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Involvement of Women in Farm Decision-making and Adaptive Capacity to Extreme Events of Farming Households in Ligao City, Albay, Philippines

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ABSTRACT

This study examined the involvement of women in agricultural decision-making among farming households in Ligao City, Albay, Philippines and related this to enhancement or decline of their adaptive capacity to extreme weather events. Data were collected through a household survey in the three selected barangays representing coastal, lowland and upland communities. More than 50% of husbands solely made decisions on choice of food crops, cash crops, tree species, and farm production. This parallel findings in the Philippines showing male dominance in agricultural production. Nevertheless, women still participated in decision-making in a limited way as 13-16% of them singly decided on behalf of the household while 30-38% made decisions together with the husband. Following the Sustainable Livelihood Framework, an adaptive capacity index was developed for the households. The analysis revealed that 96.17% of the respondents had low (<0.5) and 3.83% had medium adaptive capacity (>0.5), with all scores ranging from 0.0982 to 0.6171. Age and choice of trees species by husband positively influence adaptive capacity, while choice of cash crops by husband has negative relationship. Farm decision-making is gendered, and giving authority to the person with more capabilities to make effective decisions based on his/her relationship to this resource-based livelihood should be considered despite prevalent notion of the dominance of one gender.

Key words: *Adaptive capacity, farm decision-making, gender, feminist political ecology*

INTRODUCTION

Half of the world's food is produced by the labor participation of women in agriculture. In many countries in Asia, women are involved in pulling seedlings for transplanting, transplanting, weeding the rice paddies, joining the harvest, managing and storing seeds for the next crop, threshing and milling rice for the family's consumption, growing other crops, and raising livestock (*CGIAR Gender Program n.d.*). Apart from providing a significant component of the work force in the agricultural sector, women also take on key roles as agricultural managers or decision-makers (*Lumbo et al. 2010*). Despite this, "female domestication" and "housewifization" of women still dominate most discourses, particularly in rural places (*Sachs 1996 as cited by Hwang et al. 2011*).

The Global Gender Gap Index, introduced by the World Economic Forum in 2006, captures the magnitude and scope of gender-based disparities based on economic, political, education and health criteria. In 2013, the

Philippines ranked 5th worldwide in closing the gender-based disparity, and the only country in Asia in the Top 20. The Philippines advanced from its previous place in 8th position in 2012, and has notably addressed gaps in educational attainment and health and survival (*Hausmann et al. 2013*).

While women are very visible in the Philippines, including in the agricultural sector, agricultural programs seldom deliberately address them as major participants, even if most agricultural extension workers are women (*Castillo 1988*). Further, there is also a predominant view that women are mere farmers' wives (*Lumbo et al. 2010*), and therefore perceived to be more engaged in reproductive (i.e., looking after the household) rather than productive (e.g., farming activities and management) tasks.

Meanwhile, extreme events are among the stresses that farmers have to contend with, particularly in the Philippines. These events, which include typhoons, drought, and excessive rains, result in partial or complete losses in farm production and damage farms (e.g., erosion) and other properties. Smallholder farmers are among the most vulnerable to extreme events due to their limited resources, and their farms are usually located in fragile environments. It is therefore necessary to enhance their adaptive capacity and determine the contributing factors in order to sustain and improve their livelihoods, and reduce the risks of falling deeper into poverty.

This study examines the involvement of women in various agricultural decision-makings among smallholder farmer households in three barangays in Ligao City, Albay, and relates this either to enhancement or decline of their adaptive capacity to climate change and extreme weather events.

It therefore addresses the question: Does the involvement of women in farm decision-making improve the household adaptive capacity to extreme weather events? Specifically, it attempts to answer the following questions:

1. What are the areas in agricultural production where women contribute in decision-making?
2. What is the adaptive capacity of the smallholder households, using the Sustainable Livelihood Framework, to extreme weather events?
3. Is there a relationship between participation of women in farm decision-making and the household's adaptive capacity?

Women in Farming

A study of women farmers in Occidental Mindoro, Philippines (*Lumbo et al. 2010*) confirmed the results of the 1991 World Bank study that women are viewed merely "as farmers' wives and not farmers in their own right". Thus, even if they are heavily engaged in farm work, such as multiple cropping and small-scale animal production, they were never the targets of agricultural extension programs. This was manifested through non-membership in community organizations, non-attendance in farming-related trainings and seminars, and lack of financial and technical support received by the majority of the women farmers. This situation becomes an added burden for the women farmers, especially when men leave the farm for other employment. It also makes hiring of farm labor and farm management of women farmers as second priorities, next to the availability of capital.

