

Integrating *Gender* into Environmental Economics Research: Lessons from EEPSEA Studies

EDITORS: Herminia A. Francisco, Linda M. Peñalba, and Kalikasan C. Cuevas



Economy and Environment Program for Southeast Asia

The **Economy and Environment Program for Southeast Asia (EEPSEA)** was established in May 1993 to support training and research in environmental and resource economics. Its goal is to strengthen local capacity in the economic analysis of environmental issues so that researchers can provide sound advice to policy makers.

To do this, EEPSEA builds environmental economics (EE) research capacity, encourages regional collaboration, and promotes EE relevance in its member countries (i.e., Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, the Philippines, Thailand, and Vietnam). It provides: (a) research grants; (b) increased access to useful knowledge and information through regionally known resource persons and up-to-date literature; (c) opportunities to attend relevant learning and knowledge events; and d) opportunities for publication.

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**INTEGRATING GENDER
INTO ENVIRONMENTAL ECONOMICS RESEARCH:
Lessons from EEPSEA Studies**

Economy and Environment Program for Southeast Asia

July, 2016

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Front cover: A man and a woman are drying fish pallets in Medellin, Cebu.
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Table of Contents

<i>Foreword</i>	<i>v</i>
<i>Contributors</i>	<i>vii</i>
<i>Acronyms</i>	<i>ix</i>
Synthesis. Integrating Gender into Environmental and Natural Resources Economics Research: Insights from Philippine Case Studies <i>Linda M. Peñalba, Ma. Larissa Lelu P. Gata, Merlyne M. Paunlagui, Zenaida M. Sumalde, Margaret M. Calderon, Maria Helen F. Dayo, and Samantha Geraldine G. De los Santos</i>	1
Case Study 1. Determinants of Farmers' Decision to Continue Farming the Rice Terraces of Hungduan <i>Margaret M. Calderon and Ma. Larissa Lelu P. Gata</i>	44
Case Study 2. Assessment of Gender Role Participation in Coastal Resource Management Program: A Case Study in Masinloc, Zambales <i>Zenaida M. Sumalde, Maria Helen F. Dayo, and Ma. Cristina A. Alvarez</i>	76
Case Study 3. Adaptive Capacity and Adaptation Actions of Households for a Typhoon Event in Bula, Camarines Sur, Philippines <i>Linda M. Peñalba, Merlyne M. Paunlagui, and Samantha Geraldine G. De los Santos</i>	124

Foreword

Gender equality is a critical element in promoting economic development and in effecting social and institutional change. It is achieved when men and women have equal rights, and are presented with the same conditions and opportunities to shape their own lives and affect society. The intent is that by providing such equal opportunity, the potentials of both men and women to contribute to development are enhanced to the benefit of society.

The International Development Research Centre (IDRC) and Swedish International Development Cooperation Agency (Sida), EEPSEA's donor agencies, both consider gender equality as an important principle in their programs. Needless to say, they both require their recipient organizations to observe gender equality in the delivery of their services and in the conduct of their development and/or research programs. EEPSEA's host organization, the WorldFish Center, also puts heavy emphasis on the gender dimension of its research projects. As a response, EEPSEA has made it a requirement under the current grant (2012–2016) for research proposal submissions to include a discussion on the gender dimension of their proposed research.

EEPSEA also initiated a research project in 2011 entitled *Engendering Environmental and Natural Resource Economics Framework*, which tested the basic question “How can we engender ENRE research and will it matter?” We contracted a lead researcher to first review the research areas of past studies that EEPSEA had supported and to recommend how those studies can be made more gender-sensitive. A framework to engender environmental economics research framework was developed based on literature review. We then selected researchers in the Philippines in the research areas of forest resource management, coastal resource management, and climate change adaptation to revisit the old study site or to conduct a similar study in another site using the same methodology and analytical procedures but with a gender-sensitive research framework. The results and analysis of the two studies were compared.

The project concludes that a strategic and conscious integration of gender into environmental economics research can enrich the analysis, thereby enabling researchers to give a more accurate assessment of the men-women dynamics in environmental and natural resource management. This is especially important when designing developmental policies, projects, and programs that will require involvement of both men and women in the localities. The project team ends with a recommendation on how the gender dimension can be integrated into ENRE research that goes beyond merely counting what men and women do, to determining how access to and control over resources can be made more equitable.

It is our hope that this book will demonstrate to environmental economic researchers the various methodological and analytical means for integrating gender into their research. We also hope that through this book, research institutions, developmental organizations, and governments will be encouraged to engender their research and developmental projects. Such feat will be a significant step toward achieving more gender-sensitive programs and policies in the future.

Herminia A. Francisco
EEPSEA Director

About the Authors

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Acronyms

BFAR	Bureau of Fisheries and Aquatic Resources
CBCRM	community-based coastal resource management program
CCA	climate change adaptation
CGE	computable general equilibrium
CO	community organizations
CPM	Country Program Managers
CRM	coastal resource management
CRMP	Coastal Resource Management Program
DILG	Department of Interior and Local Government
DPC	direct project costs
DRRM	disaster risk reduction and management
DRRMC	Disaster Risk Reduction and Management Council
EEPSEA	Economy and Environment Program for Southeast Asia
ENRE	environmental and natural resource economics
ENRM	environment and natural resource management
FGD	focus group discussion
FRM	forest resource management
FSP	Fisheries Sector Program
GAD	gender and development
GREAT	Gender Responsive Economic Actions for the Transformation of Women
GWP	GREAT Women Project

IEC	information, education, and communication
IFAD	International Fund for Agricultural Development
KII	key informant interview
LAC	Latin Americas and the Caribbean
LGU	local government unit
MENRO	Municipal Environment and Natural Resources Office
MPA	marine protected area
NGO	nongovernmental organization
NIPAS	National Integrated Protected Area System
NPC	National Power Corporation
NRM	natural resource management
PDRPMC	Provincial Disaster Risk Reduction Management Council
PENRO	Provincial Environment and Natural Resources Office
PHP	Philippine Peso
PO	peoples' organization
RA	research assistant
SEARCA-SFRT	Seed Fund for Research and Training Program of the Southeast Asian Regional Center for Graduate Study and Research in Agriculture
TC	transaction cost
TCS	transaction costs share
TPC	total project cost
USD	United States Dollar

Synthesis

Integrating Gender into Environmental and Natural Resources Economics Research: Insights from Philippine Case Studies

Linda M. Peñalba, Ma. Larissa Lelu P. Gata,
Merlyne M. Paunlagui, Zenaida M. Sumalde,
Margaret M. Calderon, Maria Helen F. Dayo,
and Samantha Geraldine G. De los Santos



Rice farmers harvesting rice seedlings for planting
Photo courtesy of ILO in Asia and the Pacific under creative commons license at
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EXECUTIVE SUMMARY

This research demonstrates how one can enhance the gender dimension of an environmental and natural resource economics (ENRE) research, and shows what insights such a focus could generate in the analysis of data. In this integrative chapter, the analysis focused on three ENRE research areas; it compared two studies (i.e., one with gender focus and the other without explicit gender focus) per research area in order to determine if gender analysis will yield new insights and valuable information that would help develop more appropriate, inclusive, and gender-responsive development interventions.

Gender can be used in ENRE research in three ways: (1) as an explanatory variable (especially in quantitative research), (2) as a unit of analysis (useful in qualitative research), or (3) as integrated into the framework of action. In the engendered framework adopted in the three case studies presented in this book, gender was taken both as an explanatory variable and as a unit of analysis. The results showed that gender added more depth and substance to the analysis, which allowed for more focused recommendations.

In the case study on forest resource management (Case Study 1 by Calderon and Gata), the inclusion of gender in the research provided more information on the decision making of both male and female farmers in Hungduan, Ifugao province. It was clearly established that women's role in planting, weeding and cleaning, and harvesting activities was central to the overall farming activities in Hungduan. If the centrality of women's role in the productive arena will be neglected in research, then it will deny women due recognition of their central role in sustaining their family's main source of livelihood.

In the coastal resource management (CRM) study (Case Study 2 by Sumalde, Dayo, and Alvarez), the researchers found out that women had also been involved in CRM activities such as mangrove rehabilitation, coastal cleanup, and even in patrolling of the mangrove resources. They were also found to be more aware of the environmental and other community issues in their locality. As such, their role in supporting

CRM activities is equally important. It is satisfying to note that this role is recognized by development agents as women and men are equally consulted on matters related to CRM.

In the study on households' adaptive capacity to extreme climate events (Case Study 3 by Peñalba, Paunlagui, and De los Santos), the researchers gathered information about the adaptive strategies undertaken by male and female household heads during typhoon events. The researchers found out that the differences had been largely due to the men's and women's individual capacity to undertake those tasks. This means that more physically demanding works are taken up by men, whereas women undertake the less strenuous jobs like being the caregiver in the family. This is not really a surprising result. In dealing with a disaster, there does not seem to be much difference in how men and women react.

Results of the case study also showed that both men and women wanted support from the government that would provide hard infrastructures in their area in order to minimize the impacts of typhoon and flooding. They also expect assistance in terms of provision of evacuation center and food supplies in times of disaster.

Overall, it appears that if one is largely interested in finding out about the role of women in the way natural and environmental resources are managed, then a more gender-disaggregated analysis on this topic should be implemented.

INTRODUCTION

Background

Gender has been found to be a key determinant of rights to natural resources and to the benefits derived from these resources (Watson 2005; Joeques 1995a, 1995b). Likewise, gender relations directly affect the use, management, and conservation of natural resources and the environment (Agrawal et al. 2006; Resurreccion and Elmhirst 2008; Flintan and Tedla 2010). Men and women differ considerably in terms of their needs, interests, and priorities as natural resource users and as participants and beneficiaries of the development process (Kabeer and Subrahmanian 1999).

Understanding the impact of gender and gender relations on the development process is important, which is why most development organizations and institutions have included gender as part of their development and environmental agenda since the 1970s. However, the meaningful inclusion of gender in natural resource management (NRM) research and in its associated projects and activities remain a challenge; efforts in this area have been focused on other less complicated issues (Flintan and Tedla 2010).

The impacts of gender on NRM became fully understood due to the influence of policy directions. Historically, NRM policies had been hunter-focused; policies then shifted to preservationist-focused (Said 1978; Grove 1995). Because NRM policies used to be hunter-focused, documentation had highlighted the dominant role of men in NRM and in other conservation processes. Conservation of mega-species had been the priority, rather than the preservation and sustainable utilization of species that are important to local people's livelihood. The mutual supporting links between local communities and their environment were therefore broken, which eventually limited the local communities' access to natural resources (Flintan and Tedla 2010).

These developments demonstrated that people had been isolated from policies and processes that address their access to environment and natural resources, which are critical for their livelihood. Their participation

in decision making about NRM and utilization had also been weakened. Furthermore, under these development concepts, conservation had been seen as men's role. In cases where development workers interacted with the communities, they did so with local male leaders; women did not have the opportunity to participate in conservation movements (McClintock 1995).

The importance of involving all natural resource users, including women, became evident when conservation concepts shifted from protectionism-based to a more community-focused and inclusive (Flintan and Tedla 2010). The linkage between NRM and people's development was reestablished when new approaches that promote integrated and active community involvement in NRM were adopted by many development agencies (Western, Wright, and Strum 1994; IIED 1994; Rihoy 1995; Joeques 1995a). With these changes in NRM approach, the value of women's contribution, their knowledge and experiences, and their role in the exploitation or protection of the environment and natural resources were recognized (Flintan and Tedla 2010; Joeques 1995a, 1995b).

Along with the shift in conservation policies, theories on how to best achieve community participation (particularly that of women) were developed to recognize the role of women in sustainable development. *Women in development* policies were replaced by *women, environment, and development* strategies in the 1980s. However, these approaches had failed to recognize the variety of interests, motivations, and power relations involving women in environment and natural resources management (ENRM) and in the development processes, which resulted in the lack of appropriate interventions. The policy framework was then changed to *gender and development* (GAD) and to *gender, environment, and development*. This shift is expected to lead to more gender-sensitive research, which could provide more gender-informed policies and interventions (Flintan and Tedla 2010).

However, despite these efforts of policy makers and researchers, gender studies that had been conducted had insufficient gender analysis and lacked depth and recognition of the complexity of gender relations and processes (Flintan and Tedla 2010). This was particularly noted in NRM research, which mostly dealt with the natural scientific aspect

(rather than analyzed the socioeconomic dimension) and rarely included gender analysis. For example, many projects and studies in water, sanitation, and social forestry failed to promote women's interests.

In order to fill some of the gaps in gender-informed NRM research, numerous social and gender analyses studies were conducted by various groups in various empirical settings (Flintan and Tedla 2010; Resurreccion and Elmhirst 2008). Using the results of six African case studies, Flintan and Tedla (2010) outlined the importance of including gender issues in social- and natural resource-linked research, highlighted gender differences in relation to the environment and natural resources, and examined why such differences exist. Meanwhile, Resurreccion and Elmhirst (2008, p. 3) discussed the gender dimensions of natural resource exploitation and management in Asia "where gender is understood as a political, negotiated, and contested element of social relationships."

Although several gender analysis frameworks have been described in literature, not one illustrates how gender can be integrated into environmental economics research or in the valuation of the gender analysis results. For instance, the recent publications on gender and NRM have adopted qualitative approaches such as politico-ecology, politico-economy, and feminist social theory (ResurreccionElmhirst 2008); and social and resource mapping, daily and seasonal calendars, economic well-being ranking, and mobility mapping (Flintan and Tedla 2010).

The literature review conducted in this research project have revealed that one major research gap in environmental and natural resource economics (ENRE) research is the lack of gender analysis. Environmental economics research is important in guiding policy and decision makers on how to evaluate the economic implications of various environmental policy options that can affect direct and indirect natural resource users. Thus, the challenge is to come up with a framework for engendering ENRE research. Such framework will not only count what men and women do, but will also identify who has access and control over resources, and determine the gender relations and the factors affecting such relationship. All of these will be ultimately used as inputs to policy and decision making.

In response, this research project addressed the following questions:

1. How can gender dimensions be integrated into ENRE research?
2. What methods and approaches can be used to develop an engendered ENRE research framework?
3. How can the engendered ENRE framework be used to inform policy makers in designing gender-responsive development interventions?

Research Objectives

This research project aimed to develop a framework for engendering ENRE research, and forwarded suggestions on how to incorporate gender analysis into ENRE research. Specifically, this study aimed:

1. To review completed studies in the Philippines funded by the Economy and Environment Program for Southeast Asia (EEPSEA) in order to identify which research studies are amenable to gender analysis;
2. To develop a framework for engendering ENRE research;
3. To test the applicability of this framework under various socioeconomic and environmental conditions;
4. To assess if gender analysis will yield new insights and valuable information for more appropriate, inclusive, and gender-responsive development interventions; and
5. To recommend ways for integrating gender analysis into various types of ENRE research.

RESEARCH METHODS

This research used both secondary and primary data and adopted both qualitative and quantitative methods of analysis. This section covers the conceptual framework and the research process.

Research Process

Figure 1 presents the activities that the researchers conducted in this project:

1. review of literature, consisting of completed EEPSEA research reports and other literature;
2. drafting of a framework for engendered ENRE research;
3. conduct of case studies to validate the draft framework;
4. synthesis of case study results based on the gender themes of knowledge, beliefs and preferences, temporal and spatial allocation, access and control over resources, participation of men and women in the public sphere, and legal rights and status; and
5. finalization of the draft gender-sensitive framework for ENRE research.

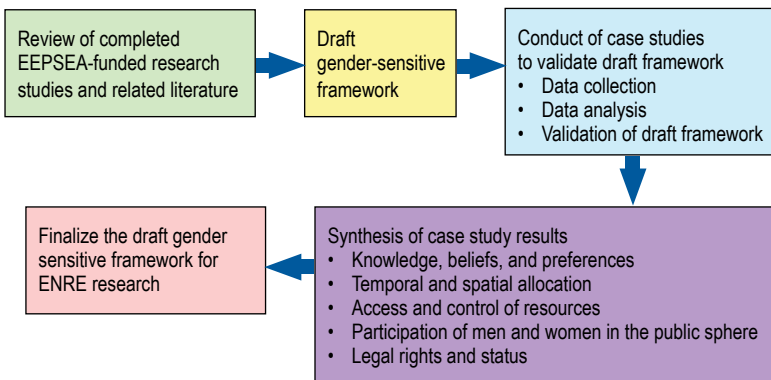


Figure 1. Research process in the development of an engendered ENRE research framework

Review of EEPSEA-funded studies

The researchers conducted a desk review of existing literature and completed EEPSEA-funded research projects conducted in the Philippines in order to gather documented information on gender relations and gender differentiation in ENRE. Specifically, the desk review aimed to determine the extent of gender-disaggregated data available in literature,

to provide information on the existing knowledge on gender and the environment, and to identify areas and topics covered in the studies and the major information/data gaps. The review was also done to analyze how gender dimensions could be integrated into ENRE research, what other types of data could have been collected, and what other data collection activities could have been employed to make EEPSEA studies be gender-sensitive.

The EEPSEA-funded research projects were classified into six categories, namely, (1) valuation research, (2) cost-benefit analysis, (3) institutional analysis, (4) adoption/determinants of choice studies, (5) computable general equilibrium (CGE) studies, and (6) cost-effectiveness analysis of pollution control options. However, the authors found that gender analysis was more relevant in the first four categories. Six research reports from each of the first four categories were then reviewed to determine which type of research would be amenable to gender analysis, and how gender dimension could be incorporated into the research framework. The results of the review were accordingly integrated and used to develop the engendered ENRE research framework.

Drafting the engendered ENRE research framework

The engendered ENRE framework was developed based on the information generated from the review of existing literature on ENRE gender analysis and from the review of completed EEPSEA-funded research studies. This draft framework was presented in an EEPSEA workshop participated by natural resource and environmental economics researchers. The output of the workshop (i.e., a draft framework) was inputted in the conduct of the case studies.

Conduct of case studies

The draft framework, formulated based on the general review of literature on gender and ENRE and on the completed EEPSEA research studies, was used in the case studies. Three case studies in the Philippines were conducted, and the subjects were selected using the criteria set by the research team. The methodologies employed in the original EEPSEA-funded research studies were adopted, but was enhanced through applying the draft engendered ENRE research framework.

Specifically, the case studies were developed to

1. evaluate if a general framework would be appropriate for the various classifications of EEPSEA-funded research under different social, economic, and environmental conditions;
2. determine whether there is a difference in the results of studies with and without gender dimension;
3. describe how women's contribution to ENRM can be assessed and economically valued;
4. identify the additional information that can be generated by engendering ENRE research; and
5. assess the modifications to be made to engender ENRE research (if the draft framework is not appropriate).

Data collection

The data collection methods used in the conduct of the case studies consisted of household survey, focus group discussions (FGD), and key informant interviews (KII).

1. Household survey were used to gather information from men and women involved in ENRM on their socioeconomic characteristics, the nature and extent of their involvement in ENRM-related activities, and other data needed in describing gender relations and their participation in ENRM.
2. FGDs were held to enable the primary stakeholder participants to discuss openly their perceptions, attitudes, and views. The method also aimed to validate community-level activities, regulations, and practices. Separate FGDs with male and female participants were conducted to explore gender differences in attitudes, behavior, and preferences. Other tools, such as daytime-use analysis, were used as part of the FGDs in order to capture the specific activities performed by men and women.
3. KIIs were conducted with key community leaders to determine the gender-related ENRM activities. This method also provided an opportunity for more in-depth discussion of critical issues.

Data analysis

The generated data were subjected to appropriate qualitative and quantitative analyses. Both descriptive and inferential statistics were used to analyze the data. Frequency distributions, means, and graphs were used to characterize the socioeconomic profile of the respondents and their practices, knowledge, perceptions, and preferences. On the other hand, the inferential statistics used included regression analysis (logit and tobit), test of proportion (z-test), and test of association (Cramer's V and Eta coefficients). The contributions of men and women in ENRM activities were valued using appropriate economic valuation methodologies, which included replacement cost, value of time spent for ENRM-related activities, foregone income/loss in productivity, willingness to pay, and cost of illness.

1. *Value of time used in ENRE related activities.* This involved computing and valuing the time spent on ENRM-related activities using the prevailing wage rate in the area. This included direct and indirect values; the direct value was the actual time spent on the ENRM activities whereas the indirect value included the value of other ENRM-related activities (e.g., the opportunity cost of time, that is, the value of the foregone alternative for the use of time spent in ENRM activities).
2. *Replacement cost.* This included the cost of replacing damaged properties, specifically information on how much money had been spent to replace damaged property. However, the cost borne by women was incorporated under foregone income or value of time spent in replacing the damaged property.
3. *Loss in productivity* refers to the loss in output due to environmental degradation, the value of which was estimated using market prices.
4. *Foregone income* refers to loss of income due to an individual's inability to work because of certain circumstances. In this case, the loss in income due to flooding caused by typhoons was estimated. This was based on the number of days an individual was absent from work and the prevailing wage rate.

5. *Willingness to pay* was based on the expressed amount that men and women were willing to pay for a certain adaptation program that would be implemented by the government.
6. *Cost of illness* consisted of direct and indirect components. The direct component included the actual cost of medication, hospitalization, and change in dietary requirement, transport cost in seeking treatment, laboratory fees, and consultation fees, among others. On the other hand, the indirect cost included the value of time for not being able to work while sick and the value of time of the person who took care of the hospitalized/sick person.

Synthesis of the case study results

The results of the case studies were synthesized to determine if the draft framework would be applicable to ENRE research. The synthesis was based on the following gender themes: (1) knowledge, beliefs, and preferences; (2) temporal and spatial allocation; (3) access to and control over resources; (4) participation of men and women in the public sphere; and (5) legal rights and status.

Validation and dissemination of the engendered ENRE framework

Another workshop with local gender and natural resource and environmental economics researchers was conducted after the case studies had been completed. The research team presented the results and recommendations of the case studies. The main objective of the workshop was to solicit comments and suggestions from gender and ENRE experts in order to enhance the framework.

ENGENDERED ENRE FRAMEWORK

Gender refers to the social differences between women and men. It is a dynamic concept in which the roles of women and men vary greatly from one culture to another and from one group to another within the same

culture. Gender differentiation has profound implications on the access to resources and on the benefits that men and women can derive from using the world's resources (Flintan and Tedla 2010).

Gender analysis helps researchers to understand gender relations, gender differentiation, and gender discrimination. It is an approach that disaggregates and explicitly shows how men and women, particularly male and female household members, relate to each other in terms of their roles and responsibilities. In NRM, gender analysis disaggregates gender based on men's and women's access to and control of resources and benefits, and the extent to which their rights are enjoyed and exercised. These rights include participation in decision making, access to and control of resources, equal opportunity, and equity between men and women by systematically documenting the roles of the different members of a household and/or society at large (Flintan and Tedla 2010). Gender relations and gender differences in behavior, access, control, utilization, and exploitation of environment and natural resources can be clearly explained through a framework that could guide NRM and environment and natural economics research.

Based on the review of EEPSEA-funded ENRE research projects in the Philippines, there are three ways by which researchers can deal with the gender dimension of any ENRE research:

1. Gender can be viewed as one of the many explanatory variables that affect the choices/decisions of the respondents.
2. Gender can be viewed as a unit of analysis wherein the role of men and women in the access and control of resources are analyzed.
3. Looking at gender as an integrated part of any framework of action—this translates into looking for opportunities to mainstream gender in the resulting program of actions and policy recommendations that will emerge from the research.

These three options of engendering research are shown in Figure 2. The review of EEPSEA's past studies in the Philippines revealed that most research stops short at looking at gender as an explanatory variable. There are opportunities, however, to deepen the gender dimension by adopting the two other perspectives. These approaches are discussed below:

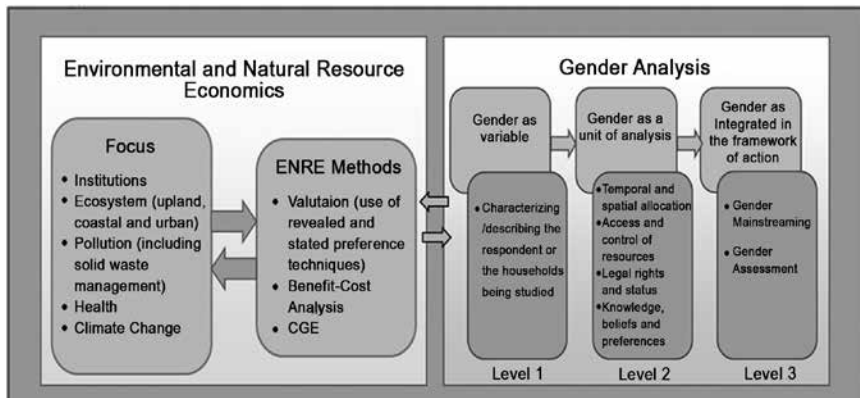


Figure 2. Engendered ENRE research framework

Gender as a variable

A prominent analytical usage of gender, as observed in the reviewed EEPSEA-funded ENRE research studies, was taking gender as a variable. Among the 21 reviewed Philippine research studies, 12 utilized gender either as a descriptive variable of the socioeconomic status of the respondents and their households or as an explanatory variable in the regression and logit analyses on knowledge, perception, attitudes, behavior, and preferences (e.g., Bennagen, Nepomuceno, and Covar 2002; Calderon et al. 2005; Subade and Jugado 2010). At this level, engendering ENRE research should prompt researchers to collect and organize gender-disaggregated data through survey method. Although this study does not claim that this level is a stand-alone for gender analysis, it can be argued that generating gender-disaggregated data is an essential first step toward a deeper and meaningful gender analysis in the succeeding levels/ways.

Taking gender as a variable entails integrating gender into any data collection and analysis instruments used in ENRE research. For example, ENRE researchers who use surveys as the appropriate data collection method need to incorporate gender as a variable when collecting data on the respondents' socioeconomic status such as income, educational attainment, age, race and ethnicity, and livelihood activities, among others. Survey instruments used in collecting data on knowledge,

perception, attitudes, and behavior must also be disaggregated based on gender.

As observed, ENRE researchers must also develop sensitivity, especially when imposing selection criteria on the respondents, in order to avoid (if not eliminate) gender biases against women. For example, imposing selection criteria such as “head of the household” or “main earner” may lead to selecting only male respondents, and thus underrepresent women in the research (e.g., Calderon et al. 2008; Harder, Labao, and Santos 2007). In the Philippines, for example, the term “household head” is culturally associated with fathers or male figures. Thus, in this case, there should be a deliberate effort to include women respondents in ENRE or any research projects (e.g., Bennagen, Nepomuceno, and Covar [2002], which preferred to interview the mothers or wives when available).

Finally, ENRE research using various economic approaches (e.g., stated and revealed preference methods) must generate gender-disaggregated database in order to address gender differences in the next level of gender analysis. Without a gender-disaggregated database, ENRE research will not be engendered in the first place. Engendering these types of economic approaches involve incorporating gender relationships in all aspects of the instrument—that is, from socioeconomic demographics to the preferential aspects of the instrument.

Some sample questions that may engage ENRE research in using gender as a variable can be as follows:

1. Is there a statistically significant difference between men and women in terms of ENRM activities? For example, is gender a statistically significant factor to a municipal solid waste management?
2. How many people are involved in people’s organizations that engage in reforestation projects around the Philippines, accounting for gender and age groups?
3. Do mothers spend more time in segregating household wastes than fathers?

Gender as a unit of analysis

Although the reviewed EEPSEA-funded ENRE research projects in the Philippines lacked gender dimension, the researchers of this research project proceeded in asking the question “*How can we integrate gender into these ENRE research projects?*” Using this analytical stance, the authors were able to identify an emerging theme in the review. This theme involved treating gender as a unit of analysis.

When gender is viewed as a unit of analysis, gender is analyzed as the relationship of men and women involving mainly the divergences in the lived experiences and opportunities between men and women in the arenas of productive, reproductive, and community activities. These engendered relationships also produce differentiated roles, access, control, and participation in ENRM. Thus, ENRE research profits from pushing gender analysis at this level in order to unravel the complex relationships among men and women both in the public and private spheres.

Based on the review conducted in this project, the authors were able to identify key themes that signify possible areas where gender can be incorporated in ENRE research. These themes include the following:

1. knowledge, beliefs, and preferences (e.g., Bennagen and Altez 2004; Calderon et al. 2005; Palanca-Tan 2007);
2. temporal and spatial allocation (e.g., Bennagen 1998; Sumalde and Pedroso 2001);
3. access and control over resources (e.g., Predo and Dargantes 2010);
4. participation in the public sphere (e.g., Bennagen and Altez 2004; Bennagen, Nepomucceno, and Covar 2002); and
5. legal rights and status (e.g., Calderon et al. 2008; Peñalba et al. 2005).

The theme *knowledge, beliefs, and preferences* emerged mainly from the reviewed ENRE research; the main valuation method relied on stated preferences. In engendering ENRE research, this theme informs how

the differentiated knowledge, beliefs, and perception of men and women influence their attitudes and participation, specifically in ENRM. Understanding the belief system of men and women can also help in identifying the root causes of gender biases and stereotypes against women and men, which may hinder them from participating in ENRM. Sample questions can be as follows:

1. How do women and men view the status of ENRM in their locality? At the national and international levels?
2. How much are men and women willing to pay for the use of the natural resources in their community? At the national and international levels?
3. Are both men and women equipped with relevant knowledge to pursue ENRM? Are they equally informed about ENRM? Are there differences in the knowledge base of men and women?
4. What are the cultural norms (including gender biases and stereotypes) that may hinder men and women from participating in ENRM or in any environment-related endeavors?
5. Do women and men receive appropriate training support on ENRM and other educational opportunities that will level up the playing field for them?
6. Do men and women have the knowledge and ability to perform ENRM and other environment-related tasks (i.e., relief activities, patrolling, etc.)?
7. What are the main differences in the knowledge, attitudes, behavior, and perception of men and women on climate change?

The theme on *temporal and spatial allocation* opens up inquiries regarding the division of labor among women and men. Gender division of labor, in this sense, renders itself readily to any valuation methods by identifying how much time men and women spend in any given period or season (i.e., in 24 hours, weeks, months, year or seasonal, and permanent work). This theme centers on two concepts, namely, the productive and the reproductive activities of women and men. Productive activities include income-generating and income-substituting activities, whereas reproductive activities refer to household activities that renew the ability

of its members to do their everyday activities, including productive roles. This theme can also be used to analyze the allocation of space for each of these labor-related activities (i.e., backyard, farm lots, woodlots, forests, etc.). More importantly, understanding such temporal and spatial allocation determines how men and women spend their time, and how they allocate the fixed land resources in their community to implement ENRM in their locality.

Some sample questions under this theme include the following:

1. How do men and women divide their productive and reproductive tasks? How do men and women manage their household chores and livelihood activities? How do these tasks affect men's and women's participation in ENRM? How does the current temporal and spatial allocation of men and women affect their ability to participate in ENRM? For example, would it be possible for women to participate in a project designed to mitigate the effect of climate change if support services (e.g., childcare) are not available to them?
2. How does the geographical location where the productive and reproductive activities are done affect how men and women allocate their time and labor?

The third theme pertains to the *access to and control over resources* un/available to men and women. *Access* refers to the ability of women and men to use resources, information, technologies, and training. *Control*, on the other hand, pertains to the ability to influence or decide what to use, when and where to use, and who will use the resources, information, and technologies that may be available to men and women.

This theme emerged out of the reviewed ENRE research studies that valued the decision-making processes of men and women when evaluating ENRM-related issues, not to mention domestic concerns. This theme is also important in the cost-benefit analysis of various competing options in any decision-making process.

