Info Note

Nurturing a gender-responsive approach to climate-smart agriculture in Guinayangan, Quezon

Magnolia Rosimo, Julian Gonsalves, and Francia Villavicencio

OCTOBER 2021

Key messages

- Coconut-based farming systems in Guinayangan, Quezon offer special opportunities for achieving multiple objectives, including carbon sequestration, economic empowerment of women and reduction of risks from variable and extreme weather.
- Gender-based role inequalities within coconut-based farming systems can be addressed through agroforestry-based, climate-smart agriculture that features small livestock, fruit trees and root and tuber crops as understory crops.
- Numerous Climate-Smart Villages, spread across the municipality of Guinayangan, now serve as proof of concept, providing evidence that climate-smart agriculture based on agroforestry interventions are gender sensitive.

An overview of gender and climate: What the literature tells us

Growing evidence suggests that climate change affects men and women differently, especially in developing countries, because of cultural norms and inequalities in the distribution of roles, resources and processes (Yabinsky, R., 2012). Climate change exacerbates inequalities because the poor are less able to bounce back from shocks and climate hazards, and thus fall deeper into poverty (Ortega, J.B., Klauth, C., 2017). Generally, the poorest populations and marginal groups are impacted the most (Escobar et al., 2008). Poor rural women in developing countries are generally considered to be the most vulnerable to climate change (Global Gender and Climate Alliance, 2016; Dankelman et al., 2008). Nhamo observed three main pathways that render women more vulnerable to climate change than men. These are "biological and physiological differences, pre-existing social norms and role behavior, and exacerbated and new forms of gender discrimination" (Nhamo, 2014: 159). Nelson et al. cited in Kakota (2011: 299) argued that "vulnerability is dynamic, locally-specific and manifested along social, gender and poverty lines." Because of these differences in vulnerabilities and capacities, women and men farmers in developing countries have different abilities to adapt to climate change (Huyer et al., 2015). For example, insecure land tenure, lack of capital and limited farm inputs poses major barriers to the adoption of conservation agriculture (a climate change adaptation strategy) in Sub-Saharan Africa (Goh, 2012). Other studies have found that financial and resource constraints as well as lower levels of access to information and extension services can prevent women from implementing adaptive practices (Jost et al., 2015; Tall et al., 2014; Twyman et al., 2014). Climate variability and weather-related shocks affect women and men's assets in different ways (Jost et al., 2015; Kristjanson et al., 2014). Women and men are changing their cropping practices in response to climate variability, with different impacts on access to and control of the income, as well as their respective workloads (Jost et al., 2015; Nelson & Stathers, 2009).

Empowering women in agriculture

Globally, agriculture remains one of the most important areas of women's work. With more than a third of employed women in agriculture sector. Women comprise some 40% of the agricultural labor force in developing countries (FAO, 2011). Less than 20% of agricultural landholders worldwide are women (FAO, 2010). Women's agricultural activities are characterized by global gender gaps in vulnerabilities, access to resources and productivity (FAO, 2011; Perez et al., 2015; Quisumbing and Pandolfelli, 2010). Substantial gender gaps in access and control continue to exist regarding six key resources

and inputs for agriculture: land, labor, credit, information, extension, and technology (Sheahan & Barett, 2014; World Bank, 2012).

As a concept, empowerment in the literature highlights mostly the social aspect. For example, Agarwal (1997); Pulerwitz et al. (2000); Kahlon (2004) describes empowerment as "The process of challenging existing power relations and of gaining greater control, over the sources of power". Mahmud and Johnston (1994) and Batiwala (1994) meanwhile suggests that empowerment is concerned with power, and particularly with the power relations and the distribution of power between individuals and group. Decision-making is an important factor that needs to be considered from empowerment as noted by Schuler and Hashemi (1994) and Hindin (2000).

Empowerment is also reflected in a person's capability set (Narayan, 2002). In this context of capabilities, Benett (2002) defines empowerment as the enhancement of assets and capabilities of diverse individual and groups to engage, influence and hold accountable the institutions which affect them. Also emphasizing capabilities and participation, Narayan (2002), suggests that empowerment is an expansion of assets and capabilities of poor people to help them participate in, negotiate with, influence, control and hold accountable institution that affect their lives. On the other hand, Kishor (2008) suggests that empowerment has to come to denote women's increased control over their own lives, bodies and environment.

In an attempt to come to a common understanding, applicable across multiple domains and disciplines, Kabeer (2001) defines empowerment as expansion of people's ability to make strategic life choices, particularly in contexts where this ability had been denied to them. The motivations for empowering women are not mutually exclusive: rather, they reinforce each other. Closing the gender gap in assets – allowing women to own and control productive assets – increases both their productivity and their self-esteem. A woman who is empowered to make decisions regarding what to plant and what (and how many) inputs to apply on her plot will be more productive in agriculture. An empowered woman will also be better able to ensure her children's health and nutrition, in no small part because she is able to take care of her own physical and mental well-being (see Smith et al., 2003 and the studies reviewed therein).

Although women's empowerment is a multidimensional process that draws from and affects many aspects of life, including family relationships, social standing, physical and emotional health, and economic power, the focus of the WEAI is on those aspects of empowerment that relate directly to agriculture – an area that has been relatively neglected in studies of empowerment.