Meanwhile, based on *Hwang et al.'s* (*2011*) study on the role of women (those that considered themselves as farmers or housewives) in intrahousehold decision-making among rice farming households in the Philippines, women have more decision-making authority in non-agricultural work (such as household expenditures, making investments in land or the house), compared to agricultural work. Nevertheless, the score was high in terms of selling the harvested crop. This suggests that there is a clear division of role between husbands and wives in the country. The factors affecting the household decision-making of women were their primary occupation, total size of landholdings, presence or absence of husband, and region of residence. When the wife is left alone (for instance, the husband is a migrant worker), her decision-making authority in agricultural work increases, and remains the same for non-agricultural work. This shows the multiple responsibilities assumed by women in the absence of their husbands.

The findings above is corroborated by farm management of rice in the island of Bohol, Philippines, which revealed the secondary involvement of women in rice production (*Bertuso n.d.*). It was found that men are the primary actors in rice production as dictated by customs, due to the heavy workload involved, while women and children participate during major production activities such as transplanting and harvesting. Women's tasks that are jointly performed with husbands are sowing seeds, transplanting, water management, selecting and drying seeds, harvesting, storage and marketing. Women who are also less burdened with childcare were seen to participate more in farming activities. Those belonging in low socio-economic groups were more involved in rice

production activities to provide much needed labor, while families higher up the socio-economic ladder just paid for hired laborers. Seed management, on the contrary, presents a different story--husbands and wives from the higher socio-economic group exhibited more shared tasks, compared to the lower socio-economic groups.

In Nigeria, while women have significantly contributed to agricultural production, male dominance also prevails in decision-making at the household and economic level. The study of *Damisa and Yohanna* (*2007*) found that the role of women in farm management decision-making process was minimal, with approximately 70% of women interviewees having no participation in the ten farm operations considered (i.e., land preparation, time sowing, fertilizer types and time of application, time of weeding, number of hired laborers and wages to be paid, time of harvesting, storage and marketing of farm produce, purchase and sale of farming implements, purchase and sale of farmlands, farm credit). Of these activities, only storage and marketing of farm produce had high female participation, with almost 46% of women's opinion considered and 24% had the final decision. The study further showed that the variables of age group, education, wealth status and tenancy have significant influence on women's participation in farm management decision-making. This implies that women who are older, with higher knowledge level, with a stronger financial condition, and with more secure tenancy have significant effect in the decision-making (*Damisa and Yohanna 2007*).

Different results, however, were obtained in agroforestry-based production systems in Nigeria (*Enete and Amusa 2010a*). Women were responsible for food crop production activities, while men overlooked the cocoa production activities. These findings blurred the prevailing notion of male dominance in farm decision-making. Instead, it highlights the division of labor between genders in the farm. A related study, meanwhile, analyzed the determinants of women's contribution to farming decisions in cocoa-based agroforestry production systems in the same area. It found that socio-economic factors (namely, years of education, years of experience, women's financial contributions, hours spent in the farm per day, and farm size) encourage women's participation in farm decision-making. On the other hand, societal constraints that yield the opposite effects are: techno-institutional constraints such as lack of extension programs for women; social-personal constraints such as 'women farmers do not have farming ideas'; and economic/financial constraint such as low or lack of financial contributions to farming activities (*Enete and Amusa 2010b*).

In Malawi, agricultural decisions in agroforestry systems, such as crop planting and fertilizer application, appeared to be jointly made by the husbands and wives. However, the husband alone often made decisions regarding tree planting and management. Nevertheless, in patrilineal households the household head makes decisions regarding tree-planting, while in matrilineal households (where land rights are transferred along the female lines) these are jointly decided. An important finding, however, pointed to greater tree densities in farm as a result of joint decision-making (*Meijer 2014*).

The above results are supported by the general findings regarding the factors that affect the authority of women in decision-making. In China and Taiwan, for instance, self-education appeared to be the strongest predictor of women's gender role attitudes. However, culture also has a great influence on this action, as demonstrated by the case of women in a mountain village in Korea. Their contribution to the household's economic condition through off-farm work did not elevate their intrahousehold position (*Hwang et al. 2011*). In Bundi district of Rajasthan in India, factors found to promote involvement of women in farm decision-making were consistent with previous studies presented; with age, family income, land holding, and education positively influencing women's contribution in decision-making. On the other hand, low self-confidence, lack of knowledge, belief that women are subordinate to male counterparts, illiteracy, poor access to farm information were the observed hurdles in women decision-making (*Chayal et al. 2013*).

The above agricultural tasks and management decisions seem to be defined by the essentialist view of gender, particularly as to how labor or decision-making fits the role of men and women. However, there are still underlying reasons for this reality that may be driven by culture or the larger political economy, which this paper hopes to explore.