Sample questions generated by the analysis of access and control may include the following:

1. How are the benefits and costs of any ENRM project shared between men and women?
2. Who are invited to attend relevant forums on ENRM and other environment-related activities or events?
3. Do men and women have equal access to the resources (e.g., information networks, technological advancement and training, and other opportunities for skills development) to carry out ENRM activities?
4. Do men and women have equal access to participate in the project or activity? Would unequal access interfere with the successful achievement of project goals?
5. Do women have equal access as men to information to programs of the government such as training for climate change adaptation mechanism?

The fourth theme illustrates the *participation of men and women in the public sphere*. This theme discusses how much time and other resources that men and women use in order to participate in public arenas. As far as ENRM is concerned, these types of action may include attendance in meetings and training courses, participation in decision making processes, accepting or seeking out services, and involvement in organizational leadership in any ENRM activities.

Participation of men and women occurs at various levels and forms depending on the cultural settings. For example, in the Philippines, men may be very vocal during public meetings yet they consult with their wives at home in whatever decisions they make.

Finally, decision-making processes at all levels involve power relationships between men and women, where men and women assert their ability to decide, influence and enforce decisions, and exercise power over issues concerning resources, income, and other pertinent areas requiring decision making.

Sample questions on this theme include:

1. Are ENRM and other development projects designed to facilitate the active participation of men and women?

2. How do men and women partake in ENRM and other development efforts in their community?
3. Do both men and women have equal opportunity to attend ENRM-related meetings and training sessions?
4. Do they have equal chance to hold public office or leadership positions in their respective organizations?
5. Do women have control over the benefits due them in ENRM and other development efforts?
6. What activities do men and women do before, during, and after calamities? For example, are women represented in organizations/committees on planning and decision making related to climate change adaptation?

Lastly, the theme on *legal rights and status* is concerned with state instruments and preexisting rights over natural resources. This theme is important in determining how customary and formal legal statutes (as well as the judicial system) affect the ongoing dialogue regarding the use and valuation of natural resources (in particular) and ENRM (in general). This theme emerged from the reviewed EEPSEA-funded research projects that investigated how men and women represent their customary legal rights in mainstream ENRM processes (e.g., Calderon et al. 2008).

Sample questions are as follows:

1. Do women and men have equal opportunity to own properties?
2. Do women and men experience legal impediments in owning properties?
3. Are women and men treated equally under the law?
4. In cases of indigenous claims, do men and women share equal opportunity and protection under the customary laws? How does such legal standing affect the status of men and women in ENRM as practiced among indigenous communities?

Gender as integrated into a framework for action

Engendering ENRE research can be done by analyzing gender as an integral part of a framework for action. This insight emanated from the reviewed

ENRE projects that examined program implementation, monitoring and evaluation, and impact assessment of any environment-related projects (e.g., Catelo, Dorado, and 2001; Naz and Naz 2005; Peñalba and Elazegui 2011; Subade 2005). This theme elevates the understanding of gendered relationships among men and women and the importance of gender sensitivity and awareness in drafting project recommendations or policy reforms in ENRE research.

There are two ways by which ENRE research can be engendered at this level. The first way is through *gender mainstreaming*, and the second is through *gender assessment*.

Gender mainstreaming promotes gender analysis in all of the components of an ENRM project such as research, planning and implementation, and evaluation. Gender mainstreaming is also a strategy to integrate the lived experiences of men and women in all project or policy design, implementation, monitoring, and evaluation in order to achieve gender equality. Sample questions include the following:

1. Are the most relevant gender issues identified in the project planning, implementation, and evaluation considered in the project plan?
2. Does the ENRM project uphold gender equality as one of its milestones? If yes, how does the project intend to achieve it? If no, why is it missing?
3. Does the plan have room for reconceptualization to include or resolve gender concerns and issues among its beneficiaries?
4. How does the project promote economic advancement among women?
5. Are there potential areas or opportunities provided by the planned activity toward empowering vulnerable groups such as women, the children, and the elderly?

Gender assessment, on the other, specifically analyzes the differentiated impact of policy and project proposals on women and men, with the ultimate goal of achieving gender equality. Sample questions include the following:

1. Is the collection of quantitative and qualitative data aggregated to reflect actual conditions of men and women?
2. How does the project or any planned activity affect women and men differently? For example, how does ENRM project address gender differences in terms of vulnerability and adaptive capacity in the face of climate change mitigation? How does the project address any specific gender needs to reduce vulnerability to climate change?
3. Does the project proponent ensure meaningful community participation in formulating its components, implementing its activities, and phasing out its project? Is the project team sensitive to gender concerns?
4. Does the project provide relevant training and capacity building? Does it systematically guarantee active participation of men and women?
5. Does the project consider potential negative impacts of its planned activities on women's workloads or access to resources? How does the project ensure equitable economic outcome for both men and women?
6. Do project monitoring indicators measure the evolution of women's and men's capacity building and training toward solving real-life problems?
7. Are the project donors and partners gender-aware/sensitive?

The operational matrix for engendering ENRE research in Table 1 covers six general ENRE methods, namely, valuation, CBA, institutional analysis, adoption and determinants of choice, CGE studies, and cost-effective analysis. The matrix shows the wide range of methods that lend themselves to gender analysis, such as contingent valuation studies, travel cost method, cost and returns analysis, institutional adaptive capacity analysis, and efficiency and effectiveness assessment of policies, among others. The matrix also provides sample research questions that can be engendered based on various research studies in the Philippines conducted by EEPSEA researchers.

Table 1. Operational Matrix for Engendering ENRE Research

ENRE Method	Sample Methods	Sample Engendered Research Questions	Sample Literature*
Valuation	Direct Use Value Time Use Contingent Valuation Studies Travel Cost Hedonic Pricing Method Indirect Use Value Transaction Cost	How do women and men view the status of ENRM in their locality? How much are men and women willing to pay for the use of the water (or any natural resources) in their community? What is the willingness to pay of forest-based communities (i.e., segregated into male and female) for the existence of tropical forests? What is the economic value of the fuel wood collected by households based on gender and age? What is the value of time spent by men and women in planning, following up, and monitoring activities in any NRM developmental project?	Calderon et al. (2008) on the conservation of Ifugao rice terraces Harder, Labao, and Santos (2007) on cost and WTP of Filipinos for saving the Philippine eagle Palanca-Tan (2007) on parents' WTP for dengue vaccines Calderon et al. (2005) on water use fee for households in Metro Manila Sumalde and Pedroso (2001) on coastal resource management
Cost-Benefit Analysis	Cost and Returns Correlation Analyses	How are benefits and costs of any ENRM project shared between men and women? What are the costs and benefits of the incineration ban in terms of environmental and health impacts?	Pabuayon et al. (2008) on CBA on farming and agroforestry systems in coconut-based farming Rufo and Rufo (2004) on the CBA of clean incineration of solid waste in Manila

Table 1 continued

ENRE Method	Sample Methods	Sample Engendered Research Questions	Sample Literature*
Institutional Analysis	Institutional Assessment Institutional Adaptive Capacity Analysis	What are the cultural norms (including gender biases and stereotypes) that may hinder the full participation of men and women in ENRM or any environment-related endeavors? Do women and men receive appropriate training support on ENRM and other educational opportunities that will level up the playing field for them? Are women and men treated equally under the law? Are women strategically positioned in any institutional assessment procedure in any given institution?	Anda (2006) on institutional assessment of the Integrated Protected Area Fund in the Philippines Naz and Naz (2006) on financing municipal ecological solid waste management Peñalba and Elazegui (2011) on the adaptive capacity of LGUs, community organizations, and households in times of typhoons
Adoption/ Determinants of Choice		Are both men and women equipped with relevant knowledge to pursue ENRM? Are they equally informed about ENRM? Are there differences in the knowledge base of men and women? What coping mechanisms do men and women adopt to address climate change-related disasters in their community? What motivates male and female farmers in choosing which tree growing and land-use system to adopt?	Predo and Dargantes (2010) on decision making during climate change-related disasters Bennagen, Nepomuceno, and Covar (2002) on changing attitudes and behavior of households on solid waste segregation and recycling

Table 1 continued

ENRE Method	Sample Methods	Sample Engendered Research Questions	Sample Literature*
Computable General Equilibrium Studies	Efficiency and Effectiveness Assessment of Policies	What are the distributional effects of policy on men and women in terms of measurable benefits such as income? How do we assess the different environmental impacts of the trade liberalization on men and women in the Philippines? How are men and women fisher folks affected by a municipal ordinance to reduce fishing permits?	Aldaba and Cororaton (2002) on trade liberalization and pollution in the Philippines Campos et al. (2003) on the assessment of fishery policies in Lamon Bay
Cost Effectiveness Analysis		What is the cost effectiveness of mixed gender natural resources management program? What is the most cost effective approach for climate change adaptation of men and women? What is the cost in consultation with the local government units, experts and other officials involved on solid waste management program?	

*Note: *EEPSEA-funded research projects in the Philippines in which some of the sample research questions on engendered ENRE were based and/or modified*

RESULTS AND DISCUSSION

Case Study 1: Forest Resource Management

The Philippine rice terraces was included in the UNESCO World Heritage List in 1995 because of its organically evolved landscape. However, these terraces have deteriorated through time, and became part of the World Heritage in Danger list in 2001. It is within this backdrop that the research theme on forest resource management (FRM) was selected to compare a previous study on Ifugao rice-terrace farming and a subsequent one on the same topic but with a gender lens. Table 2 compares these case studies.

Table 2. Comparison between previous and subsequent studies in forest resource management

Research Aspect	Previous Study	Subsequent Study
Main proponents	Calderon et al. (2008)	Calderon and Gata (Case Study 1)
Locale of the study	Heritage municipalities of Banaue, Kiangnan, Hungduan, and Mayoyao	Heritage municipality of Hungduan
Main research objective	To explain the sociocultural factors that influence the Ifugao rice-terrace farming	To determine the likelihood that Hungduan farmers would abandon rice-terrace farming
ENRE methods used	Survey methods on sociocultural and biophysical factors contributing to the problems of the Ifugao rice terraces	Survey methods on sociocultural and biophysical factors influencing rice-terrace farming practices; mixed methods with survey and qualitative methods
Gender dimension	Gender as variable to describe respondents' profile	Gender as both variable and unit of analysis

The research of Calderon et al. (2008), the previous study, had aimed to understand the causes that contribute to the deterioration of rice terraces, specifically the unstable water supply and disinterested or inadequate labor force. The authors conducted FGDs, KIIs, and household surveys among farmers from four heritage municipalities.

Using FGD, the researchers gathered information regarding the water supply condition, farming practices in different heritage sites, availability and sufficiency of labor for different farming activities, reasons for abandoning terrace farming, possible incentives to lure farmers back to terrace farming, and how the farmers instill the value of the terraces to their children. A total of 150 respondents were interviewed; the respondents were predominantly male (93%), married, and living with spouses (83%). Their ages ranged from 26 to 85 years, and they had been farming on their own lots for an average of 24 years.

In general, the respondents claimed that labor availability had been sufficient for rice-terrace maintenance, land preparation, planting, and harvesting because they usually combine family labor with hired labor in order to meet the requirements of terrace farming. Farm labor was considered to be adequate for all these farming activities, except in terrace repair and maintenance where they needed to hire 90% of the labor requirement. Traditionally, such activity is done by males, and thus the preference to hire male laborers who are paid PHP 150–250 (USD 3.60–6.00) per day.

The respondents further identified some major problems surrounding rice-terrace farming, such as (1) damaged terraces due to landslides and earthworms, (2) inadequate water supply and poor irrigation system, and (3) pest infestation by rodents and golden snails. About 16% of the terraces had already been damaged, and the respondents expressed that they did not have enough funds to rehabilitate these terraces. Government subsidy for the rehabilitation of the irrigation system and for the repair and maintenance of rice terraces could have enticed the farmers back into rice-terrace farming. Meanwhile, 87% of the respondents did not intend to abandon the terrace farming in the near future as this remains their only source of rice, and it serves as additional income because of tourism. Above all, these rice terraces are woven into their Ifugao culture whose value cannot be monetized.

Although the study of Calderon et al. (2008) seemed to cover the subject matter sufficiently, it lacked the use of a gender lens to examine the decision to abandon rice-terrace farming among the respondents.

This could be faulted from its basic assumption regarding the selection of the respondents to be male household heads, and there had been no conscious effort to include women as respondents. The enumerators were instructed to look for the head of the family first, which generally means the father; only when the father had not been available, either because he was absent at the time or had already died, was a female respondent considered. Gender aspect was limited to information as to whether the respondent was male or female, but the answers of male and female respondents were not analyzed systematically.

Thus, the more recent case study of Calderon and Gata (Case Study 1) replicated the previous study to follow up on this insight by further examining the likelihood of male and female Hungduan farmers to abandon rice-terrace farming in the future, and by identifying the sociocultural and biophysical factors that influence such a possibility. A mixed-methods research design that combines both quantitative and qualitative strategies was used in the study. The core method rested on a survey of 35 randomly selected households (out of the 200 households that had been interviewed in the previous research) involving both male and female spouses. This strategy generated data on farmers' decision as well as the key socioeconomic and biophysical factors motivating such a decision. Information on access to, control over, and participation in decision-making processes, specifically in their decision to abandon rice-terrace farming, were also analyzed. The authors used the same questionnaire that had been used in the previous study, but revised the questions to infuse gender dimension. The independent variables included gender, age, income, educational attainment, number of years farming, number of farm lots, size of farm lots, ownership of farms, farming practices, availability of water supply, budget for rice terraces rehabilitation, percentage of damaged rice terraces, *barangay* (village), and type of fertilizers used, among others. The dependent variable was the possibility that farmers would abandon rice-terrace farming in the future.

Results showed that there was no significant difference in the decision of male and female Hungduan farmers to abandon rice-terrace farming. Socioeconomic factors, such as primary occupation, educational attainment, and lot ownership were found to be strongly associated with

the farmers' decision to abandon rice terraces in the future; whereas secondary occupation, barangay, manner of acquisition, sufficiency of water supply during dry season, duration of fallow period, and availability of budget for the maintenance of the terraces were found to have moderate association. Gender was not found to be significant ($\alpha = 0.05$).

However, when considering the factors affecting the likelihood of abandonment, gender was found to be statistically significant together with age, primary occupation, secondary occupation, household income, educational attainment, number of lots owned, ability to plant all lots in one planting season, number of years farming, fallow practices, percentage of damaged terraces, availability of budget for rehabilitation and maintenance of rice terraces, and barangay.

In general, men and women of Hungduan share farm work most of the time, especially in land preparation, fertilizer application, and *palay* (paddy rice) drying. However, women were more engaged in planting, weeding/cleaning, and harvesting. On the other hand, men's work in the farm was predominant in the maintenance of terrace walls. This pattern was also observable in the hired labor as well as the *ubbu* (exchange labor). Men's labor is hired or exchanged during land preparation and postharvest activities. Women's labor, on the other hand, is hired and exchanged, particularly during planting, weeding and cleaning, and harvesting seasons.

Case Study 2: Coastal Resource Management

Coastal resource management (CRM) is a strategy that grants a community a certain degree of management responsibility to supervise access to (and use of) coastal resources. The Fisheries Sector Program (FSP) is one of the government-initiated programs intended to augment the income of small-scale fishermen and preserve the coastal resources. This section compares the results of the study that had been conducted by Sumalde and Pedroso (2001) and the subsequent case study conducted by Sumalde, Dayo, and Alvarez (Case Study 2), both of which focused on CRM. The comparison of the two studies is presented in Table 3.

Table 3. Comparison between the previous and subsequent studies in coastal resource management

Research Aspect	Previous Study	Subsequent Study
Main proponents	Sumalde and Pedroso (2001)	Sumalde and Dayo (Case Study 2)
Locale of the study	San Miguel Bay as one of the pilot sites of FSP	Masinloc, Zambales as pioneer implementer of CRM
Main research objective	To estimate and analyze the TC associated with the implementation of CRM	To assess the contributions of men and women into the CRM activities
ENRE methods used	TC, DPC, TCS	Time, value of time devoted to CRM
Gender dimension	None	Gender as variable in determining the significance of men's and women's contribution to CRM

Note: CRM = coastal resource management; DPC = direct project costs; FSP = Fisheries Sector Program; TC = transaction cost; TCS = transaction costs share

The results of the previous study showed that transaction cost (TC) accounted for 37% of the total project cost (TPC). Although the higher TC improved the performance of the stakeholders at the initial stage of project implementation, an increasing level of TC eventually slowed down the performance of the parties involved in the project.

Meanwhile, the follow-up study by Sumalde, Dayo, and Alvarez (Case Study 2) addressed the gender limitation of the earlier study conducted by Sumalde and Pedroso (2001). The subsequent study analyzed the level and value of awareness, knowledge, and participation of men and women in CRM activities. It also identified factors affecting such participation, and recommended ways to integrate gender into CRM research. The gender-disaggregated data were gathered from 50 households; the husband and wife of each household were interviewed separately and then simultaneously using the same set of questionnaires. The information from the household survey was supplemented by the FGDs conducted among selected respondents and KIIs with personnel and members of the local government units (LGU) and people's organization.

For one, the perception, roles, and factors affecting decision making differed between men and women. Both male and female respondents articulated that when it came to decision making involving household

activities, they were both concerned in the areas of food preparation, childcare, child discipline, household maintenance, home care, budgeting, from whom to borrow, and how much to borrow. However, women gave higher ratings on these chores. When it came to participation in CRM activities, women had limited participation than men. CRM activities included mangrove reforestation, coastal cleanup, guarding of marine protected area, environmental protection campaign, and sea patrolling through *BantayDagat* (Sea Watch).

Case Study 3: Climate Change Adaptation Strategies

The Philippines, ranked sixth among the 170 countries in the world in terms of vulnerability to climate change, is classified under extreme risks (Maplecroft 2011). According to EEPSEA's Mapping of Climate Change Vulnerability in Southeast Asia, all regions in the Philippines fall under the top quartile of the regions that are most vulnerable to climate change because of numerous exposures to climate hazards such as tropical cyclones, floods, landslides, and droughts (Yusuf and Francisco 2010). On the average, 20 typhoons enter the country annually; the intensities of these typhoons have increased since the 1990s (PAGASA 2009). Therefore, the people, communities, and institutions need to enhance their capacity to adapt to typhoon events and improve their resilience to probable risks. This section compares the results of the previous study conducted by Peñalba and Elazegui (2011) on the adaptation strategies of LGUs, community organizations (CO), and households to a typhoon, and the subsequent study of Peñalba, Paunlagui, and De los Santos (Case Study 3) that determined the adaptive capacity of households to climate change Table 4.

The study of Peñalba and Elazegui (2011), conducted in 2009–2010, focused on the experiences of the LGUs, COs, and households in the province of Batangas with Typhoon Milenyo (Xangsane). Using data from primary and secondary sources, KIIs, and FGDs, this study assessed the adaptive capacity of the respondents and evaluated how this capacity translated to adaptation behaviors as manifested in their response to Typhoon Milenyo.

Table 4. Comparison between previous and subsequent studies in climate change adaptation strategies

Research Aspect	Previous Study	Subsequent Study
Main proponents	Peñalba and Elazegui (2011)	Peñalba, Paunlagui, and De los Santos (Case Study 3)
Locale of the study	San Juan and Tanauan City, Batangas, which were badly hit by Typhoon Milenyo (Xangsane)	Bula, Camarines Sur, which was badly hit by Typhoon Juaning (Nock-ten)
Main research objective	To assess the adaptation strategies of local government units, community organizations, and households before, during, and after Typhoon Milenyo	To determine the adaptive capacity and the corresponding adaptation actions of the households in Bula, Camarines Sur, and to recommend gender-sensitive measures to enhance resilience and mitigate the impacts of typhoons on people's livelihoods
ENRE methods used	Calculation of adaptive capacity index	Calculation of adaptive capacity index of husbands and wives, and of husbands and wives' willingness to pay for selected adaptation options
Gender dimension	None	Gender as a variable, unit of analysis, and framework for action

However, this research did not take gender into account. Thus, the case study conducted by Peñalba, Paunlagui, and De los Santos (Case Study 2) aimed to address this gap by conducting a similar research in Bula, Camarines Sur; but this time, they conducted the study with a gender lens. Gender-disaggregated data collected through interviews and FGDs with husbands and wives were used to determine the impact of Typhoon Juaning (international name: Nock-ten), the household's response strategies, and the willingness of men and women to pay for different adaptation options.

The data on government response actions were gathered through KIIs with the LGU staff who had been involved in the relief and rescue operations during the aftermath of Typhoon Juaning. The analysis used a gender lens to elicit the difference between household decision-making

patterns, activities of husbands and wives, their preparedness and adaptive capacities, and willingness-to-pay for three different adaptation options in preparation for future extreme climatic events. The assistance given by agencies to households was also analyzed to determine the sensitivity of these agencies in addressing the different needs of men, women, and children. The authors used a modified version of the questionnaire that had been used by Peñalba and Elazegui (2011); they incorporated a gender lens into the questionnaire by adding questions that solicit information needed to analyze gender relations and to integrate gender analysis seamlessly into the study.

The results of the previous study by Peñalba and Elazegui (2011) showed that, overall, households had a low adaptive capacity index (0.48). They had the highest adaptive capacity index in infrastructure (0.64), followed by technology (0.52), while the lowest was in social capital (0.35). The high adaptive capacity index in infrastructure was brought about by the high proportion of households (90%) who owned houses built with semi-permanent to permanent materials. Majority of the households had not joined any COs (69%) and claimed that community members rarely interacted to discuss common issues concerning their community (59%). Social organizations and community interactions could help reduce the impacts of climate related risks, thus enhancing adaptive capacity.

The adaptation strategies of households were mostly physical (e.g., reinforcing their houses and properties) as well as behavioral (e.g., securing food, water, and other household needs). Some households were not able to apply feasible adaptation options because of financial limitations. Moreover, many of the respondents were not willing to adopt strategies recommended by experts (e.g., moving to a safer place) and preferred their usual response to climate risk, such as evacuating only when there was a perceived threat to life and safety.

The follow-up study by Peñalba, Paunlagui, and De los Santos (Case Study 3) also determined the adaptive capacities of husbands and wives in Bula, Camarines Sur. Since the husbands and wives of each household shared the same natural and physical assets, their adaptive

capacity index was computed for these assets on a household basis. Results showed that the household's adaptive capacity index for natural capital was moderately high (0.55), while it was slightly lower for physical capital (0.45).

The overall adaptive capacities of husbands (0.44) and wives (0.42) were almost the same, indicating low levels of adaptive capacity and resilience. This could explain why more than two months after they had experienced the typhoon and flooding, their lives have not yet returned to normal and they were still far from recovering from the disaster. Interventions to enhance the economic capital of both husbands and wives are then needed to enhance their adaptive capacity and resilience. It is believed that higher economic capital could enable the households to improve their natural and physical capitals, which are essential in building resilience.

Results also showed the gender-differentiated roles of husbands and wives in responding to the flood event. Husbands generally took care of preparedness activities that require physical strength, such as reinforcing the house and taking care of belongings and properties left behind whenever the family takes shelter in the evacuation centers. Wives were in charge of preparing the things needed by the family while at the evacuation center.

How can Research be Engendered? Will it Matter?

Insights from the case studies point to the fact that the decision to include gender dimension in any research is a crucial first step toward the engendering process.

As demonstrated in the CRMP case study (Case Study 2), at the minimum, researchers should collect gender-disaggregated data in order to meet the research objectives, especially in looking at how men and women differ in their knowledge of and participation in CRMP, in reproductive roles or household activities, and in the time spent on those activities. One could also integrate gender as a variable (Case Study 1) if the main objective is to determine the difference in decision making between male and female farmers involved in rice-terrace farming. An in-

depth analysis of the role of male and female in decision making entails a gender disaggregated analysis in decision-making processes between spouses as coping mechanisms to the extreme weather conditions as shown in Case Study 3.

Incorporating the generation of gender-disaggregated data during the research design phase is necessary. Engendered studies should plan for the separate and simultaneous interviews of male and female household members to enable the researchers to readily compare male and female responses. However, this sampling procedure is costly. Nonetheless, this is not the only way to collect gender-sensitive information. What is important is that household survey instruments should allow for this gender dimension to show up. This means that researchers should specifically ask questions that are meant to assess if there are differences in the roles and influence between men and women. It is also important to obtain information from women and men household heads—and not simply assume that one party can answer for the household. Oftentimes, one assumes that the household head is the husband, and consequently focus the interview on this household head. A gender-sensitive study should take both the husband's and the wife's perspectives. Having both the man and woman in the same household to answer survey questions is an interesting approach that promises to open up some fruitful avenues for future research (Dosmanand Adamowicz 2002 as cited by Dupont 2003). In the Bula case (Case Study 3), both spouses were asked to answer together and then separately the demographic and economic questions relating to the topic areas of the case study.

Incorporating gender analysis tends to increase the cost of ENRE research. These costs may be in terms of additional procedures in data gathering and analysis, extended length of survey period (i.e., cost of time), and additional personnel needed to carry out the engendered research design. In the Bula case study, the interview time increased by as much as 30 minutes per respondent-couple, slightly reducing the number of interviews completed from six to five per day. This may have added as much as PHP 400 to PHP 500 (USD 9.50 to 11.90) per day of interview.

However, this additional cost may be a small price to pay in generating additional details and dimensions of research compared to the social costs that could result if policies arising from such research do not reflect the actual contributions and roles of both men and women in the socioeconomic aspects of ENRE research (in particular), and development projects (in general). These additional costs also indicate additional research value in terms of detailed information and deeper understanding of the subject matter being studied.

Lessons from the Engendered Research

Recognition of women's central contributions

The comparative analysis of the earlier and subsequent research projects on the three natural resource research themes revealed that, indeed, the results were enriched when a gender lens had been included in the latter projects. Engendering ENRE research made the contributions of women visible. It could elicit data that can provide a better understanding of the conditions of men and women in ENRM-related activities.

In Case Study 1, the inclusion of gender in ENRE research deepened the level of analysis and provided more information on the decision making of both male and female farmers. These data demonstrated a number of insights on the role and responsibilities of men and women in Hungduan, Ifugao vis à vis their decision making to maintain the rice terraces. For one, through these data, it was clearly established that women's role in the planting, weeding and cleaning, and harvesting activities was central to the overall farming activities in Hungduan. Neglecting to account for such contributions to farming would therefore deny women due recognition of their central role in sustaining their family's main source of livelihood. When these details are disregarded in ENRE research, the women's contributions would remain a trivial input in any sustainable development plan of action.

Furthermore, by assuming that farming is men's domain (as previous research projects had in Hungduan), the study would have missed the

intricacy of the household division of labor based on gender. In particular, the study would have missed the fact that women in Hungduan are also farmers in the rice terraces, whose workloads are equally burdensome as that of their male counterparts. Although the men's workload in the farm (i.e., land preparation and terrace walls maintenance) are also central in the production aspects, the women's work in the planting, weeding and cleaning, and harvesting consist of the main bulk of farming activities; thus, the women's work involved the more substantial part in the decision making concerning rice-terrace farming.

In Case Study 2, the different aspects of men's and women's involvement in CRM activities were emphasized. Without a gender dimension, the stereotypical fishing activities would be attributed to male fisherfolk, and would not include the female fisherfolk who also participate in these kinds of activities. By focusing on the perception and knowledge about community and environmental issues, for example, the study was able to determine that female respondents had higher levels of awareness of these issue compared to the males. Moreover, through the engendering process, the participation of male and female respondents in CRM activities was quantified in terms of the time spent and the value of time spent on these activities. Although the female respondents spent less time in these activities, the value of the time they spent on participating was relatively higher compared to their male counterparts.

In Case Study 3, the engendering process enabled the collection of detailed adaptive strategies of male and female spouses in dealing with extreme weather conditions. Both agreed that building hard structures to minimize the impact of typhoon and flooding is an important type of assistance that could be provided by government and nongovernmental organizations. Also, they both saw the need for an evacuation center that can withstand strong typhoons and heavy flooding and that is suitable to their needs. These include well-ventilated sleeping quarters; adequate water supply facilities; adequate space for cooking and washing clothes; and more, and separate, toilets for men and women. From the results, there does not appear much difference in the preference of men and women for adaptation strategies for an extreme event.

Gender utility in ENRE research

The second theme revealed by the analysis was that gender could be used in ENRE research either as an explanatory variable, especially in quantitative research; or as a unit of analysis, especially in qualitative research. The engendered ENRE research adopted both approaches in the follow-up case studies in the three research areas.

The comparative analysis done in Case Study 2 showed that although using gender as a variable in the previous study had allowed both quantitative and qualitative analyses on this aspect, this approach did not make it possible to look into the gender relations of male and female within the household in carrying out CRM activities. The follow-up study then specifically interviewed both male and female household members to get an in-depth perspective of gender relations. This way, gender is no longer treated simply as a variable in the research but also as a unit of analysis. Thus, the researchers were able to secure a better understanding of the differences between men and women on their perceptions, knowledge, and preferences in relation to the various aspects of CRM.

The gender-enriched research focus also enabled the use of both the quantitative and qualitative analyses in the research. Specifically, the results of the quantitative analyses (i.e., statistical tests on proportion, association and logistic regression) were supplemented by qualitative analyses (i.e., analysis of gender relations), thus enabling a richer understanding of how men and women are supporting each other, and of the areas where they differ in their roles in CRM.

Finally, an elaboration on the results of the engendering process in ENRE research has implications in policy-making processes. By engendering research, the researchers were able to disaggregate the participation, perception, and level of awareness of men and women. The gender dimension was also found to be useful in fine-tuning the policy recommendations that may arise from this research. For example, in Hungduan, women are more likely than men to abandon rice-terrace farming, even though they are an integral part of rice-terrace farming.

Thus, the results of this research can inform policy recommendations on women's involvement in the public arena, such as in community and political activities. The results indicate that women are already burdened with productive activities, particularly in rice-terrace farming, so that any additional involvement of women in community activities should be adjusted to this reality. Otherwise, they might be burdened even more, and eventually feel burnt out to the point of wanting to abandon rice terrace farming. Thus, policy recommendations must be gender sensitive, especially in the time allocation of women's labor. Moreover, gender mainstreaming in project design and policy interventions must be an utmost objective of government agencies and nongovernmental organizations at all levels of participation (i.e., local, national, and international).

The policy recommendations drawn from the previous and subsequent research projects differed tremendously because of the differences in the gender lenses or perspectives used in the data collection and analysis. In the earlier studies, gender dimension was not an integral part of the analysis, whereas in the subsequent case studies, the gender focus was more in-depth.

CONCLUSION

In engendering ENRE research, there should be a deliberate effort to integrate gender into the project design, implementation, and evaluation. The key to gender-sensitive studies is to have gender-disaggregated data. As early as research design, there should be a conscious integration of gender. The case studies presented in this book shows how gender plays a significant role in the discussions around ENRE, which in the more recent discourse have provided evidence-based policy reforms for natural resource management.

Furthermore, incorporating gender analysis in ENRE entails additional cost in collecting more detailed gender disaggregated information. As such, the researchers should be strategic in selecting research questions

that need gender-disaggregated data as there is really no need to gender disaggregate all kinds of data. Otherwise, the researchers would be gathering data that might not be used at all in the analysis.

Second, data should be gathered according to gender studies theory. The disparities between men and women in society do not result from biological attributes, but rather from power relations. If the purpose is to have gender as a unit of analysis and if interaction within the household is desired, then men and women within a household may be interviewed either jointly or separately, but simultaneously, using the same questionnaire/interview schedule. Since not all information needs to be collected through separate interviews among men and women, it is important to identify which aspects of gender relations need to be captured by separate interviews.