The Women's Empowerment in Agriculture Index (WEAI) is a new survey-based index designed to measure the empowerment, agency, and inclusion of women in the agricultural sector. The WEAI was initially developed as a tool to reflect women's empowerment that may result from the US government's Feed the Future Initiative, which commissioned the development of the WEAI. However, the WEAI or adaptations of it can also be used more generally to assess the state of empowerment and gender parity in agriculture, to identify key areas in which empowerment needs to be strengthened, and to track progress over time.

For the WEAI, USAID initially defined five domains that reflected priorities from its agriculture programs, as follows:

1. *Production*: This dimension concerns decisions about agricultural production and refers to sole or joint decision-making about food and cash crop farming, livestock and fisheries, and autonomy in agricultural production, with no judgment on whether sole or joint decision-making was better or reflected greater empowerment.

2. *Resources*: This dimension concerns ownership of, access to, and decision-making power about productive resources such as land, livestock, agricultural equipment, consumer durables, and credit.

3. *Income*: This dimension concerns sole or joint control over the use of income and expenditures.

4. *Leadership*: This dimension concerns leadership in the community, here measured by membership in economic or social groups and comfort speaking in public.

5. *Time*: This dimension concerns the allocation of time to productive and domestic tasks and satisfaction with the time available for leisure activities.

Climate-smart agriculture

Climate-smart agriculture (CSA) is an integrative approach to address these interlinked challenges of food security and climate change, which explicitly aims for three objectives:

1. sustainably increasing agricultural productivity, to support equitable increases in farm incomes, food security and development;

2. adapting and building resilience of agricultural and food security systems to climate change at multiple levels; and

3. reducing greenhouse gas emissions from agriculture (including crops, livestock and fisheries.

An engagement in CSA endeavors requires that we consider these three objectives together. We need to understand that the application is at different scales (from farm to landscape), and at different levels (from local to global). These can be over short- and long-time horizons, taking into account national and local specificity and different priorities.

Well-chosen CSA option have the potential to provide benefits for women, providing an opportunity to enhance the economic status of women, helping reduce inequities between men and women, and within social groups (of women). Ultimately, the improved self-esteem and capacities can reinforce and strengthen their adaptive capacities.

This paper discusses findings from studies in climate-smart agriculture undertaken in climate-smart villages in Guinayangan, Quezon. This project site and others within the climate-smart village network of the International Institute of Rural Reconstruction provide evidence on how CSA can address gender inequities in livelihoods in coconut-based agroforestry systems, which characterize Quezon province landscapes.

Study site description and background

Guinayangan, Quezon is a third-class municipality with a total land area of 22,800 hectares comprising of 54 barangays. With a total population of 41,669 and 8,961 households, half of its population is living below the monthly per capita poverty threshold of Php1,403.00 (approx. USD33). Sixty-eight percent (14,235 has) of its total land area is devoted to agricultural production. In recent years, the municipality has been experiencing longer dry seasons due to climate change. Typhoons and hurricanes have come more frequently as well according to local folks. Being a coastal municipality, it is prone to storm surges and could potentially be affected by sea-level rise. Climate-related impacts to agricultural production in Guinayangan are purportedly brought about by increasing the poor predictability of the onset of dry and wet seasons, prolonged dry spells and strong typhoons. Crop failures such as that experienced in 2014, were the result of lack of rain and residual soil moisture to sustain production. Coconut production suffers from prolonged dry spells: nuts produced during very dry months tended to be smaller. With the majority of the town's farmers practicing coconut-based mono-cropping, periods of food and livelihood insecurity occur, forcing (primarily) male members of the households to seek employment opportunities in nearby urban areas such as Laguna and Manila.

A rapid appraisal involving focused group discussions was conducted in seven of the 11 villages where previously vulnerability assessments were also undertaken. No major differences in the perceptions of the nature of climate hazards were noted.

Climate-Smart Villages (CSVs), such as the ones set up in Guinayangan, Quezon, serve as proof of concept that CSA can provide new opportunities for women to engage in activities that enhance their income while supporting climate change adaptation efforts.

A Philippine climate-smart village: The case of Municipality of Guinayangan in Quezon

The CCAFS project of IIRR in Guinayangan and the complementary support of the Department of Agriculture AMIA program to the Municipality featured the promotion and testing of a wide range of CSA options for rice-based, upland, coastal, and for small livestock in nearly two dozen different locations in a single municipality, over a period of six years.

The data sets used for this paper were derived from the participatory vulnerability assessments undertaken between 2015-2016, farmer profiles collected, and field monitoring data and reports. Using the project's 2014-2019 database (N=290), an analysis of gender disaggregated data reveals the adoption to be only slightly skewed towards male as 54% of the adopters are men while 46% are women (Figure 1). Among the various CSA options, it is in the coastal agriculture and livestock sectors where women have demonstrated higher adoption rates (see Figure 2).