Women and Climate Change

In as much as agricultural production is not gender-neutral, so is climate change particularly in relation to vulnerability and decisions along risk-taking lines (*Women's Health Victoria 2009*). The adverse effects of climate change are already being felt in many areas, including agriculture and food security, biodiversity and ecosystems, water resources, human health, human settlements and migration patterns, and energy, transport and industry. Women are found to be more vulnerable to the effects of climate change in many of these aspects,

particularly for those reliant on natural resources for their livelihood. Social, economic and political barriers make women highly susceptible to the impacts of climate change, especially with their domestic responsibilities, unequal access to resources and decision-making process, and limited mobility. Gender-sensitive strategies are therefore crucial considerations in adapting to climate change (*UN WomenWatch 2009*).

Nevertheless, women are also effective actors and agents of change in adaptation and mitigation. They have strong body of knowledge and expertise, which are useful in adaptation, mitigation and risk reduction. Also, their responsibilities within households and communities position them well in implementing livelihood strategies that are adapted to climate change (*UN WomenWatch 2009*).

METHODOLOGY

Description of the Study Site

Ligao City is located 502 km south of Manila. It has a total land area of 24,649 ha, of which 23 % are fertile flatlands and 77 % are mountainous and hilly terrain with potential for agriculture, traversed by secondary rivers. The city, with a population of 104,914 based on 2010 Census, is composed of 55 barangays classified into 11 urban, 41 rural and 4 coastal communities. About 70% of Ligao's economy is agriculture-based, but only a small portion of the population own the land they till. The majority are tenants or seasonal farm helpers. Coconut and rice are the primary products, while root crops and vegetables are secondary products. Major industries include agro-industries, piggery and poultry, and concrete products (*NSCB Region 5, 2012*).

Ligao City has upland, lowland and coastal communities where the landscape/watershed approach could be suitably demonstrated. Following this criterion and using Geographic Information System (GIS), the barangays of Oma Oma, Herrera and Maonon were chosen as the focus study areas in Ligao City (**Figure 1**). Oma Oma, the upland barangay, has a total area of 1,011.70 ha. (This area is based on GIS measurements, as the area reported in the Barangay Development Plan, i.e., 520 ha, does not match the spatial area presented in **Figure 1**). It has a population of 1,655 in 2010, constituting 367 households. Farming is the main livelihood source, with 169 registered farmers based on barangay records. Herrera, the lowland barangay, has an area of 473.09 ha.