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Determinants of Farmers' Decision to Continue Farming the Rice Terraces of Hungduan

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Photo by Stephen Bugno under the creative commons license at <https://www.flickr.com/photos/52442953@N05/8607335245/>.
A woman processing rice in Ifugao province, Philippines.

EXECUTIVE SUMMARY

This case study took off from two previous studies that had been conducted in the municipality of Hungduan, Ifugao province. The previous studies had looked into the problem of abandonment of rice-terrace farming by Ifugao farmers, among others, but did not consider gender as a dimension in their inquiries; gender was merely used as a variable in describing the respondents' profile. This subsequent case study, the third to tackle this issue in this same location, described the possibility that the male and female Hungduan farmers may abandon rice-terrace farming in the future, identified the sociocultural and biophysical factors that would influence the possible abandonment of rice-terrace farming among Hungduan farmers, and determined the likelihood of Hungduan farmers to abandon rice-terrace farming.

The researchers used a mixed-methods research design that combines both quantitative and qualitative strategies. The core method rested on a survey research design involving male and female heads of 35 households in Hungduan, Ifugao. The survey generated data on the socioeconomic and biophysical factors of Hungduan farmers that influenced their decisions about their rice-terrace farming practices. This was augmented by a qualitative strategy to capture the textured experiences of men and women respondents in terms of their access, control, and participation in the decision-making processes, specifically in their decision to abandon their rice-terrace farming.

The results of the case study showed that there was no significant difference in the decision of male and female Hungduan farmers to abandon rice-terrace farming; the influence of gender on farmers' decision making was found to be insignificant at $\alpha = 0.05$. Furthermore, socioeconomic data, such as primary occupation, educational attainment, and lot ownership had a strong degree of association with the farmers' decision to abandon the rice terraces in the future; secondary occupation, *barangay* (village), manner of acquisition, sufficiency of water supply during dry season, duration of fallow period, and availability of budget for the maintenance of the rice terraces were found to have moderate association. As far as the factors that could affect the likelihood that rice terraces would be

abandoned, gender was found to be a statistically significant factor together with age, primary occupation, secondary occupation, household income, educational attainment, number of lots owned, ability to plant all lots in one planting season, number of years farming, fallow practices, percent of damaged terraces, availability of budget for rehabilitation and maintenance of rice terraces, and village.

Including gender (whether as a variable, unit of analysis, or part of the framework for action) in environmental and natural resources economics (ENRE) research deepens the level of analysis and provides more information that could better explain the choices that farmers make. Although incorporating gender analysis into ENRE research tends to increase the cost of research, the additional cost is small compared to the social costs that would otherwise result from policies arising out of research that did not appropriately account for the economic value of women's participation and views. Thus, a key to gender-sensitive studies is to have gender-disaggregated data; gender should be consciously integrated into the research design.

INTRODUCTION

Background

Prior to this research, two studies had been completed in Hungduan, Ifugao by Calderon et al. (2009) and Calderon et al. (2011). The first study, funded by the Economy and Environment Program for Southeast Asia (EEPSEA), was conducted in 2009 and aimed to develop a sustainable financing mechanism for the conservation of the Ifugao Rice Terraces; this was undertaken in two phases. The first phase looked into the sociocultural factors that influenced the Ifugao farmers' practices in relation to the terraces, and assessed the availability of labor that would undertake the restoration of the terraces. The 100 survey farmer-respondents came from the heritage municipalities of Banaue, Hungduan, Kiangnan, and Mayoyao (Figure 1).

The study by Calderon et al. (2009) revealed that many of the farmer-respondents did not plan to abandon rice-terrace farming. However, they indicated a need for labor subsidy for terrace repair and maintenance as this was the costliest among the different terrace farming activities.

The second study, funded by the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) under its Seed Fund for Research and Training (SFRT) program (henceforth SEARCA-SFRT), was conducted in 2011. The study aimed to build the capacity of Hungduan farmers in preparation for the full-blown project on payments for environmental and cultural services by engaging farmers in environmental and cultural resource assessment in a watershed context. One of the activities under this project was a survey of 200 farmers on their farming practices, and whether there was a possibility that they would abandon rice-terrace farming. The survey found that the farmers' harvests from the terraces were barely enough for their needs, and that they had no surplus income for terrace repair. However, the farmers had no intention of abandoning their rice-terrace farming practices anytime soon.

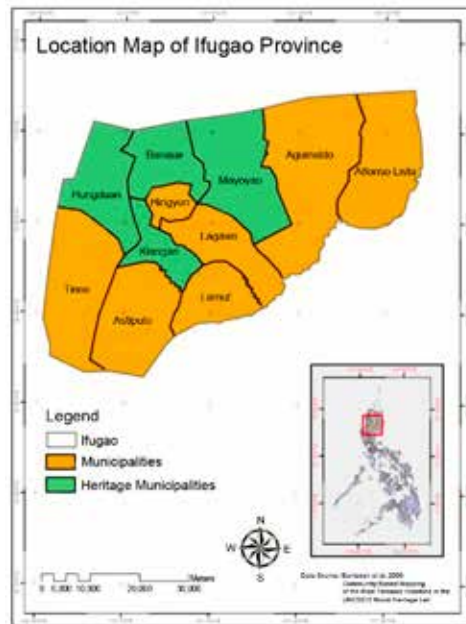


Figure 1. Heritage municipalities of Ifugao

Rationale

In the course of the studies, the authors observed the significant contributions of Ifugao women in the project activities, especially in farming. However, these previous research studies did not consider gender as an important dimension in their inquiry. The concept of gender was used only as a variable to describe the household profiles. Moreover, these projects targeted only males as the main respondents, as they were considered the heads of the households. Thus, the researchers of this study chose to go back to Ifugao (i.e., Hungduan) to conduct the farmer survey again, but this time with the added dimension of a gender lens. This choice was made based on the following points:

1. Conducting the case study in Hungduan would allow the researchers to compare the results of the study with and without the gender dimension and ultimately answer the question, *"Will the results be different if the gender dimension would be incorporated into the research methodology?"*

2. This case study would also allow the researchers to track down the original respondents in the previous research projects.
3. A member of the research team had already established a good working relationship with the community.

Objectives

Thus, in general, this case study aimed to

1. identify the sociocultural and biophysical factors that would influence the possible abandonment of rice-terrace farming among Hungduan farmers; and
2. determine the likelihood that Hungduan farmers would abandon rice-terrace farming.

However, with respect to the larger project on *Engendering Environmental and Natural Resource Economics Research in Southeast Asia*, this case study specifically intended to

1. compare the results of the surveys of Hungduan farmers with and without gender analysis;
2. draw lessons on the implications of adding a gender dimension to ENRE research projects; and
3. analyze the applicability of the engendered ENRE framework developed by the team.

Research Questions

In order to achieve these objectives, this case study focused on three questions:

1. Is there a significant difference in the possibility of male and female farmers to abandon rice-terrace farming in the future?
2. What are the key socioeconomic and biophysical factors that would influence the possible abandonment of rice-terrace farming among Hungduan farmers?
3. What is the likelihood of Hungduan farmers abandoning rice-terrace farming based on gender?

METHODOLOGY

Considering the nature of the research questions, the research team opted for a mixed-methods research design that combines both the quantitative and qualitative strategies in solving the research problems. In general, mixed methods design incorporates various quantitative and qualitative approaches within a single project (Creswell 2003; Morse 2003).

In this case, the core method rested on survey research design to generate data on the key socioeconomic and biophysical factors of Hungduan farmers that influence their decision about their rice-terrace farming practices. However, due to the focus of the research questions, the researchers augmented the core method with supplemental data on gender. This required using an additional qualitative strategy to capture the textured experiences of men and women respondents in terms of their access to, control of, and participation in the decision-making processes, specifically in their decision to abandon rice-terrace farming.

Data Collection Methods

The study was conducted in three *barangays* (villages) in the municipality of Hungduan, Ifugao. These villages were Baang, Hapao, and Nungulunan. The three villages were further classified into three clusters using the watershed approach.

Prior to data collection, the research team communicated with the local government unit (LGU), specifically the municipal government of Hungduan, during which the research agenda were introduced and field visits were scheduled. Upon approval by the LGU, the team proceeded to draft a specific respondents' informed consent form to ensure that the respondents understood their rights as participants of the research project.

As mentioned earlier, this research used survey methods infused with a gender perspective. The survey design was done in three phases: (1) preparation of survey instrument, (2) training of the enumerators, and (3) the actual interview.

The survey was designed to have two types of comparison of data: (1) previous survey v. current survey, and (2) male v. female respondents in the current survey. In the first type of comparison, the data of the previous survey (without gender aspect) were assessed in the light of the results of the current survey (with gender aspect). This latter survey was done by interviewing male and female respondents together and separately. The second type of comparison was done between the responses of the males and females who were interviewed separately. In doing so, the research team was able to accomplish research objectives 1 and 2.

Sampling Procedure

The number of households in the case study survey was reduced to 35, which were chosen randomly from those who had been interviewed in the previous study of Calderon et al. (2011) under the SEARCA-SFRT, during which the selection of respondents had been done randomly ($n = 200$). The list of randomly selected participants was used in locating the potential respondents ($n = 35$) for the current study. If the preselected respondents were not available, then they were replaced using the same procedure. Table 1 summarizes the number of respondents in each village, comparing the previous and current studies.

Table 1. Distribution of respondents across villages (previous v. current studies)

Village	Previous Study (2011)	Current Study (2012)	
	Male	Male	Female
Baang	35	11	11
Hapao	84	16	16
Nungulunan	36	8	8

Data Collection

The same questionnaire from the previous 2011 study was used, but was revised to incorporate the gender dimension. The original survey gathered information about the respondents' farming practices, water supply situation, farm labor availability, costs and returns from farming, problems in the terraces, and socioeconomic situation. In the latter case study, however, the authors only asked the questions that were revised for gender analysis.

In this current engendered research, gender-disaggregated data were generated from the couple-respondents by interviewing them together and then separately. For those items in the questionnaire that solicited opinions, the research team asked the male and female respondents separately in order to generate their personal beliefs. On the other hand, questions pertaining to basic household information were asked once the couples were interviewed together; this set of questions consisted of factual questions and did not leave much room for personal opinion.

In the interest of time efficiency, research assistants (RA) were involved in the survey. Despite their having considerable experience in research, the RAs still underwent the training for enumerators; they were given specific instructions on how to conduct the survey. They were active in giving feedback regarding the questionnaire and regarding the manner by which the survey was to be implemented.

The actual interviews with the respondents were conducted from 21–23 January, 2012 in three villages of Hungduan, Ifugao. A team of two RAs interviewed the respondents, one couple at a time. Each interview lasted for 35–45 minutes. First, the RAs interviewed the couples together using the appropriately marked questionnaires. While one RA asked the questions listed on the survey instrument, another RA observed the couple's reactions (i.e., facial expression, length of time elapsed before answers were formed, etc.) while answering the survey questions. Finally, the RAs concurred with one another on their observations and insights regarding the interview. The RAs systematically recorded these notes for analysis. Second, the RAs interviewed the couples separately but simultaneously.

Data Analysis

The data analysis involved two phases: (1) the collection and processing of gender-disaggregated data, and (2) interpretation of the data using gender lenses.

The research team subdivided the data analysis into three parts:

1. First, the results of the survey were analyzed using quantitative methods to determine if there was a statistical significance in the possibility of abandoning rice-terrace farming among male and female Hungduan farmers. Tests on association and logistic regression of factors as the determinants of the decision to abandon rice-terrace farming were also done. The results from the current research project were compared with those obtained from the SEARCA-SFRT project to see if there was a significant difference due to the inclusion of gender concepts in the later study.
2. Second, the results were interpreted further by using qualitative analysis to highlight the components of the proposed environmental and natural research economics (ENRE) framework. Such analysis specifically looked at the themes of the proposed framework, which include allocation of labor, access and control over farm resources, participation in community affairs related to rice-terrace farming, and legal rights and status concerning the maintenance of rice terraces.
3. Finally, from these analyses, conclusions were drawn on how gender can contribute to ENRE research vis-à-vis the case of the Hungduan farmers.

Quantitative strategy

The results of the survey were processed to determine the presence of a statistically significant difference between the choice of male and female Hungduan farmers to abandon rice-terrace farming ($\alpha = 0.05$).

Hypotheses testing. The following were the hypotheses that this project tested:

- Hypothesis 1:* There is no difference between the decision of male and female Hungduan farmers to abandon rice-terrace farming.
- Hypothesis 2:* Key socioeconomic and biophysical factors, such as gender, age, income, educational attainment, number of years of farming, size of farms, ownership of farms, and perceptions of labor availability are not associated with the decision of the farmers to abandon the rice terraces in the future.
- Hypothesis 3:* The key socioeconomic and biophysical factors do not affect the likelihood of abandonment of rice terraces.

Hypothesis 1 was tested using the test on proportion (z-test), while Hypothesis 2 was tested using the test on association (Cramer's V and Eta coefficients). The z-test was used to compare the proportions of two independent groups that do not overlap (i.e., male and female farmer-respondents) in order to determine if they were significantly different from each other. To test the correlation between the factors associated with possible abandonment of the rice-terrace farming, Cramer's V and Eta coefficients were computed for categorical and ratio variables, respectively. The degree of association of these variables (i.e., strong, moderate, or weak) was determined only for those variables where the association was found to be significant.

Finally, Hypothesis 3 was analyzed using the logistic regression method. All tests were conducted using a 5% level of significance. Logistic regression was used to analyze the factors that affect the likelihood that farmers would abandon the rice terraces in the future. Logistic regression, also called logistic model or logit model, was used to predict the outcome of a binary dependent variable (i.e., "yes" or "no" answer to the question posed to farmers as to whether it is possible for them to abandon rice-terrace farming in the future) based on the socioeconomic characteristics of the farmers and the biophysical characteristics of the rice terraces they farm.

Variables. The independent variables included gender, age, income, educational attainment, number of years of farming, number of farm lots, size of farm lots, ownership of farms, farming practices, availability of water supply, budget for rice terrace rehabilitation, percentage of damaged rice terraces, village, and type of fertilizers used, among others. The dependent variable was the possibility that farmers would abandon rice-terrace farming in the future.

Weighing. Weights were assigned to each respondent, computed using the following formula:

$$\text{Weight} = N/n = 200/35 = 5.71.$$

The value of weight of 5.71 indicates that one respondent is equivalent to six members of the population ($N = 200$).

Qualitative strategy

The qualitative strategy involved the descriptive analysis of the dynamics of the relationship between men and women in Hungduan, Ifugao in terms of (1) allocation of labor, (2) access to and control over farm resources, (3) participation in community affairs, and (4) legal rights and status concerning the maintenance of rice terraces. Overall, these research themes were useful in presenting the lived experiences of men and women in Hungduan, Ifugao that could shed light on the factors that determine the possibility of abandoning rice-terrace farming. In using the qualitative strategy in this study, the researchers were able to see the extent and nature of participation among men and women in rice-terrace farming.

Allocation of labor. The temporal and spatial allocation of labor in farming was disaggregated based on gender and age. Based on the insights gathered in the previous research, age difference was also an important determinant of labor availability in the household (Calderon et al. 2009). This analytical theme allowed the researchers to understand the sources of labor requirements of rice-terrace farming.

Access and control. This analytical theme focused on how men and women farmers allocated household and farm resources among themselves, and how such decision making factored into the possibility of abandonment.

Participation in community affairs. The previous studies on Hungduan farmers determined that community activities were an integral part of the sociocultural context that supported rice-terrace farming. Thus, this analytical theme on the participation of men and women in community affairs was equally helpful in understanding the textured lives of men and women in Hungduan.

Legal rights and status. The discussion on legal rights included the customary laws governing the Hungduan community, and mainstream policies that were relevant in the improvement of women's conditions (in general) and the maintenance of the rice-terrace farming among Hungduan farmers (in particular).

RESULTS AND DISCUSSION

To address the research questions, this section has been divided into three, namely, (1) comparison of the results of surveys of previous and current studies on farmers, with and without gender analysis, respectively; (2) qualitative gender analyses; and (3) lessons and implications on engendering ENRE.

Comparison of the Previous and Current Studies

Previous study

The original questionnaire was developed by Calderon et al. (2009) under EEPSEA in order to investigate the factors affecting the Ifugao farmers' decision to continue or abandon farming, among others. The number of respondents in this study was 150 farmers, mostly male, from the four heritage municipalities of Ifugao, namely Banaue, Hungduan, Kiangnan, and Mayoyao. The EEPSEA project was followed by another study, this time focusing on the municipality of Hungduan with funding support

from SEARCA-SFRT. The number of respondents in this study was 200 male farmers. This study served as the reference, especially in selecting the respondents for the current study.

Variables. The variables used in the SEARCA-SFRT study included socioeconomic variables like sex, civil status, age, educational attainment, primary occupation, and income; farming information like farm ownership, number of years farming, farming practices, and availability of labor; and problems in rice-terrace farming. However, there was no conscious effort to include women in the respondents; in fact, the enumerators were instructed to look for the head of the family first, which generally means the father or husband. Only when the father/husband had not been available, either because he had been absent in the household or had died or the household was headed by a female, that a female respondent was considered. Furthermore, the gender aspect was limited to information as to whether the respondent was male or female, but the answers of male and female respondents were not analyzed systematically. Thus, gender was treated only as a variable.

Results. In the SEARCA-SFRT study, 97% of the male respondents revealed that they did not plan to abandon rice-terrace farming. The team had tried to use logit regression to analyze the factors that could affect their decision to abandon terrace farming in the future, but did not get significant results. The incentives that could attract farmers who have already abandoned farming into returning were labor subsidy and repair of the irrigation system.

Current study

The subsequent case study replicated the SEARCA-SFRT survey, using the 200 households as the population of interest from which the 35 randomly selected households were drawn. This strategy was adopted to be able to compare the results of the previous study (without gender lens) and the current study (with gender dimension) in order to answer the research questions.

Respondents' profiles. As mentioned earlier, the current study drew randomly selected households ($n = 35$) from the list of respondents from the previous (2011) study ($n = 200$). Of these respondents, there were 35 males whose average age was 46 years (ranging from 27 to 82), and 35 females whose average age was 46.37 years (ranging from 21 to 73). The average number of household members was about seven people per household. The average monthly household income of the respondents was PHP 4,455.10, with Baang village having the lowest average monthly income of PHP 1,609.10 and Hapao village having the highest average monthly income per household of PHP 6,743.23 (Table 2). In general, the male respondents earned relatively higher than the female in the three villages.

Table 2. Socioeconomic characteristics of the respondents

Household Information	Villages		
	Baang	Hapao	Nungulunan
Average number of household members	7	7	6
Gender			
Male	11	16	8
Female	11	16	8
Average monthly income (PHP)			
Household	1,609.10	6,743.23	3,792.13
Male	427.27	4,679.76	2,028.38
Female	272.73	1,108.33	562.50

Hypothesis 1. The authors compared the possibility that male and female Hungduan farmers would abandon rice-terrace farming using the test of proportion ($\alpha = 0.05$). The results revealed that there was no significant difference between the decision of male and female Hungduan farmers to abandon the rice-terrace farming (Table 3). The lack of statistical significance in the comparison may be due to the difficulty in getting a “yes” response (i.e., to abandon rice-terrace farming) because rice-terrace farming is culturally embedded in their survival as households and community as Ifugaos (ADB 2009; Gonzales 2001; UNESCO 2008).

Table 3. Test of the comparison of male and female Hungduan farmers regarding the possibility of abandoning rice-terrace farming

Gender	Zc	Z.025
Male v. Female	0.974	1.96 ^{ns}

Note: ns = not significant at 5% level of significance

Hypothesis 2. In identifying the key socioeconomic and biophysical factors associated with the possibility that rice farming would be abandoned, the test of association ($\alpha = 0.05$) was used. The factors tested included gender, age, income, educational attainment, number of years farming, size of farms, ownership of farms, and perception of labor availability. The results of which are presented in Table 4.

Based on the results, the factors that had moderately strong degree of association were primary occupation, educational attainment, and lot ownership. The factors with moderate degree of association were secondary occupation, village, manner of acquisition, sufficiency of water supply during dry season, length of fallow period, and availability of budget for the maintenance of the rice terraces. Finally, the factors with weak degree of association were lot size and percentage of terraces damaged. Gender and age were not significant factors at $\alpha = 0.05$, indicating that the gender of the farmers had nothing to do with their decision to abandon the rice-terrace farming in the future.

Hypothesis 3. Finally, the authors tested the socioeconomic and biophysical factors that could affect the likelihood that rice-terrace farming would be abandoned using logistic regression method (Table 5). All variables were tested for statistical significance at $\alpha = 0.05$. In this third hypothesis, gender was found to be a statistically significant factor in the likelihood that rice-terrace farming would be abandoned, unlike in the first two hypotheses. The results revealed that the odds that males would abandon rice-terrace farming compared to females increased multiplicatively by 4.

Table 4. Factors associated with possible abandonment of rice-terrace farming

Variables	Coefficient	p-value	Degree of Association
Gender	0.024	0.626 ^{ns}	
Age	0.019	0.710 ^{ns}	
Primary occupation	0.385	0.000*	Strong
Secondary occupation	0.266	0.000*	Moderate
Monthly income	0.031	41.000 ^{ns}	
Educational attainment	0.400	0.000*	Strong
Village	0.259	0.000*	Moderate
Lot ownership	0.351	0.000*	Strong
Lot size	0.136	0.007*	Weak
Manner of acquisition	0.146	0.014*	Moderate
Planting all plots in one season	0.008	0.867 ^{ns}	
Irrigation	0.055	0.272 ^{ns}	
Enough water supply during rainy season	0.059	0.240 ^{ns}	
Enough water supply during dry season	0.179	0.000*	Moderate
Years farming terraces	0.045	0.374 ^{ns}	
Rice variety	0.059	0.240 ^{ns}	
Kind of fertilizer	0.061	0.475 ^{ns}	
Fallow field	0.059	0.240 ^{ns}	
Fallow frequency	0.057	0.251 ^{ns}	
Fallow length	0.103	0.040*	Moderate
Percent of terraces damaged	0.367	0.000*	Weak
Have budget to rehabilitate/maintain terraces	0.133	0.008*	Moderate

Notes:

- (1) *significant at 5% level of significance; ns = not significant at 5% level
 (2) Cramer's V and Eta coefficients were used for categorical and ratio variables, respectively. If the association is significant, then the degree of association of these variables was determined.
 (3) Cramer's V criteria = 0.01–<0.10 is weak, 0.1–0.30 is moderate, and >0.30 is strong.
 (4) Eta coefficients criteria = 0.01–0.20 is very weak, 0.21–0.40 is weak, 0.41–0.60 is moderate, and 0.61–1.00 is very strong.

Table 5. Logistic regression on the likelihood of abandoning rice-terrace farming among Hungduan farmers

Variables	Estimate	Error	Standard χ^2	Wald Pr > χ^2
Intercept	-63.0503	6.897100	83.5685	<0.0001
Gender	1.4748	0.521400	8.0002	0.0047
Age	2.1761	0.090200	581.4016	<0.0001
Primary occupation				
Tenant farmer	-115.2000	2.958500	1516.1939	<0.0001
Handicraft/processing/ woodcarving	-152.7000	5.531100	761.7686	<0.0001
Shop keeping/utility store	384.7000	5.624200	4678.6124	<0.0001
Construction labor	58.1922	4.823700	145.5383	<0.0001
Service (teacher, doctor, preacher, government employee, etc.)	136.2000	5.461100	621.6725	<0.0001
Homemaker	12.3252	3.209700	14.7458	00.0001
Secondary occupation				
Cultivating own farm	-257.4000	9.425600	745.5155	<0.0001
Tenant farmer	220.6000	3.586400	3782.4230	<0.0001
Handicraft/processing/ woodcarving	-60.5343	2.602600	540.9921	<0.0001
Shop keeping/utility store	107.2000	3.207000	1117.1531	<0.0001
Construction labor	57.8222	2.066200	783.1326	<0.0001
Service (teacher, doctor, preacher, government employee, etc.)	-43.1630	3.620900	142.0988	<0.0001
Homemaker	49.5827	2.321300	456.2622	<0.0001
Gardening (vegetable crop)	-122.6000	3.909300	983.4994	<0.0001
Household income	-0.0094	0.000162	3378.6941	<0.0001
Educational attainment				
Elementary undergraduate	42.6161	1.083600	1546.6015	<0.0001
Elementary graduate	-43.9588	2.041100	463.8513	<0.0001
High school undergraduate	-10.3333	2.381300	18.8306	<0.0001
High school graduate	-30.5401	1.371900	495.5326	<0.0001
College undergraduate	191.3000	3.398300	3167.4946	<0.0001
College graduate	-95.0568	2.019600	2215.4192	<0.0001
Vocational graduate	-103.8000	4.883000	451.4841	<0.0001

Table 5 continued

Variables	Estimate	Error	Standard X ²	Wald Pr > X ²
Number of lots	-4.6985	0.233500	404.9076	<0.0001
Lot size (m ²)	0.0205	0.000351	3408.5642	<0.0001
Able to plant in all lots in one season	-95.9455	2.305400	1731.9657	<0.0001
Percent of lots not planted	-4.3810	0.111200	1553.3777	<0.0001
Years of farming in the terraces	1.7082	0.050800	1131.2730	<0.0001
Fallow	-16.1791	1.700800	90.4917	<0.0001
Fallow period	4.6566	0.391100	141.7969	<0.0001
Percent of damaged rice terraces	1.3555	0.026400	2643.4307	<0.0001
Budget for rehabilitation damaged terraces	-13.9069	0.932100	222.6114	<0.0001
Village				
Hapao	20.5561	0.923900	495.0702	<0.0001
Nungulunan	46.6312	1.125900	1715.4673	<0.0001

Notes: (1) $df = 1$ (2) All variables listed above are significant at 5% level of significance.
 (3) Reference categories: Gender 0 = female; Budgetrehab = no; Primary 1 = cultivating own farm; Secondary 0 = none; Education 1 = none; Brgy = 1; Lot ownership 1 = conjugal
 (4) Interpretation will always be in comparison to the set reference.

Age was another factor that was found to be significant; for every unit increase in age, the odds of abandoning rice-terrace farming increased multiplicatively by 9. If the farmer is a tenant or produced handicrafts, his/her likelihood of abandoning the terraces would decrease. On the other hand, if he/she manages a shop or is involved in construction labor and services or is a home maker, the likelihood of abandoning the terraces would increase. If the farmer's secondary source of income is gardening, handicrafts, or services, his/her likelihood of abandoning the terraces would decrease. On the other hand, if he/she has a shop or is involved in construction labor or is a home maker, the likelihood of abandoning the terraces would increase. Every unit of increase in the farmer's income would decrease the likelihood of abandoning their rice-terrace farming. This may be due to the fact that the income from primary and secondary occupations was sufficient for their current needs.

Table 5 also shows that for every unit of increase in the number of lots farmed, the odds of farmers abandoning rice-terrace farming would decrease by 4.70. Moreover, for every unit of increase in the size of lots farmed, the odds of farmers abandoning the rice-terrace farming would increase very minimally by 0.02.

Furthermore, the results showed that the odds of abandonment would decrease by 95.95 if the farmers are able to plant on all their lots in one season. Farmers who could plant the entire farm lots were less likely to abandon their rice-terrace farming compared to those who could not. In terms of number of years of farming, the likelihood of abandonment would increase as the number of years of farming increases. This pattern of behavior is consistent with the findings on association with age. Farmers who practice fallowing are less likely to abandon rice-terrace farming than those who do not; this may be because of the resulting productivity of land due to the traditional practice of having only one cropping season per year followed by a fallow period. However, if fallow period is overextended, farmers who practice fallowing would more likely abandon rice-terrace farming; this may be because of their lack of income and interest. Similarly, for every percent increase in the damaged rice terraces, farmers would be more likely to abandon rice-terrace farming. However, if there was enough budget to rehabilitate and maintain the damaged rice terraces, farmers would be less likely to abandon their farms.

Finally, results suggest that those farmers living in Hapao and Nungulunan would be more likely to abandon rice-terrace farming compared to those living in Baang. The relatively poor water supply and poor access to water in Nungulunan, as well as the access of Hapao farmers to more secondary sources of occupation from their proximity to the main roads, may have contributed to this likelihood. On the other hand, farmers in Baang had greater access to water supply, and their village had more favorable farming conditions compared to the other two villages.

Qualitative Gender Analyses

The qualitative results revealed the lived experiences of the men and women of Hungduan, Ifugao, which were not captured in the quantitative analysis. Thus, the authors supplemented the core method with complementary qualitative data in order to have a more comprehensive perspective of the research problem. The presentation of results in this section caters to four analytical themes that are relevant to the discussion, namely, allocation of labor, access to and control over farm resources, participation in community affairs, and legal rights and status of the Hungduan farmers. The discussion of these analytical themes centers on the supplemental data and their implications on (1) the dynamic relationships between men and women in Hungduan, Ifugao, and (2) the applicability of infusing ENRE research with a gender dimension.

Allocation of labor

Sources of labor for Hungduan farmers were abundant. These sources of labor included, but were not limited to

1. Family labor, in which the adult male and female household members are joined by their male and female children in working in the rice terraces; work time per family member ranged from 0.5 to 116 days per year, especially during land preparation and postharvest activities;
2. Hired labor, which is usually available for the Hungduan farmers for a fee; work time ranged from 0.5 to 14 days per year at daily minimum wage of PHP 100 to 150 for female farm workers, and PHP 200 to 250 for male farm workers;
3. *Pinaliyak*, which refers to the 50–50 sharing agreement; and,
4. *Ubbu*, which is a local term for exchange labor; labor is usually exchanged among community members whose work time ranged from 1 to 30 days per year, especially during land preparation, and weeding and cleaning.

In general, Hungduan men and women shared farm work most of the time, especially in land preparation, fertilizer application, and drying. However, women were more engaged when it came to planting, weeding/cleaning, and harvesting, whereas men's work in the farm was predominant in the maintenance of terrace wall. This pattern was also observable in the hired labor as well as in the ubbu (exchange labor). Men's labor was hired or exchanged during land preparation and postharvest activities. Women's labor, on the other hand, was hired and exchanged particularly during planting, weeding and cleaning, and harvesting seasons.

The data presented in Tables 6, 7, and 8 demonstrate a number of insights on the role and responsibilities of men and women in Hungduan, Ifugao vis-à-vis their decision making on maintaining the rice terraces. For one, it was clearly established that women's role in the planting, weeding and cleaning, and harvesting activities was central to the overall farming activities in Hungduan. The centrality of women's role in the productive arena also affected the decision-making processes within their respective households. Thus, neglecting such contributions to farming would deny women their place in sustaining their family's main source of livelihood. If these details are to be disregarded in ENRE research, then women's contributions would remain a trivial input in any sustainable development plan of action.

Furthermore, by assuming that farming is men's domain, as previous research projects in Hungduan had assumed, the study would miss the intricacy of the household division of labor based on gender. Had the gender dimension not been incorporated into this current research, the fact that women in Hungduan were also farmers in the rice terraces whose workload was equal to that of their male counterparts would also have been missed. While men's workload in the farm in terms of land preparation and terrace wall maintenance was also central in production, the women's work in planting, weeding and cleaning, and harvesting comprised the bulk of farming activities. Given their contribution to farming activities, women had a more substantial part in the decision-making on rice-terrace farming.

