <p>Note: You don't need to ask each activity to the respondent, ask first if they are undertaking the main activity like in rice production, off-farm labor, non-farm labor, non-rice production, livestock management, reproductive activities and leisure activities, if NOT, indicate N.A. (not applicable), if applicable then that's the only time that you ask them about their specific activity</p>

		<p>and if there was any change the time spent.</p> <p>Reason: changes might have specific reason but not necessary needs to be filled-up</p>
16e.	<i>Irrigation water</i>	<p>Ask if applicable, Indicate the availability of irrigation water flooding, if it increased, decreased or did not change and then indicate the percent change in irrigation water availability Quality of irrigation water can also change, so indicate if became better before, worse before flooding/drought or did not change at all after flooding/drought. Also indicate the source of irrigation water, before and after flooding/drought to validate their answers.</p> <p>Note: this is more applicable in drought prone areas not necessarily in flood prone areas. If this question is not applicable just put N.A.</p>
16f.	<i>Drinking water</i>	<p>Indicate the availability of water during flooding, if it increased, decreased or did not change and then indicate the percent change in water availability. It can increased as more water provided/bought from open market, or might decreased since the source of water is only a deep well which can be easily contaminated during flooding/drought. Quality of drinking water can also change, so indicate if it became better before, worse before flooding/drought or did not change at all after flooding/drought. Thus it is also important to indicate the source of water, before and after flooding/drought to validate their answers.</p>
16g.	<i>Food</i>	<ol style="list-style-type: none"> 1) Indicate if food is sufficient for the whole household during flooding, indicate the change if it increased, decrease or did not change, then indicate the percent change 2) Ask also the quality of food if it was better, worse or the same before flooding/drought. 3) Ask the source of food during flooding, several options are specified, just tick all possible answers. Respondent can have <u>multiple responses</u> but please encircle the most important reason. 4) Indicate the number of months that their rice

		<p>produced available for home consumption within a year. Ask during normal and flood/drought year</p> <p>5) Ask if the rice available for home consumption during flood year enough for the whole household</p> <p>6) If no, then ask why there is no enough rice for the household, possible answer is due to crop loss, rice is not enough for the whole family, they sold it, instead for home consumption or lend it to neighbors, etc. Respondent can have <u>multiple responses</u> but please encircle the most important reason.</p> <p>7) Ask the male/female respondent who they think gets the sufficient food during flooding/drought. Tick from the choices indicated. It is also possible that no one gets sufficient so just indicate NONE.</p>
16h.	<i>Fuel</i>	<p>1) Indicate if fuel is sufficient during flooding/drought, indicate the change if it increased, decrease or did not change, then indicate the percent change</p> <p>2) Ask the source of fuel for cooking during normal and flood/drought year</p> <p>3) Ask the source of fuel for energy needs (electricity or heat) during normal and flood/drought year</p> <p>4) Ask if there is enough fuel for cooking and energy needs during flooding/drought</p> <p>5) Ask this question only if the source for fuel like for cooking is wood, if not, indicate, N.A. and if the household use wood, then ask who collects wood, during normal and flood/drought year. Tick from the choices. Respondent can have <u>multiple responses</u> but please encircle the most people responsible.</p> <p>6) If they collect wood, indicate how many hours spent in collecting wood during normal and flood/drought year. Put the reason for the change in time spent in the Remarks portion.</p>
16i.	<i>Education</i>	<p>Ask only this portion if they have school age children (children who are they support or send to school).</p> <p>If they have, ask if there is any disruption on their school during flooding and ask the reason why, Tick from the choices. Respondent can have <u>multiple responses</u> but please encircle the most important reason. After indicating the reason, ask him/her to identify who he/she think is mostly affected by the school disruption due to flooding.</p>