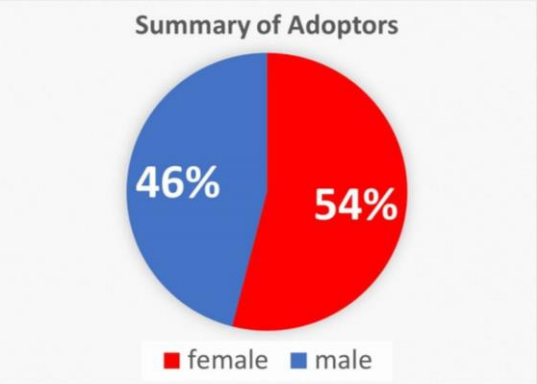

Figure 1. Adoption rate per gender from 2017 database.

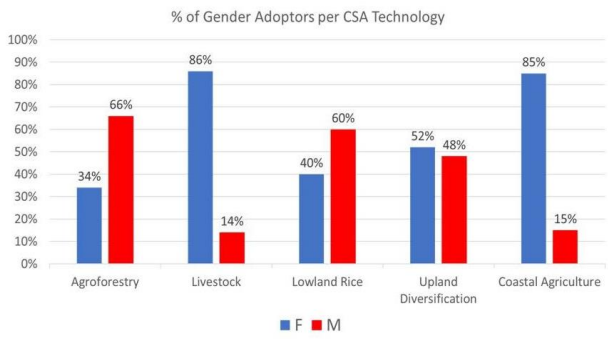

Figure 2. Adoption pattern per CSA option (2017 database).

Of the nine technological options that were featured in the portfolio of options, two were assessed in this paper in terms of gender differences and outcomes. The study will adopt the five domains of empowerment cited by the WEAI[1]. It will serve as a reference especially concerning measures of the roles and extent of women's engagement in the agriculture sector in some of the five domains:

- Decisions about agricultural production,
- Access to and decision-making power over productive resources,
- Control over use of income,
- Leadership in the community, and
- Time use.

Agroforestry as a climate-smart option

Agroforestry is a land use system in which woody perennials (trees, shrubs, palms, and bamboos) are used on the same plot as agricultural crops, animals or both, either in some spatial arrangement or over some temporal sequence. The cycle of typical agroforestry system is typically longer than a year. In our experience, this system offers some of the best opportunities for a community to achieve economic empowerment, ecosystem enhancement and mitigation and adaptation objectives. The establishment of an agroforestry system can enrichen lives and livelihoods through its many possible co-benefits: social, economic, and environmental. Trees can work as wind breaker, provider of shade or "nutrition pump". The roots of most trees grow deeper into the soil than the roots of annual crops helping them tolerate short-term drought. This means that they can recover nutrients and water from lower soil layers even if there is reduced rainfall. Leguminous trees can even help to fix atmospheric nitrogen thus enriching the soil with much-needed nitrogen. With the ability to sequester carbon and fix nitrogen, the tree-based diversification confers multiple benefits, with synergistic effects.

Multiple benefits include:

- Biodiversity: more habitats for many species of plants, animals and other organisms, pollinators and biological pest controls
- GHG emissions: trees bind carbon in their biomass (above and below ground); decaying biomass contributes to carbon storage in the soil and improves air quality: trees work as wind-breaker and help to reduce soil erosion; this reduces dust and other particles in the air
- Soil fertility: decaying biomass protects soil surface through litter and more carbon is stored in the soil
- Water retention: trees slow the flow of water due to their above and below ground biomass
- Economic: long-term income diversification
- Environmental: improved micro-climate (wind, humidity, temperature), efficient use of land, landscape conservation

Table 1. Agroforestry's adaptation and mitigation[2]

Productivity	Adaptation	Mitigation
• Depending on the system, crop yields can increase under AF. • AF produces additional outputs such as fruits, fodder, green manure, timber and fuel woods, which together can also compensate for any crop losses.	AF systems increase resilience to: • extreme dry conditions • variable rainfall • extreme rain and wind • rising temperatures and evaporation rates AF also reduces the risk of production failure by diversifying enterprises and income sources.	AF systems have high potential for climate change mitigation via carbon sequestration in the soil and biomass.

Understanding the nature of coconut-based farming systems and the role of men and women

At least 80% of the total agricultural land area of Guinayangan is devoted to coconut and the main source of livelihood of majority of farming households is copra (dried coconut kernels where oil is extracted) production. Mono-cropping is the dominant simplified "agroforestry" farming system in this area. Traditionally, copra processing is a male-dominated agricultural operation. However, in the recent years, women are starting to be involved and sharing the income from copra processing. There is increasingly equal opportunity for women to earn income. They typically work from 7:00-8:00 am, return back at 11:30 am, and later back to work until 4:00pm, returning to feed their animals and attend to household chores.

[1] Sabina Alkire, Ruth Meinzen-Dick, Amber Peterman, Agnes Quisumbing, Greg Seymour, Ana Vaz, The Women's Empowerment in Agriculture Index, World Development, Volume 52, 2013, pages 71-91.

[2] Schaller M., Barth E., Blies D., Röhrig F., Schümmelfeder M. (2017). Climate Smart Agriculture (CSA): Climate Smart Agroforestry. International Center for Tropical Agriculture (CIAT); The Centre for Rural Development (SLE), Berlin. 4p.