Table 6. Percentage distribution of the farmers based on their perceived sufficiency of labor for rice-terrace farming

Activity	Perceived Sufficiency	
	Sufficient	Not Sufficient
Terrace maintenance	91.43	5.71
Land preparation	88.57	8.57
Rice planting	88.57	8.57
Rice harvesting	85.71	11.43
Rituals	28.57	2.86

Table 7. Percentage distribution of farmers based on their sources of labor for rice-terrace farming in Hungduan, Ifugao

Source of Labor	Activity				
	Terrace Maintenance	Land Preparation	Rice Planting	Rice Harvesting	Rituals
Family only	71.43	54.29	28.57	17.14	11.43
Hired labor only	0.00	2.86	0.00	0.00	11.43
Relative only	5.71	2.86	0.00	0.00	2.86
Family + hired labor	14.29	20.00	17.14	14.29	0.00
Family + immediate relatives	0.00	0.00	2.86	0.00	2.86
Exchange labor "ubbu"	0.00	2.86	2.86	2.86	0.00
<i>Pinaliyak</i>	2.86	0.00	0.00	0.00	0.00
family + "ubbu"	2.86	11.43	37.14	45.71	0.00
family + relatives + "ubbu"	0.00	0.00	0.00	2.86	0.00
"ubbu" + family + hired labor	0.00	2.86	5.71	8.57	0.00
Family only + "pinaliyak"	0.00	0.00	0.00	2.86	0.00
relative + "ubbu"	0.00	0.00	2.86	2.86	0.00

Notes: (1) *Pinaliyak* refers to 50–50 sharing agreement; (2) one farm household already abandoned farming in Nungulunan

Table 8. Percentage distribution of farmers based on gender division of labor for rice-terrace farming in Hungduan, Ifugao

Activity	Family			Hired			Ubbu		
	Male	Female	Both	Male	Female	Both	Male	Female	Both
Land preparation	34.29	5.71	57.14	17.14	0.00	2.86	8.57	0.00	8.57
Planting	0.00	65.71	31.43	0.00	25.71	0.00	0.00	37.14	5.71
Fertilizer application	8.57	17.14	34.29	0.00	0.00	0.00	0.00	0.00	0.00
Pesticide application	2.86	5.71	2.86	0.00	0.00	0.00	0.00	0.00	0.00
Terrace wall maintenance	62.86	8.57	25.71	14.29	0.00	5.71	0.00	0.00	2.86
Weeding/cleaning	5.71	71.43	20.00	0.00	17.14	0.00	5.71	0.00	0.00
Harvesting	0.00	51.43	37.14	0.00	31.43	0.00	2.86	51.43	8.57
Postharvest									
Drying	14.29	11.43	65.71	0.00	0.00	0.00	0.00	0.00	0.00
Pounding	2.86	11.43	60.00	11.43	2.86	5.71	0.00	0.00	0.00

Access to and control over farm resources

Given the fact that women provided substantial farm labor, the next analytical question would be whether or not women had access and control over farm resources. This case study concentrated on farm land as resource. As shown in Table 9, farmlands in Hungduan, Ifugao were mostly conjugally owned, 29.52% of which were inherited whereas 7.83% were bought.

Participation in community affairs

The level of participation of women in the productive and community activities in Hungduan, Ifugao was very high, primarily due to the following factors:

1. Customs and beliefs in Hungduan assigned and maintained women's critical participation in some traditional productive activities in farming; and

Table 9. Type of lot ownership across different owners

Type of Ownership	Lot Size (m ²)			Manner of Acquisition					
	Ave	Range	Inherited	Bought	Free Use	Rented	Gudwa/Kinapya ¹	Salda ²	Percent Total
Conjugal	276.0	3–3000	29.52	7.83	0.00	0	0.00	0.00	37.35
Husband	32.5	30–40	6.63	0.60	0.00	0	0.00	0.00	7.23
Wife	554.0	5–2500	4.82	0.00	0.00	0	0.00	0.00	4.82
Brother	900.0	150–1080	0.00	0.00	0.00	0	4.82	0.00	4.82
Sister	300.0	300	0.00	0.00	0.00	0	0.60	0.00	0.60
Other relatives	841.0	7–5000	0.00	0.00	1.20	0	14.46	1.81	17.47
Others (not blood relative)	587.0	180–1800	0.00	0.00	0.00	0	27.71	0.00	27.71
Percent total	–	–	40.96	8.43	1.20	0	47.59	1.81	

Notes: (1) ¹Gudwa/Kinapya means 50–50 sharing; (2) ²Salda means mortgaged.

2. New institutional arrangement in Hungduan challenged the cultural stance on equality between men and women in Hungduan.

The GREAT Women Project (GWP) 2006–2011 was initiated to enable LGUs to create a social, physical, and economic environment to improve women's access to and control of economic resources (GWP 2008). "GREAT" stands for Gender Responsive Economic Actions for the Transformation of Women. Since its inception, there have been a series of training programs and livelihood projects, which were started under the auspices of the National Commission on the Role of Filipino Women (now National Commission for Women) and the Canadian International Development Agency. These developmental actions resulted in the issuance of Hungduan Gender and Development (GAD) Code in 2008, and the supporting Implementing Rules and Regulations in 2009.

The GAD Code of Hungduan embodies a comprehensive policy at the municipal level through the cooperation of the LGU and its allied agencies, which tap the potentials of women in Hungduan, Ifugao to become more involved in the productive activities and counteract the marginalization of women. The pervasive gender differences in the Philippines are noted in terms of the lack of capital, family responsibilities, relative lack of skills in managing and operating enterprises, low in technology entrepreneurship, lack of social protection, and limited access to markets and market information—all of which have put women always at a disadvantage (NCRFW 2008). Such capacity building aimed to improve the higher level of planning and decision-making processes in the LGU by instilling and formalizing gender sensitivity and awareness during the planning, implementation, and evaluation of local plans, policies, and ordinances. These capacities are projected toward creating more economic avenues for women farmers.

These recent formal institutions established in support of women strengthen women's place in the economic and productive aspect (in general) and in rice-terrace farming (in particular). Consequently, women are given more avenues to participate not only in the reproductive activities (i.e., activities done within the households) and productive activities (i.e., income-generating and/or income-substituting activities)

but also in community affairs (i.e., activities done with other community members), thereby opening up women to more possibilities.

Legal rights and status. The legal rights that govern the Hungduan community are rooted in their indigenous rights over their ancestral domain. These legal rights dictate succeeding land tenure instruments, whether mainstream (i.e., provided by the Philippine statutory laws) or customary (i.e., provided by the customary laws). The maintenance of the rice-terrace farming among Hungduan farmers depends on the safeguarding of these rights and traditions.

Lessons and Implications on Engendering ENRE

On dealing with gender variable in ENRE research

Integrating the gender variable into ENRE research necessitates the use of mixed methods; other innovative and emerging methods facilitate merging of both the quantitative and qualitative analyses. In this case study, the results of the quantitative analyses (i.e., statistical tests on proportion, association, and logistic regression) were supplemented by qualitative analyses (i.e., analysis of gender dimensions) to further understand the intricacies involved in the gendered relationships of the male and female respondents.

In terms of sampling procedure, the research has demonstrated the value in interviewing both male and female respondents separately and simultaneously; this strategy readily allowed the comparison of responses from male and female respondents. However, the authors recognize that this sampling procedure is costly.

Furthermore, the results of this study show that the gender difference between male and female respondents was not statistically significant. This study therefore recommends that for as long as the sample size is sufficiently large, the selection of respondents is random, and there is conscious integration of gender dimension into the research design (not only in survey instrument), it will not be necessary to interview both spouses separately and simultaneously. This would solve the dilemma on spousal availability in cases where one's spouse is absent, or the household

is headed by a single family member. As a rule of thumb, ENRE research must consciously incorporate research questions on gender impacts or dimensions in any research endeavors. The basic requirement in gender analysis is to collect gender-disaggregated data.

On dealing with gender as unit of analysis

Analysis of the gender variable can be elevated further by dealing with gender as a unit of analysis. This would allow researchers to understand the complex relationships within households and between male and female. In the case study, the researchers looked into the dimensions of allocation of labor by gender, access and control, participation, and legal rights and status. However, the authors were not able to incorporate a time allocation study to capture the intricacy of gender relationships.

On dealing with gender as an integral part of a framework for action

This aspect can be useful in fine tuning policy recommendations that may arise from this research. For example, this research found that in Hungduan, women are more likely than men to abandon rice-terrace farming, even though women are integral part of rice-terrace farming. Thus, the results of this research could inform policy recommendations on women's involvement, especially in the public arena, such as in community and political activities. The results, however, indicate that women are already burdened with productive activities, particularly in rice-terrace farming. This means that any additional involvement of women in community activities should be adjusted to this reality. Otherwise, they might be burdened further and could lead to the abandonment of rice-terrace farming.

Thus, policy recommendations must be gender-sensitive, especially in the time allocation of women's labor. Gender mainstreaming in project design and policy interventions must be an utmost objective of government agencies and nongovernmental organizations at all levels of participation (i.e., local, national, and international).

CONCLUSIONS

With respect to the hypotheses of the case study, the following conclusions are made:

1. Hypothesis 1, which states that there is no difference in the decision of male and female Hungduan farmers to abandon the rice-terrace farming, is accepted.
2. Hypothesis 2, which states that key socioeconomic and biophysical factors such as gender, age, income, educational attainment, number of years farming, size of farms, ownership of farms, and perception on labor availability do not influence the decision of the farmers to abandon the rice terraces in the future, is rejected. Factors such as primary occupation, educational attainment and lot ownership were found to have a strong degree of association with the farmers' potential decision to abandon the rice terraces in the future; secondary occupation, village, manner of acquisition, sufficiency of water supply during dry season, duration of fallow period, and availability of budget for the maintenance of the rice terraces were found to have only moderate association. Gender was found to be insignificant at $\alpha = 0.05$.
3. Hypothesis 3, which states that the key socioeconomic and biophysical factors do not affect the likelihood of abandonment of rice terraces, is also rejected. Among other things, gender was found to be a statistically significant factor in the likelihood of abandoning rice-terrace farming, unlike in the first two hypotheses. Other factors that were found to be significant are age, primary occupation, secondary occupation, household income, educational attainment, number of lots owned, ability to plant all lots in one planting season, number of years farming, fallow practices, percent of damaged terraces, availability of budget for rehabilitation and maintenance of rice terraces, and village.

Including gender (whether as a variable, unit of analysis, or part of the framework for action) in ENRE research deepens the level of analysis

and provides more information that can better explain the choices that people make, or in this case, the choices that farmers make. Furthermore, if research projects fail to recognize the valuable role and participation of women by not systematically including them in the research design and implementation, then such research will not be able to highlight their contributions.

Although incorporating gender analysis in ENRE research will tend to increase the cost of research, this additional cost would be small compared to the social costs that would otherwise result if policies arising from such research do not appropriately account for the economic value of women's participation, views, beliefs, etc.

In this case study, the authors argue that if research projects fail to recognize the valuable role and participation of women by not systematically including them in the research design and implementation, then such research will not be able to highlight their contributions. As a result, policies arising from such research will be ill-informed of the economic value of women's participation, and views.

RECOMMENDATIONS

Based on the results of this case study, the following research initiatives are recommended:

1. There should be a deliberate effort to integrate gender into the project design, implementation, and evaluation.
2. The key to gender-sensitive studies is to have gender-disaggregated data. As early as planning the research design, gender should be consciously integrated. People should be dealt with as input/resource, beneficiary, and advocate.
3. Incorporating gender analysis into ENRE entails additional cost; thus, researchers should be strategic and organized in identifying which research questions need gender-disaggregated data given the limitation and scope of the research project. Otherwise, researchers would be gathering data that may not be useful in the analysis.

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Assessment of Gender Role Participation in Coastal Resource Management Program: A Case Study in Masinloc, Zambales

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Photo by Kunlayanee Pornpinatepong.
Women fishers hauling fish harvests

EXECUTIVE SUMMARY

This case study was conducted in two villages of Masincloc, Zambales, a province that is considered ecologically, scientifically, and economically rich in coastal resources such that a program like Coastal Resource Management Program (CRMP) considered the province to be worthy of a sustainable environment and economic project. This study dealt with an issue that has become a litmus test of integrating gender as a variable or unit of analysis in the conduct of development programs. The authors attempted to take the case of CRMP to illustrate gendered participation in a development program. What does it take to disaggregate gendered data to arrive at a more substantive and meaningful research? The discussion is not uncommon, and it was pointed out in this study that one of the benefits of gender-disaggregated data is that the researchers were able to understand the differences in the perspectives of men and women in terms of their roles, participation, awareness, and knowledge in natural resource use and management. This study, thus, attempted to assess the level of awareness of men and women, as well as their time spent on participating in coastal resource management (CRM) activities for future development programs. The study identified the factors affecting their participation in CRM activities. The results showed that gender, membership in organization, and their awareness of CRM programs significantly affected their decision to participate. Interestingly, women's reproductive roles and men's awareness of CRM activities were the identified drivers of their participation.

INTRODUCTION

Background and Statement of the Problem

The province of Zambales provides a vast array of agricultural, coastal, and timber forest resources; but it also faces its share of environmental and coastal degradation problems. The mangrove forests in Zambales, which are critical in linking terrestrial and marine ecosystems, are among the most threatened. Rapid mangrove deforestation were experienced in the past due to establishment of fishponds and due to indiscriminate logging. Indirectly, poverty, the lack of appreciation of the importance of mangroves, and the lack of environmental awareness have all contributed to the widespread mangrove degradation and have hampered rehabilitation efforts. In addition, the province is confronted with serious issues in illegal fishing and failure in implementing policy and regulatory measures, which is further aggravated by a combination of economic, political, and sociocultural issues.

The ecologically, scientifically, and economically rich coastal resources in the province prompted the government to declare the area as a Protected Seascape through Proclamation No. 231 on August 18, 1993. A sustainable coastal resource management (CRM) plan that enlists the full participation of stakeholders provides an avenue for concrete community action to support the proclamation (PENRO Zambales 2010).

The Coastal Resource Management Program (CRMP) was envisioned to be an instrument for the optimal and sustainable use of coastal waters. With the local government at the reins, the end goal was to have equitable distribution of benefits for marginal fishers. CRMP specifically aims to manage coastal and marine resources sustainably and to uplift the socioeconomic conditions of the people living in the coastal areas, particularly in the provinces and municipalities surrounding marine biodiversity corridors of national and global importance, as identified in the Philippine Biodiversity Conservation priorities (PENRO Zambales 2010).

It has been argued that in implementing CRMP, the differentiated roles, participation, knowledge, and awareness of men and women in natural resource use and management are directly connected to the sustainability of the program and to the improvement of their environment and economic well-being. Thus, this case study looked at the gender role participation in coastal resource management (CRM) in the municipality of Masinloc in Zambales province, which is one of the first municipalities to implement a CRMP.

The municipality of Masinloc came from the Bolinao-Zambal phrase "*Babali nin Masin Ilog*," which means "the town where there is a river." It was founded as a native settlement on the southern bank of the river, across the island that became known as San Salvador. It has an area of approximately 7,560 hectares (ha) that includes 42.2 kilometers (km) of coastline and mountainous terrain.

A 600-megawatt coal-fired power plant is located in Masinloc, along with three wharves that are important sources of employment in the area. These wharves are the ones connected to the power plant previously owned by the National Power Corporation (NPC) (now owned by AES-MPPCL), the Benguet Corporation wharf, and the Matalvis Fish Port. All of these wharves have important implications on the coastal environment and on the households' perception and knowledge about coastal protection and management.

In 1998, the local government of Masinloc, the local community, and the People's Organizations (PO) jointly established (and have since been supporting) the CRMP of Masinloc. However, despite the claim that gender dimension had been considered in the development and implementation of the CRMP, no study can be found that looked into this aspect for the Masinloc CRMP. As such, this case study assessed the gender role participation in the Masinloc CRMP.

This study built on an earlier study by Sumalde and Pedroso (2001); the previous study looked into the transaction cost of implementing a CRM project. This case study extended the analysis of the previous one by looking into the role of men and women in the implementation of the CRM activities in the coastal community of Masinloc, Zambales.

This study argues that integrating gendered knowledge, perception, and awareness is important to have a better perspective of the community engagement in CRM projects. Likewise, the differentiation of roles and contributions of men and women can be useful in program planning and implementation.

Specifically, the case study aimed to answer to the following research questions using data from two Masinloc study villages:

1. What productive and reproductive roles do men and women play?
2. What is the extent of awareness, knowledge, and participation of men and women in CRM activities?
3. How much time and what is the value of time that men and women spend on CRM activities?
4. What factors affect the participation, time spent, and value of time spent by men and women in CRM activities?
5. What conclusions can be derived from this engendered research project?

METHODOLOGY

Framework of the Study

An engendered research framework had been developed to serve as a general guideline on how to apply gendered analytical procedures. The framework attempted to assess the gender differences in the awareness, perception, and knowledge in household, livelihood, and coastal resource management activities.

The household activities of child rearing, home maintenance, food preparation, child discipline, shopping for household needs, and doing the laundry constitute reproductive roles. Livelihood activities, on the other hand, pertain to productive roles such as fishing and other income-generating occupations. Finally, CRM activities involve activities identified with the CRMP, such as organizational meetings and training.

Gender analysis of the data collected identified how men's and women's knowledge, beliefs, and perceptions provided constraints and opportunities for the CRMP. Participation was measured in terms of the time spent on each activity as reported by the respondents. The value of time spent on CRM activities was the market value or opportunity cost of men's and women's time spent participating in the different activities.

Place and Scope of the Case Study

The study was conducted in the municipality of Masinloc, Zambales, Philippines, which is 250 km northwest of Manila, on a coastal plain between the Zambales mountains on the east side and the West Philippine Sea (also called the South China Sea) on the west side. Masinloc has an area of 33,150 ha; 7,560 ha of which are under the National Integrated Protected Area System (NIPAS). It has 42.2 km of coastline, along which lie 11 of its 13 *barangays* (villages). Approximately 26% of its 9,211 households depend on the coastal areas for their livelihood (PENRO Zambales 2010).

The case study covered two villages: San Lorenzo (Panglit Island) and Bani. These are two of three villages where most of the CRM activities are being implemented (Figure 1). San Lorenzo has an area of 540 ha with 539 households. Its 20 ha of marine protected areas include the *taclobo* (giant clam) farm, mangrove reforestation area, and a pilot site for sea cucumber ranching. Bani, on the other hand, has an area of 530 ha, with 5 ha of marine protected area. The village has 565 households.

Data Collection

The study used secondary and primary data. Secondary data related to CRMP implementation were obtained from the Provincial Environment and Natural Resources Office (PENRO) of Zambales and the CRMP office in Masinloc. Primary data, on the other hand, were obtained from focus group discussions (FGD), key informant interviews (KII), and an interview survey.



Figure 1. Map of Zambales showing the study sites

The FGDs and KIIs were participated by officials of key government agencies like the municipal agriculture office, the Bureau of Fisheries and Aquatic Resources (BFAR), and the CRMP implementing unit of the local government unit (LGU). These discussions were particularly useful in designing the survey instrument and in elaborating on the CRMP's history and implementation.

After designing the survey questionnaire, the instrument was reviewed and pretested. Enumerators were trained prior to conducting the actual interviews. Majority of the enumerators were women. The interview survey was conducted among 50 households from the two villages. To generate gender-disaggregated data, the male and female household heads were both interviewed to make up the total number of 100 respondents. The husband and the wife of each household were interviewed simultaneously but separately in order to avoid unsolicited opinions and to prevent one from influencing the other during the interview.

The survey questionnaire consisted of seven sections: (1) general information; (2) perception, knowledge, attitudes, and practices; (3) decision making and participation in household and livelihood activities and credit; (6) participation of other household members; and (7) sociodemographic profile.

Data Analysis

Descriptive statistics

Descriptive statistics, mainly percentages and means, were used to analyze the data on the respondents' profile, their productive and reproductive roles, and respondents' awareness and knowledge of and participation in CRM activities. To get an estimate of the time spent on CRM activities, each respondent was asked about the time they spent each month for each of the CRM components. The time spent on household and livelihood activities was estimated by the respondents based on activities during a normal day.

The participants were also asked to rate themselves in terms of their participation in household chores such as laundry, cooking, shopping for household needs, childcare, and house maintenance. The rating scale assigned "1" for lowest level of participation and "10" for the highest. Means of the self-ratings were computed for each activity by gender and village.

The value of time spent participating in each of the household, livelihood, and CRM activities was estimated by the respondents from the income they would have normally earned from such activities. In the case of housework done by housewives and other similar cases where there is no reported income, the average of the reported estimates from the group was used as the opportunity cost of their time. In cases where the respondents received token remuneration, this was included on the opportunity cost of their time. Thus, the value of time spent on CRM activities was estimated by multiplying the time (in hours per month) by the income from these activities, or the opportunity cost of their time in the case of unpaid activities.

Factors affecting the decision to participate in CRM activities

The decision to participate in CRM activities was analyzed using logit regression method. Following Madala (2001), the logit regression was calculated from

$$\text{Ln}Z_i = \frac{P_i}{1-P_i} = \beta_0 + \beta_i X_i + \mu_i \quad \text{Equation (1)}$$

where:

- β_i = coefficients of the logit;
- X_i = vector of the explanatory variables;
- P_i = probability of participating in CRM activities based on a “yes” answer to participate in the CRM project, and
- μ_i = random error term.

The probability of participating in CRM was computed as follows:

$$P_i = \frac{1}{1 + e^{-Z}}. \quad \text{Equation (2)}$$

The higher the value of the logit, the higher the odds would be for participation in CRMP. The marginal effects ($\partial P_i / \partial X_{ij}$), which explain the change in probability to participate for every unit change in the explanatory variable, was computed as follows:

$$\partial P_i / \partial X_{ij} = \beta_j P_i (1-P_i). \quad \text{Equation (3)}$$

Factors affecting time and value of time in participating in CRM activities

Time spent on CRM. Tobit regression was used to determine the effects of the different factors to the amount and value of time devoted to CRM activities by the respondents. The tobit was used to include the latent, unobserved variable, such as the zero value of the dependent variable.

The tobit regression model used for time spent on CRM was given by (Madala 2001):

$$Y^* = \beta_i X_i + \mu_i \quad \text{Equation (4)}$$

where:

- Y^* = time spent on CRM activities (hours per month), unobserved latent variable;
- Y_i = Y^* if $Y^* > 0$, 0 if $Y^* \leq 0$;
- X_i = vector of explanatory variables; and
- μ_i = random term, $\mu_i \sim \text{IN}(0, \sigma^2)$.

The probability of time (Y) equals zero is given as

$$P_i = F\left(\frac{Z}{\sigma}\right); \quad Z = \frac{-\sum \beta_i X_i}{\sigma} \quad \text{Equation (5)}$$

Mathematically, this is expressed as

$$P_i = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\frac{Z}{\sigma}} \frac{\left(\frac{Z}{\sigma}\right)^2}{e^{\frac{1}{2}\left(\frac{Z}{\sigma}\right)^2}} \quad \text{Equation (6)}$$

The marginal effects ($\partial P_i / \partial X_i$), which explain the change in time spent on CRM activities with the changes in the explanatory variables were computed using the following equation:

$$\frac{\sigma Y_i}{\sigma X_j} = \beta_j F\left(\frac{\sum \beta_i X_i}{\sigma}\right) \quad \text{Equation (7)}$$

Value of time spent on CRM. The model for the value of time spent by the respondents on CRM activities were estimated using Equation (4), except that the dependent variable was changed from time spent to value of time expressed in PHP (Philippines Peso) per month. Thus,

$$Y^* = \beta_i X_i + \mu_i \quad \text{Equation (8)}$$

where:

Y^* = value of time spent on CRM activities (PHP/month), unobserved latent variable;

Y_i = Y^* if $Y^* > 0$, 0 if $Y^* \leq 0$;

β_i = coefficients of the tobit;

X_i = vector of explanatory variables; and

μ_i = random term, $\mu_i \sim \text{IN}(0, \sigma^2)$.

The same procedure used in estimating Equation (4) was used, and with the same explanatory variables described in Table 1.

Table 1. Explanatory variables used in the logit and tobit regression models

Explanatory Variables	Units/Measure	Description	Notes
brgy	1 = San Lorenzo 0 = Bani	Dummy for village	Proxy for environmental, institutional, and socioeconomic conditions faced by respondents that cannot be measured
age	1 = female 0 = male	Dummy for gender	Proxy for experience, mindset, and other personal factors that cannot be captured/measured
education	years of formal education	Educational attainment of respondents	Proxy for knowledge and other related characteristics of the respondent that cannot be measured
hhsz	count	Number of household members	Captures the effects of domestic conditions and the demand for household resources
hhy	PHP per year	Household income	Replaced with respondent's income in the regressions with "male only" and "female only" data sets
awareness	1 = aware 0 = otherwise	Dummy for awareness of CRM activities	
organization	1 = members 0 = otherwise	Dummy for membership in a community organization	Proxy for community involvement and interest in coastal resource management

RESULTS AND DISCUSSION

The CRM Program of the LGU

The CRMP of Masinloc started in 1998 under the Office of the Municipal Mayor. It obtained official status on 4 June, 2008 when the Office of the Sangguniang Bayan (municipal council) passed Municipal Ordinance No. 92-08, known as the Coastal Resources Management Code of the Municipality of Masinloc. The Code aims to

1. institutionalize good coastal governance practices through establishing a functional, multi-sectoral CRM body with budget allocation;
2. enhance the participation of community and other stakeholders through regular reporting and feedback;
3. reduce environmental degradation by completely stopping all illegal and destructive activities in all municipal waters; and
4. sustain 10% of the good reefs and enhance the management of critical coastal habitats (i.e., mangroves, seagrass) (Masinloc Municipal Council 2010).

The local government of Masinloc ensures ownership of the CRMP implementation while respecting the principle of co-management with the other relevant government institutions (i.e., NPC, BFAR, Marine Protected Area Network and Zonal Management team, Department of Education, etc.) and other stakeholders like POs and private sectors. It was only in 2011 when a separate budget was allocated to the local government for the implementation of the CRMP activities (through the Municipal Environment and Natural Resources Office [MENRO]) that it was established to become the implementing unit of CRMP. Additional funding from the World Bank was also secured for the CRMP.

The activities identified with CRMP include establishing marine protected areas (MPA) for *taclobo*/giant clam farming; sea cucumber ranching; mangrove rehabilitation and reforestation; apprehending illegal fishers; capability building and implementing information, education, and communication (IEC) campaigns; alternative livelihood; and sustainable ecotourism.

Profile of Respondents

Age and educational profile of respondents

The average age of all female respondents was 38, while that of the male respondents were 43 years. Both the male and female respondents from Bani were relatively older than those from San Lorenzo (Table 2). The educational background of both men and women were almost similar with slightly more women having college education.

Table 2. Socioeconomic characteristics of respondents, by gender, by village, Masinloc, Zambales, 2011

Characteristics	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Age, average (years)	39	34	47	41	43	38
Age, range (years)	22–59	21–59	24–78	20–77	22–78	20–77
Educational Attainment (% of respondents)						
Elementary level	8	12	24	4	16	8
Elementary graduate	28	16	8	28	18	22
High school level	4	20	20	16	12	18
High school graduate	52	36	36	48	44	42
Vocational/ Undergraduate	0	0	4	0	2	0
Vocational graduate	8	4	0	0	4	2
College level	0	8	8	4	4	6
College graduate	0	4	0	0	0	2

Access to community resources/facilities

Access to community resources and facilities bear on the respondents' ability to perform their productive and reproductive roles in the community. Table 3 shows that the respondents had a high level of access to health facilities, medical assistance, and educational programs. However, access to water facilities, sanitation, library facilities, and childcare was not very satisfactory, as this was realized by less than 50% of the male and female respondents. Access to career assistance, on the other hand, was perceived to be available by more male (68%) than female respondents (38%).

Table 3. Respondents' access to community resources, by gender, by village, Masinloc, Zambales, 2011

Community Resources	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Health facilities	84	100	96	100	90	100
Water facilities	44	36	40	56	42	46
Medical assistance	80	88	88	92	84	90
Sanitation	44	48	60	44	52	46
Educational programs	76	72	80	92	78	82
Libraries	32	28	36	40	34	34
Career assistance	60	32	76	44	68	38
Childcare	68	68	68	64	68	66
Others*	0	0	100	100	50	50

Notes: (1) *Other community resources include feeding program, relief goods, etc.
(2) Figures reported in this table are from multiple responses.

Involvement in community organizations

The total number of female respondents who joined organizations (12 respondents) was lower than that of the male respondents (25 respondents) (Table 4). However, five female organization member-respondents (out of the 12) claimed that the decision to join had been made by the wife, while seven female member-respondents said that this had been a joint decision. The rest of the women (8 out of the 12) claimed that other relatives had influenced the decision to join an organization. Interestingly, none of the women attributed the decision to join an organization solely to the males. In contrast, 15 male member-respondents (out of the 25) said the decision had been made solely by them, but a few (three male member-respondents) said it had been solely decided by their wives. Only 7 out of the 25 male member-respondents said that the decision had been made jointly. (Table 5).

Table 4. Membership in community organizations, by gender, by village, Masinloc, Zambales, 2011

Item	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
No. of respondents who are members	13	5	12	7	25	12
Percentage (%) of respondents	52	20	48	28	50	24

Table 5. Person responsible for the decision to join an organization

Decision Maker in Joining Organization	No. of Organization Member-Respondents					
	San Lorenzo (n = 18)		Bani (n = 19)		Total (n = 37)	
	Male (n = 13)	Female (n = 5)	Male (n = 12)	Female (n = 7)	Male (n = 25)	Female (n = 12)
Husband	7	0	8	0	15	0
Wife	2	2	0	3	3	5
Husband-and-wife	4	3	3	3	7	7
Relative/In-law influenced the decision	0	0	1	1	4	8

A total of 37 male and female respondents reported that they had been members of an organization. About half of the organization member-respondents were members of fishermen's associations in their villages (19 out of the 37 organization member-respondents). Interestingly, 9 out of the 12 female member-respondents were members of fishermen's organizations, whereas male member-respondents were members of fishermen's organizations, civic groups, farmer and fishermen's organizations, and cooperatives. A total of nine male member-respondents (out of the 25) joined organizations prior to 2009, and 11 joined in 2011. Meanwhile, majority of the women member-respondents (8 out of the 12 female member-respondents) joined only in 2011 (the year MENRO was formed and took over CRMP implementation). Thus, collective action through the CRMP has been seen to encourage women participation (Table 6).

Table 6. Type of organization joined by respondents and year of joining, by gender, by village

Item	No. of Organization Member-Respondents					
	San Lorenzo (n = 18)		Bani (n = 19)		Total (n = 37)	
	Male (n = 13)	Female (n = 5)	Male (n = 12)	Female (n = 7)	Male (n = 25)	Female (n = 12)
Type of Organization						
Fishermen association	6	4	4	5	10	9
Civic groups	0	0	6	1	6	1
Farmer and fisherman association	5	1	0	0	5	1
Cooperatives	2	0	2	1	4	1
Year of Joining						
2011	9	4	2	4	11	8
2009–2010	3	1	2	3	5	4
Before 2009	1	0	8	0	9	0

Reproductive Roles of Male and Female Respondents

Decision making in household activities

The household provisioning activities considered included food preparation, childcare, child discipline, household maintenance, home care, and budgeting (Table 7). Decisions regarding food preparation and childcare were mainly made by women. Respondents perceived child discipline to be a joint responsibility of the male and the female heads.

