

GENDERED BARRIERS AND PARALLEL REALITIES: Gender and Climate Action Research on Corn Value Chain in Bukidnon and Maguindanao, Philippines



Implementation of the ASEAN Green Recovery through Equity and Empowerment (AGREE) Project in the Philippines



**GENDERED BARRIERS AND PARALLEL REALITIES:
Gender and Climate Action Research on Corn Value Chain in Bukidnon and Maguindanao
Provinces, Philippines**

Research Team

Maria Carolina Rodriguez-Dawonlay vda. Bello
Divina Gracia Mariano Baclig
Lalang Hu Mga Laga Organization, Inc.

Field Researchers

Jocelyn Dawonlay (Impasug-ong and Sumilao)
Iriel Meliston (Malaybalay)
Mellan Sayutin (Datu Saudi Ampatuan)
Helen Rojas (Maguindanao)
Bainot Sarah Abdullah (Datu Odin Sinsuat)
John Rey Dawonlay
Maria Carina Rodriguez

Project Implementer - Philippines, Philippines Partnership for Sustainable Agriculture

Amy Melissa Chua
Cherry Tadeo
Ryan Abarquez
Jedidaiah Herrera
Suzie Hope Vanidad

Local Partner Organizational

Sigay Nu Mga Babay, Community-based organization/Women's Group

Government

Ministry of Agriculture, Fisheries and Aquatic Resources (MAFAR)
Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)
Office of the Provincial Agriculturist, Province of Bukidnon
Department of Agriculture - Local Offices in LGUs
Philippine Commission on Women

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On cover is Jocelyn Dawonlay, Impasugong and Sumilao local researcher and corn farmer showing her corn crops in their 14-leaf growth stage. Photo by Maria Carolina Rodriguez-Dawonlay vda. Bello

Authors: Maria Carolina Rodriguez-Dawonlay vda. Bello, Divina Gracia Mariano Baclig
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EXECUTIVE SUMMARY

The Philippines has a total land area of 30 million hectares with 14.1 million hectares or 47 percent of the country considered as agricultural land used for production of rice and corn – the two major crops of the country. Agriculture is one of the main drivers of the Philippine economy contributing 8.5 percent to the Philippine Gross Domestic Product (GDP) and employing more than one third or approximately 24.5 percent of the population (PSA, 2022). However, the sector has been facing several challenges that hinder its development and the improvement of lives and livelihoods of smallholder Filipino farmers. One these concerns is around climate resilience and adaptation. While climate change negatively impacts the sector, the contribution of agriculture practices to greenhouse gas emissions also cannot be discounted.

It is against this background that the ASEAN Green Recovery through Equity and Empowerment (AGREE) is being implemented in the Philippines. This research project has two main objectives - to understand opportunities and barriers, and generate recommendations for private and public sector actors to ensure their efforts to transition to a low-carbon economy in ASEAN's agriculture sector are gender-inclusive and promote livelihoods and green job opportunities for women. Towards this end, the research investigates the conditions necessary to promote equal opportunities for women and men to engage in and benefit from agriculture value chain practices that contribute to a low-carbon economy. Findings from the research will inform a pilot testing of solutions with private sector partners and recommendations for policymakers.

The project kicked-off with a virtual consultation workshop convened by the Philippines Partnership for Sustainable Agriculture (PPSA) for the selection of the value chain of focus for AGREE. The workshop served as a focus group discussion where participants, who have strong experiences in working with women farmers, and with climate-smart agricultural practices, explained actual government programs, business practices, and initiatives related to their respective value chains of involvement. Following this and field research activities, the project pursued a study on the role played by and the participation of women farmers in the corn value chain. The sites covered are Bukidnon and Maguindanao with a total of 170 respondents of household interviews, focus group discussions, and key information interviews¹. Of this number, there were 80 farmer respondents recorded in the household (HH) interviews.

The research found that women play a real significant role in corn farming, evidenced by their presence in most of the value chain activities, specifically in bringing quality yield attributed to women's diligent upkeep of the farms using climate friendly practices. More than half of the female respondents are taking on a number of production activities such as harvesting, pest control, spraying, pruning and clearing, land maintenance, and transplanting; while also doing most of the reproductive tasks that make production possible. Men do more physically heavy tasks such as land preparation (plowing) and operation of farm equipment. Women mostly do the weeding, which takes time to do and can also be physically tasking. Women's weeding task is an invisible and undervalued role that affects corn production's reliance on herbicides, making women potential champions of climate action in the corn value chain.

Based on the field research, the issues affecting women corn farmers pertain to low income, crop failure, effects of hazards including pests and diseases, lack of government financing and crop

¹ Key informants from local government functionaries and local trader groups, social enterprises, community-based women's groups.

protection, and lack of and high prices of farm inputs. The situation experienced by farmers is surrounded by systemic challenges including some key strategic concerns such as lack to no access to information and local planning opportunities, and lack of an enabling environment that could increase the agency of the farmers. Policies are in place but there is a gap in implementation.

On the other hand, climate action is still focused on adaptation, e.g., use of genetically upgraded or modified varieties of seeds in corn farming. These varieties have higher yield but also demand a higher quantity of inputs such as chemical fertilizers, pesticides, and glyphosates. While there are good initiatives by the government in place, these programs remain far from benefiting farmers on the ground, especially women farmers. Mitigation-related practices can be pursued but takes a higher level of investment, resources, and absorptive capacity.

Furthermore, the lack of government operationalization of gender-transformative climate action, the invisibility of private sector efforts to support smallholder production, and the problem associated with price control by traders make corn production difficult and economically unstable on the side of the small farmers, who, when gathered together, make a big contribution to the entire corn value chain.

Gender-inclusive approaches also seem to be missing at the operational level. This is true for the micro, meso, and macro practices and innovations in climate action among communities, social enterprises, and businesses. Women farmers are missing in the agricultural data used by the local government functionaries, as evidenced by the lack of data on the percentage of farming households, and the inexistence of sex-disaggregated data on agricultural households. There are also no women's livelihoods or green jobs run by the government or private sector in the areas covered.

The results of the study call for further engagement and incentivization of women corn farmers in climate action. Green jobs would be one of the ways to involve women in meaningful climate action. An example of which is the involvement of women in organic fertilizers and zero GHG renewable-natural energy production and marketing. But for green jobs to be sustainable, government and private actors should come in with initial financing that are equitable to address the issues of lack of access to assets, such as tools, equipment, and land as well as rights to own these. Knowledge, skills, and technology from government programs on climate change needs to be transferred not only to farmers but also to stakeholders, especially the duty bearers.