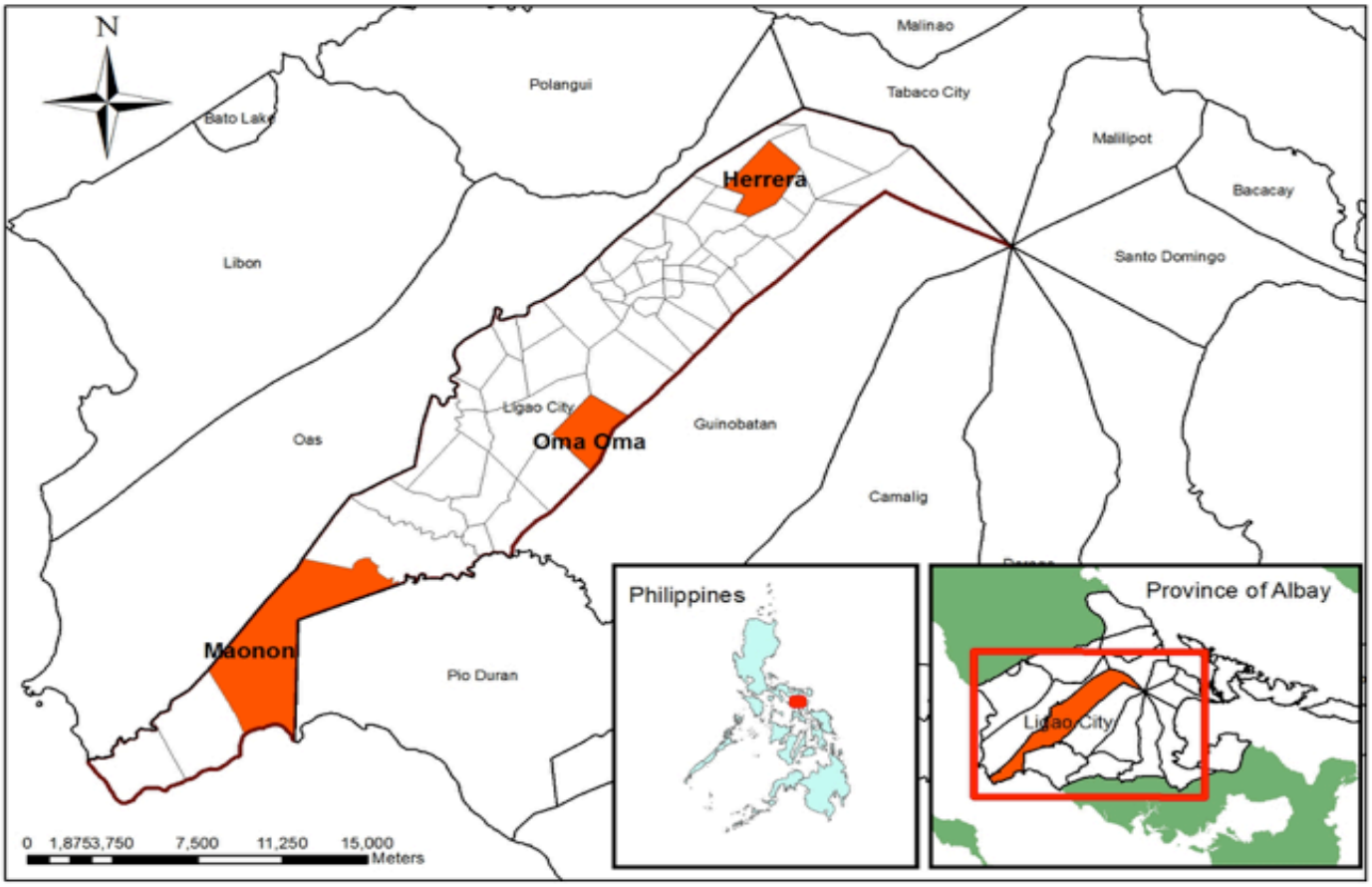

Figure 1. Map of Ligao City highlighting the three barangay-study areas.

Its population was 2,440 in 2010, with a total of 455 households. The major sources of income are farming, provision of labor and small businesses. It has a total of 69 registered farmers. Maonon, the coastal barangay, has an area of 2,493.57 ha, with a population of 2,960 in 2010 and 610 households. Farming and fishing are the major source of livelihood. The barangay has 220 farmers.

Data Collection

Data were collected through a household survey conducted on November 7-16, 2012. A survey questionnaire was used to gather information on the socio-economic profile of the farmer respondents; their farm profile and farming practices; services obtained from trees, particularly in adapting to climate extremes; attitudes towards risks; impacts, vulnerability and adaptation to climate change and extremes; future adaptation strategies; and preferred farm design or attributes. The respondents were selected from a list of farmers obtained from the three barangays, while the sample size was determined following Sloven's formula [n=N/1+(Ne^2)] with 95% level of confidence. Based on this, the sample sizes identified for Oma Oma, Herrera and Maonon were 126, 44 and 141, respectively. Meanwhile, the number of completed questionnaires was 128, 46 and 139, respectively. For the purposes of this study, only the socio-economic and farm characteristics, variables for the assessment of adaptive capacity (**Table 1**), and the decision-making practices of the respondents (**Table 2**) were used and analyzed.

Table 1. Variables used to measure the adaptive capacity of the households using the Sustainable Livelihood Framework.

Variable	Code	Description	Relationship to Adaptive Capacity
Social Capital			
Number of institutions that provide information on climate change	noinfocc	Actual number	+
Membership in organization	orgmem	Member = 1; Non-member = 0	+
Distance to nearest relative or neighbor	dstnsrel	Distance in meters (the nearer the relative, the higher the adaptive capacity)	-
Number of institutions that provide support	noinstsup	Actual number	+
Financial Capital			
Household income per capita	caphhtinc	Total income over household size	+
Number of appliances	noapplncs	Total number of appliances	+
Number of farm animals	farmanimls	Number of head of big-sized farm animals (e.g., cow, carabao, horse)	+
Number of other farm animals	oderfaniml	Number of head of small- to medium-sized farm animals (e.g., pig, goat, chicken, duck)	+
Physical Capital			
Farm size	farmsize	Total area of farm (ha)	+
House ownership	hausown	Owned = 1; Not owned = 0	+
Human Capital			
Educational attainment	educ	0 = None; 1 = Elementary; 2 = High School; 3 = College/ Vocational/Post-Graduate	+
Number of total household members working	thhmjob	Total number of household members with job (either farm or off-farm)	+
Natural Capital			
Number of crops planted	nocrops	Number of types of crops planted	+
Number of trees/ perennials planted	noperenial	Number of types of trees/ perennials planted	+
Percent of farmland planted with trees	%farmtree	Percent of land use share by trees	+

Table 2. Variables for different farm decision-making practices.

Variable	Code	Description of Responses
Decision on food crops	fudcrps	*Husband =1; Wife = 2; Both =3*
Decision on cash crops	cshcrps	*Husband =1; Wife = 2; Both =3*
Decision on tree species	treplnt	*Husband =1; Wife = 2; Both =3*
Decision on farm production	frmprodn	*Husband =1; Wife = 2; Both =3*

Adaptive Capacity Index Estimation

The adaptive capacity of a system describes its ability to modify its characteristics or behavior so as to cope better with changes in external conditions (*Fussel and Klein 2006*). It is defined as the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (*IPCC 2001*). For this study, the adaptive capacity was operationalized using the Sustainable Livelihood Framework, particularly the resources and livelihood assets available to them or they have access to. These assets include: human, social, natural, physical and financial capital (*DFID 1999*).