There are nine major activities (Figure 3) performed in the coconut value chain, as identified by the locals. Generally, men are more involved in the production activities, especially those that require physical strength, such as harvesting or polling, collecting, removal of husk, preparation of the kiln for smoking, weighing and loading of by-products. Though women share in all activities, they have bigger role in activities such as shelling and preparation for cooking. During the focused group discussions, farmers claim that decisions on where to market the copra is vested with the copra integrator or "casa", a middle-man. These copra integrators usually support in the form of advances or loans. Aside from roles, decision-making is also dominated by men in copra production (Figure 3).

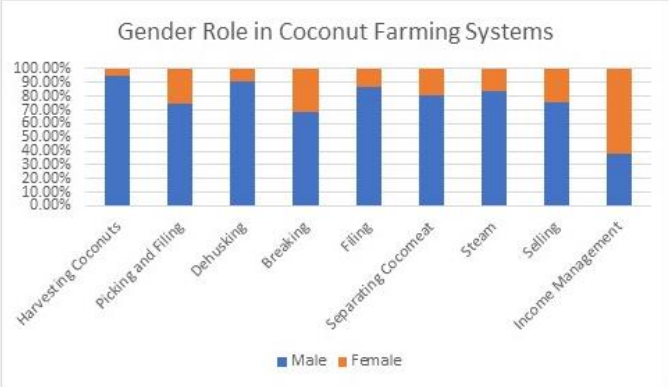

Figure 3. Gender role in coconut production

In spite of the historical preference by the locals for coconut-based farming systems as primary livelihoods, there is an acute awareness of the risks from mono-cropping). Results from the conducted vulnerability assessments confirmed these risks. Vulnerability to climate-related hazards was pronounced when typhoons hit (uprooting coconut trees or decapitating their canopies). Longer dry seasons also results into smaller and lesser nuts thus, fetching lower prices. For this farming system to become resilient, both intensification and diversification of production was identified as major CSA requirements. Agroforestry, through the introduction of multi-story farming systems, was promoted as a climate-smart primary pathway. The integration of banana, cacao and black pepper as an under-story crop was an initial first step followed by long-term perennials such as fruit trees like rambutan, custard apple, jackfruit, durian, and citrus. Each farmer received an average of 20 fruit trees. Appropriate CSA farming techniques such as planting in deep and wide pits and the use of compost and green leaf manure trees (*gliricidia sepium*) was bundled in. Cacao, coffee and black pepper, as well as small livestock production, formed part of the new income pathways in this climate resilient farming system.

Initial benefits from this system accrued in the form of better nutrition and improved food security. Farmers reportedly being able to share farm products with neighbors. Some farmers are already harvesting products from the secondary crops, usually the short cycles crops. Fruit, coffee, cacao and fruit trees are long cycle crops, viewed as assets for the future. Many emphasize that they are investing in medium and long cycle activities (trees), primarily for their children's future. Generally, considerations for adoption are: market viability, requiring less labor, and not competing with their main livelihood: copra production.

From the data sets it appears that the preference for agroforestry is primarily men, at 66% adopters and 34% by women (Figure 2).

The factors that drive women to adopt is influenced by the technology's labor requirement, it should not be labor-extensive and, should offer quick benefits. Women's priority are short-term expenses such as food, school children's expenses (school supply, transportation, food). They prefer livelihood options that provide income for them. They prefer short-term crops such as root and tuber crops and legumes which they can sell and consume. The labor required in planting fruit trees (with wide, deep pits) is considered heavy for women. However, they do see the benefit of this approach as trees tolerate drought better (deep pits, deep roots, better drought tolerance). Women also prefer understory crops that are not time consuming thus allowing them to attend to their households' primary livelihood: copra production. Daily income flows from copra helps women cover their daily cash needs. They prefer to plant root and tuber crops and legumes as compared to vegetables that require their constant care and management. Another factor influencing the planting of perennial crops like fruit trees is the land ownership factor: many of the upland farmers are tenants.

Women also prefer small livestock. Initially, goat raising was integrated in the system. But since goats produce only 1-2 offspring, and culturally not considered a "staple" source of meat in this part of the country, goats are usually butchered during special occasions, like birthdays. Farmers prefer to integrate native pigs into these farming systems, being easier to raise, produce more offspring and with good market potential.

Labor and decision requirements for the agroforestry system

Except for the fruit trees where men have a bigger role in land preparation, the other CSA options, such as understory crops like root and tuber crops, legumes, cash crop such as pineapple, women and men contribute labor equally. Decision making in these crops is share]=[.

Low external input-based small livestock production as an option for women

Livestock production systems, especially the large-scale commercial systems associated with pork and broiler production, have large carbon footprints because of their heavy reliance on external inputs. Feed has to be formulated and combined with chemical additives (antibiotics, hormones preservatives and micro-nutrients) and transported hundreds of miles to feed retailers, and finally, to the producers. Many of these production systems, which rely heavily on external inputs, are increasingly emerging as livelihood options, uniquely suited to the richer farmers. The livestock sector is a promising income generating option that the poor do not engage in, because of high costs entailed. Livestock production is expected to come under considerable pressure in the future as result of rising temperatures, affecting the growth and reproductive rates of pigs and other livestock.