Other recommendations are elaborated in the latter part of this report and includes the following key suggested solutions:

- Align and appropriate targeted climate action initiatives would be ideal
 - Promote gender and development and climate education locally
 - Scale up existing climate innovation practices that are already promoting women's role to overcome gender-based constraints in agricultural value chains
 - Maximize entry points for promoting and scaling women's empowerment and gender transformation in agricultural value chains
 - Create local development budget menu for prioritization towards climate positive and WEE-enabling programs

- Implement real and equitable transfer of knowledge, skills development, and technology that integrates the development of gender, climate, and crisis lens of farmers
- Design various forms of investment that incentivizes climate-smart initiatives at the local level by providing tangible and intangible benefits and opportunities
- Rethink regulatory measures and engagement with the private sector

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List of Acronyms

ADB	Asian Development Bank
ARMM	Autonomous Region in Muslim Mindanao
ASEAN	Association of Southeast Asian Nations
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BAS	Bureau of Agricultural Statistics
BENRO	Bukidnon Environment and Natural Resources Office
BINHI	Basic Integration for Harmonized Intervention
CA	Conflict-affected
CH ₄	Methane
CO ₂	Carbon dioxide
DA	Department of Agriculture
DOS	Datu Odin Sinsuat
DSA	Datu Saudi Ampatuan
EPA	United States Environmental Protection Agency
FAO	Food and Agriculture Organization
FAW	Fall ArmyWorm
FGD	Focus Group Discussion
GAD	Gender and Development
GDP	Gross Domestic Product
GHG	Greenhouse Gasses
GSVC	Gender-Sensitive Value Chain
HH	Household
HVCC	High Value Commercial Crops
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
KII	Key Informant Interview
MAFAR	Ministry of Agriculture, Fisheries and Agrarian Reform
MILF	Moro Islamic Liberation Front
MNLF	Moro National Liberation Front
N ₂ O	Nitrous oxide
NFSCC	National Framework Strategy on Climate Change
NSAG	Non-State Armed Group
OPAg	Office of the Provincial Agriculturist

PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PCW	Philippine Commission on Women
PPSA	Philippine Partnership for Sustainable Agriculture
PSA	Philippines Statistics Authority
R&D	Research and Development
SAAD	Special Areas for Agricultural Development
SCOPSA	Sustainable Corn Production in Sloping Areas
SOCCKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani, General Santos
SSNM	Site-Specific Nutrient Management
UNAHCO	Univet Nutrition and Animal Healthcare Company
UNFCCC	United Nations Framework Convention on Climate Change
UNU-EHS	United Nations University - Institute for Environment And Human Security
VC	Value chain
WEEF	Women's Empowerment and Equality Framework

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1. BACKGROUND AND CONTEXT

The Philippines has a total land area of 30 million hectares with 14.1 million hectares or 47 percent of the country considered as agricultural land. The national banner crops for the Philippines are rice and corn (PSA, 2014). High value commercial crops (HVCC) are also produced, such as coffee, cavendish banana, mango, coconut, sugarcane, pineapple, cassava, camote, garlic, eggplant, calamansi, onion, cabbage, tobacco, rubber, cotton and abaca; and livestock.

In terms of disaster risk, the Philippines ranks third among countries with the highest risk index globally, with the highest exposure and susceptibility to extreme events coupled with the least coping and adaptive capacities.² Being most vulnerable to climate change with sea level rise, increased frequency of extreme weather events, rising temperatures, and heavy rainfall that brings floods and mudflows, which all negatively impact the natural environment, agriculture and food production, and pose health risks including mosquito-and-water-borne diseases, among other ill-effects.³ The agriculture sector, especially in the Philippines, bears the brunt of these climatic shocks. One extreme event can spell monumental disaster for rural communities dependent on incomes from rice and corn farming. As an example, when Typhoon Rai⁴, locally known as Odette, hit the country in December 2021, it resulted in over half a billion dollars-damage to the agricultural sector and affected almost a third of the working population in the sector.

The United Nations Framework Convention on Climate Change (UNFCCC) estimates greenhouse gas (GHGs) emissions contributed by the Philippine agriculture sector to around 29 percent of the country's total GHGs emissions – next only to the 55 percent from the Energy sector dominated by fossil fuels. With the commitment to reduce carbon emissions by 75 percent in the year 2030, agriculture plays a crucial role, especially given that its value chains - from production, aggregation, processing, and distribution - also involve mostly fossil-fuel-dependent transport and machinery. From other estimates, the Philippines agriculture sector's total greenhouse gas emissions at 61.37 million tons.⁵

Aside from being highly vulnerable to hydrometeorological and geologic hazards, the Philippines is also affected by armed conflict and violence. Decades of struggle for independence, dating back from 1969, from non-state armed groups (NSAG), such as the Moro National Liberation Front (MNLF) and the Moro Islamic Liberation Front (MILF) in Mindanao, have incited social unrest and insurgency affecting hundreds of communities (Bangsamoro Development Agency, 2015).

Being a member of the Association of Southeast Asian Nations (ASEAN), the Philippines is to benefit from the ASEAN's commitment to an inclusive, gender-, culture- and climate-responsive policymaking that will look into the opportunities and barriers that women farmers, women landowners, and women entrepreneurs particularly those from the marginalized sectors such as indigenous women and/or poorer communities.

² 2018 World Risk Report United Nations University- Institute for Environment and Human Security (UNU-EHS) and Amnesty Organization

³ Institute for Economics and Peace Report, 2019.

⁴ Typhoon Rai's trail of destruction in the Philippines reignites loss and damage calls. Climate Home News. Isabelle Gerretsen. Accessed 28 December 2022

⁵ <https://ourworldindata.org/>

2. RESEARCH OVERVIEW

The ASEAN Green Recovery through Equity and Empowerment (AGREE) research implementation in the Philippines began with the identification of the value chain of focus through a consultation with the partners of the Philippines Partnership for Sustainable Agriculture (PPSA), the implementing organization in the Philippines. The goal of the value chain selection was to focus on the crop that has potential to push forward the gender equality and climate agenda of the ASEAN.

Specifically, the objectives sought to be achieved are as follows:

1. Deeper private sector understanding of the “business case” responsibility and buy-in about how to transition agricultural value chains to become more inclusive, gender-responsive, and climate-positive.
2. ASEAN policymakers understand how to support actors and stakeholders such as agribusinesses, civil society, financial institutions/investors, development organizations/climate funds, as well as understand how to work with these actors and stakeholders to better develop policies/incentives, access NDC priority financing, or align investments.
3. Both public and private sectors jointly identify, design, and/or test high-impact women’s economic empowerment interventions for scaling in Cambodia, Philippines, and Viet Nam.
4. Women in agriculture value chains know how to adopt climate-positive practices and recognize themselves as a critical component of their own economic recovery and sustained prosperity.