Human capital represents the skills, knowledge, ability to labor and good health, represented by the indicators of educational attainment and number of household members working. Social capital embodies the social resources upon which people draw, in pursuit of livelihood objectives or, in this context, reducing vulnerability to extreme weather events. Indicators identified for social capital are the number of institutions that provide information, membership in an organization, the distance to nearest relative/neighbor, and the number of institutions that provide support in the case of extreme weather events. Natural capital is the natural resource stocks from which resource flows and services useful for livelihoods are derived. In this study, the number of crops planted and the percentage of land planted with trees represent this asset. Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods, represented by farm size and house ownership. Lastly, financial capital refers to the financial resources that people use to achieve their livelihood objectives (*DFID 1999*). Indicators for this asset include household income per capita, number of appliances, number of farm animals, and number of other farm animals.

Following the above operationalization of adaptive capacity and the different variables identified for each capital asset, normalization of the values for each variable and respondent was performed to permit comparison and the employment of mathematical calculations. If a particular variable contributes to adaptive capacity, equation [1] was used for normalization. Otherwise, equation [2] was applied. All the normalized scores of the above variables were averaged to come up with a composite index for adaptive capacity *(Islam Nazrul et al. 2013*).

Equation 1: $Y = (X_i - X_i^{min}) / (X_i^{max} - X_i^{min})$
Equation 2: $Y = (X_i^{max} - X_i) / (X_i^{max} - X_i^{min})$

Where:
Y = normalized value of the observed
X_i = value of the observed variable
X_i^{mean} = minimum value of all the observed variable
X_i^{max} = maximum value of all the observed variable

Based on the scores of the adaptive capacity index, the household respondents were categorized as having low adaptive capacity (<0.5) and medium adaptive capacity (>0.5).

Relationship between Adaptive Capacity and Farm Decision Making

Four farm decision-making activities were considered in this paper, which are presented in Table 2. Food crops refer to crops planted for household consumption; cash crops are those meant to be sold; tree species are the trees planted in the farm whether for protective, regulative or economic purposes; and farm production considers the technologies to be employed and other farm management decisions (such as production system, time of planting, etc.). Only the top three decision-making actors were considered in this analysis, namely the head of household (i.e., the husband), wife, or both. Other decision-makers were dropped, such as other members of the family, as their frequency is very small.

An ordinary least squares (OLS) regression was performed to determine the relationship between the actual values of the adaptive capacity index (Y) and the decision-making practices (X). The barangay where the household respondents reside and the age of the respondent were also included in the regression to determine if these variables have relationship to adaptive capacity. The underlying factors and circumstances behind the results were discussed and interpreted. The empirical model of the household's adaptive capacity is shown below:

$$Y = ß0 + ßBarangay + ßage + ßFudcrps\_Wife + ßFudcrps\_Husband + ßCashcrops\_Wife + ßCshcrops\_Husband + ßTreplnt\_Wife + ßTreplnt\_Husband + ßFrmprodn\_Wife + ßFrmprodn\_Husband + ei$$

Where:

Y- estimated adaptive capacity index (dependent variable)
Barangay- dummy variable for Barangay (1- Coastal; 0 - Upland)

age- age of the respondents
Fudcrps_Wife- dummy variable for food crops planted by wife (1 – Yes, 0 – No)
Fudcrps_Husband- dummy variable for food crops planted by husband (1 – Yes, 0 – No)
Cashcrops_Wife- dummy variable for cash crops planted by wife (1 – Yes, 0 – No)
Cashcrops_Husband- dummy variable for cash crops planted by husband (1 – Yes, 0 – No)
Treplnt_Wife- dummy variable for tree species planted by wife (1 – Yes, 0 – No)
Treplnt_Husband- dummy variable for tree species planted by husband (1 – Yes, 0 – No)
Frmprodn_Wife- dummy variable for farm production technology employed by wife (1 – Yes, 0 – No)
Frmprodn_Husband- dummy variable for farm production technology employed by wife (1 – Yes, 0 – No)
ß0, ß's- parameters to be estimated in the model
Ei- error term

RESULTS AND DISCUSSION

Profile of the Respondents

More than half of the respondents across the barangay were male (58%), married (86%), and with mean age of 48 years old (**Table 3**). This suggests that generally, the farmers in the three barangays had relatively wide experience with regard to farming. Almost all respondents (98%) had farming as their major occupation.