There are ways to reduce the carbon footprint of livestock production systems while also reducing risks, by emphasizing small-scale, backyard systems that rely more on locally grown alternative feed sources such as roots and tuber crops, leafy crops, and by-products like copra and rice bran. Commercial feed can be used in the first month only to ensure a balanced diet is achieved during the critical first month. Housing is another important aspect deserving attention in the wake of climate change. Native housing for animals can help further lower the temperatures that the animals are subjected to. These systems are climate-smart because they rely on natural materials found locally while also providing aeration that lowers ambient temperatures and thus reduces health/disease risks. A focus on native pigs or mixed breeds will further reduce the current near total reliance on external feed for pig production. More importantly such production systems are relevant to the poor, especially women. However, with the constant increase in feed production, small farmers are slowly disengaging from this livelihood option.

The common livestock production in Guinayangan involves commercial swine raising, carabaos, and cows. Generally, men are more involved in the activities and in the decisions except for income management where women are more involved than men (Figure 4). Women and men share the task mostly for swine production. For large animal such as cows and carabaos, mostly is a man's responsibility.

Low-external input production is a pathway to reducing the carbon footprint of livestock production while promoting it for women and the poor. Emphasizing small scale backyard system that rely on locally grown alternative feed sources, using native housing materials, the project re-introduced native pigs. Native breeds are known to tolerate high temperatures and humidity better than modern and commercial breeds. The production of forage species (e.g., *gabi*, kangkong, camote, *tricanthera*, guinea grass, napier, *callliandra*, ipil-ipil, etc.) at household level helped ensure feed even during dry seasons. The testing of alternative pig feed formulations has been promoted. Improved housing practices was also introduced and the setting up of decentralized breeding facilities at the community were set up. This was necessary for upgrading local breeds of goats and pigs.

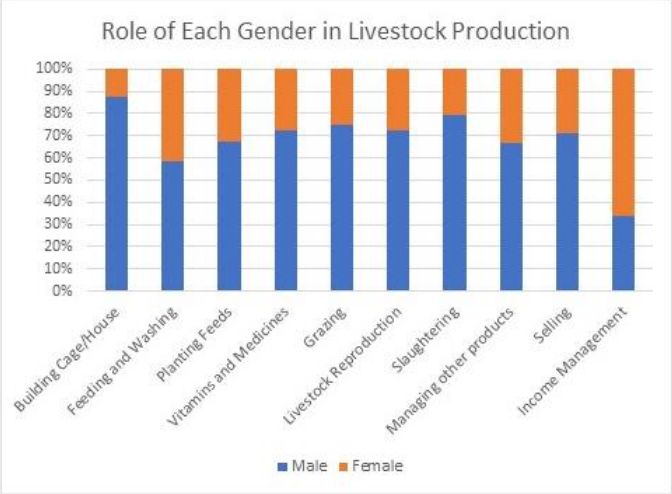

Figure 4. Gender role in small livestock production

Monitoring data indicates that adoption rate for this CSA option is relatively higher for women (86%) as compared to men (14%) as indicated in Figure 2.

The practice of low external input pig production has drawn wide interest and the number of women increased to 74 farmers and expanded to five additional villages. The interest in native breed pig production has been rekindled among women. This CSA serves as an asset building approach, involving only a small investment outlay with potential for expansion. When raised in housing made of natural materials, the temperatures can be lowered in these pigpens (open sides permitting aeration and roofs made of natural materials).

Growing native pigs has proven to be reliable due to their tolerance to changing climate. They have higher survival compared to commercial breeds. A litter can be sold for PHP2,000 while a fully grown (3-4 months) native pig can be sold at PHP100-120 per kilo at live weight, if butchered can go as high as PHP180 and if processed into lechon can generate PHP200 per kilo (PHP50 = USD1).

Swine raising is now considered as women's' livelihood when in the past, commercial pigs were managed mostly by men. Women are more involved in the management of native pigs, devoting 70% of total time in animal management. Consequently, they have a say on how to spend the income from this livelihood. It is well-known that women are inclined to spend income they earn on children education, better nutrition, and food and medical expenses. Women now proudly claim that they can afford to serve "lechon" or roasted pork during special occasions

(usually associated only with wealthy households), thus enhancing their social status.

Social learning: The unifying requirements for empowering farmers and women leaders

Farmer Learning Groups (FLGs) provide the beneficiaries with a platform for knowledge exchange. The FLGs are designed to bring together beneficiaries while creating a sense of belonging to a community, giving them a platform to help one another. Women participation in the pig production learning group has been very evident, with 84% being women adopters and only 14% are men and of the 34 members in the Arbismen FLG, 20 are women. This has increased their confidence and feelings of self-worth.

Women have started to take on leadership role as well in community activities. Of the 13 swine FLGs, nine are led by women. In addition, the Arbismen FLG has been able to reach out to more than 15 women in their own village and to more than 10 women in other villages. In the FLG, challenges are overcome together.