While there is a research design guide established for the AGREE Project, the selection of the value chain of focus in the Philippines required a process that: a) consults key actors from private, public, and civil society sectors; b) preliminarily reviews data sets and literature; and c) employs field interviews. As set by the AGREE Project’s Research Methodology, the following criteria guided the PPSA in selecting the value chain of focus. These criteria intended to show the potential of the value chain to advance women’s economic empowerment and gender equality and low-carbon economic growth:

1. High proportion of women involved in any stages of production (where data exists)
2. High GHG emissions per production unit
3. Contribution of the value chain to national GDP and domestic food supply, as components of the national COVID-19 recovery plans
4. Demonstrated vulnerability to climate change
5. Crops/commodity identified in the climate change action plans with focus on those demonstrating alignment with the ASEAN Guidelines on Responsible Agricultural Investments
6. Crops/commodities which share a high concentration of women in value chain components where women experiences barriers on access and control over resources;
7. Crops/commodities where climate smart agriculture practices are already in place; and
8. Crops/commodities where private sector actors are already working on some initiatives;

A. Selecting corn as value chain of focus

Consultation with PPSA partners. On 7 July 2022, PPSA conducted an online consultation with its network partners who are engaged in the value chains of rice, vegetables, corn, coffee, poultry, and industrial farm waste. The consultation participants were first oriented on the purpose of the activity, the objectives of the research, gender in agricultural value chains, and climate actions in agriculture. The selection workshop did a pre-scan of (i) women's participation and benefits in the production, aggregation, processing, and distribution activities of the value chain. The selection also elicited responses through a combination of surveys and focus group discussions to scope the existing climate-smart practices in various commodities.

This consultation session found that women have high levels of participation in the corn value chain activities. Corn also enjoys greater market value compared to other crops. On the climate side, corn however registers significant emissions which makes it also a good target for carbon reduction potential, if done right. After the workshop, the analysis was developed along with desk research on the economic anchor of the commodities to the country and emerging plans. Pragmatic considerations on 1) the existence of stakeholders and a critical mass of partners in the network, as well as 2) balance in terms of existing investments across commodities in the country, were also taken into account in the final selection.

From visual scans in the community, anecdotal accounts from a local social enterprise also renders corn being a ready-product, allowing women to decide if they will pursue vending in their own stores or selling in the local marketplace, to traders or to factories and/or corn-product manufacturers. However, there are still cases in different areas when women smallholder farmers such those producing corn have less access to farm input and technology support and markets.

The climate-smart practices gathered were:

- Conversion of industrial farm wastes into organic fertilizers
- Inter-cropping, agroforestry
- Composting
- Regenerative agriculture training sessions
- Responsible sourcing
- Plastic neutrality
- Organic farming and inputs
- Manual labor without oil-powered machines
- Some advanced practices on decarbonization with targeted reduction targets on companies' direct and indirect emissions

From an institutional and investment point of view, corn also enjoys relatively less support in terms of public and private sector investments when compared to rice and coffee (the two other potential value chains of choice). Based on these considerations, the value chain chosen for the Philippines is corn.

B. Meta Review of Related Literature

Corn Value Chain in the Philippines

Corn is the second main crop in the country based on productivity and area. There are two main varieties produced in the country - yellow and white corn. Yellow corn accounts for 70 percent of the country's annual corn production which is grown and traded as a raw material for livestock feeds. White corn, on the other hand, is an alternative staple food to rice for 15 percent of the Philippine population, particularly in Visayas and Mindanao. Furthermore, corn provides income and livelihood to the various nodes of the value chain - from agricultural input suppliers, hauling and transport services, traders, and processors. Recent data from the Philippine Statistics Authority and Bureau of Agricultural Statistics (BAS) (2014) estimate the total production at 5,248,020 tons for yellow corn and 2,129,056 tons for white corn.

Due to its high market demand, yellow corn is the preferred variety, especially for farmers able to buy hybrid and farming inputs. This is also made apparent by the vast area of land (totalling 1,282,045 ha) dedicated to its production. Yellow corn is also preferred for feeds because of the high carotene content, which is very important in poultry growing, especially the egg-laying type (layers). White corn or flint type corn is utilized for human consumption, usually by marginal farmers as a cheaper alternative to hybrid corn. Smallholder farmers lack the capacity to buy hybrid seeds or fertilizers, unless provided for *pro bono* by the government.

Yellow corn's profitability is mainly driven by an increasing trend in the demand for meat (Labios et al., 2015: 14). Big corporations that produce animal feeds, mainly located in Central Luzon and Southern Tagalog regions, dominate the market.

Table 1. List of major players in the corn-based livestock feeds production

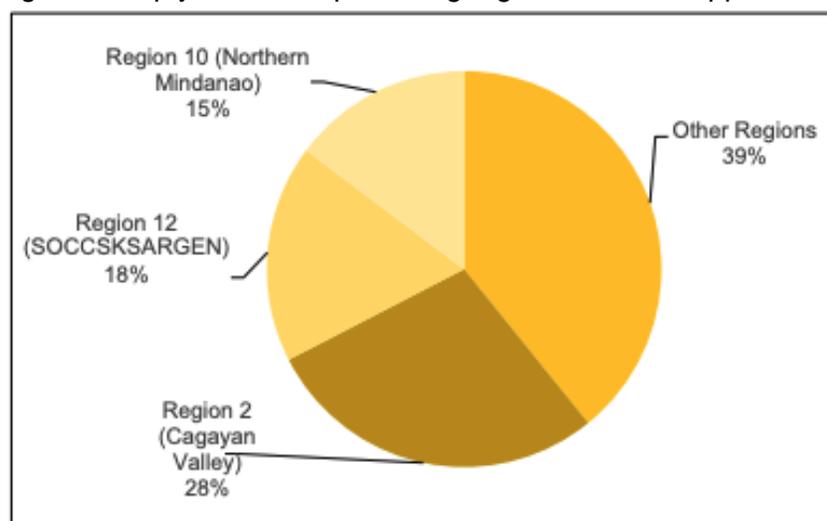
Major Domestic Players	Foreign Players
B-MEG of San Miguel Foods Incorporated (SMFI), reporting to have an estimated of 25% share in the feed market	Charoen Pokphand Foods (CPF), Thailand
Univet Nutrition and Animal Healthcare Company (UNAHCO), Inc.	New Hope Group, China
Pilmico Foods Corporation (Pilmico), the integrated agribusiness and food subsidiary of the Aboitiz Group	Sunjin, Korea

Source: Salazar (2021: 6)

Areas where yellow corn are mainly produced are the regions of Cagayan Valley (Region 2), SOCCSKSARGEN (Region 12), and Northern Mindanao (Region 10) accounting for around 61 percent of total domestic yellow corn production of the country (Salazar, 2021: 7). Among the

provinces that are top corn producers are Isabela, Bukidnon, and South Cotabato, totalling to approximately 45 percent of the total national output (Salazar, 2021: 7). Increased production in these areas can be attributed to the difference in weather patterns between the islands of Luzon, Visayas, and Mindanao (Salazar, 2021: 36-37).