16j.	<i>Human health</i>	<p>1) Ask male/female respondent to rate if the health status of their family members improved, worsened or did not change due to flooding. If improved or worsened then ask the reason for the change.</p> <p>2) Identify the different diseases/ health problems that their household members had during flooding. Tick from the choices. Respondent can have <u>multiple responses</u> but please encircle the most common health problem.</p> <p>3) Of the health problems identified, ask him/her to identify who does he/she thinks was most affected member of the household. <u>Response should be only one.</u></p> <p>Note: Validate the responses. It is unreasonable/illogical if they there was health problem and yet responded that their health status improved and still the same. If there is health problems, please indicate that their health status worsen as an effect of their health problems.</p>
17.	<i>Impacts on men's lives</i>	<p>This question basically asks about the impacts of flooding/drought to men's lives. Ask him/her to rate ALL impacts listed, from 1-5, 1 being the least unaffected, 5- highly affected by the impact. Then ask to identify the most significant impact, encircle the impact.</p> <p>Note: You can use cards to show to the respondents indicating the rating scale for the respondents to easily rate each items.</p>
18.	<i>Impacts on women's lives</i>	<p>This question basically asks about the impacts of flooding/drought to women's lives. Ask him/her to rate ALL impacts listed, from 1-5, 1 being the least unaffected, 5- highly affected by the impact. Then ask to identify the most significant impact, encircle the impact.</p> <p>Note: You can use cards to show to the respondents indicating the rating scale for the respondents to easily rate each items.</p>
19.	<i>Impacts on agricultural activities</i>	<p>Ask the male/female what do they think is the impact of flooding to their agricultural activities. Respondent can have <u>multiple responses</u> but please encircle the most</p>

		significant impact.
C. Coping responses		
20.	<i>Strategies</i>	<p>This question asks about the adaptation strategies that they male/female took or did he/she had the most influenced. Ask him/her to rate ALL strategies listed, from 1-5, 1 means they never done the strategies, 5- very often. Then ask to identify the most significant strategies taken by him/her. Encircle the strategy.</p> <p>Note: You can use cards to show to the respondents indicating the rating scale for the respondents to easily rate each items.</p>
21.	<i>Rice variety decision maker</i>	<p>This question should only be asked if they did he/she or other household member changed their rice variety as adaptation response. If the question applicable, ask him/her who decides on varieties to grow.</p>
22.	<i>Factors_rice variety</i>	<p>This question should only be asked if he/she or other household member changed their rice variety as adaptation response. If the question applicable, ask him/her to rate ALL factors listed, from 1-5, 1 being the least unimportant factor, 5- highly important factor. Then ask to identify the most significant factor. Encircle the factor.</p>
23.	<i>Factors_cropping pattern</i>	<p>This question should only be asked if he/she or other household member changed their cropping pattern as adaptation response. If the question applicable, ask him/her to rate ALL factors listed from 1-5, 1 being the least unimportant factor, 5- highly important factor. Then ask to identify the most significant factor. Encircle the factor.</p> <p>Note: You can use cards to show to the respondents indicating the rating scale for the respondents to easily rate each items.</p>
24.	<i>Migration</i>	<p>This question should only be asked if he/she or other household member migrated as adaptation response. If the question applicable, ask him/her to identify who</p>

		migrate and who was left behind to manage the farm.
25.	<i>Constraints to adapting</i>	This question asks about the constraints in their ability to adapt to flooding. Ask him/her to rate ALL constraints listed, from 1-5, 1 being the least unimportant, that means that particular item/constraint did not affect him/her at all, while 5- means he/she is highly affected by that factor. Then ask to identify which among the constraints listed that affected him/her most. Encircle the constraint.
III. Institutional Support		
A. Government and other Institution's Support:		
26.	<i>Access to support</i>	Ask the male/female respondent if they get any support from the government or any institution
	<i>Kind of support</i>	If they have support, Ask male/female respondent to identify the kind of support they received from government and other institution, see the listed code.
	<i>Source of support</i>	Ask male/female respondent to identify the source of support they received from government and other institution, see the listed code.
	<i>Kind of support expected</i>	Aside from the support from the government listed, or if no support received from the government, ask male/female respondent to list down the kind of support he/she expects from the government. Put in number 1), the most important they expect from the government. Note: Even if they have not received any support from the government, this question should be asked to each respondent to know their expectations from the government.
B. Source of information		
27.	<i>Access to information</i>	Ask male/female respondent if they have access to the following item: i) farming practices; ii) livestock activities; iii) weather condition, Indicate yes or no.
	<i>Source of</i>	If he/she has access to information, ask to identify the