Summary

- Men have a dominant role in mono-crop coconut farming systems making most of the decisions. Men and women share production and marketing decisions of crops other than coconut.
- Native swine production has been considered a woman's livelihood as they are more involved in the management of swine. In livestock, the norm in the Philippines, is whoever provides the most labor, owns the animal. Small livestock is now considered a relevant CSA and women livelihood option, as their role and decision-making increases.
- Crop diversification is also taking place, with women preferring to plant understory crops like root and tuber crops and black pepper. Understory crops do not usually take too much time and does not detract women from their main source of livelihood of copra production.
- This choice of crops and cropping patterns is driven by their priorities. Women's priorities currently are for meeting daily, short-term expenses such as food, school children's expenses (school supply, transportation, food).
- Compared to other sources of income; household members find small livestock to be the most worthwhile as it generates significant income from a small investment in a short span of time. Swine are also considered as assets that can readily be sold in the eventuality of emergencies.
- When assets are built and savings increased, households have more disposable income that they can use, not only to support everyday expenses, but also to purchase non-essential needs.
- In coconut-based systems, the introduction of CSA based on fruit, tree, coffee, cacao, black pepper, and bananas are considered low carbon pathways for building nature assets (and carbon stocks) and for anticipatory adaptation (for the future). On the other hand, annual crops such as root tubers and bananas and small livestock are all short cycle activities that generate interim benefits while also supporting the intensification-diversification CSA agenda. This approach of bundling long cycle and short cycle CSA activities augurs well as a gender-sensitive and equitable climate change adaptation approach.
- With the promotion of CSA/agroforestry in these coconut-based systems, role and decision-making processes have become more egalitarian (between men and women). With the incorporation of women-friendly crops and small livestock within the system, women have started to play an active role in the coconut-based farming systems.
- The use of farmer learning group platforms has provided voice and opportunity for farmers, especially women, to share their experiences in managing their swine and in collectively analyzing and resolving management issues.

Conclusion

The data collected in Guinayangan Philippines has demonstrated that there is not much difference in how men and women perceive the nature and impacts of climate change. They understand impacts in terms of its implications for the entire household and the farming system. Roles and responsibilities are culturally determined. Women relegate most of the "heavy" tasks to men. However, there is value in understanding the roles and the division of labor as they can help identify/support in identifying options.

The factors that drive women (and men) to adopt any technology or associated processes is determined by a technology's labor requirement. Ideally, it should not be labor extensive and should offer early benefits.

Women prefer short cycle livelihood options which generate regular and daily income sources from within the limits of their resource base.

Small-scale, low carbon footprint production systems of native pigs (small livestock) provide special opportunities for the economic empowerment of women. Small livestock are assets that women can consider their own to manage and decide on.

Diversification as a climate-smart agriculture programing surfaces as a promising investment option for governments, donors and CSO providers. The co-benefits of growing understory crops of economic and food and feed value are recognized, for the increased food and income they generate. Important environmental co-benefits accrue such as the enhancement of carbon sequestration, the lowering of temperatures as result of

the micro-climate manipulation that result from multistory/multi strata cropping systems and the enhancement of above and below ground biodiversity. Households, women, and the local environment in Guinayangan benefit in multiple ways from the intensification and diversification of Guinayangan's coconut-dominated landscapes. Numerous climate-smart villages spread across the municipality serve as proof of concept providing evidence that climate-smart agriculture based on agroforestry type interventions are gender sensitive. Spontaneous outscaling of these approaches from community to community and farmer to farmer is noted, supporting efforts for incentivizing community-based adaptation.