Figure 1. Top yellow corn-producing regions in the Philippines, 2018

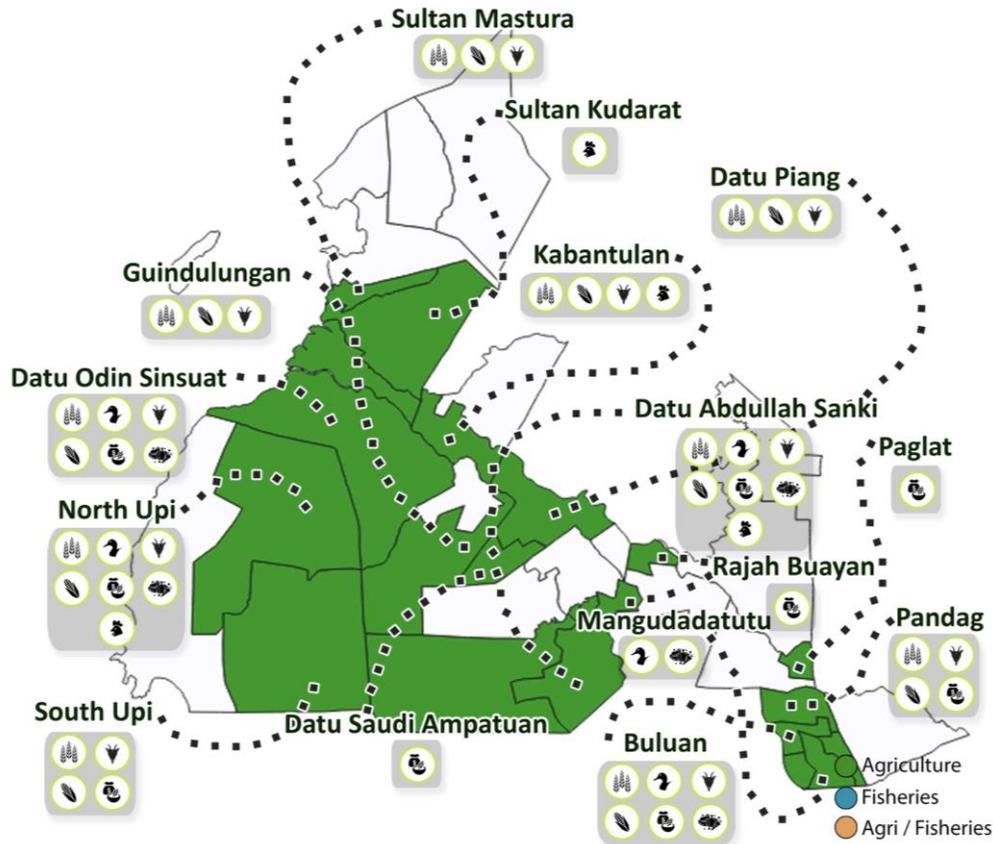


Source: PSA, 2019 in Salazar, 2021: 7

Unlike yellow corn, white corn has a limited number of hybrid varieties as seed companies do not find it particularly marketable (Labios et al., 2015: 12). Although native varieties are available for planting, these are usually early maturing and low yielding.

Geographical coverage for corn production

Bukidnon, one of the provinces of Northern Mindanao or Region 10, has a relatively large land area dedicated to corn production relative to other provinces in the region (Salazar, 2021: 22). According to the study conducted by Salazar (2021: 22), corn producers in the province are not smallholders with an average landholding in the range of two to 20 hectares.



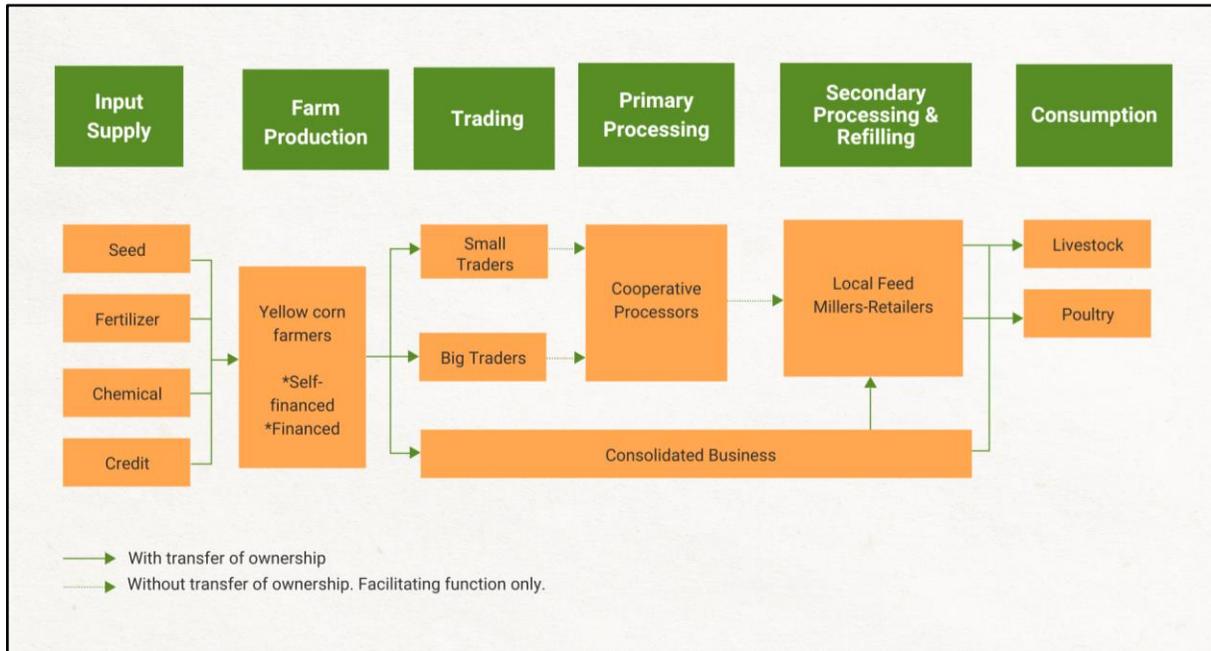
Source: Department of Agriculture. Retrieved from https://saad.da.gov.ph/priority_provinces/region-xiii/maguindanao-3

The total capital necessary for corn production in one cropping amounts to an average of PHP30,000 to PHP40,000 per hectare (Salazar, 2021: 22). Trader-lenders provide the needed capital, which the farmers should repay on their next harvest at a six percent interest rate per seasonal operation (Salazar, 2021: 22).