	<i>information</i>	source, use the code listed
	<i>Recipient of information</i>	Ask who is the common recipient of these information, use the code listed
IV. Mitigation options		
28.	<i>Technology intervention</i>	In the listed technology interventions ask the male/female respondent to rate how likely him/her to adopt the listed technology interventions, 1- being highly unlikely, 5- being the highly likely. Putting a remark for each intervention is an option, only when a respondent mentioned additional information
29	<i>Training</i>	Ask male/female to indicate their training needs, Respondent can have <u>multiple responses</u> but please encircle the most important training mentioned.

Annex 6. Explanatory Statement



MONASH University

Department of Social Work

Faculty of Medicine, Nursing and Health Sciences

2 May 2011

Explanatory Statement – Key informants

Title: Analysis of gendered adaptation to flooding in the Philippines

This information sheet is for you to keep.

My name is Gerlie T. Tatlonghari and I am conducting a research project with Margaret Alston a professor in the Department of Social Work towards a PhD degree at Monash University, Victoria, Australia. This means that I will be writing a thesis which is the equivalent of a 300 page book. This study is being conducted in association with International Rice Research Institute (IRRI). We have funding from Monash University for an international PhD scholarship.

Based on my meetings with the people involved in the IRRI-Japan submergence project that was implemented in Nueva Ecija, Philippines in 2008, you are in a key position to give information about some of the research questions of my study. You, as the leader of your organisation is well able to inform me about your organisation's contribution to address the need of men and women of the flooded communities.

The aim/purpose of the research

The general objective of the study is to understand how men and women cope with flooding events in rice farming households of the Philippines. I am conducting this research to specifically identify the factors that influence the differences in coping responses of men and women and to understand the consequences of flooding events within the household and community.

Possible benefits

The possible benefits of undertaking this kind of study to your organisation is that you can be better informed about the consequences of flooding events for men and women and their current coping responses. This important information can help

your organisation to better formulate recommendations for future coping responses.

What does the research involve?

The study involves a one hour interview to talk about the coping responses that you implemented and are currently employing to address the needs of strengthen men and women in flood-prone areas. For the purpose of accuracy and to capture detailed information, the interview will be audio-taped and photographed. As the interview will take a one hour, you might feel some discomforts/inconveniencies. However, I will keep track of the time and be concise with my questions.

Can I withdraw from the research?

Being in this study is voluntary and you are under no obligation to consent to participation. However, if you do consent to participate, you may withdraw at any time.

Confidentiality

To manage the confidentiality or anonymity of the data that I will be collecting from you, be assured that any personal information will not be mentioned when findings of the study are published. I will be using pseudonyms/codes to refer to some of the information relied by you.

Storage of data

Storage of the data collected will adhere to the University regulations and kept on University premises in a locked cupboard/filing cabinet for 5 years. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Use of data for other purposes

Your information may be used as part of my thesis and other publications arising from this work but you will not be identified. This data will remain anonymous. You will not be identified in any way.

Results

If you would like to be informed of the aggregate research finding, please contact Gerlie T. Tatlonghari on cell phone number: [REDACTED]

[REDACTED] The findings are accessible for 2013-2018.