House cleaning, laundry, and other chores that fall under home care were seen to be a major part of daily household decisions made by women. However, a significant proportion of respondents also viewed decisions regarding home care as the joint concern of both the male and female household heads. Decisions involving investments in house repairs and similar activities were reported to be in the domain of the male heads. Interestingly, in matters involving financial decisions, the wife appeared to be the keeper of the household purse and controlled the daily budget.

Participation in household activities

Both men and women respondents participated in household chores. Women had the highest participation in childcare and laundry, followed by cooking; men were responsible for house maintenance. In terms of hours spent on household activities on an ordinary day (Table 9), women estimated that they spend 81 hours a week on domestic work, whereas men spend 65 hours a week for reproductive activities.

Meanwhile, the estimates of the value of time spent on the different activities showed that the value of time spent on childcare and cooking amounted to more than PHP 1,000 per week. The time spent for doing the laundry was a far second at PHP 621 a week. Note that “value in exchange” or the market value for time spent as a housewife was not included. Using the opportunity cost, as estimated by the women, led to highest estimates of the value of time for activities in childcare and cooking. The value of time spent by women on most activities was higher than the estimate of value of time spent on the same activities by their male counterparts (Table 9), again supporting the notion that reproductive roles in the household are primarily women’s roles.

Table 7. Decision making in household activities, by gender, by village, Masinloc, Zambales, 2011

Activity/ Decision Maker	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Food Preparation						
Wife only	68	80	48	64	58	72
Both husband and wife	28	16	48	32	38	24
Husband only	4	4	4	4	4	4
Child Care						
Wife only	48	52	72	72	60	62
Both husband and wife	40	40	24	28	32	34
Not applicable	8	4	0	0	4	2
Others ^a	4	4	4	0	4	2
Child Discipline						
Husband only	4	4	12	0	8	2
Both husband and wife	80	72	80	84	80	78
Wife only	4	20	0	16	2	18
Not applicable	8	4	4	0	6	2
Others ^b	4	0	4	0	4	0
Home Care						
Wife only	48	56	48	56	48	56
Both husband and wife	48	40	24	36	36	38
Husband only	4	4	12	0	8	2
Children	0	0	16	8	8	4
House Maintenance						
Husband only	84	64	80	76	82	70
Both husband and wife	16	32	16	20	16	26
Wife only	0	4	4	4	2	4
Budgeting						
Wife only	84	56	60	56	72	56
Both husband and wife	12	32	32	44	22	38
Husband only	4	12	8	0	6	6

Notes: (1) ^a husband, brother/sister, children; (2) ^b brother/sister, children

Table 8. Time spent on household activities, by gender, by village, Masinloc, Zambales, 2011

Activities	Average Time Spent (Hours per Week)					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Childcare	36	42	23	46	30	44
Cooking	7	14	14	22	10	18
House maintenance*	10	5	24	7	17	7
Washing clothes	4	8	4	8	4	8
Marketing for household needs	6	4	2	4	4	4
Total	63	73	67	87	65	81

Note: *House maintenance is done annually

Table 9. Value of time spent on household activities, by gender, by village, Masinloc, Zambales, 2011

Activities	Value of Time Spent (PHP per week)					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Childcare	1,019	1,078	1,168	1,642	1,094	1,353
Cooking	515	1,247	897	1,033	702	1,140
Washing clothes	254	506	423	736	329	621
Marketing for HH needs	190	335	185	279	188	306
House maintenance*	602	385	1,448	395	1,016	391
Total	1,978	3,166	2,673	3,690	2,313	3,420

Note: * House maintenance is per year

Men's and Women's Productive Roles

Livelihood activities

There appears to be a differentiation between the occupational roles of the male and female respondents in the study villages. More male respondents (94%) than women reported fishing as their primary occupation. The most common preoccupation among women was the operation of small retail or *sari-sari* stores (retail store).

Table 11. Occupations of respondents in the study villages, by gender, by village, Masinloc, Zambales, 2011

Characteristics	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Primary Occupation						
Fishing	96	24	92	4	94	14
None/plain housewife	0	56	0	52	0	54
Business operator	0	16	0	36	0	26
Skilled/unskilled labor, public service	4	4	8	8	6	6
Secondary Occupation						
Skilled labor	4	0	28	0	16	0
Public service	24	4	4	0	14	2
Unskilled labor, business operator	12	4	16	0	14	2
Farming/livestock raising	4	8	8	4	6	6
Fishing	4	0	8	0	6	0
None	52	84	36	96	44	90

Decision making in livelihood activities

Table 12 illustrates the respondents' decision-making roles in livelihood activities. In general, both male and female respondents saw the male household head as the decision maker on "when to go fishing." Among the

farming households, the husband also appeared to dominate decisions regarding what to plant, when to harvest, what and how much inputs to use, where to buy inputs, and on hiring farm labor. Thus, it may be inferred that decision making in terms of the key livelihood activities of fishing and farming have been stereotyped as a male activity. However, the respondents appeared to be divided about decision making regarding when to sell produce; responses varied amongst “husband only,” “wife only,” and “jointly”. Since the timing of selling the produce is linked to the availability of resources in the household, and since Filipino women are seen as the traditional “keepers of the household purse,” the women made a significant contribution to such decisions.

Table 12. Decision making in livelihood activities, by gender and village, Masinloc, Zambales, 2011

Activity/ Decision Maker	Percentage (%) of Respondents					
	San Lorenz		Bani		Total	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
When to Go Fishing						
Husband only	92	84	100	96	96	90
Husband and wife	8	16	0	4	4	10
What to Plant						
Husband only	12	16	24	40	18	28
Husband and wife	12	20	4	12	8	16
Wife only	4	4	4	0	4	2
Not applicable	72	60	68	48	70	54
When to Harvest						
Husband only	16	12	24	36	20	24
Husband and wife	8	20	8	12	8	16
Wife only	4	4	0	4	2	4
Not applicable	72	64	68	48	70	56
What Inputs to Use						
Husband only	36	28	44	48	40	38
Wife only	0	4	0	4	0	4
Husband and wife	8	8	4	0	6	4
Not applicable	56	60	52	48	54	54

Table 12 continued

Activity/ Decision Maker	Percentage (%) of Respondents					
	San Lorenz		Bani		Total	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
How Much Input to Use						
Husband only	36	32	44	48	40	40
Wife only	0	4	0	4	0	4
Husband and wife	8	4	4	0	6	2
Not applicable	56	60	52	48	54	54
Where to Buy Inputs						
Husband only	32	24	44	48	38	36
Wife only	4	8	0	4	2	6
Husband and wife	8	8	4	0	6	4
Not applicable	56	60	52	48	54	54
Who to Hire						
Husband only	36	8	52	20	44	14
Wife only	12	8	4	0	8	4
Co-worker	0	0	4	0	2	0
Not applicable	52	84	40	80	46	82
When to Sell						
Husband only	48	32	28	28	38	30
Wife only	24	12	32	52	28	32
Husband and wife	20	32	24	16	22	24
Co-worker	0	0	4	0	2	0
Not applicable	8	24	12	4	10	14
To Whom to Sell						
Wife only	24	12	32	56	28	34
Husband and wife	20	36	24	20	22	28
Husband only	48	28	28	20	38	24
Co-worker	0	0	4	0	2	0
Not applicable	8	24	12	4	10	14

Livelihood outcomes

The respondents from Bani reported higher household income than did the San Lorenzo respondents. Note that more women in Bani had their own primary source of income, mainly as operators of small businesses. Overall, the average annual household income was PHP 103,550; 44% of which came from fishing, which was the primary occupation of most male respondents. The male respondents had a larger contribution to household income than the female respondents. This may indicate the few opportunities that are available to women to participate in productive roles. Men were the bread winners in majority of the sampled families, whereas the non-valued reproductive roles were usually the domain of women.

Table 13. Family size and household income of the respondents' households, by village, Masinloc, Zambales, 2011

Characteristics	San Lorenzo (n = 50)	Bani (n = 50)	Total (n = 100)
Family size, average	4.5	5.1	4.8
Household income, average (PHP/year)	94,836	112,263	103,550
Household income, range (PHP/year)	18,000–314,400	24,000–438,000	18,000–438,000
Per capita income (PHP/year), average	26,644	24,994	25,819
Percent of income from fishing	45	43	44
Male contribution to HH income (%)	71.50	62.42	66.58
Female contribution to HH income (%)	20.75	20.25	20.48

Decisions related to credit

Decisions to avail of credit, including from whom to borrow and how much, were usually decided jointly by the husband and wife. This illustrates that decision making regarding credit was often shared by the male and female household heads (Table 14).

Table 14. Decision making in household activities, by gender, by village, Masinloc, Zambales, 2011

Activity/ Decision Maker	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Credit Availment						
Husband and wife	48	24	24	24	36	24
Wife only	0	12	4	8	2	10
Husband only	12	4	22	4	10	4
Not applicable	40	60	64	64	52	62
Credit Source						
Husband and wife	68	48	60	40	64	44
Wife only	8	16	4	24	6	20
Husband only	24	20	36	16	30	18
Not applicable	0	16	0	20	0	18
Credit Amount						
Husband and wife	68	48	56	40	62	44
Husband only	24	28	32	16	28	22
Wife only	8	4	12	24	10	14
Not applicable	0	20	0	20	0	20

Awareness, Perceptions, and Knowledge of CRMP

Respondents' awareness of CRMP

Majority of the respondents were aware of the CRM program of the local government. Interestingly, the data show that awareness of specific regulations was higher than that of CRMP in general, and that a greater proportion of women than men respondents expressed this awareness. Survey results showed that although the respondents were aware of specific regulations connected to CRMP, they were unaware that these regulations were present as a direct result of having been instituted as part of CRMP. The data also show that information campaigns on the five component activities of CRMP need to be intensified. These five components include *Bantay Dagat* (Sea Watch), mangrove reforestation, marine protected areas (MPA), coastal clean-up, and environmental protection campaign.

Table 15. Respondents' awareness of CRMP and its activities, Masinloc, Zambales, 2011

Indicator	Percentage (%) of Respondents					
	San Lorenzo		Bani		Total	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Aware of CRMP	60	80	68	76	64	78
Aware of CRM regulations	82	100	94	89	88	94
Aware of component CRMP activities*	33	50	47	58	41	54

Note: *CRMP activities include Bantay Dagat (Sea Watch), mangrove reforestation, marine protected area, coastal clean-up, and environmental protection campaign

Knowledge of CRMP regulations

The implementing LGUs enforced specific regulations to support CRMP. Table 16 shows the distribution of respondents in terms of their knowledge of CRMP regulations.

Majority of the male (86%) and female (74%) respondents were aware that certain fishing methods are illegal, and are therefore prohibited. More than half of the respondents were aware of the appropriate mesh size for fishing. They were also aware of the enforcement of a penalty for violations. However, only a few were aware that there were regulations on the capacity of boats and fishing distance from the shore allowable on municipal waters. Likewise, the respondents were generally aware of the regulations on where to plant mangrove saplings, the system for maintaining of seedlings, and the general prohibition of mangrove-cutting. However, the extent of awareness could still be improved with an intensified education and information campaign on mangrove maintenance.

Table 16. Respondents' knowledge about CRM regulations by gender and village, Masinloc, Zambales, 2011

Regulations	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Regulations in Fishing						
Prohibition of illegal fishing methods and penalty for violation	84	82	88	64	86	74
Mesh size to use	42	59	63	57	51	58
Boat/fishers registration	11	12	19	14	14	13
Capacity of boat	5	0	19	7	11	3
Fishing distance from the shore	5	6	25	0	14	3
Regulations in Mangrove Reforestation						
Where to plant the mangrove sapling	26	41	69	29	46	35
Maintenance of the seedlings	21	35	44	14	31	26
Cutting of mangroves is prohibited	32	18	25	36	29	26
Others* (specify)	5	0	13	0	9	0
Regulations in Marine Protected Area						
Allowed area for fishing	53	59	50	29	51	45
Limits to frequency of fishing	16	18	25	14	20	16
Assigned people to maintain the MPA	11	24	31	0	20	13
Regulations in Coastal Clean-Up						
Mobilization for clean-up	16	35	38	64	26	48
Responsibilities of community	26	12	0	21	14	16
Frequency of clean-up	26	6	0	0	14	3
Penalty	11	0	6	0	9	0

Table 16 continued

Regulations	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Regulations in Bantay Dagat						
Apprehension of illegal fishing	58	59	44	64	51	61
Penalty for violation of fishery code	32	18	25	21	29	19
Responsibilities of fish warden	37	29	0	0	20	16

Notes: (1) Figures reported in this table are from multiple responses (2) *Other regulations in mangrove reforestation include the planting system and regulations on the prohibition of boats from entering the mangrove area.

The respondents were generally aware of three important regulatory measures related to MPAs: (1) area within the MPA where fishing is allowed, (2) limits to frequency of fishing within the MPA area, and (3) the people assigned to maintain the MPAs. Meanwhile, more female respondents (48%) than males (16%) were aware of community mobilization for coastal clean-up and the responsibilities of the community. However, it appears that only respondents from San Lorenzo (particularly the male respondents) were aware about the frequency of clean-up. Also, the few who were aware of the penalty for violation were males, as shown in Table 15. About half of the male respondents (51%) and more than half of the female respondents (61%) were aware that illegal fishers would be apprehended under CRMP. Note that more male respondents were aware about the penalty for violation of the illegal fishing and about the responsibilities of the fish warden. It appears, therefore, that details of implementation of regulations generally appealed to males.

Sources of information about CRMP

The local government office was the most commonly reported source of information about CRMP, implying that LGUs exerted effort to disseminate information about the program. Neighbors, friends, and POs were also mentioned as sources of information (Table 17).

Table 17. Sources of information about CRMP, by gender, by village, Masinloc, Zambales, 2011

Statements	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Friends	0	0	24	5	13	3
Neighbors	0	10	12	21	6	15
Peoples' organization	20	10	0	5	9	8
Local government	80	45	76	58	78	51
Others*	7	35	0	21	3	28

Note: *Other sources of information include Bantay Dagat, the Department of Environment and Natural Resources, father, husband, and relatives.

Respondents' participation in CRMP

The respondents' participation in training, program activities, and decision making/consultations was also assessed in this study. Trainings and seminars are part of the capability-building component of CRMP; they are important in preparing the beneficiaries to be active program partners. As shown in Table 18, the rate of attendance in training was higher in San Lorenzo than in Bani, although the Bani respondents' attendance still needs to be improved. Similarly, the respondents' actual involvement in the specific activities of CRMP was also low, although involvement in consultations and decision making regarding CRMP was high. This was particularly true for the women. Thus, it would appear that despite the low rates of actual participation in activities, the women made sure that their voices were heard, and that they contributed to CRM decisions by taking part in consultations.

Table 18. General overview of respondents' participation in CRM training, activities and decision making by gender, by village, Masinloc, Zambales, 2011

Activities	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Attended CRM trainings	59	44	38	22	48	33
Participated in CRM activities	68	36	64	36	66	36
Participated in CRM decisions	81	89	63	100	72	94

Note: Figures reported in this table are from multiple responses.

Respondents' participation in CRM activities

In general, the respondents reported some degree of participation in the five CRMP activities, particularly in mangrove reforestation and coastal clean-up. In mangrove reforestation, San Lorenzo respondents reported higher rates of participation than the Bani respondents did. In coastal clean-up, the female respondents from Bani reported the highest rate of participation among all groups. Overall, women were most active in mangrove reforestation. However, the women respondents were just as active as the men respondents as sea wardens (Bantay Dagat), which involves greater risk than the other CRM activities (Table 19).

Table 19. Participation in CRMP activities, by gender, by village, Masinloc, Zambales, 2011

Activities	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Mangrove reforestation	94	78	63	67	79	72
Marine protected area	18	33	19	11	18	22
Coastal clean-up	65	22	75	89	70	56
Bantay Dagat (sea patrol)	47	44	13	22	30	33
Environmental protection campaign	12	11	13	11	12	11

Note: Figures reported in this table are from multiple responses.

Respondents' self-rating of the extent of their CRM participation

On a scale of 1–10 (with 1 as the lowest and 10 the highest), the female respondents' self-rating scores of their participation in the different CRM activities ranged from 6–10, which was higher than the male respondents' self-rating scores of 5–9. Participation in activities related to MPAs and Bantay Dagat, respectively, were rated to be highest by the female respondents. Overall, female respondents rated their own participation in MPA management at the highest level of participation (Table 20). In environmental protection campaign, the community action was an avenue for socialization, and thus provided incentive for participation by the respondents.

Table 20. Average self-rating on participation in CRM activities, by gender, by village, Masinloc, Zambales, 2011

Activities	Level of Participation					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Marine protected area	9	10	8	9	8	10
Bantay Dagat	8	7	9	10	8	8
Mangrove reforestation	7	7	9	6	8	7
Coastal clean up	6	8	7	8	7	8
Environmental protection campaign	10	10	5	7	7	8

Note: Rating scale: 1 (lowest) – 10 (highest)

Decision making and consultation related to CRM activities

Both the male and female respondent groups widely participated in the decision-making and consultation processes related to CRM activities. This was consistent with the information given by the CRM officer who stated that despite the relatively lower participation of women, they had been heavily involved in consultations and decision making, especially with respect to consultation about mangrove reforestation (Table 21).

Table 21. Participation of respondents in consultations and decision making about CRM, by gender, by village, Masinloc, Zambales, 2011

Activities	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Consultation in fishing activities	85	75	100	67	91	71
Consultation in mangrove reforestation	100	100	90	78	96	88
Consultation in MPA	77	88	70	44	74	65
Consultation in coastal clean-up	85	63	80	100	83	82
Consultation in Bantay Dagat activities	85	100	80	78	83	88

Respondents' participation in trainings related to CRM

Overall, a total of 41 respondents attended CRM-related trainings (Table 22), 24 of which were men and 17 were women. Half of the female trainee-respondents attended the Bantay Dagat training, while male trainee-respondents preferred to attend other CRM trainings. In fact, all the female trainee-respondents in Bani attended the Bantay Dagat training. This may imply that these women are now potentially better equipped with knowledge and skills than the men are to be sea wardens. This may also imply an impending reversal in gender roles in this CRM activity. Despite the linkages with other institutions like University of the Philippines Marine Science Institute, University of the Philippines in Visayas, and NGOs, most of the trainings attended by the respondents were conducted by the LGU (Table 22).

Table 22 further shows that except for a few male trainee-respondents from Bani, the respondents generally agree over the usefulness of training. They perceived that these trainings provided them with both technical knowledge and hands-on experience that helped them carry out their activities related to CRM.

Table 22. Types of training attended, training organizers, and perceived usefulness of training, by gender, by village, Masinloc, Zambales, 2011

Items	San Lorenzo (n = 26)		Bani (n = 15)		Total (n = 41)	
	Male (n = 15)	Female (n = 11)	Male (n = 9)	Female (n = 6)	Male (n = 24)	Female (n = 17)
Type of Training Attended (No. of Respondents)						
Bantay Dagat	4	3	0	6	5	8
Other CRM-related activities*	9	5	9	0	18	6
Proper disposal of waste	2	3	0	0	1	3
Training Organizer/Implementer (No. of Respondents)						
Private sector	2	3	0	0	1	3
Local government	13	8	9	9	23	14
Usefulness of Training (% of Respondents)						
% of training attendees who perceived the training to be useful	100	100	83	100	94	100

*Note: *Other CRM-related activities trainings include trainings on protecting the corals, fishing methods and regulations, law enforcement, mangrove planting, laws on protecting the coastal area, rescue operation in coastal area, and multi-sectoral training on ecosystem.*

Time spent on participating in CRM activities

Involvement in CRM activities can be measured in terms of the time spent on doing the activities. Each male respondent spent an average of 145 hours per month on participating in all activities. This was higher than the average 114 hours per month (3.8 hours per day) spent by the female respondents on the same activities (Table 23). Coastal clean-up and MPA activities took up most of the respondents' time spent on CRM activities. On the other hand, environmental protection campaign only took 7 and 16 hours per month of the men and women respondents' time in CRM activities, respectively. The large amount of time spent for CRM activities implies that the program provides some forms of incentive that encourages community participation. In the case of Bantay Dagat, the people assigned would normally spend almost the whole night patrolling the sea, but they would take turns in doing the activity. Thus, despite the high participation of females in Bantay Dagat, the actual amount of time spent per month was very low.

Table 23. Time spent on CRM activities, by gender, by village, Masinloc, Zambales, 2011

Activities	Time Spent by Respondents on CRM Activities (Hours per Month)					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Mangrove reforestation	16	22	19	5	17	14
Marine protected area	52	24	64	60	56	34
Coastal clean-up	61	54	53	24	58	44
Bantay Dagat	9	4	6	6	8	5
Environmental protection campaign	10	7	4	24	7	16
Total	148	112	146	119	145	114

Value of time spent on CRM activities

In most cases, participating in CRM activities was unpaid. It was only in San Lorenzo where majority of the respondents received cash allowances for mangrove rehabilitation and reforestation activities and for serving as Bantay Dagat. Some of those who were not given cash were given snacks or t-shirts as tokens for participating. Still, others participated on a purely voluntary basis (Table 24).

Since time is an important resource, it has a corresponding value. Thus, it is useful to estimate the value of time spent on CRM activities. As shown in Table 25, estimates of the value of time spent on CRM activities were generally higher among the female than the male respondents, although the latter spent relatively more time on the activities. This may be because the opportunity cost of time of the females who participated in the CRM activities was higher than the males' due to the nature of their source of income, which was operation of business. The average value of time of women who joined CRM activities was PHP 3,277 per month, while the value of men's time was PHP 2,802 per month (Table 25). Comparing the two villages, the value of time of the female respondents from San Lorenzo was generally higher than that from Bani because of the higher opportunity cost of women's time from San Lorenzo.

Table 24. Incentives given for participating in CRM activities, by gender, by village, Masinloc, Zambales, 2011

Incentives	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Cash	81	78	6	11	44	44
Free snacks	33	50	40	38	39	40
T-shirts	0	0	7	13	6	10
No payment/other incentives	67	50	53	50	56	50

Table 25. Value of time in participating in CRM activities, by gender, by village, Masinloc, Zambales, 2011

Activities	Value of Time (PHP/month)					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Environmental protection campaign	148	764	210	450	179	1,214
Marine protected area	1,101	1,257	1,021	450	1,069	1,055
Bantay Dagat	756	443	400	725	685	537
Mangrove reforestation	850	600	548	105	734	371
Coastal clean-up	117	118	151	95	135	100
Total (PHP/month)	2,973	3,182	2,330	1,824	2,802	3,277

Perceived benefits from participating in CRM activities

In general, the women respondents appeared to be more positive about the benefits, particularly economic and environmental, reaped from participating in CRMP (Table 26). Along with other benefits, social capital formation through collective action within the community was valued particularly highly by the women. A potential cause for concern was the perception of 19% of the male respondents from Bani that “CRMP does not provide benefits.”

The economic benefits expected by the respondents included increased fish population and the consequent higher income. Improved environmental quality through reduction in water pollution and protection from natural calamities were believed to translate to environmental benefits. Again, some respondents did not see any benefit from participating in CRMP (Table 27).

Table 26. Expected benefits from participating in CRM activities, by gender, by village, Masinloc, Zambales, 2011

Expected Benefits	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Economic	88	78	25	44	56	61
Environmental	50	56	56	44	53	50
Social	0	11	0	11	0	11
Others*	0	0	12	22	6	11
None	0	0	19	0	9	0

Notes: (1) Figures reported in this table are from multiple responses; (2) *Other expected benefits include knowledge gain, sense of fulfillment by contributing to environmental protection, and forming linkage with experts in the field.

Table 27. Expected economic benefits from CRM by gender, by village, Masinloc, Zambales, 2011

Expected Economic Benefits	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)
Gives extra income	40	50	18	5	28	28
Increase in number of fish	40	30	35	47	38	38
None	13	15	12	32	13	23
Others*	7	5	35	16	22	10

Note: *Other benefits include clean environment, protection of fish habitats, safety of the people who live near the river, sustainability of food and protection of the environment, and the perception that the next generation would benefit from outcomes of the CRM activities.

Factors Affecting Participation in CRM Activities

This study conducted three separate regressions: (1) one for all respondents combined, in which gender was introduced as a variable; (2) one for female respondents, in which awareness of CRMP of the LGU was omitted due to limited data; and (3) one for male respondents. In the separate regressions run for the male and female data, the respondent's income was used (instead of household income) to capture the effect of men's and women's income contribution to CRM participation.

Factors affecting the decision to participate in CRM activities

The results of the logit regressions show that three variables significantly affected the decision of the respondents to participate in CRM activities: (1) gender, (2) awareness of the CRM program, and (3) membership in an organization. The value of the coefficient of the dummy for gender revealed that the probability of participation would decrease by 0.5637 if the respondent is female. Thus, females tend to not participate in CRM activities. The data earlier suggested that women are mostly burdened by reproductive roles. On the other hand, the signs of the coefficients of awareness in CRM activities and membership in an organization were both positive. This means that with these variables, the probability of participation increases. Specifically, if the respondent is aware of the CRM program, the probability of participation would increase by 0.7509. Moreover, membership in an association would increase the probability of participation in CRM activities by 0.60. Since awareness of the CRM program appeared to have a positive relationship with the probability of participation, program implementers should make sure that partner communities are fully informed about the program. In addition, formation of associations or groups would similarly benefit the program through wider participation (Table 28). The log likelihood was -33.3368 and significant at 1% level, which indicates the high power of the model in predicting participation in CRM activities.

Running the regression with data for the male respondents only, two variables have significant effect on the decision to participate in the CRM activities: (1) awareness of the CRM program and (2) membership in an organization or association. The positive signs of their coefficients indicate that the probability of participation would increase if the

Table 28. Factors affecting the decision to participate in CRM activities, by gender and all respondents, Masinloc, Zambales, 2011

Variable	Female			Male			All Respondents		
	Logit Coefficient	Marginal Effects		Logit Coefficient	Marginal Effects		Logit Coefficient	Marginal Effects	
Gender dummy	–	–		–	–		–0.25589***	–0.56371***	
Village dummy	1.7284230	0.3908078		1.5640490	0.2925403		0.48339	0.11995	
Age	–0.2669960	–0.0638765*		0.0620331	0.0117823		0.00118	0.00029	
Education	–0.0525100	–0.0125621		–0.0245846	–0.0046695		0.03830	0.00955	
Family size	–1.0342530**	–0.2474400*		0.0677685	0.0128717		–0.24950	–0.07344	
Household income	–	–		–	–		0.00004	0.00001	
Respondent's income	0.0004581*	0.0001100*		–0.002571	–0.0000488		–	–	
CRM awareness dummy	Omitted	Omitted		4.6679100***	0.8116500***		4.38423***	0.75094***	
Organization membership dummy	10.0377900**	0.9694900***		2.3458300**	0.4293310**		2.94716***	0.60521***	
Constant	10.3358100			–5.1833860			–2.40480		
Log likelihood	–11.473301	–13.450571		–33.3368000					
Pseudo-R ₂	0.573800	0.588300		0.5191000					

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, respectively.

male respondent is aware of CRM activities or if he is a member of an association.

On the other hand, there were more variables that significantly affect the decision of female respondents to participate in CRM activities. These variables included age, household size, respondent's income, and membership in an association. The negative sign of the coefficient of age implies that the probability of women's participation in CRM activities would decrease as they get older. In the same manner, an additional member of the household would mean a decrease in the probability of female's participation in CRM activities by 0.247. As shown in the socioeconomic characteristics of the respondents, the average age of female respondents was 38 years old, which implies that the female respondents were at their reproductive age; an additional child would therefore tie her to the reproductive roles of childcare and nurturance, diverting time away from CRM activities.

The respondents' income had a positive sign, which means that as the income of women increases, the probability that they would participate in CRM activities would increase by an amount equal to the value of the coefficient.

The above results showed that the factors affecting the decision to participate in CRM activities differed by gender and should therefore not be overlooked in designing programs that would affect men and women.

Factors affecting time spent on CRM Program activities

Separate tobit regression analyses for male, female, and overall respondents were conducted using the same set of variables in order to identify the factors affecting the time spent (hours per month) on CRM activities.

In the pooled data, five factors significantly affect the number of hours that the respondents devoted in CRM activities every month: village, gender, respondent's income, awareness of CRMP, and membership in an organization. Except for gender, all the variables positively affected the time spent on CRM activities (Table 29).

Table 29. Factors affecting time spent in CRM activities, Masinloc, Zambales, 2011

Variables	Female			Male			All Respondents		
	Tobit Coefficients	Marginal Effects	Tobit Coefficients	Tobit Coefficients	Marginal Effects	Tobit Coefficients	Tobit Coefficients	Marginal Effects	
Gender dummy	-	-	-	-	-	-40.32010***	-40.32010***	-14.80560***	
Village dummy	18.28920	4.1342130	34.13961		0.024340	22.28500*		8.12954*	
Age	-1.02210	-0.2294702	0.67862		0.000492	-0.33187		-0.12071	
Education	-0.26995	-0.0606057	-1.75456		-0.001270	-1.72814		-0.62856	
HH size	-10.71010**	-2.4045000**	1.73486		0.001257	-5.32999		-1.93861	
HH income	-	-	-		-	0.00247***		0.00090***	
Respondent's income	0.00376*	0.000843*	-0.00012		-0.000008	-		-	
CRM awareness dummy	Omitted	Omitted	97.66220***		0.061410***	88.12525***		23.09717***	
Organization membership dummy	111.85490***	51.937400***	51.63060***		0.036080***	62.46420***		26.91287***	
Constant	15.63440		-126.08200*			-62.06218			
Sigma	45.13930		55.03773			49.85445			
Log likelihood	-102.10510		-179.35030			-281.31700			
Pseudo-R ²	0.14340		0.08370			0.116800			
Marginal effects after tobit									
Y = E (totaltime* totaltime>0)	5.84880		0.05132			12.39690			
(predict, y-star(0,..))									

Note: *, **, *** mean significant at 10%, 5%, and 1% levels, respectively.

The estimate of the coefficient of the dummy for gender showed that female respondents tended to spend 14.80 hours less than the time male respondents spent on CRM activities in a month. On the other hand, there were also significant differences between the behavior of respondents from San Lorenzo and Bani. Respondents from San Lorenzo spent 8.13 hours more time in CRM activities per month than did respondents from Bani. This may be explained by the fact that majority of the CRM projects in San Lorenzo (e.g., MPA, taclobo farm, mangrove rehabilitation, and reforestation) were located close to the village. Moreover, there were several members of the Bantay Dagat from this village. Awareness of CRM activities and membership in an association increased the time spent on CRM activities by 23 hours per month and 26.9 hours per month, respectively.

In the regression of the female respondents, household size, respondent's income, and membership in organizations significantly affected the time spent by the female respondents on CRM activities. An increase in household size would decrease the time spent on CRM activities because reproductive roles generally take priority for women. Conversely, an increase in women's income and membership in organizations would have a positive impact on time spent by women on CRM activities. Thus, improved finances and social capital empowers women in coastal resource management.

In men, membership in organizations and awareness of CRMP were the factors that significantly and positively affected the time males spent on CRM activities, as shown further in Table 28. Thus, men need to be targeted by IEC- and community-organizing efforts.

Note that membership in organizations had a significant effect in all regression models. However, women respondents who were members of organizations tended to spend much more time on CRM activities than their male counterparts. As indicated by the value of the marginal effects, membership in an organization would increase the time spent by women on CRM activities by 52 hours per month; in men, organizational membership would lead to an additional 0.036 hours per month only. Nevertheless, this result indicates that membership in an organization can potentially impact time investment by community members in CRM activities. This should be considered in planning CRM activities.