Next in the corn value chain are the traders that can be classified according to their purchasing capacity. Trader-lenders can be classified as small traders which purchase corn at a lower farm-gate price than big players, such as B-Meg. The advantage of selling to small players is the quick turnaround time and access to credit for purchase of much needed inputs for the next cropping season. Whereas there is a longer processing time, from one to several weeks, when selling to big traders (Salazar, 2021: 22).

For the processing node of the value chain, cooperatives play an important role in the yellow corn supply chain in Bukidnon, especially in providing postharvest processing facilities and services to farmers and traders (Salazar, 2021: 22). One of the services provided by cooperatives is the drying and hauling of yellow corn. After corn is dried, it is sold to feed mills, which conduct the secondary processing and retailing node of the yellow corn value chain.

Figure 3. Yellow Corn Value Chain in Bukidnon



Source: Salazar, 2021: 22

White corn is mainly produced in Region 12 (SOCCSKSARGEN), ARMM (now BARMM), and Region 10 (Northern Mindanao) (Salazar, 2021: 6). The total production of the aforementioned regions, mostly located in the island of Mindanao, account for more than half of the overall white corn produced in the country. At the provincial level, provinces with the highest white corn production rates are Maguindanao, South Cotabato, and Lanao del Sur. Though the main market for white corn is not in the island itself but in Cebu, production areas are themselves the consumers of white corn at the household level (Salazar, 2021: 6).

Climate Action in the Corn Value Chain

It has long been established that the agriculture sector is one of the most vulnerable in terms of climate risks. The main impacts of climate change affecting agricultural production, especially of corn farmers, are climate variability as well as pests and diseases. Most areas engaged in corn production are rainfed and increased yield is contingent upon the amount of rainfall, which has become increasingly erratic due to climate change.

Farmers without access to supplemental irrigation risk crop failure especially during prolonged dry spells or El Nino-induced droughts, a situation which has become more intense and frequent as a result of climate change. On the other hand, excessive rainfall and flooding could easily wipe out a season's crops (Labios et al., 2015: 22). According to DOST-PAGASA (2018: 1), "increasing trends in annual and seasonal rainfall were observed in many parts of the country." Such trends were found to be associated with extreme rainfall events. Multi-model projections suggest a range of increase and decrease in seasonal-mean rainfall exceeding 40% of its historical values." In corn, for instance, an increase in temperature above 30 degrees Celsius will lead to a reduction

in yield by 1.7 percent, especially in drought conditions where crops are exposed to prolonged high temperatures (HLPE, 2012: 34).

Another devastating effect of climate change is the proliferation of pests and diseases. According to FAO (2008: 2), “*there is clear evidence that climate change is altering the distribution, incidence and intensity of animal and plant pests and diseases.*” Temperature is a significant factor in the population dynamics of insects (Skendzic, 2021). Thus, increased mean temperatures will most definitely translate to an increase in the population of insects that destroy crops negatively affecting yield. For corn growers in the Philippines, the Asiatic/Asian corn borer causes the most severe damage among pests that inflict the crop. Its larvae can wield severe damage on the corn plant - from kernels down to its tassels, leaves, and stalks (Nafus and Shreiner).

Despite the negative impacts of climate change on the agriculture sector, its contribution to greenhouse gas emissions cannot be discounted. For instance, the use of synthetic nitrogen fertilizers, especially of corn monocrop plantations, has significantly released greenhouse gasses in the atmosphere (Buendia et al., 2018: 58). Therefore, climate change mitigation should be undertaken simultaneously with adaptation by the agricultural sector, including corn producers.

Several climate actions from the adaptation to the mitigation spectrum have been led and initiated by the Department of Agriculture to address continued greenhouse gas emissions and the adverse effects of climate change. In order to curb N₂O emissions from inorganic fertilizer application, a program called *Agri-Kalikasan* was launched (Buendia, et al, 2018: 38). It is an organic-based agriculture development program that had several components:

- *Tipid Abono* and Balanced Fertilization Program that promotes prudent utilization of inorganic fertilizers combined with organic ones not only to address the steep cost of chemical inputs but also to decrease GHG emissions as a result of fertilizer application;
- *Balik Pataba sa Bukiran* (Rice Composting and Nutrient Recycling) Program that advocates for the production of on-farm compost from rice straw using *Trichoderma* as decomposition agent;
- Integrated Organic-Based Model Farms that exhibits abovementioned programs for efficient solid waste management and alternative fertilizer.

The overall aim of these programs is to reduce consumption and dependency on artificial nitrogen fertilizers that would eventually translate into decreased GHG emissions in the agriculture sector. Corn stalks, a usual byproduct during harvests, could be substituted for rice straws in *Balik Pataba sa Bukiran*.

Labios et al. (2015: 28-29) suggests further good practice options aligned with climate actions (both mitigation and adaptation) that can be undertaken in corn farming illustrated in Table 2 below and elaborated in further paragraphs.

Table 2. Climate action (mitigation and adaptation options) in corn (Labios et al., 2015: 28)

Case study	Brief description	Criteria satisfied	Regional relevance	Impact on women	References
Yellow corn					
1	Site-specific Nutrient Management	Mitigation (increase nutrient efficiency, reduce GHG emission)	High	+	DA-BAR (2013) Ocampo (2010) Pasuquin et al. (2010) Witt et al. (2008, 2009)
2	Village-type dryer	Adaptation and mitigation (erratic rainfall, grain quality efficiency)	High	+	
3	Sustainable Corn Production in Sloping Areas	Adaptation and mitigation (conserve soil moisture, reduce GHG emission)	High	+	BSWM
White corn					
1	White corn for food Village-type white corn mill	Adaptation (corn grits as product serve as staple food)	High	+	UPLB Horizon (2014)
2	Sustainable Corn Production in Sloping Areas	Adaptation and mitigation (conserve soil moisture, reduce GHG emission)	High	+	BSWM

**Impact on women: (+) helpful for women, (-) negative impact for women*

Note: The practices identified in this table were sourced from a series of consultations with the heads of the DA and its attached agencies, especially those involved in climate change, rice, and corn programs; and Research and Development (R&D) focal persons from DA regional offices.