The average family size was 5, while more than half of respondents across the three barangays had families ranging from 1 to 5 members, which is the most commonly used indicator of poverty. This revealed that more than half of respondents were living below the average family income in Albay, Philippines, i.e., PhP 18,726 capita^{-1} yr^{-1} (*NCSB 2013*). The mean per capita income per barangay also revealed that only Herrera satisfied (and even exceeded) the above poverty index, with half of the respondents earned more than PhP 100,000 per year. Maonon and Oma Oma, however, were way below the desired living standard, with more than 80% of the respondents earned below PhP 100,000. To make ends meet, some farmers had off-farm employment such as contractual/temporary employment and fishing as common adaptive methods. Some respondents also planted vegetables and crops in their backyard and/or raised of livestock such as chickens or pigs, usually for family consumption.

In terms of farm characteristics, about a quarter of the respondents per barangay had been farming for around 10 years. The average farm size was 15,000 m^2 and ranged from 1,000 to 145,000 m^2. While the farmer respondents had revealed several tenurial arrangements on the land that they farm, with about 40% of them opining that they own or inherited the lands and about the same percentage were tenants, this information needs further validation. It was observed during field work that some farms were in the mountains located in high sloping areas, thus making these land automatically a property of the government. For most smallholder farmers in the barangay, they might be considered de facto owners of their farm.

In terms of production systems, respondents in Herrera (lowland) were mostly rice farmers, and therefore about 80% of them practiced monocropping (**Table 4**). There were several exceptions practicing multiple cropping (15.38%) and crop rotation (5.12%). In the coastal area, Maonon, respondents had the option to farm and/or fish during lean months or extreme weather events. Respondents were mostly practicing multiple cropping (49.57%) and monocropping (33.91%). In Oma Oma (upland), some farmers were members of the Conservation Farming Villages (CFV), a program of the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) that promotes agroforestry. It is therefore not surprising that it has the highest percentage of farmers practicing agroforestry (9.73%), however the difference is not significant compared to that of Maonon (8.69%) with CFV-adopters also. Other production systems in Oma Oma are almost equally distributed among multiple cropping (32.75%), monocropping, usually of coconut (30.09%), and crop rotation (27.43%).

Women's Involvement in Farm Decision Making

All farming decisions (namely: choice of food crops, cash crops, and tree species to be planted and farm production) were predominantly determined by the husband or the household head, with percentages of 50.34%, 45.51%, 52.61% and 56.04%, respectively (**Table 5**). Averaging these figures showed that 51% of the respondents had the husbands solely decided these aspects compared to only 15% of women who decided on their own. However, women participated in decision-making in about 50% of the households, mostly in partnership with the husband. Male dominance in farm decision-making is the reality that can be gleaned from the study. This is also despite the fact that, upon further scrutiny, 30% of the households the husband was also involved in off-farm work. The finding parallels the Philippine

Table 3. Percentage distribution of the socio-demographic and economic characteristics of the respondents per barangay.

Socio-demographic Characteristics	Herrera (n=46)	Maonon (n=139)	Oma Oma (n=128)
Gender (n=313)			
Male	54.35	54.68	68.06
Female	45.65	45.32	35.94
Age (n=313)			
21-29	2.17	6.47	7.03
30-39	2.17	23.74	20.31
40-49	21.74	30.22	26.56
50-59	28.26	28.06	25.00
60-69	32.61	8.63	17.97
70-79	10.87	2.16	3.13
80-89	2.17	0.72	0.00
Civil status (n=305)			
Single	8.89	2.19	6.50
Married	75.56	90.51	83.74
Widow/widower	15.56	7.30	9.76
Education (n=296)			
Elementary	56.82	67.18	63.64
High School	38.64	28.24	31.40
College / Vocational/ Post-graduate	4.55	4.58	4.96
Religion (n=295)			
Roman Catholic	95.65	93.02	94.17
Iglesia Ni Cristo	2.17	3.10	1.67
Methodist	0.00	1.55	0.00
Born Again	2.17	2.33	4.17
Primary Occupation (n=312)			
Farming	95.65	99.28	98.43
Fishing	0.00	0.72	0.00
Vendor	2.17	0.00	0.79
Barangay Employee	2.17	0.00	0.79
Native in the Area (n=247)			
Yes	95.56	86.96	95.40
No	4.44	13.04	4.60
Ethnicity (n=296)			
Bicolano	100.00	92.97	100.00
Visayan	0.00	6.25	0.00
Tagalog	0.00	0.78	0.00
Membership in Organization (n=313)			
Yes	30.43	43.17	25.78
No	69.57	56.83	74.22
Household Size (n=313)			
1-5	54.35	57.55	64.06
6-10	41.30	38.85	32.81
11-15	4.35	3.69	3.13
Total Income			
PhP 0-100,000	50.00	86.33	86.72
PhP 100,001-200,000	26.09	12.23	9.38
PhP 200,001-300,000	17.39	1.44	2.34
PhP 300,001 and above	6.52	0.00	1.56
Average per capita income (PhP)	26,047.95	9,688.65	10,282.00

Table 4. Percentage distribution of farm characteristics of the respondents.