Factors affecting the value of participation in CRM activities

The value of time spent on CRM activities was the combination of any participation incentives given to respondents and the opportunity cost of the respondents' time. The results of the tobit analyses—which identified the factors affecting the value of time spent by female, male, and all respondents in CRM—are summarized in Table 30.

The analysis of the pooled data showed that gender, household size, household income, awareness about CRM activities, and membership in an association significantly affected the value of time spent on CRM activities. The value of time spent on CRM activities would significantly decrease by PHP 1,370.29 per month if the respondent is female. Moreover, an additional household member would decrease the value of time spent on CRM activities by PHP 284.84 per month because an additional family member means more time required at home. It was earlier noted that women's opportunity cost of time was higher than that of males, making time diverted away from CRM costly. On the other hand, if annual household income would increase by PHP 1,000, then the value of time spent on CRM activities would increase by PHP 0.082 per month. Correspondingly, awareness of CRM activities and membership in an association would increase the values of time for CRM activities by PHP 2,911 and PHP 1,840 per month, respectively.

In the gender-disaggregated data, village, household size, respondent's income, and membership in organizations each had a significant effect on the value of time of the women respondents. If the female respondent would be from San Lorenzo, then the value of time would be higher by PHP 142.60 per month, likely because women in San Lorenzo have higher opportunity cost of time than those in Bani. On the other hand, an additional member of the household would decrease the value of time spent on CRM activities of women by PHP 42.89 per month. This may be because the increased reproductive demands at home would directly reduce the time devoted by women on CRM activities. An increase in respondents' income, however, tended to increase the value of time spent on CRM activities, as this would clearly translate to higher opportunity cost of time. The value of time spent on CRM activities would also therefore be higher for female members of organizations who had a higher value of opportunity cost.

Table 30. Factors affecting the value of time spent on CRM activities by gender and all respondents, Masinloc, Zambales, 2011

Variable	Female		Male		All Respondents	
	Tobit Coefficients	Marginal Effects	Tobit Coefficients	Marginal Effects	Tobit Coefficients	Marginal Effects
Gender dummy	–	–	–	–	–1,370.287000***	–432.858000***
Village dummy	661.26460*	142.6031*	717.3477	0.014300	575.314100	179.548100
Age	–29.02690	–6.1245	20.9774	0.000420	–9.953846	–3.098186
Education	–16.94254	–3.5748	63.3936	0.001300	46.310440	14.414360
HH Size	–203.28750*	–42.8929*	–42.0552	–0.000800	–240.843100*	–74.963670*
HHIncome	–	–	–	–	0.081788***	0.025457***
Respondent's income	0.10460**	0.0221*	0.2128**	0.000043**	–	–
CRM awareness dummy	Omitted	Omitted	2975.6560*	0.052810***	2,711.339000***	615.528000***
Organization membership dummy	2,497.81500***	1,159.3280***	1,413.9450**	0.027850**	1839.715000***	678.718900***
Constant	344.82710		–5,594.1640		–2,574.288000	
Sigma	946.15000		1,974.3140		1,694.870000	
Log likelihood	–156.78880		–294.2028		–475.853700	
Pseudo-R ²	0.10300		0.0493		0.076900	
Marginal effects after tobit: Y = E(value of time* value of time>0, (predict, y-star(0.,))	113.14010		0.0462		534.619900	

Note: *, **, *** mean significant at 10%, 5%, and 1% levels, respectively.

In the data of male respondents only, the tobit analysis showed that respondent's income, awareness of CRMP, and membership in organizations significantly affected the value of their time spent on CRM activities. An increase in a male respondent's income would lead to an increase in the value of time spent on CRM activities by PHP 0.000043 a month. Similarly, awareness of CRM would also increase the value of time spent on CRM activities by PHP 0.052 a month, while males who were members of organizations would be expected to have higher value of time spent on CRM.

Problems or constraints in participating in CRM activities

Although majority of the respondents declared no constraints in participating in CRM activities, 22% of the respondents from San Lorenzo feared for their lives and the lives of their husbands who served as sea wardens or Bantay Dagat. They risked retaliation from violators of regulations they had apprehended (Table 31). The lack of unity among the community members was another problem expressed by a few of the respondents. They lamented that those who did not participate were the ones who always complained about environmental problems. Other constraints to their participation in CRM activities included the low budget allocated for the activities, nonpayment of honoraria/allowances, and low penalty for violators.

Table 31. Problems/constraints to participating in CRM activities, by gender, by village, Masinloc, Zambales, 2011

Problems/Constraints	Percentage (%) of Respondents					
	San Lorenzo (n = 50)		Bani (n = 50)		Total (n = 100)	
	Male (n = 25)	Female (n = 25)	Male (n = 25)	Female (n = 25)	Male (n = 50)	Female (n = 50)
Life of assigned Bantay Dagat are at risk	0	22	0	0	0	12
No unity in the community	6	0	13	11	9	6
None	81	67	63	78	72	72
Others*	13	11	25	11	19	11

Note: The other constraints include low budget, low life expectancy of mangroves, and low penalty for the violators.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR ENGENDERING CRM RESEARCH ACTIVITIES

Coastal resource management (CRM) is widely recognized as a service of the local government to manage marine and coastal environments and to prevent further environmental degradation. In Masinloc, a CRMP was started in 1998, and was then institutionalized on 4 June, 2008 through Municipal Ordinance No. 9208 known as the Coastal Resource Management Code of the Municipality of Masinloc. In 2011, the newly formed MENRO became the CRMP implementing arm of the LGU.

This case study generally aimed to assess the contributions of men and women to CRM activities through a survey of 100 men and women in two coastal villages (San Lorenzo and Bani) in Masinloc, Zambales. Specifically, this study attempted to (1) characterize the roles of men and women with regard to their productive and reproductive roles; (2) assess the level of awareness, knowledge, and participation of men and women in CRM activities; (3) estimate and assess the time spent and the value of time spent by men and women on participating in CRM activities; (4) identify the factors affecting participation and the value of time spent by men and women on CRM activities; and (5) recommend ways to incorporate a gender perspective into CRM research.

Gender-disaggregated data were gathered from 100 male and female heads (50 males and 50 females) from 50 households in San Lorenzo and Bani. FGDs and KIIs were conducted with CRMP officers, POs, and partner institutions/agencies in order to understand CRMP, to design the survey, and to supplement the household survey data.

In the descriptive and qualitative statistical analyses, using gender as a variable can reveal gender-related trends. Separating the male and female household heads during the interview allowed in-depth assessment of gender relations. Moreover, disaggregating data by gender and including gender as a variable in logit and tobit regression analyses of decision making, participation, and value of time spent on CRM activities allowed statistical assessment of the effect of gender, along with other factors. The differences between men's and women's perceptions and knowledge

related to CRM activities were revealed, as well as the reproductive and productive roles performed by men and women in CRM activities.

The gendered framework of the study led to important insights into the differences between males and females in their perceptions, knowledge, and participation in CRM activities, as well as in the outcomes they obtained. Thus, development activities would have differential outcomes and impacts on men and women—and ultimately, on households—if gender perspectives are taken into account. This study can provide inputs in framing gender-responsive CRM programs.

From the results of this case analysis, the following conclusions can be forwarded:

1. Men were the main bread winners, while the unvalued reproductive roles were mainly in the women's domain. Fishing was the primary occupation of men, while women were either plain housewives or operators of small retail stores. Thus, decisions related to fishing were made by males, although the women contributed to decisions on the sale of products. In the domestic arena, major investment decisions on house repair mainly rested on the male head. Couples usually made joint decisions on child discipline and availing of credit.
2. Most of the respondents were aware of the CRMP of the local government, although more women than men were aware of the CRMP activities. Yet, knowledge about specific component activities and regulations appeared to be limited. Popular knowledge about CRMP regulations included appropriate mesh size for fishing, illegal fishing methods, and apprehension and punishment of violators.
3. The rate of participation in consultations and decision making in CRM was high, especially among women. However, actual participation in CRM training and activities was generally low. Bantay Dagat training was popular among women, while men preferred other CRM trainings. Among CRM activities, participation rates of men and women were highest in mangrove reforestation, while more women than men participated in coastal clean-up.

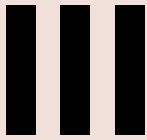
4. Overall, male respondents spent more time on CRM activities than did women. The most time spent by all respondents was in coastal clean-up and MPAs.
5. Gender, awareness of CRM program, and membership in an organization significantly affected the decision to participate in CRM. Females tended to favor their reproductive roles in the household over CRM activities, but awareness of CRM activities and membership in an organization increased their probability of participation. A male from the study sites would tend to decide in favor of CRM participation if he was aware of CRMP or if he was a member of an organization. A female from the area would favor CRM participation if she was younger than average, belonged to a smaller household, had higher income, or was a member of an organization.
6. Gender, village, awareness of CRM program, membership in an organization, and respondents' income significantly affected the amount of time spent by the respondents on CRM activities. Female respondents would spend less time on CRM activities than males would, while respondents from San Lorenzo would spend more time on CRMP than those from Bani. Awareness of CRM activities, membership in an association, and an increase in household income were associated with an increase in the time spent by respondents on CRM activities. Men who were members of organizations or were aware of CRMP would spend more time on CRM activities. Women, on the other hand, would spend more time on CRMP if they belonged to smaller households, earned more, or were members of organizations.
7. Gender, household size, household income, awareness of CRM activities, and membership in an association significantly affected the value of time spent on CRMP. The value of time spent on CRM activities tended to increase in males. Bigger households, increase in household income, awareness of CRM, and membership in an association also increased the value of time spent on CRM. In males, increase in own income, awareness of CRM, and membership in organizations would increase the value of their time spent on CRMP. In females, those from San Lorenzo had higher value of time due to their high opportunity

cost, as CRM activities competed with their small business operations. Smaller households, higher income, and membership in organizations increased the value of time that women spent for CRM activities.

8. The decisions of both men and women to participate in these activities were reflective of the resources available to them. The choices of men, for example, were influenced by their perceptions as the head of the family, whose main responsibility was household provisioning. On the other hand, the women's choices were naturally connected to their predominant role in reproduction. However, the results must be taken with caution since the research was done as a case study. It is thus recommended that similar case studies be done on a wider scale and consider other issues related to coastal resources such as poverty, health and nutrition, and governance. Nevertheless, the results can provide a starting point for further analysis of the gender dimension in CRM research.

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Adaptive Capacity and Adaptation Actions of Households for a Typhoon Event in Bula, Camarines Sur, Philippines

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Community-driven typhoon recovery project of small farmers

EXECUTIVE SUMMARY

Climate change poses serious challenges to institutions and households in the Philippines. Thus, it is important to determine its impacts on households and to identify the corresponding, gender-sensitive adaptation measures that the government and communities can do to enhance the resilience and adaptive capacity of the affected sectors.

This research was done in Bula, Camarines Sur. Gender-disaggregated data collected through interviews and focus group discussions with husbands and wives were used to determine (1) the impacts of Typhoon Nock-Ten, (2) the households' response strategies, and (3) the willingness of men and women to pay for different adaptation options. The data on government response actions were gathered through key informant interviews with the local government staff involved in relief and rescue operations. The researchers used a gender lens in the analysis in order to discern the difference between the husbands' and wives' household decision-making patterns, activities undertaken during the typhoon event, preparedness and adaptive capacities, and their preferences among the three different adaptation options that could help them prepare for future hazards. The researchers also analyzed the assistance available to households from various sources in order to determine the sensitivity of these support mechanisms in addressing the different needs of men, women, and children.

The results of the study showed the gender-differentiated roles of husbands and wives in responding to the flooding associated with an extreme climatic event. Husbands generally took care of preparedness activities that require physical strength, such as reinforcing the house and taking care of belongings and property left behind when the family takes shelter in evacuation centers. Wives, on the other hand, were in charge of preparing the things needed by the family while at the evacuation center, such as food and clothing. The Household Adaptive Capacity Index, which was computed in this study using the indicators of the Sustainable Livelihood Framework, revealed that the husbands and wives had moderate adaptive capacities to survive the impacts of typhoon events. They had the skills, infrastructure, and social network

they could rely on during disasters; however, they would find it difficult to cope financially in the absence of livelihood opportunities.

More husbands than wives were willing to buy disaster insurance, invest in construction of riprap along the river banks, and support relocation to safer places. Socioeconomic factors (e.g., familiarity with the present place of residence, presence of relatives, and employment opportunities) were the primary factors that constrained the husbands' decision to relocate. The impact of typhoon events was found to be greater on husbands than on wives largely because more husbands were gainfully employed while only a few of the wives interviewed earned wages.

Gender analysis is important to account for the gender-differentiated roles, needs, contributions, and impacts of extreme climate events on men and women. A mixed method of research is also recommended to ensure that both the qualitative aspects of gender relations and the quantitative valuation of men's and women's roles, contributions, and impacts are addressed.

INTRODUCTION

Rationale

Climate change is a reality recognized as the greatest challenge of societies in the 21st century (Vincent 2007). Tropical cyclones are one of the most destructive forms of natural hazards affecting many countries around the globe and causing tremendous annual losses in lives and property (PAGASA 2009). Studies have predicted that if global warming continues unabated, it will cause more frequent and more intense tropical storms, floods, and tornadoes in the coming century (PAGASA 2009).

The Philippines, located on the west of the Pacific Ocean, frequently experiences tropical cyclones. Every year, an average of 20 typhoons hit the country, resulting in heavy casualties and massive destruction to crops and properties (Alegado 2011). From January 2011 to September 2011, a total of 17 typhoons entered the Philippine Area of Responsibility. More than half of these typhoons affected the Bicol Region, the most destructive of which was Typhoon Juaning (international name: Tropical Storm Nock-Ten), which hit the area in July 2011. In Camarines Sur alone, the Provincial Disaster Risk Reduction Management Council (PDRPMC) estimated the total damage to agricultural crops (eg., rice, corn, vegetables, and other root crops) to be PHP 242 million, which affected 26,488 farmers and 37,770.57 hectares (ha) of farmland (Macatangay 2011). The damages continued to rise because even weeks after Typhoon Juaning, several towns had remained flooded, including most of the *palay* (paddy rice) and agricultural crops.

The hazards associated with tropical cyclones impact all societies; however, it is important to recognize that they have varying effects on ethnic groups, social classes, age groups, and gender (Carvajal-Escobar et al. 2008). Although both the United Nations Framework Convention on Climate Change and the Kyoto Protocol recognize the importance of gender-related differences in dealing with climate change, both entities have not directly addressed the issue (Pandey 2005). Women are also distinctly affected by typhoons, but the structures and the patriarchal ideology on which development interventions are based on have made

women invisible in most climate change adaptation (CCA) projects (Lambrou and Piana 2006).

Most studies have limited treatment of gender and rarely use gender analysis. Gender is usually treated only as a variable for classifying the sex of the survey respondents. Analyzing gender relations with respect to the research problem is seldom undertaken. Accordingly, stakeholders need to have clear understanding of the nature and extent of the impacts of typhoons and flooding on men and women, as well as their differing roles in disaster risk reduction and management (DRRM) and adaptation, in order to formulate appropriate policies and actions.

This study attempted to integrate gender analysis into the estimation of climate change impacts and analysis of choices of adaptation actions. It called for gender-disaggregated documentation and analysis of the impacts of typhoons on household livelihoods and the adaptation actions taken by household members before, during, and after the event.

Research Objectives

This study generally aimed to determine the adaptive capacity and the corresponding adaptation actions of the households in Bula, Camarines Sur to extreme events and to recommend gender-sensitive measures that would enhance people's resilience and thereby mitigate the impacts of climatic events on people's livelihood. Specifically, the objectives were as follows:

1. To conduct a gender-disaggregated analysis of the impacts and adaptation actions undertaken by the households in response to Typhoon Juaning,
2. To compare the factors that affect the vulnerability and adaptive capacity of men and women,
3. To identify adaptation strategies in order to mitigate the impacts of climate change on the livelihood activities of the households,
4. To determine the households' preferences on adaptation strategies and the factors that influence such behavior, and
5. To recommend gender-sensitive measures to mitigate climate change impacts and improve households' resilience.

RESEARCH METHODS

Study Site Selection

The study team visited three possible CCA study sites in Camarines Sur during the preliminary data gathering. The team visited the municipalities of Nabua, Baao, and Bula, which were most damaged by Typhoon Juaning and the resulting flood. Disaster Risk Reduction Management Council (DRRMC) officers were interviewed about the latest climate-induced event, their DRRM plans, and problems faced with regard to DRRM in their respective municipalities. The research team also gathered reports, municipal profiles, and other supporting data about the latest climate-induced event and their rescue and relief operations.

The team decided to focus on Bula, Camarines Sur as the case study site. Of the three municipalities visited, Bula was the only one without any DRRM plans regarding communication and information dissemination protocols and vulnerability assessments in the event of a calamity. Bula lacked DRRM information and training, resulting in ineffective disaster management during the July 2011 typhoon event. At the time of the interview, the DRRM office had only just been formed and was about to start its training. In addition, Bula sustained damages to the agriculture sector amounting to PHP 143 million, exclusive of the damages to infrastructure and properties.

Bula is a second-class municipality located between the two cities of Iriga and Naga, with a land area of approximately 19,041 hectares (ha). Of its total land area, 62.10% has been devoted to crop production, of which 5,398 ha have been planted to rice. Other crops included corn, coconut, banana, sugarcane, sweet potato, mongo, taro, and other root crops. Most of the men were farmers and fishermen while most women were weavers of *guinaras* (fiber from abaca stalk) and *sinamay* (fiber from pineapple leaves).

The municipality of Bula is composed of 33 villages with a total population of 62,024 in 2007 (NSO 2009). Seven villages (i.e., Pawili, Sto. Domingo, Fabrica, Causip, San Jose, Sagrada, and Salvacion) are located along the

Pawili River, while four (San Roque, Ombao Polpog, Sto. Niño, and San Ramon) are located along the Bicol River. Two villages (Itangon and Caorasan) are along the Ragay Gulf, while the remaining six (Balaogan, Casugad, Fabrica, Palsong, San Jose, and Sta. Elena) is located next to Lake Baao.

The villages' proximity to these water bodies is important to the livelihoods of the local people; however, this has led to frequent flooding during the rainy season, thereby hindering the socioeconomic development of the municipality. In the aftermath of Typhoon Juaning, 18 out of Bula's 33 villages were submerged while nine were extremely affected. The flood, which rose up to 90 centimeters (cm), came 24 hours after the typhoon. Although it was not raining in Bula, the continuous rains from the nearby province of Albay drained toward the Bicol River Basin, of which Bula is included.

The villages of San Jose and San Miguel in Bula were purposively selected based on the heavy damages incurred by these villages during the onslaught of Typhoon Juaning. In 2010, San Jose and San Miguel had a population of 2,507 and 2,921, respectively.

Data Gathering Methods

The study utilized both secondary and primary data. The profiles of the municipality of Bula and the selected villages of San Jose and San Miguel, as well as information about their municipal DRRMC plans and programs, were obtained from secondary sources. The study team collected primary data through key informant interviews (KII), focus group discussions (FGD), and a household survey. The *barangay* captain (village head) of each *barangay* (village) served as the key informants for the study. In addition, separate FGDs for men and women were conducted in each village. Male and female village officials and residents attended the FGDs in order to elicit additional information about their experiences during Typhoon Juaning.

The data obtained from the KIIs and FGDs (conducted separately for men and women) enabled the researchers to generate gender-disaggregated

data regarding the respondents' specific concerns and recommendations to mitigate climate change impacts. The household survey generated data on household characteristics, impacts of the typhoons and the corresponding adaptation actions taken by household members, the factors affecting the vulnerability of men and women, willingness to pay for the adaptation strategies, and measures to mitigate climate change impacts. Twenty-five households in each village were interviewed leading to a total of 50 households surveyed.

The survey questionnaire was based on the design of the Economy and Environment Program for Southeast Asia (Peñalba and Elazegui 2011), with items added to solicit information needed for gender analysis. Like the FGDs, husbands and wives were interviewed separately to answer questions pertaining to the impact of the typhoon and their corresponding adaptation strategies, willingness to pay, and the factors influencing such behavior. A total of 50 husbands and 50 wives were interviewed, with a total of 100 individual respondents.

Data Analysis

The proposed engendered Environment and Natural Resource Economics (ENRE) Research Framework was used to analyze the data collected. Descriptive statistics was use to analyze household characteristics, impact of typhoon, and adaptation strategies. Inferential statistics was used to determine the factors affecting residents' preference in terms of adaptation strategies.

To determine the exact value of Typhoon Juaning's impacts on the residents of San Jose and San Miguel, the researchers estimated the following: (1) total monetary loss and reduction in the quality of life due to climate-related disaster impacts in the area; (2) the duration of flood and associated costs of damage to properties, agriculture, infrastructure, livelihood or employment; and (3) adverse impacts on health and safety. The impacts on children who were not able to attend school or on household members who fell ill due to the typhoon and flooding were also analyzed. These figures represent the numeraires that valuate climate change impacts (Schneider et al. 2000).

The numeraires are expressed in terms of the value of damage to crops, properties, losses in income, and cost of illness. Data on the losses to local government units (LGU), damage to infrastructure, and cost of relief, rescue, and rehabilitation were taken from LGU reports on the impacts of Typhoon Juaning.

The authors applied the gender lens in interpreting the results. Such analysis was achieved by looking at the different themes of the proposed framework from gender as a unit of variable, as a unit of analysis, and as a framework of action. These themes included (1) beliefs and perceptions of the respondents, (2) temporal and spatial allocation of activities, (3) access and control over resources during typhoons, and (4) participation in identifying and undertaking adaptation strategies.

The results of the survey were processed to determine if there were differences between the men's and women's perceptions of the impact of typhoons, and to recommend measures to mitigate climate change impacts and to improve household resilience. The study aimed to answer this question: *Is the impact greater for women because they are in charge of meeting the household reproductive needs (e.g., what food to eat, where and how to cook) during calamities?*

Temporal and spatial allocation in this study refers to activities performed by men and women before, during, and immediately after the occurrence of a typhoon. It is very important to distinguish which activities are done by men and that by women so that appropriate adaptation strategies, hinged on the contributions of men and women, can be developed. Hence, the study also intended to answer the following questions:

1. Who has the final say in the performance of these activities?
2. Who has the access to resources and who makes the final decision in using them?
3. Can a wife independently decide on payments for, or acceptance of, adaptation strategies to be identified, or does she have to first consult her husband? Or is it a joint decision?

The researchers also assessed the gender sensitivity of the recommended adaptation strategies and adaptive capacity enhancement programs by answering these questions: *Are men's and women's concerns and experiences mainstreamed in adaptation strategies? Are the particular concerns of men and women addressed in the adaptation strategies?*

RESULTS AND DISCUSSION

Respondent Profile

Socioeconomic profile

The respondents' socioeconomic characteristics mirrored their vulnerability to climate change. They were poor, middle-aged, had limited sources of income and social networks, had low level of education, and minimal valuable assets.

The husbands interviewed were between 23 and 85 years old, with an average of 48 years; the wives were between 18 and 83 years old, with an average age of 46 years (Table 1). Most of the wives (74%) had been residing in the village for about 38 years while the same proportion of husbands had lived there for at least 35 years.

Data on household composition implies longer life expectancy for females than for males. This was evidenced by the slightly higher average number of males aged 15 years old and below compared to the number of women of the same age group. Conversely, the average number of females aged 60 years old and over was slightly higher than males.

The proportion of husbands (42%) who had elementary education was higher than that of the wives (26%). An equal proportion of husbands and wives reached, although not completed, high school (18%). More wives (22%) than husbands (16%) did not complete primary education, although 6% of the wives completed their college education while none of the husbands did.

Table 1. Profile of respondents, Bula, Camarines Sur, 2011

Indicator	Husband	Wife
Average age	47.54	45.70
Average no. of years living in the area	35.60	38.42
Average no. of years in school	7.74	7.78
Membership in organizations	18%	44%
Involved in DRRM activities of their organization	10%	30%
Average household size	6	
Average household composition		
Male members	3.10	
Female members	2.94	
Male working members	1.28	
Female working members	0.58	
Male below 15 years old	1.38	
Female below 15 years old	1.14	
Male 60 years old and older	0.14	
Female 60 years old and older	0.18	
Average household income (2010)	PHP 60,894.00	
Average house value	PHP 64,947.40	
Access to electricity	76%	
Access to drinking water	Piped water 50%, Well 48%	

On the average, the households interviewed were composed of three male members and three female members, with family sizes ranging from 2 to 13 members per household. The number of household members who were working and contributing to household income ranged from one to three, although on average, one male and one female member of the household were working. The household dependency ratio was quite high, where approximately 33% of the household members were below 15 years old while about 39% of the household members were more than 65 years old.

The respondents' annual household income was derived from different sources. Farm income was derived from crop production, livestock-raising, and fishing. In 2010, respondents' household income averaged at PHP 60,894, which is only half of the poverty income threshold of PHP 101,982 per annum for a family of six. The income range was very wide, from PHP 4,000 to PHP 288,000, although majority (44%) fell within the PHP 10,000–49,999 annual income bracket.

The average value of the respondents' house was PHP 64,947; the range also varying widely, from PHP 4,000 to PHP 500,000. Majority (58%) had houses valued at PHP 50,000–150,000, while 42% had houses built from light materials. About 76% of the respondents had electricity. Half of the households had piped water connection, while the other half drew their domestic water supply from tube wells and hand pumps.

As shown in Table 2, more than half (54%) of the wives were not working for wages or payment in kind. About 16% of the wives were engaged in farming (rice farming and livestock-raising), while 16% were self-employed, being vendors or owners of *sari-sari* (variety goods) store. Other income-generating activities that the wives engaged in included being a government employee, hired laborer, skilled laborer, hired farm worker, and laundry-woman. Only 6% of the wives had a secondary occupation as a hired laborer or laundrywoman.

Many of the husbands were farmers (34%), while 22% provided hired labor. Some were also fishermen (14%) or tricycle drivers (14%). Other occupations by the husbands included skilled labor, hired farm work, government employment, or membership in the Citizen Armed Force Geographical Unit. Others were either primarily security guards or store owners. Some of the husbands also took on secondary jobs—8% as skilled laborers, 6% as hired laborers, and a further 6% as fishermen. Three of the husbands interviewed, however, had no primary occupation (Table 2).

Table 2. Distribution of respondents by primary and secondary occupation, Bula, Camarines Sur, 2011

Occupation	Husband				Wife			
	Primary		Primary		Secondary		Secondary	
	No.	%	No.	%	No.	%	No.	%
Farmer	17	34	2	4	8	16	0	0
Hired Farm Worker/ Laborer	11	22	3	6	3	6	2	4
Skilled Labor	3	6	4	8	1	2	0	0
Self Employed	0	0	1	2	8	16	0	0
Fisherman	7	14	3	6	0	0	0	0
Driver (PUV)	7	14	0	0	0	0	0	0
Others	2	4	1	2	3	6	1	2
None	3	6	36	72	27	54	47	94
Total	50	100	50	100	50	100	50	100

Gender division of household labor

A clear distinction was evident in the types of household activities performed by husbands and wives. In general, the husbands were in charge of outdoor activities that require physical strength, while wives took care of household chores and nurturance activities, which are considered to be less strenuous but repetitive. Most of the husbands interviewed mainly performed house repair and backyard maintenance (64%) and farming (44%), while most of the wives were solely in charge of marketing (82%), cleaning house (58%), and washing and ironing clothes (48%) (Table 3). Activities jointly performed by husbands and wives included food preparation and childcare (both at 34%), budgeting (36%), and education of children (60%).

Table 3. Distribution of respondents who mainly perform household activities, Bula, Camarines Sur, 2011

Activities	Husband		Wife		Husband and Wife	
	Number	Percent	Number	Percent	Number	Percent
Home maintenance	32	64	–	–	–	–
Farming	22	44	–	–	–	–
Food preparation	–	–	33	66	17	34
Marketing	–	–	41	82	–	–
Childcare	–	–	30	60	17	34
Child discipline	–	–	–	–	35	70
Home care	–	–	29	58	–	–
Budgeting	–	–	24	48	18	36
Laundry	–	–	24	48	–	–
Education	–	–	–	–	30	60

Note: Multiple response table. Percentages were computed based on number of husband and wife respondents ($n = 50$ each) and number of household respondents ($n = 50$).

Assistance needed and potential providers

The respondents identified several kinds of assistance that they felt they needed in order to cope with the effects of extreme climate events (Table 4). Majority (78%) indicated that they would need financial assistance because most of them had no savings to draw from in case of emergencies. More than one-third (38%) expressed their need for relief goods and emergency supplies, and about 3% identified the need for medical assistance.

On the other hand, 16% expressed the need for rescue assistance, which implies that a considerable proportion of the respondents would not be able to independently flee the disaster zone and would require rescue.

Majority (70%) of respondents identified government agencies as the primary source of assistance particularly for relief (34%) and medical (18%) assistance. Other social networks (e.g., friends and relatives) and church organizations were also identified as possible sources of financial and medical assistance. On the other hand, 60% identified their relatives as their source of different types of assistance, particularly financial (42%).

Table 4. Household respondents' sources of outside help, Bula, Camarines Sur, 2011

Type of Assistance	Source of Assistance						Total Counts	%
	Gov't Agency	LGU	Relatives	Friends	Neighbor	Others		
Financial	4	2	21	5	4	3	39	78
Relief	17	0	1	0	0	1	19	38
Rescue	4	0	3	1	0	0	8	16
Medical	9	1	3	1	0	1	15	3
Basic necessities	1	1	2	0	0	1	5	1
Total counts	35	4	30	7	4	6		
%	70	8	60	14	8	12		

Note: Multiple response table. Percentages were computed based on the number of household respondents (n = 50).

Gender-Disaggregated Analysis of the Impacts of Typhoon Juaning

Typhoon Juaning, which brought strong winds and heavy rains, affected the respondents differently. Although the typhoon itself stayed for only a few hours, its strong winds destroyed or blew the roofs off of several houses. The heavy rains affected several provinces in the region and caused flooding, which further aggravated the damages to crops, livestock, and properties already caused by the typhoon. According to the respondents, even without a typhoon, two consecutive days of rain is all it takes to cause flooding in their village.

A day after Typhoon Juaning, the Pawili River overflowed. This caused San Jose to be flooded for up to 18 days, forcing many to evacuate. About 64% of the respondents sought shelter in evacuation centers or relatives' houses. In some portions of San Miguel, the flood lasted for as long as 30 days. It mostly affected the rice lands along a river channel, and this prevented the farmers from salvaging their crops that were about to be harvested.

Damage to properties, crops, and livestock was severe for almost half of the households included in the study (Table 5). The other half experienced only slight damage or loss. Only 2 out of the 50 households included

in the interview did not experience damage to and loss of property and production.

The heaviest losses were in terms of agricultural production, particularly for rice. On average, crop production losses amounted to PHP 56,311 per farm because the typhoon arrived only days before rice crops were due for harvesting (Table 6). The few farmers who were able to harvest their rice before the typhoon lost their harvest to the flood; it was either carried away by the flood or it rotted after being soaked in floodwater. Farmers incurred additional damages when they had attempted to plant rice again after Typhoon Juaning as these were also destroyed by the succeeding typhoons. These agricultural losses not only caused loss of productive activities but also posed difficulties to the women who had to budget the meager income of the family. In addition, wives, who were often asked by their husbands to get credit, had to worry about the creditors.