- A. **Site-specific Nutrient Management (SSNM)**, a strategy similar to the *Tipid Abono* and Balanced Fertilization Program that advocates the combined use of available organic nutrient sources (e.g., crop residue and manure) and inorganic fertilizers. The use of fertilizers is adjusted to properly compensate for nutrient deficiency and address the needs especially of high-yielding crops.
- B. **Village-type dryers** reduce post-harvest losses by 37% by drying. *“Thirty-seven percent of post-harvest losses in corn are caused by drying. This is followed by storage, which*

comprises 24 percent of the total loss. Part of the government’s program objectives is to reduce the national average post-harvest loss by decreasing drying loss and improve milling recovery, since high post-harvest losses coupled with the limited post-harvest facilities were identified as part of major problems in the Philippine corn industry” (Amongo 2011; De Luna 2013; Gragasin 2013 in Labios et al., 2015: 28).

C. **Sustainable Corn Production in Sloping Areas (SCOPSA)** involves land use management that includes technologies that consider “socio-economic conditions and biophysical limitations of upland areas. This ensures the sustainable development of soil and water resources for corn production” (Contreras 2013; DA-BSWM 2013 in Labios et al., 2015: 29).

Climate mitigation actions are also identified in the review:

- Improved fertilizer management practices is the most convenient and effective way to reduce N₂O emissions from excessive application of nitrogen in the soil. Labios et al. 2015) and Buendia et al. (2018).
- Enhanced management and application of organic and synthetic fertilizers as well as crop diversification (i.e., intercropping of leguminous crops, such as peanuts, with a main crop) will optimize nitrogen input in soil (Buendia et al, 2018: 58).
- Other alternative approaches in reduction of nitrogen fertilizer application: (1) split fertilization or the staggered application of fertilizers into three smaller increments and (2) use of nitrification inhibitors which reduces the conversion of ammonium to nitrite” (Buendia et al, 2018: 58).

Table 3. Mitigation measures to reduce N₂O emissions from agricultural soils (Buendia et al., 2018: 58)

Mitigation Measure/Strategy	Description
Improved fertilizer management	The addition of synthetic nitrogen fertilizers to soil results in N ₂ O emissions. Any excess in N input will just be volatilized and leached (run-off) into the soil and later emitted as N ₂ O. In this measure, farmers need to be supported in determining the proper amount of N input needed by the crop based on soil analysis and crop residue management. This can be in the form of fertilizer recommendation to optimize N inputs.
Crop diversification	Planting nitrogen-fixing legume crops, such as mung bean, peanut, cowpea, or soybeans, in rotation with other cash crops will increase the amount of nitrogen in the soil and decrease the need for the use of synthetic fertilizers.

Several low-carbon and climate-resilient policies and practices have been initiated at several levels. At the regional level, ASEAN has drawn-up a multi-sectoral framework for climate change focusing on agriculture and forestry. At the national level, the Philippine government, through the Department of Agriculture has implemented several programs that target climate change mitigation and adaptation.

Based on the examples cited by Labios (2015) and Buendia (2018), the DA's approach in climate change mitigation through the reduction of greenhouse gas emissions relies heavily on decreasing the use of nitrogen-based chemical inputs as fertilizer. Programs such as *Tipid Abono*, *Balik Pataba sa Bukiran*, and SSNM limit the application of artificial fertilizer in favor of organic alternatives. Though climate-smart programs have been implemented on the ground, its impact in the reduction of NO₂ emissions remains to be seen. Further, sex-disaggregated data on the number of farmers adopting good agricultural practices as a result of these programs is insufficient.

It should also be noted that proposed and implemented climate actions target the production node of the value chain disproportionately. Aside from those earlier enumerated by Labios (2015) and Buendia (2018), Salazar (2021) suggests increasing initiatives in research and development focused on:

- corn hybrid varieties for climate change adaptation and better marketability, which focuses on the production node; and
- developing more economical alternatives to nitrogen-based chemical fertilizers in terms of the input node side .

Mitigation and adaptation strategies must also target post-harvest processes such as drying and milling so that climate action is not only concentrated mainly in production, but is spread in the different nodes of the value chain. Value chain actors including the farmers, input producers and suppliers, operators of post-harvest facilities, and traders/marketers, should be involved in reducing GHG emissions and promoting climate-adaptive practices.

Women as Corn Farmers

The Philippine Statistics Authority (PSA) estimates the number of women farmers at 2.24 million or 23 percent⁶ of the total employed in the agriculture sector. However, the Philippine Commission on Women (PCW) clarified that while less women compared to men are engaged as paid or formally recognized workers, *“rural women greatly contribute and have vital roles”* and *“official data may not accurately capture women’s work in agriculture as it is normally considered to be extensions of their household tasks and therefore not reported as ‘work... women continue to be unaccounted for in “agriculture work” even if they “continue to participate in unpaid family work in agriculture in larger numbers as compared to men.”*

On a related note, a PSA 2011 Northern Mindanao data release on rural women’s participation in agriculture revealed that 56.60% of women engaged in agriculture are unpaid family workers. Women are corn farmers as much as men and have valuable roles in corn farming. A 2019 study by the Department of Agriculture (DA) in Nueva Ecija validated the various tasks of females in corn production that include planting, fertilizer application, manual harvesting, manual shelling, and drying operation. Males mostly do the plowing and land preparation, and use equipment for shelling and milling.

Women also contribute significantly to agriculture but still remain mostly undervalued for both care and farm work. Few rural women own land and few of them are also able to access credit, technology,

⁶ Agricultural Indicators System. 2019. Can be retrieved at https://psa.gov.ph/sites/default/files/AIS%20Employment%20and%20Wages_signed%201127%20.pdf

and other farmers' programs. Despite their contributions, women face gender barriers that make it hard for them to equally access land, farm inputs, loans and other farm and agricultural resources. Women are also less represented in government planning and decision-making bodies. Even if both women and men work the land, men are the usual landowners. Women's work in the field and the home are not equally valued. (Ani and Cassola, 2020)

Recognizing women's unpaid and/or family work as intrinsically connected to and systematically part of the formal agricultural value chains can make women more visible to both government and private sectors' to make agriculture-based development efforts, as well as climate actions inclusive, comprehensive, sustained and, therefore, efficient.

As corn farmers, women's health is also affected by chemical inputs. A study in Benguet province showed the important role of women in farming of vegetables and other crops including corn (Lu, 2010). The study discussed occupational health issues and other factors that negatively affect women's health such as cultural, political and socio- economic perceptions. The commonly used pesticide, manzeb, a carbamate, was said to be the main culprit in women's health issues.