References

- Akter, A., Rutsaert, P., Luis, J., Htwe, N.M., Su, S., Rahajo, B., and Pustika, A. (2017). Women's Empowerment and Gender Equity in Agriculture: A Different Perspective from South Asia. Food Policy. Retrieve from https://www.sciencedirect.com/science/article/pii/S0306919217303688
- Alkire, S., Meinzen-Dick, R.S., Peterman, A., Quisumbing, A.R., Seymour, G., and Vaz, A. (2012). The Women's empowerment in Agriculture Index. IFPRI Discussion Paper. Retrieved from http://www.ifpri.org/publication/women%E2%80%99s-empowerment-agriculture-index
- Batliwala, S. (1994) "The Meaning of Women's Empowerment: New Concepts from Action," Gita Sen et al. (eds.) Population Policies Reconsidered: Health, Empowerment and Rights. Harvard Center for Population and Development Studies.
- Bina Agarwal, 1997. ""Bargaining" and Gender Relations: Within and Beyond the Household," Feminist Economics, Taylor & Francis Journals, vol. 3(1), pages 1-51.
- Climate resilience in agriculture: key concepts for community-based adaptation: https://cgspace.cgiar.org/rest/bitstreams/90427/retrieve;
- Climate Smart Agriculture: a primer of local government officials in the Philippines: http://hdl.handle.net/10568/68835;
- Climate Smart Villages: Key Concepts, A primer for CCAFS partners in Southeast Asia: http://hdl.handle.net/10568/76929
- Dankelman, I., Alam, K., Ahmed, W.B., Gueye, Y.D., Fatema, N. and Mensah-Kutin, R. (2008), 'Gender, Climate Change and Human Security Lessons from Bangladesh, Ghana and Senegal', report prepared by The Women's Environment and Development Organization (WEDO) with ABANTU for Development in Ghana, ActionAid Bangladesh and ENDA in Senegal.
- Escobar C. Y., Quintero M.A., Garc´ıa, M. V. (2007). *The Women's Role in the Adaptation to Climate Variability and Climate Change: Its Contribution to the Risk Management*. Retrieved from https://www.researchgate.net/publication/252560515
- FAO. (2011). The state of food and agriculture, women in agriculture, closing the gender gap in agriculture 2010–11. Food and Agriculture Organisation of the United Nations, Rome.
- FAO (2010). The State of Food Insecurity in the World. Addressing food insecurity in protracted crises. ISBN 978-92-5-106610-2. http://www.fao.org/docrep/013/i1683e/i1683e.pdf.
- Gender in Climate-Smart Agriculture Module 18 for the Gender in Agriculture Sourcebook. World Bank, FAO and IFAD. Retrieved from http://documents.worldbank.org/curated/en/654451468190785156/Gender-in-climate-smart-agriculture-module-18-for-gender-in-agriculture-sourcebook
- Glemarec, Y., Qayum S. and Olshanskaya, M. (2016). *Leveraging Co-benefits Between Gender Equality and Climate Action for Sustainable Development: Mainstreaming Gender Considerations in Climate Change Projects.* UN Women.
- Goh A. 2012. A literature review of the gender differentiated impacts of climate change on women's and men's assets and well-being in developing countries. Washington, DC: International Food Policy Research Institute.
- Hindin, M.J. Women's autonomy, women's status and fertility-related behavior in Zimbabwe. *Population Research and Policy Review* 19, 255–282 (2000). https://doi.org/10.1023/A:1026590717779
- Huyer, S. (2016). *Closing the Gender Gap in Agriculture*. Gender, Technology and Development. 20(2) 105-116. Asian Institute of Technology. SAGE Publication. Retrieved from http://journals.sagepub.com/doi/abs/10.1177/0971852416643872
- Huyer, S., Campbell, B., Hill, C. and Vermeulen, S. J. (2016). *CCAFS Gender and Social Inclusion Strategy. Working Paper No. 171.* CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Retrieved from https://ccafs.cgiar.org/publications/ccafs-gender-and-social-inclusion-strategy#.WtlDS9R97VQ
- Jost C, Kyazze F, Naab J, Neelormi S, Kinyangi J, Zougmore R, Aggarwal P, Bhatta G, Chaudhury M, Tapio-Bistrom M-L, Nelson S, Kristjanson P. 2015. Understanding gender dimensions of agriculture and

climate change in smallholder farming communities. Climate and Development 8(2): 133- 144.

- Kabeer, N. (2001). Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment. Discussing Women's Empowerment-Theory and Practice. SIDA Studies No. 3, Swedish International Development Cooperation Agency, Sweden.

- Kahlon, P., (2004). '73rd amendment and women's empowerment: A Punjab study' A paper presented in the seminar on Rural Women and Economic Empowerment of Women in South Asia at GB Pant Social Science Institute, Allahabad.

- Kakota T, Nyariki D, Mkwambisi D, Kogi-Makau W (2011) Gender vulnerability to climate variability and household food insecurity. Climate Dev 3(4):298–309.

- Kishor, S., Subaiya, L., Macro International, United States., & MEASURE DHS (Program). (2008). *Understanding women's empowerment: A comparative analysis of Demographic and Health Surveys (DHS) data*.

- Mahmud, S. and A. Johnston (1994) "Women's Status, Empowerment, and Reproductive Outcomes," in G. Sen, A. Germain and L. C. Chen (eds.) Population Policies Considered: Health Empowerment and Rights. Boston, MA: Harvard School of Public Health.

- Manilay, A., Cabriole, M.A., Itliong, K., Jordan, R., Ro simo, M., Monville-Oro, E., Barbon, W.J. and J. Gonsalves. 2021. Coconut-based systems in the Philippines: Intensification and diversification with Climate-Smart Agriculture. Working Paper No. 367. Wageningen, the Netherlands: CGIAR Research Pro gram on Climate Change, Agriculture and Food Secur ity (CCAFS). https://hdl.handle.net/10568/115290

- Mendez KS, Vidallo RR, Rosimo M, Angeles DR, Bernardo EB, Gonsalves J. 2021. Learning Groups: refining technologies and social processes for climate resilient agriculture. Cavite, Philippines: International Institute of Rural Reconstruction (IIRR). https://hdl.handle.net/10568/114778

- Narayan, Deepa. 2002. Empowerment and Poverty Reduction: A Sourcebook. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/15239 License: CC BY 3.0 IGO.

- Nelson, S. and Huyer, S. *A Gender-Responsive Approach to Climate-Smart Agriculture: Evidence and Guidance for Practitioner*. Practice Brief Climate Smart Agriculture. Global Alliance for Climate-Smart Agriculture.