<p>If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:</p>	<p>If you have a complaint concerning the manner in which this research CF10/2380 – 2010001351 is being conducted, please contact:</p>
<p>Margaret Alston ████████████████████ ████████████████████ Email: ██</p>	<p>Thelma R. Paris Senior Scientist (Socio-economist-Gender Specialist) Social Sciences Division International Rice Research Institute DAPO Box 7777 Metro Manila , Philippines ██ ████████████████████</p>

Thank you.

Gerlie T. Tatlonghari



Department of Social Work

Faculty of Medicine, Nursing and Health Sciences

2 May 2011

Explanatory Statement – Men/women in rice farming that is /head/member of the household

Title: Analysis of gendered adaptation to flooding in the Philippines

This information sheet is for you to keep.

My name is Gerlie T. Tatlonghari and I am conducting a research project with Margaret Alston a professor in the Department of Social Work towards a PhD degree at Monash University, Victoria, Australia. This means that I will be writing a thesis which is the equivalent of a 300 page book. This study is being conducted in association with International Rice Research Institute (IRRI). We have funding from I have funding from Monash University for an international PhD scholarship.

After consultation with your village leader and the head of the rice farming group we have identified you as one of the potential participants of our research project. Given your substantial contribution to rice farming and as key agents during flooding events, we believe that you can greatly contribute to the aim of our study.

The aim/purpose of the research

The general objective of the study is to understand how men and women cope with flooding events in rice farming households of the Philippines. I am conducting this research to specifically identify the factors that influence the differences in coping responses of men and women and to understand the consequences of flooding events within the household and community.

Possible benefits

The possible benefit of undertaking this kind of study is for you to recognise your own capacities in preparing for flooding. In this way, you might think of ways to strengthen your capacity in times of flooding. The result of the study can be of great input to the policy makers, researchers and international communities that are

supporting and funding households and communities to sustain the livelihood and reduce the risk of flooding.

What does the research involve?

The study initially involves three (3) activities with different topics: 1) group assessment of the current situation of the community related to flooding 2) group discussion about flooding events and your coping response and 3) in-depth interviews. It is also possible to conduct a household survey if additional funding will be available. Each of the activities will take one to two hours depending on the phasing of participants. For the purpose of accuracy and to capture detailed information, the interview will be audio-taped and photographed. As the activities will take one to two hours and may tackle some sensitive issues to you, you might feel some discomforts/inconveniencies. However, I will keep track of the time and be concise with my questions. In case, you feel emotionally stressed during the sessions, you will be referred to the barangay health center and meet the barangay social worker for counseling.

Can I withdraw from the research?

Being in this study is voluntary and you are under no obligation to consent to participation. However, if you do consent to participate, you may withdraw at any time.

Confidentiality

To manage the confidentiality or anonymity of the data that I will be collecting from you, rest be assured that any personal information will not be mentioned when findings of the study are published. I will be using pseudonyms/codes to refer to some of the information relied by you.

Storage of data

Storage of the data collected will adhere to the University regulations and kept on University premises in a locked cupboard/filing cabinet for 5 years. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Use of data for other purposes

Your information may be used as part of my thesis and other publications arising from this work but you will not be identified. This data will remain anonymous. You will not be identified in any way.

Results

If you would like to be informed of the aggregate research finding, please contact Gerlie T. Tatlonghari on cell phone number: [REDACTED] [REDACTED] edu; g.tatlonghari@irri.org [REDACTED] [REDACTED]

<p>[REDACTED] e researchers about any aspect of this study, please contact the Chief Investigator:</p>	<p>If you have a complaint concerning the manner in which this research CF10/2380 – 2010001351 is being conducted, please contact:</p>
<p>Margaret Alston [REDACTED] [REDACTED] Email: [REDACTED]</p>	<p>Thelma R. Paris Senior Scientist (Socio-economist-Gender Specialist) Social Sciences Division International Rice Research Institute DAPO Box 7777 Metro Manila , Philippines [REDACTED]</p>

Thank you.

Gerlie T. Tatlonghari