Women's gender roles influence their preferences. A recent study by the FAO looked into how gender roles influence tree-based farming. It found that while income security is the main consideration in the selection of crops for both male and female farmers, women prefer crops varieties that offer nutritional value and timber trees that can serve as wind barriers and control flooding and soil erosion. Meanwhile, males are more inclined toward fruit trees that are as marketable as corn crops (FAO, 2022).⁷

Both women and men farmers are affected by climate change hazards and armed conflict. This problem tops up the existing problems they face such as insufficient mobility fund, geographic location, high labor costs, lack of water source, increasing transportation cost, and challenges in marketing including analyzing supply and demand, pricing, product promotion. However, small landholders become more vulnerable to income failure, indebtedness, and eventual financial loss. Among the disadvantaged farmers, women are much more vulnerable as they work small plots and work shorter hours because of reproductive duties. (Chandra, et.al 2017) Women are also concerned with the need to assist in the production of a variety of crops that could support the nutritional needs of the communities. This concern motivates women to diversify their crops for nutritional value even when government support is not able to reach them. (Hubilla, et.al. 2018)

"It is known that women's work often takes place in the least valued parts of the value chain, e.g., home-based workers or informal workers more generally. Women tend to be underpaid and their (informal) jobs are less secure. In agricultural settings, women are often not visible, while they do a large part of the farm-activities.

Moreover, it is well-documented that women-owned rural businesses tend to face many more constraints and receive far fewer services and support than those owned by men. If women had the same access to those resources as men, they would produce 20-30 percent more food and their families would enjoy better health, nutrition and education. If women had equal access to agricultural resources and services, food security would be greatly improved and societies would grow richer, and not only in economic terms." (FAO, 2022)

⁷ The same study uncovered gendered social and political-institutional barriers and recommended ways to promote gender equality in agriculture.

3. STUDY DESIGN

A. Research Objectives

The aim of the research was two-fold:

- Understand opportunities and barriers; and
- Generate recommendations for private and public sector actors to ensure their efforts to transition to a low-carbon economy in ASEAN's agriculture sector are gender-inclusive and promote livelihoods and green job opportunities for women.

Key research questions included:

1. What roles do women and men working in agriculture value chains currently play in climate mitigation and adaptation practices (e.g. climate smart agriculture)?
2. What are barriers and challenges that hinder women's and men's ability to participate in and access resources and opportunities in low-carbon agriculture value chains?
3. What climate innovation practices or solutions may help women and men overcome gender-based constraints in agricultural value chains?
4. What are entry points for promoting and scaling women's empowerment and gender transformation in agricultural value chains using a low carbon economy lens?

B. Frameworks of Analysis

For the corn value chain, the study investigated the presence of enabling policies that promote climate adaptive practices and innovations undertaken by actors of the corn value chain. With the combination of the following frameworks of analysis, the study investigates the specific roles that women play in each node of the value chain coupled with economic empowerment and leadership perspectives to assess factors of success and gaps. The study also further assessed how women play a role in implementing climate-smart strategies based on the field investigation exercises.

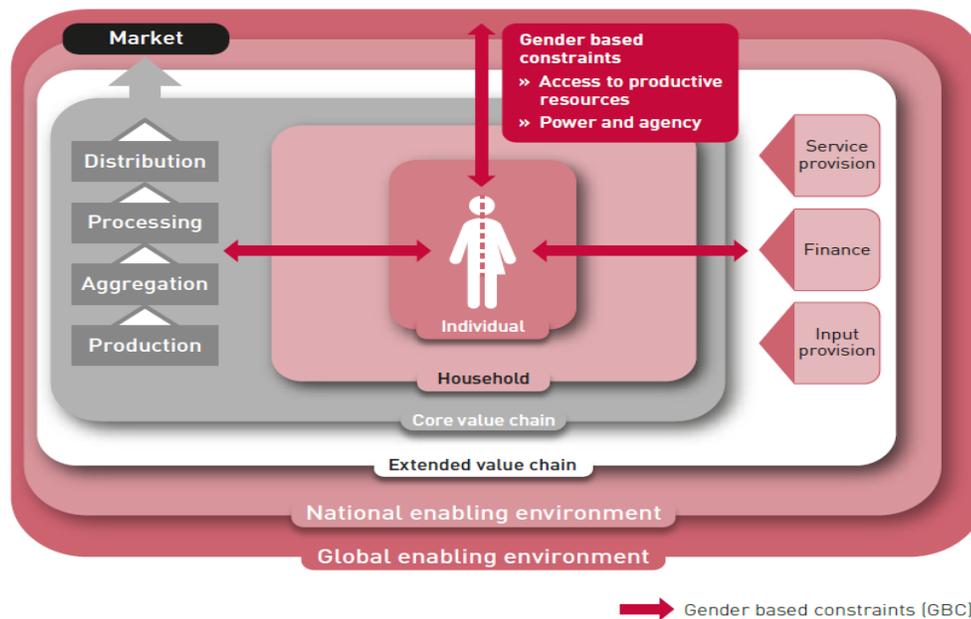
The research also looked into climate adaptation measures being practiced in production, such as planting of climate-resilient crops, crop and livelihood diversification, crop insurance for climate disasters, water-saving measures – e.g., rainwater harvesting for watering and drip irrigation. On the other hand, mitigation strategies to reduce carbon emissions or enhance sinks of greenhouse gasses were also sought. These include shifts from fossil fuel to renewable energy sources, arresting deforestation, improving soil carbon storage, reducing methane (CH₄) emissions, preventing burning practices, and efforts to grow trees on farms.

1. FAO's "Developing Gender-Sensitive Value Chains (GSVC): A Guiding Framework, 2016."⁸ which focuses on gender equality as an essential dimension of sustainability and value chain analysis. Based on the framework, the value chain covers four stages of (1)

⁸ UN FAO (2018). Developing Gender-Sensitive Value Chains: A Guiding Framework. URL: <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1175525/>

production, (2) aggregation, (3) processing, and (4) distribution (before corn/corn products reach the Market).

Figure 4. United Nations Food and Agriculture Organization’s (FAO) “Developing Gender-Sensitive Value Chains (GSVC): A Guiding Framework, 2016”⁹



2. Sarah Longwe’s Women’s Empowerment and Equality Framework (WEEF),¹⁰ which examines the extent to which women and men have equal **access to and control** over resources and assets, **voice and agency (participation)**, as well as **equal opportunities (including welfare, services, financing and training)** to achieve their chosen life outcomes.