Table 5. Extent of damage/loss to households caused by Typhoon Juaning, Bula, Camarines Sur, 2011

Extent of Damage	Number of Households	Percentage of Households (%)
Severe damage/loss	23	46
Slight damage/loss	25	50
No damage/loss at all	2	4
Total	50	100

Table 6. Average value per farm of damage to agricultural production, Bula, Camarines Sur, 2011

Segment of Agricultural Production	Average Value (PHP)		Percentage of Households Incurring this Damage (%)
	Damage	Repair	
Crops	56,311	2,700	34
Livestock and poultry	36,667	1,000	12
Aquaculture and fishing	13,000	–	4
Others (irrigation)	3,000	–	12

Damages to houses and other properties were also quite significant, averaging about PHP 15,698 per household (Table 7). About 86% of the household respondents lived in single-storey houses, which easily submerged in floodwater that rose to as high as 5 meters (m). Of the 50 household respondents, 37 households (74%) reported that their house had been damaged by Typhoon Juaning. Of this 37, 8 households reported that their house had been totally demolished. The value of damage, which ranged from PHP 50,000 to PHP 150,000, was not surprising considering that majority of the respondents' houses were made of light materials.

There were also household appliances and pieces of furniture that were destroyed, the average cost of which was estimated at PHP 3,544 per household (Table 7). The other households were more fortunate to have had their furniture repaired at an average cost of PHP 1,200 per household. Some of the wives also reported losing their personal belongings, either when the family's clothes had been carried away by flood or when these had to be disposed of after having been soaked in the mud. Water lines and electrical lines were also damaged, with repair and replacements costing an average of PHP 1,200 and PHP 1,000 per household, respectively.

Table 7. Average value per household of property damage/losses due to Typhoon Juaning, Bula, Camarines Sur, 2011

Property	Average Value (PHP)			Percentage of Households Incurring this Damage (%)
	Damage	Replacement	Repair	
House	6,375	6,625	5,789	74
Household appliance and furniture	3,544	–	1,200	34
Personal belongings	1,479	3,000	–	32
Vehicle	–	400	1,200	6
Amenities	300	1,200	1,000	8
Others	4000	–	–	10
Total	15,698	11,225	9,189	

Typhoon Juaning also affected the respondents' income, with an estimated loss ranging from PHP 200 to PHP 40,000. The husbands reported losing more income (about PHP 3,898 per individual) than the wives, who reported an average income loss of only PHP 600 per individual (Table 8) throughout the two-week period during and subsequent to the arrival of Typhoon Juaning. This is largely due to the high number of women who were not gainfully employed or whose sources of income were intermittent; unlike the husbands who mostly earned on a daily basis for wage work or hired labor. It is also possible that although they may work in their farm, the women do not actually consider themselves as working, and thus did not consider losses due to flooding as loss of income. This could be the reason why only two of the wives, in contrast to 21 husbands, reported having lost income to Typhoon Juaning and the subsequent flooding.

For women *sari-sari* store (retail store) owners, flooding also meant lower profits. After the typhoon, their cost of transportation increased because they had to use a combination of boat and tricycle to go to town for supplies. At the same time, there were fewer customers because residents had lost income due to Typhoon Juaning. Moreover, the risk of operating the store also went up as more residents bought goods on credit.

There were also respondents who got injured and sick due to Typhoon Juaning. Of the 100 respondents, two husbands and two wives reported being injured, with the cost of treatment having amounted to between PHP 500 and PHP 1,000.

Table 8. Indication of income losses due to Typhoon Juaning, by gender, Bula, Camarines Sur, 2011

Income Lost	No. of Husbands	No. of Wives
< PHP 1,000	4	1
PHP 1,000–5,000	16	1
PHP 40,000	1	0
Total	21	2
Average Income Loss	PHP 3,897.62	PHP 600.00

Typhoon Juaning also affected the schooling of children, who missed school for more than two weeks on average. Children could not attend school due to the flood and because the schools were being used as evacuation centers. The school in the town proper, however, could not be used as an evacuation center as it was also flooded for several days.

When asked how many days it took for the households to recover from the losses, responses varied widely. About 18% of the household respondents were able to recover within a week, 52% took as long as 180 days (Table 9). This latter case was particularly true for households who had tried planting rice twice after Typhoon Juaning, but still failed to harvest due to the succeeding typhoons that hit the study villages in 2011.

Because farming was the most common source of livelihood in the study area, it was difficult to determine accurately the number of days the farmers and farm workers were absent from work because farm work depended on the schedule of farming activities. During the four FGDs conducted in December 2011, the participants reported that they had not been successful in planting rice since Typhoon Juaning struck the Bicol region in July 2011. This means that majority of the farmers and farm workers had not been able to work on the farm for five months following the typhoon. After Typhoon Juaning, a few farmers in both villages, including the village leader, had attempted to plant rice. This was again washed away by the flood. Several respondents took various odd jobs as construction workers, hired laborers in Naga City, and workers in vulcanizing shops for 2–3 days in a week.

Table 9. Number of days that households took to recover from losses due to Typhoon Juaning, Bula, Camarines Sur, 2011

Number of Days	Number of Households	Percent
10 or less	9	18
11 – 30	9	18
31 – 60	4	8
61 – 90	2	4
> 90	26	52
Total	50	100

For those who were self-employed, including tricycle drivers, and those who worked as hired laborers, the number of days absent from work was easier to account. Days absent from work and loss of income could be best illustrated among tricycle drivers. After Typhoon Juaning, it took two weeks for the floodwaters to recede and for the streets to become passable by tricycle, which was the only means of public transportation in the study area. Assuming each tricycle driver earned a daily net income of PHP 250, this means that each tricycle driver lost about PHP 3,750 for the two weeks he was not able to work. However, not only did the tricycle drivers lose income, the tricycle owners also lost out by being unable to collect the PHP 100 daily boundary.¹

Among women, for whom normal employment opportunities were already limited, the flood rendered livelihood to become even more difficult, as households requiring laundry services became fewer. For instance, a woman who washes clothes three times a week would have lost PHP 750 a week during and after the flood.

While flooding primarily brought additional cost to the respondents, it also brought income-earning opportunities for some. For instance, a couple of boat owners used their boats to ferry commuters, enabling them to earn as much as PHP 300 per day; however, transportation costs for the commuters increased significantly since the boat fare was double the regular tricycle fare. Flooding also enabled some residents to catch fish for about three to four days after the onset of flooding. On average, their share of the catch was about 1.5 kg. Of these, 0.5 kg was usually consumed by the household, while the remaining 1 kg (worth about PHP 100) would be sold and the proceeds used to buy rice and other necessities.

The additional cost incurred for emergency supplies in response to Typhoon Juaning was not very high because they only gathered what was already available in the house, including rice, noodles, candles,

¹ "Boundary" is the amount of money owners of public utility vehicles earn from the drivers for the use of their vehicles; this is a fixed daily amount. Drivers are then able to keep whatever amount remains.

vegetables, and root crops from the backyard. Based on their experience, respondents had to bring everything they possibly could to the evacuation center because supplies were never enough.

The husbands had to use available materials to shield their houses from Typhoon Juaning; they put old tires on the roof to prevent it from being carried away by strong winds. Others put used sacks and plastic sheets to protect the walls and windows from the rain. These preparations proved futile as the water from the Bicol River and Lake Baao brought in floods as high as 1.5 m.

Vulnerability of Men and Women

Vulnerability is said to be a function of risk, exposure, sensitivity, and adaptive capacity. All of the respondents lived in the same locality and were considered to have the same level of exposure to the risk of typhoon and flooding, regardless of gender. On the other hand, adaptive capacity is determined by several socioeconomic factors that would characterize the individual's and household's resilience and ability to recover from typhoon and flooding impacts. The adaptive capacity indicators used in this study were economic, technology, infrastructure, knowledge and skills, and social capital.

Economic indicator

Majority of the husbands (94%) drew income from various sources; only 6% were not employed. On the other hand, more than half of the wives interviewed (54%) were not engaged in any income-generating activity. The sources of income for the households interviewed were agriculture (crops and livestock), aquaculture, off-farm income, nonfarm income (business and/or employment), and other sources (e.g., pension and remittances) (Table 10).

Table 10. Average annual income in 2010, by gender of household members and by income source, Bula, Camarines Sur, 2011

Income Source	Average Income (PHP)		
	Male	Female	Total
Farm	–	–	20,830.00
Aquaculture	–	–	19,512.50
Off-farm	13,608.82	7,466.67	21,075.49
Nonfarm sources			
Business only	27,350.00	46,362.50	73,712.50
Employed only	34,045.00	24,300.00	58,345.00
Average income from both business and employment	31,712.90	33,589.47	65,302.37
Others	20,750.00	25,675.00	46,425.00

About 32% of the household respondents (Table 11) relied on farm income as a source of livelihood, and most of them earned between PHP 5,000 and PHP 15,000. On average, annual income from farming was about PHP 20,830 (Table 10). The smallest amount earned in 2010 was PHP 1,200 while the highest amount was PHP 80,000. In most households, only one male and one female were involved in farming.

About 22% of the household respondents derived income from aquaculture (Table 11). In 2010, 16% earned less than PHP 15,000 annually from fishing while 6% were actually earning between PHP 35,001 and PHP 45,000. On average, the household respondents earned PHP 19,512.50 from aquaculture in 2010 (Table 10).

Some of the husbands and wives interviewed also engaged in off-farm and nonfarm work. In 2010, husbands earned an average income of PHP 13,608.82 from off-farm work, almost twice the amount that wives earned (PHP 7,466.67) (Table 10). The lowest amount that the husbands received for off-farm work was PHP 600.00, whereas the wives received PHP 1,000.

Of the 50 household respondents, 38% included male members involved in nonfarm work; 24% also had businesses (Table 11). Nonfarm income included wage labor, self-employment, and business operation.

Table 11. Respondents' income sources in 2010, by gender, Bula, Camarines Sur, 2011

Income Source	Household			
	Number		Percent	
Farm	16		32	
Aquaculture	11		22	
	Male		Female	
	Number	Percent	Number	Percent
Off-farm	17	34	9	18
Nonfarm				
Business	12	24	8	16
Employed	19	38	11	22
Both business and employment	19	38	18	36
Others	8	16	10	20

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each) and number of household respondents (n = 50).

On average, these male household members earned PHP 31,712.90 in 2010, which consisted of income from both business and employment earned in conjunction. Nonfarm income earned by male members in 2010 ranged from as low as PHP 300 to as high as PHP 240,000. On the other hand, only 36% of the households had a female member who earned from these nonfarm sources (Table 11), which averaged about PHP 33,589.47. The minimum amount that they earned in 2010 was PHP 3,600.00 and the maximum amount the female workers were able to earn was PHP 96,000.00.

Some households also received income from other sources, such as pensions and remittances. The proportion of households with male members who earned or received income through other sources was 16%, while for female members it was 20% (Table 11). The smallest amount that the male members received was PHP 500.00 in 2010 and the highest amount was PHP 144,000.00, averaging at PHP 20,750.00. On the other hand, the female members received an amount of PHP 500 to PHP 144,000.00 annually, averaging at PHP 25,675.00 per annum.

Infrastructure indicators

The value of the respondents' houses ranged from PHP 4,000 to PHP 500,000, with an average value of PHP 64,947 (Table 12). The earliest year of house acquisition was 1947 and the latest was just within 2011. Nine respondents did not own the houses they lived in rent-free.

The type of housing materials and the structures of the houses influenced their susceptibility to the impacts of typhoon and flooding. In terms of construction, 26% of the households interviewed lived in houses made of permanent materials, 32% lived in semipermanent houses, and 42% lived in houses made of temporary or light materials. Most of the respondents (86%) lived in single-storey houses, 8% lived in two-storey houses, and 6% lived in houses that had an elevated first level.

The residents who depended on tube wells and pumps for their domestic water supply were also sensitive to the effects of flooding. Floods submerge pumps, rendering them nonfunctional, while making the well water prone to contamination.

Table 12. Distribution of household respondents by value of house, Bula, Camarines Sur, 2011

Value (PHP)	Number	Percent
< 50,000	19	38.0
50,000 – 99,000	13	26.0
100,000 – 140,000	5	10.0
> 140,000	4	8.0
Does not own house	9	18.0
Total	50	100.0
Average Value	PHP 64,947.40	

Technology indicators

Access to shelters. The respondents identified five available evacuation centers in the area (Table 13). These included the village hall, school building, gym/multi-purpose hall, church, and an NGO facility. Among these five evacuation centers, some of the respondents (42%) indicated the village hall as the most accessible, being less than a kilometer away from their homes. The second nearest evacuation center to the respondents (40%) was the school building.

Not all of the identified evacuation centers were located within the respondents' respective villages. About 22% of the respondents lived 4–6 km away from the nearest evacuation centers, while 34% lived 1–3 km away from the nearest one (Table 13).

During Typhoon Juaning, 68% of the household respondents indicated that they had walked to the evacuation center since it was only a short distance away. About 24% had to use a boat to reach the nearest evacuation center because the floods had made the roads impassable. Eighteen percent said there had been tricycles and pedicabs available to them when they needed to evacuate. About 6% of the households had to be evacuated using off-road vehicles because roads had become impassable to ordinary vehicles.

Table 13. Distribution of household respondents, by distance of evacuation centers to their house, Bula, Camarines Sur, 2011

Distance (km)	Evacuation Center										Total	
	Village Hall		School Building		Gym/Multi-purpose Hall		Church		NGO Facility			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 1	12	24	3	6	0	0	5	10	7	14	27	54
1–3	8	16	6	12	1	2	1	2	1	2	17	34
4–6	1	2	10	20	0	0	0	0	0	0	11	22
Total	21	42	20	40	1	2	6	12	8	16	56	112

Note: Multiple response table. Percentages were computed based on the number of household respondents (n = 50).

As the husbands usually stayed behind to look after their houses and animals, the wives were responsible for bringing their children and belongings to the evacuation centers. While walking to these centers, wives face the possibility of getting bitten by snakes, or drowning.

Source of weather information. The respondents identified four sources of weather information, namely, media (i.e., radio, TV, newspaper), local government, relatives/friends, and neighbors (Table 14). A higher proportion of the husbands (52%) were the first to learn about the incoming typhoon compared to the wives (30%). The proportion of husbands and wives who received weather information together (38%) was also high. This could be because the most common source of information for all respondents was the media (i.e., radio, TV, newspaper) (86%) and, in most instances, the family watches the news together. Moreover, the husbands—who often stayed outside the house—had greater access to other information sources compared to the wives, who were usually busy with household chores and did not have time to listen to the news or socialize with neighbors.

Table 14. Distribution of respondents by source of weather information, Bula, Camarines Sur, 2011

Sources	Husband		Wife		Husband and Wife		Total	
	No.	%	No.	%	No.	%	No.	%
Mass media (radio/TV/newspaper)	16	32	12	24	15	30	43	86
Local government	4	8	2	4	4	8	10	20
Neighbor	4	8	0	0	0	0	4	8
Relative/Friend	2	4	1	2	0	0	3	6
Total	26	52	15	30	19	38	50	100

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents ($n = 50$ each) and number of household respondents ($n = 50$).

Social capital indicators

Social capital, expressed in terms of nonformal community relations, was high in the study villages. Few of the respondents, regardless of gender, were members of formal community organizations or had engaged in organized collective actions. The peace and order situation in the study villages was good, and the incidence of crime against property was low. Both the female and male respondents helped their neighbors during social occasions, such as preparing for weddings and birthdays.

Membership in organizations. Only 18% of the husbands were part of a community organization. About 4% of the husbands belonged exclusively to male organizations, including farmers' association and men's organization in the village. On the other hand, 14% of the husbands were members of groups comprised by male and female members. These groups or organizations included farmers' association, political groups, nongovernmental organizations (NGO), parents' groups and senior citizens' association.

The wives were more active than the husbands in participating in community organizations. About 44% of the wives were members of organizations in their village; two were members of more than one organization. Of the 50 wife-respondents, 38% were members of women's organizations and 10% were members of mixed membership organizations (i.e., farmers' association, cooperatives, political groups, and senior citizens' organizations).

The organizations that the respondents belonged in were also active in DRRM activities. Only 10% of the husbands and 14% of the wives said that their organizations had not participated in any DRRM activity. The organizations that the male respondents belonged in were active in rescue and relief operations, as well as early warning information dissemination. Most wives participated in relief operations, especially those who were members of women's organizations. They also gave early warning information, took part in rescue operations, and cleaned up after the event. However, only a few of the respondents participated in these operations during Typhoon Juaning, mainly because they were also severely affected and were busy taking care of their households.

Collective actions in the village. The respondents reported that they had undertaken minimal collective action during Typhoon Juaning; in most cases, the adult male members of the households had been the ones involved (Table 15). This was reflected in the answers of the households on their participation in *bayanihan* (exchange labor) events, particularly in rescue operations, relief operations, and watching over a neighbor's house. About 60% of husbands and wives said they had participated in bayanihan that had been initiated in their village during/after the typhoon. Of those who did not participate in bayanihan, 38% of the husbands and 36% of the wives said that their occupation with individual household activities had prevented them from participating.

Survey results showed that the husbands' contributions to community activities ranged from a minimum of half a person-day up to 10 person-days (an average of 2.3 person-days). Family members helped their neighbors evacuate, and took part in the village cleanup activities during and after Typhoon Juaning.

The husbands were involved in about 10 types of community activities during and after the typhoon, as listed in Table 15. More than one-third of the husbands (38%) participated in the village clean-up, which was the most time-intensive activity. This clean-up activity was especially crucial in San Jose as the debris that blocked their bridge had worsened the flooding in the village.

The wives also contributed between 2 hours and 8 person-days (an average of 2.5 person-days) in order to participate in the village activities during and after the typhoon. After Typhoon Juaning, the wives participated in five community activities. Like the men, they participated in clean-up activities (12%), and one wife volunteered to work for eight days to assist people in the evacuation center.

Both the husbands and wives participated in the following activities: cleaning up (14%) and assisting in either evacuation procedures or at evacuation centers (8%). Among the six types of community activities done by both husbands and wives, the most time-intensive activity was helping assess the situation to provide basis for relief and repair/reconstruction of damaged dwellings. They devoted an average of 3.29 person-days in performing these types of activities.

About 42% of the household respondents shared that the incidence of burglary or looting of properties was rare; 32% said it never happened in their village. This indicates a high level of social capital in the community.

Table 15. Distribution of respondents by type of community activity performed during/after Typhoon Juaning, Bula, Camarines Sur, 2011

Collective Adaptation Options	Husband Contribution		Wife Contribution		Husband & Wife Contribution	
	No.	%	No.	%	No.	%
Helped evacuate people/assisted in evacuation	13	26	1	2	4	8
Participated in clean-up activities	19	38	6	12	7	14
Monitored the situation	–	–	1	2	1	2
Helped assess the situation as basis for relief	1	2	–	–	1	2
Repaired/reconstructed damaged dwellings	6	12	–	–	2	4
Disseminated early warning	1	2	1	2	–	–
Participated in reinforcing dikes, placing sandbags, etc.	3	6	–	–	–	–
Helped people to reinforce and harvest crop	2	4	–	–	–	–
Cut branches	1	2	–	–	–	–
Participated in rescue operation/ helping people be safe	4	8	–	–	–	–
Organized and provided necessities at evacuation centers	–	–	–	–	1	2
Helped neighbors to secure/ recover lost belongings	1	2	–	–	–	–
Distributed relief goods/disaster assistance for affected people	–	–	3	6	–	–

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

Knowledge and skills indicators

Level of education. The respondents' level of education was generally low. Most of the respondents (54% of husbands and 46% of wives) received only 4–6 years of education (Table 16). A few of the husbands (14%) and wives (14%) were able to receive tertiary education, but only three wives were able to complete the 14 years of schooling required for tertiary completion. On average, the husbands received seven years of education and the wives received eight years.

Training on disaster response and management. Only 24% of the surveyed households had received training on disaster preparedness in the last five years, and 76% of the households had not yet attended any such forum. Among the untrained households, 35 said they had needed these DRRM training programs; only the remaining three said there had been no need for such training.

Of the 12 household respondents who were able to receive training, 11 received training on DRRM, while one received climate change training. The husbands were more active in participating in these training programs, where the subject matter included disasters, disaster preparedness, and rescue operations, as they comprised 66.7% of the respondents who attended, as compared to the wives who comprised only 41.66%.

Table 16. Years of schooling attended by the respondents, Bula, Camarines Sur, 2011

Years of Schooling	Husband		Wife	
	No. (n = 50)	Percentage (%)	No. (n = 50)	Percentage (%)
< 4	2	4	1	2
4 – 6	27	54	23	46
7 – 10	14	28	19	38
11 – 14	7	14	7	14

Most of the training programs that the respondents attended were provided by the LGU. Eight of the training programs were about disaster preparedness, two were DRRM-related, two were about rescue operations, and only one was about climate change (Table 17). Other organizations that provided respondents with training programs included NGOs, religious organizations, and the Department of Interior and Local Government (DILG).

The respondents devoted an average of 12.5 hours to the disaster preparedness training. Of the 12 household respondents that received training, four had attended eight-hour training programs. The respondents' attendance in rescue operation trainings varied widely. One husband attended a training program for two hours, while another husband attended a training that lasted 80 hours.

The respondents were asked to rate the usefulness of the disaster-response training they had attended. Of the 12 households that had received training, eight said that the training programs on DRRM and disaster preparedness had been very useful; three said these had been useful, and the one who had attended the climate change training said the training had been only somewhat useful.

Of the subjects covered by the training programs, the respondents found disaster preparedness to be most useful, followed by rescue operations. They also found knowledge on alternative livelihood and social responsibility to be useful, albeit to a lesser extent.

Table 17. Sponsors of DRRM-related training programs attended by the respondents, Bula, Camarines Sur, 2011

Training Program Topic	Sponsor				Total
	NGO	LGU	Church	DILG	
Climate change	0	1	0	0	1
Disaster Risk Reduction Management Training	0	2	0	0	2
Disaster preparedness (flood, typhoon, fire, etc.)	2	4	1	1	8
Rescue operation	0	2	0	0	2
Total	2	9	1	1	13

Note: Responses in the table are not indicative of the number of respondents who attended, but rather the number of training programs implemented. One respondent may have attended more than one of these training sessions.

Indicators used to signal evacuation. Among the 50 households interviewed, 28 (56%) considered the level of flood as a basis for evacuation, while 27 (54%) considered the heavy rains and strong winds as sufficient signals for evacuation. Typhoon warning signals had also been helpful in considering whether or not to evacuate, as stated by five of the respondents. Five households indicated that they would consider evacuating upon issuance of advice for evacuation by relevant authorities.

Respondents also identified the following signs as basis for evacuation: overflow of water from the river, if the sky is considered sufficiently dark, when the red ants are starting to climb the walls, and when the branches of the trees are falling. Using this last scenario as a signal for evacuation, however, is dangerous, particularly for women and children, as moving to evacuation centers would expose the residents to hazards posed by falling branches.

Household adaptive capacity index

Gender analysis was conducted to determine the adaptive capacity of husbands and wives in the study area. Since the husbands and wives of each household shared the same natural and physical assets, the household's adaptive capacity index was computed for these assets. Results showed that the household's adaptive capacity index for natural capital was moderately high (0.55), while it was slightly lower for physical capital (0.45) (Figure 2).

The adaptive capacity index (in terms of individually possessed assets such as economic, social, and human capital) was also computed separately for husbands and wives to determine gender differentiation. Results showed that husbands and wives had the same level of human capital (0.46), but the wives (0.48) had a slight edge over the husbands (0.45) in terms of social capital. The respondents' level of education was low; only about 14% had been able to attain tertiary education. The wives had a slightly higher level of education than the husbands, since 38% of the wives completed secondary education whereas only 28% of the husbands did.

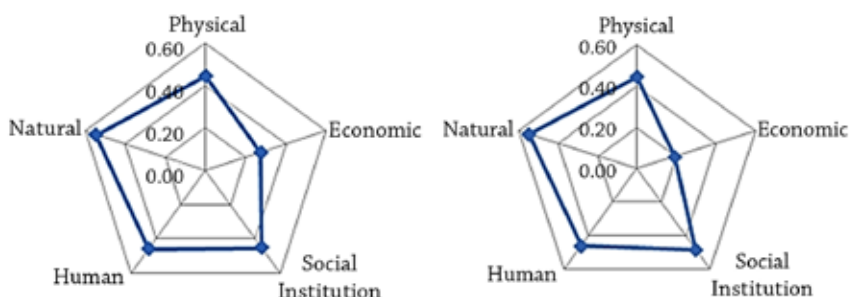


Figure 2. Adaptive capacity index of husbands (left) and wives (right)

The economic capital indices of both husbands and wives were very low, although the husbands (0.27) had higher economic capital than did the wives (0.19). This reflects the findings that husbands were more gainfully employed than the wives, even if more wives had relatively higher educational attainment than the husbands. The average annual income of male members of the households was PHP 33,487, while the female members earned PHP 32,694 on average. This data also suggests that the wives were unable to find jobs despite their relatively higher level of education due to limited employment opportunities for women in the area.

Overall, the adaptive capacities of husbands (0.44) and wives (0.42) were almost the same. These figures indicate that the respondents had moderate adaptive capacity and resilience, and that households are able to cope with disasters by relying on available physical infrastructure, technology, and social capital. However, after Typhoon Juaning and the subsequent flooding, they struggled for more than two months because livelihood opportunities in the area were scarce. As mentioned earlier, the respondents had to rely on different kinds of assistance; in particular, 76% of the household respondents needed financial assistance because they did not have savings for emergency needs. By the time this study was undertaken, their lives had still not returned to normal, and they had been far from full recovery. Interventions to enhance the economic capital of both husbands and wives are needed to enhance their adaptive capacity and resilience. It is expected that higher economic capital would enable the households to improve their natural and physical capitals, which are essential in building resilience.

Adaptation Strategies to Mitigate the Impact of Typhoon Juaning

Adaptation strategies

The husbands and wives, either separately or jointly, performed a number of measures to secure the family and their properties and to mitigate the impact of Typhoon Juaning. Despite these measures, many of the household respondents still suffered severe losses because they had not anticipated the wind speed that the typhoon brought. Furthermore, they had not anticipated flooding because rainfall was not heavy in the study sites. However, heavy rains in neighboring areas had brought floodwaters from the surrounding highlands rushing into the study villages.

From the respondents' individual accounts, the husbands did more than their wives before, during, and after Typhoon Juaning. A total of 13 adaptation measures were undertaken by husbands, 7 by wives, and 11 jointly by husbands and wives (Table 18). Most of the husbands reinforced their houses (52%) and repaired or reconstructed their houses (46%). On the other hand, most wives bought food and other basic necessities (46%), and queued for typhoon or flood relief goods (50%). Activities commonly done by both husbands and wives were the following: moving family members to a safe place, securing properties and belongings, buying food and other necessities, and queuing for relief goods.

Household decision-making patterns were reflected in the kinds of adaptation measures performed by either husband or wife, or both. For instance, husbands generally took charge of activities that require physical strength, such as reinforcing the house before Typhoon Juaning made landfall, bundling firewood, securing animals, and repairing damaged houses and other properties. On the other hand, wives generally performed activities inside the house, such as providing food, securing family belongings, and preparing materials for evacuation, such as clothes, cooking utensils, medicine and other necessities. Note that, generally, the wives were the ones who queued for relief goods and who looked for assistance.

Most of the wives (72%) stated that they had received warnings less than a day before the typhoon came. In the case of husbands, 48% received warnings a day before the typhoon came. Given limited resources, they responded by securing their properties and storing food in case of emergency. The fact that they had previously been exposed to flooding and the disaster management practices undertaken by the local government helped them react and respond to the weather information that they had received.

Table 18. Distribution of respondents by measures taken in response to impacts brought about by Typhoon Juaning, Bula, Camarines Sur, 2011

Measures	Husband		Wife		Husband and Wife	
	No.	%	No.	%	No.	%
Moving family members to safe place	8	16	4	8	22	44
Securing properties/belongings	20	40	7	14	17	34
Buying food and other basic necessities	9	18	23	46	19	38
Reinforcing the house	26	52	0	0	7	14
Cutting and trimming trees near the house	6	12	0	0	0	0
Harvesting harvestable crops, etc.	0	0	0	0	5	10
Staying in shelters	9	18	0	0	14	28
Monitoring the status of typhoon and flood	4	8	5	10	6	12
Helping injured neighbors evacuate to safer places	7	14	0	0	0	0
Queuing for typhoon/flood relief goods	7	14	25	50	4	8
Repairing/reconstructing houses	23	46	0	0	9	18
Repairing damaged properties	7	14	0	0	4	8
Recovering damaged agricultural produce and repairing paddy fields	3	6	0	0	3	6
Looking for other source/s of income outside the community	4	8	2	4	0	0
Seeking government support	0	0	5	10	0	0

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

The husbands and wives agreed that they chose a certain adaptation option not just for safety reasons, but also because they were imitating what others were doing (Figure 3). More wives than husbands chose adaptation options that they felt “needed to be done,” both to prevent further damage to property as well as to ensure food security. On the other hand, the husbands chose adaptation options because they were cheap.

Both husbands and wives saw their lack of income as the main reason for being unable to prepare sufficiently for Typhoon Juaning. As such, their recommendations to overcome the adaptation barriers leaned more on livelihood opportunities other than farming. The husbands were more detailed than the wives in identifying recommendations for overcoming adaptation barriers. While the wives mainly suggested seeking assistance from the government, the husbands recommended more options, including providing agricultural technology and equipment, housing programs, adopting waste management practices, and adjusting the agricultural cropping period. This indicates that despite the higher percentage of women involved in DRRM activities, their husbands were more exposed to outside activities because of farm work and other economic activities.

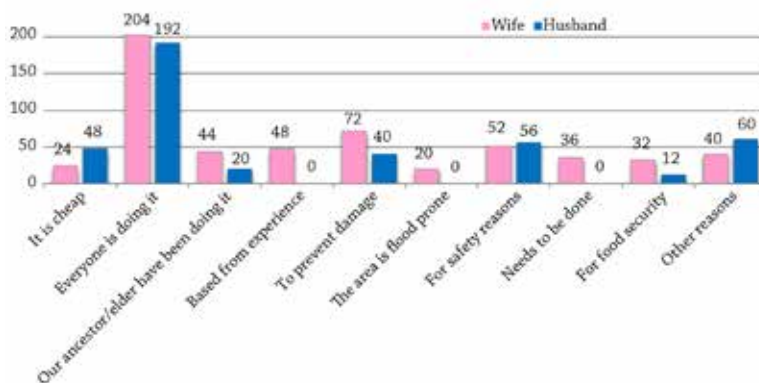


Figure 3. Reasons for adopting certain adaptation options, by gender, Bula, Camarines Sur, 2011

Household evacuation process

Among the 50 household respondents, 64% evacuated to safer places during Typhoon Juaning. About 46% of the households evacuated everyone in their family, while in some households (14%), the wives and their children had evacuated first while the husbands and other male members of the household followed after making sure that their house was safe to be left behind. Two households said that their husbands did not leave their house even when everybody had already evacuated. The rest of the household respondents (36%), however, did not see the need to evacuate even when their area was already flooded.

Assistance from external sources

Most of the household respondents received assistance after Typhoon Juaning. As expected, the assistance provided to the affected households was far greater after the event than before or during the event. The assistance received by the respondents from external sources before, during, and after Typhoon Juaning included relief goods (e.g., rice, canned goods, noodles, clothes, and water); financial assistance; construction materials; and other forms of assistance (e.g., mosquito net, medicine, household items). Many of the respondents received relief goods more than once while they were staying at the evacuation center. In San Jose, relief goods were provided even to households that did not stay at the evacuation center.