Socio-demographic Characteristics	Herrera (n=46)	Maonon (n=139)	Oma Oma (n=128)
Years Farming (n=313)			
1 to 10	21.74	25.90	25.00
11 to 20	17.39	26.62	22.66
21 to 30	19.57	20.86	27.34
31 to 40	28.26	18.71	17.19
41 to 50	10.87	5.76	7.03
>50	2.17	2.16	0.78
Farm Size in m^2 (n=311)			
1000 - 10,000	65.22	56.20	72.66
11,000 - 20,000	15.22	16.06	10.94
21,000 - 30,000	8.70	11.68	8.59
31,000 - 40,000	4.35	6.57	3.13
41,000 - 50,000	2.17	2.92	3.13
>50,000	4.35	6.57	1.56
Mean	16,500	19,000	11,900
Range	1,870 - 125,000	1,000 - 145,000	1,000 - 75,000
Production system (n=267)			
Monocropping	79.50	33.91	30.09
Crop rotation	5.12	7.83	27.43
Multiple cropping	15.38	49.57	32.75
Agroforestry	0.00	8.69	9.73

Table 5. Percentage distribution of household members involved in farm decision-making.

Farm Decision-Making Activities	Household Member		
	Husband	Wife	Both
Food crops (n=296)	50.34	14.86	34.80
Cash crops (n=301)	45.51	16.28	38.21
Tree species (n=249)	52.61	14.46	32.93
Farm production (n=298)	56.04	13.09	30.87
Average	51.13	14.68	34.21

agricultural studies (*Lumbo et al. 2010; Hwang et al. 2011; Bertuso n.d.*), which provide evidence of male dominance in terms of decisions on production aspects. This is the political-economy context that dictates the roles assigned to and/or expected from women and men, even in the agricultural sector.

Only about 13-16% of the wives solely chose on behalf of the household with regards to the concerned farm decision-making activities. Meanwhile, 30-38% of the respondents related that both the husband and the wife make farm decisions. It is also worth noting that the choice of cash crops had the most women involvement, either singly or together with the husband. This could be due to the fact that women are usually involved in the selling of produce, as also observed during fieldwork, hence they have knowledge of produce that has the highest demand or a better price. This knowledge gave her the leverage to have more active participation in decision-making in this area. Meanwhile, decisions on farm production and choice of tree species to plant had the highest level of male participation. This is consistent with results in Nigeria and Malawi that predominantly, men oversee tree-planting and other farm production decisions.

Adaptive Capacity of the Households to Extreme Weather Events

The province of Albay is one of the most vulnerable to the risks of climate and extreme events as it is located in the pathway of typhoons and is adjacent to the Pacific Ocean. A large portion of the country's population dependent on farming is exposed to greater climate vulnerability due to the potential threats of drought and dry spell.

The estimated adaptive capacity index of the households yielded the highest value of 0.6171 and the lowest value of 0.0982. Based on these figures, the farmers were categorized into two groups, i.e., with medium adaptive capacity (>0.5) and low adaptive capacity (<0.5) (**Table 6**). Almost all (96.17%) of the household respondents had low adaptive capacity, and only 3.83% had medium adaptive capacity. The coastal barangay of Maonon had the most number of household respondents with low adaptive capacity at 98.56%. It can be observed also from their socio-economic profile that the households from this barangay had the lowest

Table 6. Percentage distribution of the adaptive capacity scores of the households in the three barangays.

Level of Adaptive Capacity	Herrera (n=46)	Maonon (n=139)	Oma Oma (n=128)	Total (n=313)
Low (<0.5)	93.48%	98.56%	94.53%	96.17%
Medium (>0.5)	6.52%	1.44%	5.47%	3.83%

annual income and educational attainment. Meanwhile, the lowland barangay of Herrera had the highest percentage of household respondents with medium adaptive capacity, which also parallels more diversified livelihoods in the barangay, being located near the town proper, and the households having annual income above the poverty incidence. About two-thirds of the household respondents had adaptive capacity index scores between 0.3 and 0.4.

Relationship of Women Involvement in Farm Decision-Making and Adaptive Capacity of Household to Extreme Events