- Nelson, V., & Stathers, T. (2009). Resilience, power, culture, and climate: a case study from semi-arid Tanzania, and new research directions. *Gender and Development*, *17*(1), 81–94. Retrieved from: http://www.jstor.org/stable/27809208

- Nhamo, G. (2014). Addressing women in climate change policies: A focus on selected east and southern African countries, Agenda: Empowering women for gender equity. p156-167. http://dx.doi.org/10.1080/10130950.2014.94673

- Ortega, B. and Klauth, C. (2017). *Climate Landscape Analysis for Children in the Philippines*. UNICEF Philippines. Retrieved from https://www.unicef.org/philippines/UNICEFPHCLAC.pdf

- P. Kristjanson, A. Waters-Bayer, N. Johnson, A. Tipilda, J. Njuki, G.D. Baltenweck, D. MacMillan. Livestock and women's livelihoods: a review of the recent evidence.

- Perez, C., Jones, E. M., Kristjanson, P., Cramer, L., Thornton, P. K., Forch, W., & Barahona, C. (2015). How resilient are farming households and communities to a changing climate in Africa? A gender-based perspective. Global Environmental Change, 34(September), 95–107. Retrieved April 24, 2016, from http://doi.org/10.1016/j.gloenvcha.2015.06.003

- Philippine Commission on Women (2014). Women's Empowerment, Development and Gender Equality Plan 2013-2016. Retrieved from http://library.pcw.gov.ph/sites/default/files/WEDGE_plan_2013-2016_0.pdf

- Pulerwitz, J., Gortmaker, L., DeJong, W. (2000). Measuring sexual relationship power in HIV/STD research. Sex Roles, 42(7/8), 637-660. http://link.springer.com/article/10.1023%2FA%3A1007051506972

- Quisumbing, A. R., & Pandolfelli, L. (2010). Promising approaches to address the need of poor female farmers: resources, constraints, and interventions. World Development, 38(4), 581–592.

- Schuler, S.R., and S.M. Hashemi. (1994). Credit Programs, Women's Empowerment, and Contraceptive Use in Rural Bangladesh. *Studies in Family Planning.* Vol. 25, No. 2, pp.65-76.

- Seller, S. (2016). Gender and Climate Change: A Closer Look at Existing Evidence. Global Gender and Climate Alliance. Retrieved from http://genderandenvironment.org/resource/gender-climate-change-closer-look-existing-evidence/

- Sheahan, Megan; Barrett, Christopher B. 2014. Understanding the Agricultural Input Landscape in Sub-Saharan Africa: Recent Plot, Household, and

Community-Level Evidence. Policy Research Working Paper;No. 7014. World Bank Group, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/20346 License: CC BY 3.0 IGO.

- Smith S, Sullivan K. Examining the influence of biological and psychological factors on cognitive performance in chronic fatigue syndrome: a randomized, double-blind, placebo-controlled, crossover study. Int J Behav Med. 2003;10(2):162-73. doi: 10.1207/s15327558ijbm1002_05. PMID: 12763708.

- South East Asia Climate-Smart Villages AR4D sites: 2016 Inventory: Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/83372/Scoping%20Study%20Climate%20Smart%20Villages%20in%20Myanmar.pdf?sequence=1&isAllowed=y

- Tall A, Kristjanson P, Chaudhury M, Mckune S. 2014. Who gets the information? Gender, power and equity considerations in the design of climate services for farmers. Copenhagen, Denmark: CGIAR Climate Change, Agriculture and Food Security Programme.

- Twyman J, Green M, Bernier Q, Kristjanson P, Russo S, Tall A, Ampaire E, Nyasimi M, Mango J, McKune S, Mwongera C, and Ndourba, Y. 2014. Adaptation Actions in Africa: Evidence that Gender Matters. CCAFS Working Paper no. 83. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

- UN Women Watch. *Women, Gender Equality and Climate Change*. Fact Sheet. Retrieved from http://www.un.org/womenwatch/feature/climate_change/

- Yabinski, R. (2012). *Women More Vulnerable Than Men to Climate Change.* Retrieved from https://www.prb.org/women-vulnerable-climate-change/

This info note provides a summary of a range of climate-smart agriculture activities undertaken as part of a project funded by CCAFS P1596 gender-sensitive CSA options trialed and tested in CSVs in Southeast Asia led by the International Institute of Rural Reconstruction (IIRR) in the Philippines.

Magnolia Rosimo *(maggie.rosimo@iirr.org) is the Program Manager of the Learning Community Program of the IIRR Philippine Country Office.*

Julian Gonsalves *(juliangonsalves@yahoo.com) is the Senior Advisor for IIRR's Program in Asia.*

Francia Villavicencio *(francia.villavicencio72@gmail.com) is a former staff member at the IIRR Asia and currently with WFP in Ethiopia.*

About CCAFS Info Notes

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) brings together some of the world's best researchers in agricultural science, development research, climate science and Earth system science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security. Visit us online at **https://ccafs.cgiar.org**.

CCAFS is led by the International Center for Tropical Agriculture (CIAT) and supported by:

CGIAR · Australian Government Australian Centre for International Agricultural Research · Irish Aid · Ministry of Foreign Affairs of the Netherlands · New Zealand Foreign Affairs & Trade Aid Programme · Swiss Agency for Development and Cooperation SDC · UKaid from the British people · USAID From the American People · IFAD Investing in rural people