All respondents said they had received assistance from the local government at the time of the calamity. About 22% of the husbands were able to receive assistance from the national government when some politicians distributed relief goods. On the other hand, 28% of the wives were able to receive assistance from the church (Table 19). The differences in the number of respondents who reported having received assistance from various sources indicate who, between the spouses, received such assistance.

Table 19. Respondent's sources of assistance received, Bula, Camarines Sur, 2011

Source of Assistance	Respondents				Average	
	Husband		Wife			
	No.	%	No.	%	No.	%
National government	11	22	9	18	10.0	20
Local government	50	100	50	100	50.0	100
Relatives/Friends	9	18	11	22	10.0	20
NGOs	7	14	12	24	9.5	19
Church	10	20	14	28	12.0	24
Others	—	—	3	6	1.5	6

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents ($n = 50$ each).

Perception toward future risk of typhoon and flooding

The male and female respondents generally had the same perception about the cause of disastrous typhoons and flooding. A large proportion of the husbands (42%) and wives (48%) believed that extreme typhoon or flooding had been an act of God that cannot be controlled. On the other hand, 6%–16% from both genders believed that these weather events had been aggravated by human-induced factors, such as deforestation and improper waste disposal.

Majority of the husbands (70%) and wives (62%) believed that future risks due to typhoon and flooding would become more severe than what they have experienced (Table 20). Few said that future risks would be the same or less severe. An almost equal proportion of husbands and wives were uncertain about the severity of future risks.

For those who stated that future risks would be more severe, most (17 husbands and 14 wives) stated that this would be due to overexploitation of natural resources. This indicates that a higher proportion of husbands compared to wives said that overexploitation of natural resources would lead to future risks. In addition, husbands identified more reasons compared to wives.

Most of the husbands (76%) and the wives (80%) had plans to mitigate the impacts of typhoons and flooding in the future (Table 21). More wives (62.5%) than husbands (55.2%) said that they plan to improve or renovate their house. Other plans mentioned by the respondents included resettling in other areas, adopting appropriate technology, and finding a job elsewhere, or an alternative livelihood.

Table 20. Respondents' perception toward future risks of typhoons and flooding, Bula, Camarines Sur, 2011

Perception	Respondents				Average	
	Husband		Wife			
	No.	%	No.	%	No.	%
More severe than what we experienced	35	70	31	62	33.0	66
About the same as what we experienced	4	8	5	10	4.5	9
Less severe than what we experienced	1	2	3	6	2.0	4
Not sure	10	20	11	22	10.5	21
Total	50	100	50	100	50.0	100

Table 21. Respondents' plans to protect themselves from the impacts of typhoons and flooding in the future, Bula, Camarines Sur, 2011

Plan	Respondents				Average	
	Husband		Wife			
	No.	%	No.	%	No.	%
To improve/renovate existing house	21	55.2	25	62.5	23.0	58.9
To resettle to other areas	11	29.0	8	20.0	9.5	24.5
To find job somewhere else/ alternative livelihood	4	10.5	5	12.5	4.5	11.5
To adopt appropriate technology	1	2.6	2	5.0	1.5	3.8
Others	1	2.6	–	–	1	2.4
Total	38	99.9	40	100.0	39	100.0

The respondents were also asked about the kinds of assistance that they felt they would need to better cope with future typhoons and flooding (Table 22). For both husbands and wives, alternative livelihood was number one. As reported earlier, farm work and farm-related work were the most common forms of employment available in the area, and these were heavily affected by typhoons and flooding.

Albeit slightly higher for wives than husbands, they both agreed that building evacuation centers that can withstand the impact of typhoons and flooding should be the second type of assistance provided by the government and NGOs. They both saw the need for an evacuation center that could not only withstand strong typhoons and heavy flooding but could also respond to their basic needs. For example, there should be more toilets in the evacuation center to cater separately to men and women. Likewise, such a facility should be well-ventilated to prevent the spread of disease.

The third type of assistance pertained to building houses with better design. During the FGDs, the wives said if they only had the resources to build a two-storey house, they would have done so. Majority of the houses in the area were single-storey structures made of temporary materials, which could be easily flooded and destroyed by strong winds.

Assistance for basic necessities and financial assistance were the fourth and fifth types of calamity assistance mentioned by husbands and wives during the survey.

The other types of assistance mentioned by both husbands and wives included insurance against typhoon and flooding, diversified farming technology, information on how to cope with climate change, house repair assistance, medical assistance, boats for rescue operation, and educational assistance for children. Among the above-mentioned types of assistance, the husbands preferred boats for rescue operation more than the wives did.

Table 22. Kinds of assistance that households would need to cope with the impacts of typhoons and flooding in the future, Bula, Camarines Sur, 2011

Assistance	Husband		Wife	
	No.	%	No.	%
Alternative livelihood source (economic indicator)	25	50	26	52
Building evacuation centers that can withstand impacts from typhoons & floods	12	24	14	28
Building with better housing design (technology indicator)	10	20	13	26
Assistance for basic necessities (food, clothes, household items)	9	18	9	18
Financial assistance	5	10	7	14
Setting up the insurance market against typhoon and flooding	2	4	5	10
Diversified farming technology (technology indicator)	3	6	5	10
Technology/knowledge/information on how to cope with CC	4	8	5	10
Construction materials and house repair assistance	2	4	4	8
Medical assistance	4	8	3	6
Boats for rescue operation and evacuation	7	14	2	4
Educational assistance for children	1	2	1	2

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

Households' Preference for Adaptation Strategies and the Factors that Influence Such Behavior

This section presents the different adaptation options that husbands and wives would be willing to choose to protect their livelihood and properties. There are three options: (1) a disaster insurance scheme with an annual fee of PHP 6,000 payable in 12 installments of PHP 500 per month; (2) construction of riprap to prevent flooding and contribution of a one-time amount of PHP 450; and (3) relocation.

Disaster insurance scheme

The husbands were more willing than the wives to pay for a disaster insurance scheme. Only 34% of the wives were willing to pay for this type of insurance (Table 23). The husbands and wives who were not willing to pay for disaster insurance explained that they did not earn enough money to pay for the insurance premium. Other reasons included the belief that disaster insurance was not necessary, especially in comparison to other expenses that should be prioritized; these respondents believed that only those households from higher income groups could afford to pay for disaster insurance (Table 24). If the price of insurance premium would be reduced to less than PHP 6,000 per year, the proportion of women who would be willing to buy disaster insurance would be higher.

Table 23. Reasons for respondents' unwillingness to pay for the disaster insurance scheme, Bula, Camarines Sur, 2011

Reason	Husband		Wife	
	No.	%	No.	%
Disaster insurance is not necessary	5	10	6	12
Did not have enough money to pay the disaster insurance	21	42	31	62
Only those from higher income groups could pay for this	1	2	33	66
Not applicable/Willing to pay	25	50	17	34

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

Table 24. Insurance premium the respondents were willing to buy for the disaster insurance scheme, Bula, Camarines Sur, 2011

Amount per Annum (PHP)	Husband		Wife	
	Number	Percent	Number	Percent
< 500	5	20	11	33.3
500 – 1,000	3	12	4	12.1
1,001–1,500	5	20	7	21.2
1,501–2,000	1	4	0	0.0
2,001 and more but below 6,000	4	16	8	24.2
Not applicable	7	28	3	9.1
Total	25	100	33	100.0
Mean	PHP 1,204		PHP 1,066	

Insurance, if affordable, was preferred as this would allow households to replace properties that will be damaged.

Both husbands and wives desired an insurance scheme that had the following characteristics: (1) transparency and accountability about the insurance scheme, (2) a facilitative process for filing claims, and (3) provision of more information to the public (Table 25).

Table 25. Willingness to buy disaster insurance with preferred characteristics, Bula, Camarines Sur, 2011

Extent of willingness	Husband		Wife	
	Number	Percent	Number	Percent
Very sure	35	70	27	54
Somewhat sure	11	22	14	28
Not very sure	2	4	5	10
Not sure at all	2	4	4	8
Total	50	100	50	100

Construction of riprap

Thirty-three husbands (66%) and 24 wives (48%) were willing to contribute PHP 450 for riprap construction to control flooding. Most of the husbands who were not willing to choose this option cited lack of money as reason for their unwillingness. Wives who were unwilling to contribute to this project cited the same reason as well as their uncertainty that such an option will be effective against flooding (Table 26).

When the contribution amount was hypothetically lowered to less than PHP 450, the proportion of husbands and wives willing to pay for this option increased to 90% and 86%, respectively. More than half of these additional husbands were willing to contribute a one-time payment of PHP 100. On average, the husbands and wives were willing to contribute PHP 101.67 and PHP 108.33, respectively, for riprap construction.

Table 26. Reasons for not wanting to support the construction of riprap, Bula, Camarines Sur, 2011

Reason	Husband		Wife	
	No.	%	No.	%
Riprap is not effective to reduce risk	4	22.22	10	38.5
Riprap construction is not a priority of the household	1	5.56	4	15.4
Financial constraints	12	66.67	12	46.2
LGU should shoulder the expenses	1	5.56	2	7.7
Others	–	–	2	7.7

Note: Multiple response table. Percentages were computed based on the number of husband (n = 18) and wife (n = 30) respondents who responded to this question.

The husbands and wives who were willing to pay for riprap construction believed that it would protect their properties and crops from future flooding. They mentioned other characteristics that would make this riprap construction option more attractive, namely, (1) an honest leader who would lead the construction and (2) provision of enough information about the project. Based on the survey results, which used a Likert scale (with 10 being the highest value) to measure the value that respondents attributed to the characteristics they cited as important to compel them to invest in riprap construction, providing information about the construction's nature would be the most compelling characteristic; husbands and wives rated this 9.10 and 8.91, respectively. Transparency and accountability in the fund collection for the project was found to be the second most important characteristic for husbands (rated 9.04); for the wives, it was affordability (rated 8.60).

Relocation

When asked if they would be willing to relocate, majority of both wives (70%) and husbands (60%) said yes (Table 27). Those who did not want to leave their place of residence despite the frequent occurrence of typhoons and flooding cited several reasons. The husbands did not want to relocate because their livelihood was at their current place of residence, and they were worried that there would be no available job for them at the relocation site. Meanwhile, social concerns were the main reason for the wives' unwillingness to relocate. They cited that they were already accustomed to where they live and that their current residence was near to their relatives. Like their husbands, the wives were also concerned

about leaving behind their property and livelihood; at the same time, they were worried about the uncertainty of economic activities in the relocation site.

A large proportion of the husbands (37%) and wives (42%) were willing to be relocated if they would be paid between PHP 60,000 to PHP 100,000 per household to help them start their new life at the relocation site (Table 28). Table 28 also indicates that about 5% of husbands and 19% of wives were willing to be relocated even without cash payments. The data also show that more husbands (26.8%) than wives (18.6%) require a higher amount of payment to be relocated. In fact, 7 of the 41 husbands were only willing to be relocated if given PHP 1,000,000. The average amount that was acceptable to husbands was PHP 441,020, compared to PHP 157,831 for the wives.

Table 27. Reasons for unwillingness to relocate, Bula, Camarines Sur, 2011

Reason	Husbands		Wives	
	Number	Percent	Number	Percent
Uncertainty of livelihood source at relocation site	13	26	8	16
No money for relocation	–	–	1	2
They grew up here	6	12	6	12
Prefer to stay unless the whole community relocates with free housing	–	–	2	4
Not applicable/Willing to relocate	30	60	35	70

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

Table 28. Amount the respondents were willing to accept to be relocated, Bula, Camarines Sur, 2011

Amount (PHP)	Husband		Wife	
	Number	Percent	Number	Percent
Less than 50,000	4	9.8	7	16.3
60,000–100,000	15	36.6	18	41.9
100,001–300,000	9	22.0	2	4.7
300,001 and above	11	26.8	8	18.6
No cash payments	2	4.9	8	18.6
Total	41	100.0	43	100.0
Average	PHP 441,020		PHP 157,831	

Factors Affecting Respondents' Choice of Adaptation Options

Willingness to buy disaster insurance scheme

Three separate regression runs were conducted to determine the factors that influenced the respondents' attitude toward the three adaptation options cited in the previous section. Specifically, two regressions were run separately for husbands and wives (in which the gender variable was omitted), and another one was run for the combined values.

The results showed that it was only in the regression for the wives that attendance in training programs had a significant effect on the probability that the wives would be willing to pay for a disaster insurance scheme. This suggests that, for wives, attendance in training programs enabled them to gain knowledge on disaster preparedness, which lowered the probability of their willingness to pay for a disaster insurance scheme (Table 29). The value of the training coefficient was 0.3865, which is statistically significant at 10% level of significance. This indicates that if a wife had attended the training on disaster risk reduction and management, the probability that she would pay for a disaster insurance scheme would decrease by 0.3865. Although the coefficients were not significant, the signs were consistent for the regression for the husbands, and for the combined regression for husbands and wives.

Willingness to contribute to the construction of riprap

Based on the results of the three regression runs, number of years of residence in the village, household size, house ownership, permanence of housing materials, and attendance to training were all found to have had a significant influence on the probability that the respondent would contribute to riprap construction to prevent riverbank erosion and control flooding. In San Jose, the distance of the village hall from the riverbank had decreased from 50–10 m due to river bank erosion.

The negative sign for the years of residence in the village variable indicates that the probability that both husbands and wives would contribute to riprap construction would diminish with the length of their stay in the village (Table 30). This implies that they have become accustomed to, and

Table 29. Factors affecting respondents' willingness to pay for disaster insurance scheme, Bula, Camarines Sur, 2011.

Variable	Husband			Wife			Both		
	Coefficient	Marginal Effects		Coefficient	Marginal Effects		Coefficient	Marginal Effects	
Gender dummy									
Years of residence in the village	-0.0180141	-0.00205980		-0.0131753	-0.0032877		-0.9999139	-0.0814897	
Household size	0.1422984	0.01627060		0.1773021	0.0442437		-0.0090869	-0.0007946	
House ownership	-0.4926864	-0.05123430		-1.2851960	-0.2945484		0.0234298	0.0020487	
Permanency of housing materials	0.1973799	0.02171560		-0.0918002	-0.0229233		0.5705573	0.0578399	
Attendance to training	-0.5725914	-0.07524180		-1.6737250*	-0.3865153		0.7052667	0.0531595	
Foregone income of husbands	0.0001460	0.00001670		0.0038308	0.0009559		-0.6757293	-0.0711407	
Total damage of Typhoon Juaning	0.0000153	4.0300e-06		-1.7500e-06	-4.370e-07		0.0001791	0.0000157	
Income of household	0.0000352	1.7500e-06		0.0000117	2.910e-06		0.0000440	3.850e-06	
Amount				0.0006582	0.0001642		0.0000172	1.500e-06	
Constant	0.4856070			-0.1269701					
Log likelihood	-12.5721660			-27.5082470			-17.7847190		
Pseudo-R ²	0.0699000			0.1722000			0.1150000		

Note: * significant at 10% level, **significant at 5%, ***significant at 1%

Table 30. Factors affecting the willingness to contribute to riprap construction, Bula, Camarines Sur, 2011

Variable	Husband			Wife			Both		
	Coefficient	Marginal Effects		Coefficient	Marginal Effects		Coefficient	Marginal Effects	
Gender									
Years of residence in the village	-0.0902982**	-0.0094855		-0.276042**	-0.0159197		-0.3444233	-0.063941800	
Household size	0.5728138 **	0.0601719		1.032497**	0.0595456		-0.0460933**	-0.008562000	
House ownership	4.1836070***	0.7439505***		9.196090**	0.9800068**		0.2421706**	0.044984300	
Permanence housing materials	2.5957930**	0.1868441		4.401099*	0.1685474		1.9018930**	0.419053200	
Attendance to training	2.9061770**	0.2036953		5.052452**	0.1783619		0.2050567	0.037089600	
Foregone income	0.0007811	0.0000821					2.0446450***	0.287018000	
Total damage	-0.0000212	-2.23e-060		-3.21e-060	-1.85e-070		0.0005481*	0.000101800	
Income of household	8.38e-060	8.80e-070		0.0000292	1.69e-060		-0.0000149	-0.000000278	
Amount	0.0004580			-0.0008284	-0.0008284		0.0000100	-0.000000187	
Constant	-4.5656740	0.0000481		-4.0127350			-0.0001066		
Log likelihood	-17.7028200			-12.1761000			-1.2768140	-0.000001980	
Pseudo R ²	0.4062000			0.5808000			-48.0626890		
							0.2134000		

Note: * significant at 10% level, **significant at 5%; ***significant at 1%

therefore feel less threatened by, the flooding situation in the village, having been living there for a long time.

The positive sign of the household size implies that an increase in the number of household members would also increase the probability that they would contribute to riprap construction. This implies that for both husband and wife, the security of household members was important, and that they were willing to pay for this security. Moreover, big households would find it hard to seek shelter in evacuation centers.

Meanwhile, if the respondents owned their house, the probability that they would contribute more to riprap construction also increased, by 0.98 for the wives and by 0.74 for the husbands. This similar pattern was also observed for households whose house was made of permanent materials; the more permanent the housing structure, the higher the probability to contribute to riprap construction.

Attendance in training programs also increased the probability that respondents would contribute to riprap construction.

Willingness to be relocated

Among the variables included in the analysis, only the household size affected the willingness of both husbands and wives, or of husbands alone, to be relocated (Table 31). Results indicated that as household size increases, the willingness to be relocated would also increase. Again, this shows the importance accorded by both husbands and wives to security and protection of family members. The lack of significance for other factors could be because the respondents preferred to stay in their village due to their sources of livelihood, and their ties with relatives, neighbors, and friends. Moreover, the respondents, particularly the husbands, were worried about employment opportunities in the relocation site.

Table 31. Factors affecting willingness to relocate, Bula, Camarines Sur, 2011

Variable	Male		Female		Both	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Gender						
Years of residence in the village	-0.0088071	-0.0020042	-0.0064770	-0.0014404	-0.63341090	-0.1372914
Household size	0.2555762*	0.0581601	0.1926800	0.0428497	-0.02229569	-0.0050015
House ownership	0.5046452	0.1191167	0.4963927	0.1149468	0.17824590*	0.03888336
Permanence of housing materials	0.5331782	0.1158139	0.2701233	0.0587209	-0.31887050	-0.0668502
Attendance to training	0.4656309	0.1018164	0.4821145	0.1022986	-0.13709820	-0.0302152
Foregone income of husbands	0.0000974	0.0000222			0.40983630	0.0857943
Total damage of Typhoon Juaning	7.86e-060	1.79e-060	9.32e-060	2.07e-060	0.00007440	0.0857943
Income of household	0.0000137	3.12e-060	0.0000107	2.38e-060	6.30e-0600	0.0000162
Amount	-0.0001808	-0.0000411	0.0000352	7.82e-060	7.37e-0600	1.37e-060
Constant	-2.1967920		-1.5981310		-0.00039360	1.60e-060
Log likelihood	-26.8210100		-26.7418400		0.68666600	-0.0000857
Pseudo-R ²	0.1425000		0.0869000		-27.50824700	
					0.14250000	

Note: * significant at 10% level; **significant at 5%; ***significant at 1%

Lessons Learned

From Typhoon Juaning and from the respondents' suggestions

The main lesson learned, not only from Typhoon Juaning but also from other typhoons experienced in the country, was that people must always be prepared in terms of reinforcing their house or putting up barriers to lessen the damage, such as blocking the windows and gaps with plastic sheets, tying the house posts to a nearby tree, and putting appliances and smaller furniture on top of tables or other pieces of large furniture (Table 32). Preparedness also means storing canned goods and other nonperishable items to be brought to the evacuation centers. Other lessons included the need for enough savings for use in times of emergencies.

Surprisingly, another lesson learned is to socialize with and help neighbors—a practice that respondents considered to be a social investment from which they can draw in times of need. This perception follows the common principle that those who help other community members can expect help in return. In times of emergencies, however, there are instances when cooperation and community support are abandoned. For instance, in one of the communities, galvanized sheets blown during the typhoon had to be redeemed for a fee. It is possible this would not have happened if social capital was high.

Table 32. Lessons learned by the respondents after Typhoon Juaning, Bula, Camarines Sur, 2011

Lessons Learned	Husband		Wife	
	No.	%	No.	%
Always be prepared and alert	36	72	26	52
Store enough food and basic necessities before the event comes	13	26	9	18
Arrange personal belongings before the event comes	6	12	4	8
Reinforce house before the event comes	5	10	9	18
Others	4	8	5	10

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

After the respondents experienced several calamities, Typhoon Juaning in particular, they offered several suggestions to soften the impacts of such typhoon event (Table 33). The most common suggestions from husbands included: fair distribution of relief goods to all the residents (20%), availability of rescue boats and life jackets for rescue operations (12%), and availability of evacuation facility within the village (4%). The respondents in one study area explained that they had been unable to get water supply during their stay at the evacuation center. This was particularly difficult for women who had to worry about where to get clean and safe water for drinking and cooking. The water from artesian wells in the village had been contaminated by the flooding.

Similar suggestions were elicited from the wives, with the addition that relief goods must be distributed before, during, and after the typhoon. The wives also put emphasis on the responsibility of the LGU to monitor the occurrence of health problems, particularly at the evacuation areas where children and old people could easily be affected. These suggestions highlight the difficulties faced by women, who had to ensure the safety and care of the children and elderly throughout the period of calamity.

Table 33. Respondents' suggestions to overcome future risks, Bula, Camarines Sur, 2011

Suggestions	Husband		Wife	
	No.	%	No.	%
Fair distribution of relief goods	10	20	11	22
Consideration of the needs of all sectors affected	4	8	9	18
Timely distribution of relief goods	4	8	8	16
Availability of rescue boats and life jackets in the village	6	12	10	20
Discipline and cooperation among people in the community	4	8	1	2
Quick response and rescue operations	4	8	3	6
Availability of an evacuation area in the village	2	4	2	4
Better evacuation facilities	0	0	2	4
Medical assistance	2	4	3	6
Additional government support	1	2	1	2

Note: Multiple response table. Percentages were computed based on the number of husband and wife respondents (n = 50 each).

There was also a suggestion to build houses on stilts instead of the more common single-storey house. Another suggestion was to always listen to the news. Yet another recommendation was to plant trees, which could indicate an increased awareness of the erosion-control function of trees, important in limiting the siltation of the Pawili and Bicol Rivers.

Although the husbands gave fewer suggestions, these were similar to that of the wives because some of them thought of prioritizing children during rescue operations and evacuation. They also suggested that men and women should learn to discipline themselves during such times to help others. The husbands also suggested that there should be additional relief, including food and water; that this relief must be given at once, and that there must be a quick response and rescue process already in place.

SUMMARY AND CONCLUSION

To achieve the objectives of the study, the husbands and wives of 50 households were interviewed separately to assess gender-differentiated impact of Typhoon Juaning and of their preferred adaptation strategies. Their willingness to buy a disaster insurance scheme, to contribute to riprap/river levee construction, and to relocate were also assessed.

Tables, graphs, and frequency distributions were used in analyzing the data. Logistic regression was used to determine the factors that influenced the willingness of husbands and wives to pay for three alternative adaptation options put forward as a response to climate-related impacts.

The damages to properties, crops, and livestock were severe for almost half of the households included in the study. Agricultural production, particularly rice production, suffered the heaviest losses.

The husbands reported higher income losses compared to the wives, largely due to the high proportion of women who were not gainfully employed. More husbands than wives were wage earners and had regular employment. The estimated average income loss reported by husbands

was six times higher (PHP 3,898 per individual) than that of the wives (PHP 600 per individual).

On the average, the children missed about two weeks of schooling, not only because the flood prevented them from going to school, but also because the school buildings were being used as evacuation centers. More than half of the household respondents took 180 days to recover from their losses, with some reporting that they still had not recovered from the trauma brought by Typhoon Juaning five months after its occurrence.

The village hall and the school building were the nearest evacuation centers, where the respondents sought shelter during the typhoon. Most of the husbands had more varied sources of information about forthcoming weather events compared to the wives, whose only source of information was the media.

During and after the typhoon, the household respondents sought financial, rescue, medical, clothing, food assistance, and other basic necessities from various sources, including national and local government agencies. Community members participated in relief and rescue operations organized by the local government and in autonomous operations in response to emergencies during the typhoon.

Both husbands and wives perceived that typhoons and flooding are acts of God that cannot be controlled. They also believed that future risks of typhoon and flooding would be more severe due to the overexploitation of natural resources. More than three-fourths of husbands and wives planned to mitigate the impacts of typhoons and flooding in the future.

Typhoons and flooding frequently occur in the area; thus, the local government conducted training programs on disaster preparedness. However, less than a quarter of the respondents attended such training programs during the last five years.

The husbands were in charge of preparedness activities that require physical strength, such as reinforcing the house, clearing the surroundings of objects that could possibly damage the house (e.g., overhanging tree

branches), harvesting harvestable crops, and storing away properties such as boat and farm machinery. On the other hand, the wives bought food and other basic necessities, stored away household items like clothes and appliances, and prepared items that they would need in the evacuation centers, such as clothes, blankets, and cooking utensils. The activities that were jointly done and decided on by husbands and wives included moving the family members to safety and securing properties and belongings, including the animals. More women than men queued for relief goods during and after the typhoon. Relief goods, which consisted of rice, canned goods, noodles, clothes, mosquito net, and water came from local and national government units, private corporations, and NGOs, but were generic and did not particularly consider women's needs. Financial assistance, construction materials, and other types of assistance were also extended to the victims of Typhoon Juaning.

Among the household members, the adult males participated in collective action, which was minimal, during and after Typhoon Juaning. Many of the husbands and wives were busy with their individual household activities, which prevented them from participating in community activities, e.g., rescuing other residents, clearing fallen trees, and cleaning up after the typhoon.

Husbands and wives recommended the provision of alternative sources of livelihood to enhance their resilience against the impacts of extreme weather events as well as to improve their capacity to undertake other adaptation strategies. Other recommendations by more than one-third of the husbands and wives included the construction of river levees, relocation, and the provision of disaster insurance.

The Household Adaptive Capacity Index of husbands (0.44) and wives (0.42) were almost the same. These figures indicate that they had moderate adaptive capacity and resilience and would be able to cope with the effects of extreme weather events by relying on available physical infrastructure, technology, and social capital. Nevertheless, they struggled for more than two months after experiencing typhoon and flooding due to the lack of an alternative livelihood. Their lives still had not returned to normal and were still far from recovering from the disaster even five

months after the extreme event. Interventions are needed to enhance the economic capital of the residents, which will, in turn, enhance their adaptive capacity and resilience, and lessen household vulnerability to the impacts of future typhoons.

More husbands were willing to buy insurance when the price was tagged at PHP 6,000 per year premium. At a lower price, the proportion of women who would be willing to buy insurance will increase. The average premium that husbands were willing to pay for disaster insurance was slightly higher (PHP 1,204) than what the wives were willing to pay (PHP 1,066).

More than two-thirds of husbands and wives were willing to contribute PHP 450 for the construction of riprap to control riverbank erosion and flooding. Others were willing to contribute to the riprap construction at lower contribution costs. Lack of money was the main reason why respondents, regardless of gender, were not willing to support the option.

More wives than husbands were willing to be relocated. Husbands who were against it were worried that there might be no available jobs for them at the relocation area. Social concerns, such as being accustomed to where they live and the nearness of relatives, were the main reasons for the unwillingness of the wives to relocate.

Logistic regression was used to determine the factors affecting the respondents' willingness to adopt the different adaptation options discussed. The number of years of residence in the village, household size, house ownership, permanence of housing materials, and attendance to training programs had significant influences on the probability that respondents would contribute to riprap construction in order to prevent river bank erosion and control flooding. Among these variables, only the number of years that the respondents had been residing in the village had a negative sign, indicating that the probability that both husbands and wives would contribute to riprap construction diminished with length of stay in the village. This implies that the longer they had been living in the village, the more accustomed to—and therefore the less threatened by—the flooding situation they were.

On the other hand, only household size affected the willingness of both husbands and wives to relocate. This means that as the family size increases, their willingness to be relocated also increases. This shows the importance that husbands and wives gave to family protection. Results of the logistic regression further affirmed the respondent's willingness to stay in their current place of residence despite the risks of flooding during every season due to social and economic reasons. This also implies that onsite risk reduction and management were the options preferred by the respondents.

RECOMMENDATIONS TO ENGENDER CLIMATE CHANGE ADAPTATION RESEARCH

Climate change adaptation studies should be engendered. As a first step, data should be disaggregated before, during, and after a disaster, which in this case was Typhoon Juaning.

This study confirms the findings of many studies about the differentiated role of men and women, and the need to recognize that men and women have different needs, interests, vulnerabilities, capacities, and coping strategies, which could be measured only by collecting gender-disaggregated data for community vulnerability and capacity assessments (WHO 2005). By having gender-disaggregated data, specific actions addressing the needs of men and women can be done.

Specifically for this study, data on coping mechanism, information on impact of the disaster and the preference over adaptation choices were collected separately for husbands and wives. As discussed earlier, husbands and wives performed different domestic and economic activities, which had consequent bearings on the impact of the disaster (e.g., heavy losses on husbands' economic activities); coping mechanism (e.g., more husbands had to leave the home to look for work outside of the community); and the decision to adopt particular adaptation strategies (e.g., more wives were willing to pay for a disaster insurance scheme at a lower premium, and to be relocated).

Gender as an Integral Part of a Framework for Action

Women's needs should be recognized and provided for at the evacuation centers. The distribution mechanisms should recognize women's traditional areas of authority, such as the management of the home, food, water, and family health (i.e., reproductive activities). If these needs are not considered, women's responsibilities for supporting dependents may put them under pressure. For instance, women are the caregivers for the sick and elderly; thus, they should be equipped with information on health resources, information about infectious diseases and other medical conditions that require immediate attention, and how to use oral rehydration therapy (ORT) to address diarrhea, which often occurs in the evacuation centers.

The inadequacy of income was often mentioned by both husbands and wives as a major concern even without the typhoon. Considering that the wives are in charge of the reproductive activities in the home, economic interventions should take this into account. For instance, community-based handicraft making, which would not take the women away from their homes, is a possibility. For husbands, it may be vocational skills, like vulcanizing or tricycle repair, given the number of males engaged in tricycle driving in both villages. By recognizing these differences, the practical needs (e.g., material needs of women in performing their household chores) are addressed, as well as the strategic function of women, through participating in livelihood activities and community needs.

The distinct activities performed by husbands and wives before, during, and after Typhoon Juaning indicate that women are active participants in coping with, adapting to, and mitigating the effects of typhoons and flooding. Thus, they should be just as actively involved in disaster preparedness programs, like training courses, seminars, and planning. These may include environmental protection, health and sanitation, and other areas that can save their livelihood or reduce the adverse effects of disasters. The fact that more wives than husbands were members of an exclusive or mixed organization should be taken as a cue by local government units in integrating lectures on disaster preparedness and

adaptation options in the activities of the organizations. Moreover, since majority of the wives are engaged in household activities, the schedule of seminars and trainings should take these into account.

As presented earlier, the recovery period from Typhoon Juaning varied among the respondents. As a response, both national and local governments must design specific, gender-sensitive interventions to address the psychological, social, and economic needs of the affected sectors.

As Walker (1996) suggested, integrating a gender perspective into emergency responses requires different levels of approaches, which may include formalization in policy guidelines, systematic social and gender analysis in a given context, systems and procedures recognized on the ground as good practice, and agreement on minimum standards. The “bottom line” must be to include women at every level and stage of disaster response.

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