The OLS regression was found significant at 5% with Prob > F = 0.0024, and the value of the R-squared is 0.061 (**Table 7**). The model generated does not say much about the relationship of the adaptive capacity of men and women with the given variables. However, this result implies future study as the body of knowledge on the adaptive capacity of men and women in agricultural production as impacted by climate change is not yet explored. The literature review showed that majority of the studies on gender relate to farming in general and with little or no study linking their role in enhancing their adaptive capacity to climate change. The three variables, namely, age, choice of cash crops by the husband, and choice of tree species to plant by the husband, have significant relationship to adaptive capacity. Age and involvement of husband in selecting tree species have positive relationship, which means that the older the respondent and men determining the tree species to plant all contribute to enhancing adaptive capacity. Although not significantly affecting adaptive capacity, Barangay Oma-Oma, an upland community, was negatively influencing adaptive capacity due to different hazards experienced and the already vulnerable condition of the area. On the other hand, men choosing the cash crops to plant had negative relationship with adaptive capacity. Since women are more knowledgeable on marketing farm products, decisions on cash crop to plant will definitely affect the household income, thereby influencing their household's adaptive capacity. The participation of women in decision-making related to cash crops (**Table 5**) is a recognition of their valuable contribution to enhance adaptive capacity. What can be inferred from this result is that participation of women in choosing cash crops, whether solely or together with the husband, should be encouraged.

Table 7. Result of ordinary least squares (OLS) regression analysis.

Level of adaptive capacity	Coefficient	Standard Error	P > |t|
Barangay	-0.0018558	0.0052347	0.723
Age	0.0006776	0.0003882	0.082*
Fudcrps_Wife	-0.0474439	0.0387158	0.222
Fudcrps_Husband	0.0102637	0.0202928	0.613
Cshcrops_Wife	0.0059504	0.0377564	0.875
Cshcrops_Husband	-0.0521188	0.0209504	0.014***
Treplnt_Wife	0.0038349	0.0312641	0.902
Treplnt_Husband	0.0385702	0.0179759	0.033**
Frmprodn_Wife	0.0341506	0.0330996	0.303
Frmprodn_Husband	0.0152773	0.0188147	0.481

The results support the general pattern of defined tasks of women and men in farming, particularly that of men being responsible for tree farming and management. Nevertheless, it also shows that despite the common notion of male dominated decisions in agricultural practices, women's participation in decision-making is vital, particularly in agricultural production areas where they contribute labor.

What can be observed as well, particularly during fieldwork, which could relate to involvement of women in farm decision-making is that those empowered women or women with high natural capital (such as those holding position in Barangay Council, e.g., barangay captain, treasurer, secretary, etc.) were the ones present whenever the project team would have gatherings for consultation or focus group discussion. In the three barangays studied, women empowerment was an issue that needs to be addressed, as there is an observed significant discrepancy between the educational attainment of male and female respondents. About 42% of the males were able to reach high school and college level education, while this was the case for only about 27% of female respondents. That is a 15-point gap, to which the relatively low level of participation of women in farm decision-making could be attributed. This could be due to low priority in educating the women as compared to men in the past.

Despite the above realities, women's participation, at least in certain aspects of farm management and decision-making, such as choice of crops, is warranted, as revealed by the results of the regression analysis. Women are usually the ones involved in converting the

harvested crops into money, through the sale of produce. With their exposure to markets, this might have given them the knowledge of crops with higher demand or higher price, which when converted to cash increases the financial capital of the household and therefore improves their adaptive capacity.

Decisions regarding tree-planting species is an area governed by men, especially as the transformation of this to ecosystem services contributing to adaptive capacity enhancement requires physical strength. Such activities include the recorded primary benefits derived from trees in the three barangays; integrating trees in farm design to improve resilience, salvaging felled trees for fuelwood and lumber, securing houses during extreme events such as typhoons, or harvesting fruits for family consumption. The farm locations, particularly in Maonon and Oma Oma, are characteristically in rugged terrain and require long distance walking. Because of this, planting materials for these activities may be more easily accessed by males.

CONCLUSION

This study examined the decision-making of smallholder farm households on selected agricultural production parameters and related this to adaptive capacity. Farm decision-making is male dominated, significantly so in the areas of choice of tree-planting species and farm production. Nevertheless, the women participated in farm decision-making in about half of the household-respondents, usually in partnership with the husband. While women had relatively low participation in the studied farm decision-making parameters, it was in the choice of cash crops where they had the highest involvement, with more than 50% of the household responses involved them whether singly or together with the husband. This is also the area where their involvement in decision-making was deemed necessary to improve the household's adaptive capacity, as deduced from the negative relationship of choice of cash crops by the husband to adaptive capacity. On the other hand, the results also reinforced the general pattern observed around the world of tree planting as being the responsibility of men, which also aids higher adaptive capacity.

The power relations and foundations of farm decision-making in Ligao City, Albay were explored given the results of the study. What can be seen was that the relationship of women and men to the environment followed the prevalent notion, with the latter managing the income generation. It also showed that the areas in which women were responsible or had greater knowledge do not necessarily assign to them the authority for decision-making. However, enhancing their human capital (and even social and financial capital) could contribute to improving their situation.

The outputs of the study implied that decision-making on several aspects of agricultural production is gendered, and giving authority to the individual with more capabilities to arrive at effective decisions based on their relationship to this resource-based livelihood should be considered, despite prevalent notions of the dominance of one gender.

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