Figure 5. Sarah Longwe’s Women’s Empowerment and Equality Framework (WEEF)¹¹

⁹ UN FAO (2018). Developing Gender-Sensitive Value Chains: A Guiding Framework. URL: <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1175525/>

¹⁰ [Sarah Hlupekile Longwe \(1991\). Gender awareness: the missing element in the Third World development project. Retrieved from this link:](#)

¹¹ Sarah Hlupekile Longwe (1991). Gender awareness: the missing element in the Third World development project.

LEVELS OF EMPOWERMENT	DESCRIPTION
CONTROL ↑	Women and men have equal control over factors of production and distribution of benefits, without dominance or subordination.
PARTICIPATION ↑	Women have equal participation in decision-making in all programs and policies.
CONSCIENTIZATION ↑	Women believe that gender roles can be changed and gender equality is possible.
ACCESS ↑	Women gain access to resources such as land, labor, credit, training, marketing facilities, public services, and benefits on an equal basis with men. Reforms of law and practice may be prerequisites for such access.
WELFARE ↑	Women's material needs, such as food, income, and medical care, are met.

Figure

Caption

Fig. 3: The Women's Empowerment Framework by Longwe (1995)

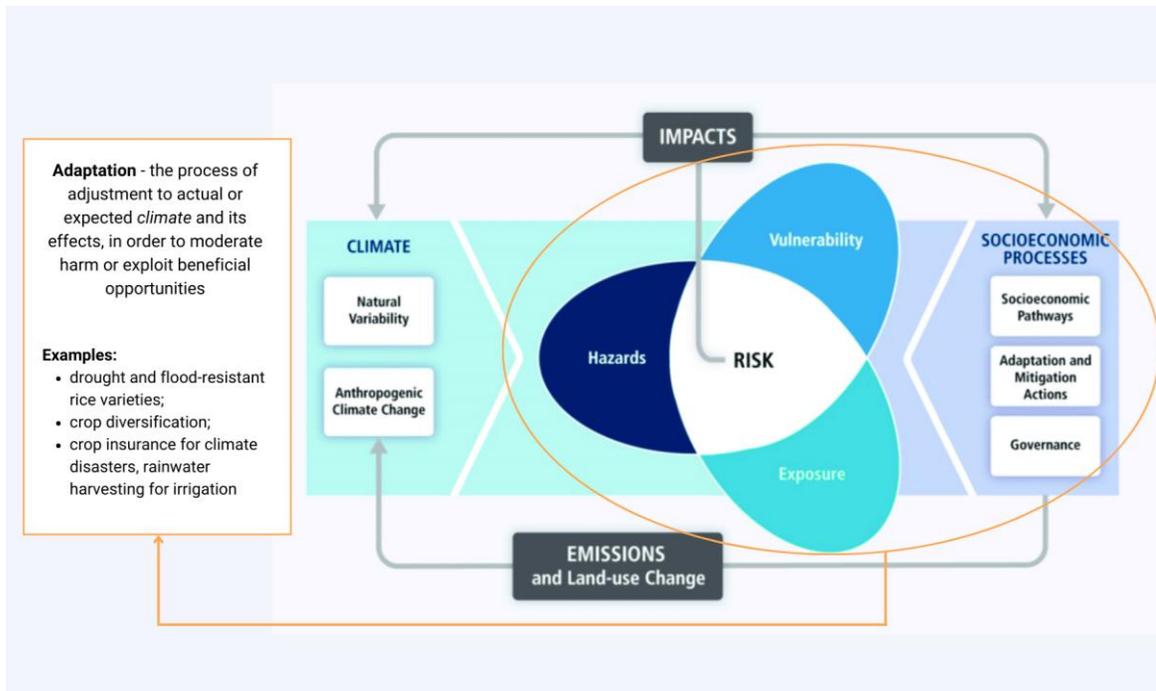
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- Climate Risks and Hazards Framework¹² of the Intergovernmental Panel on Climate Change (IPCC). This framework sees climate risk caused by exposure, hazards experienced, and levels of vulnerability. The framework views how climate risks can be minimized or avoided by policies that promote adaptation and mitigation actions at various levels of society. Increasing access to different socio-economic streams provide diverse sources of income and green livelihoods.

Figure 6. Climate Risks and Hazards Framework¹³

¹² Field, C. B., Barros, V. R., Mach, K. J., Mastrandrea, M. D., Van Aalst, M., Adger, W. N., ... Yohe, G. W. (2014). Technical Summary. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 35-94). Cambridge University Press.

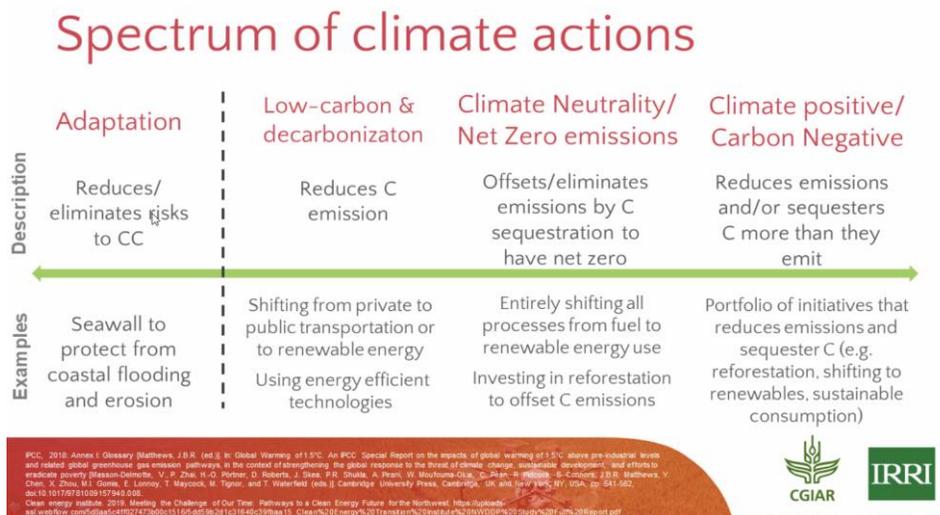
¹³ Field, C. B., Barros, V. R., Mach, K. J., Mastrandrea, M. D., Van Aalst, M., Adger, W. N., ... Yohe, G. W. (2014). Technical Summary. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 35-94). Cambridge University Press.



Source: IPCC 2012 in Cardona, et al. (2012)

- International Rice Research Institute Spectrum of Climate Actions examines actions that cover adaptation, low-carbon and decarbonization, climate neutrality/net zero emissions, and climate positive/carbon negative interventions or mechanisms in the corn value chain.¹⁴ Mitigation strategies being implemented or utilized by corn value chain actors were categorized according to the levels of carbon reduction and sequestration, as illustrated in the figure below.

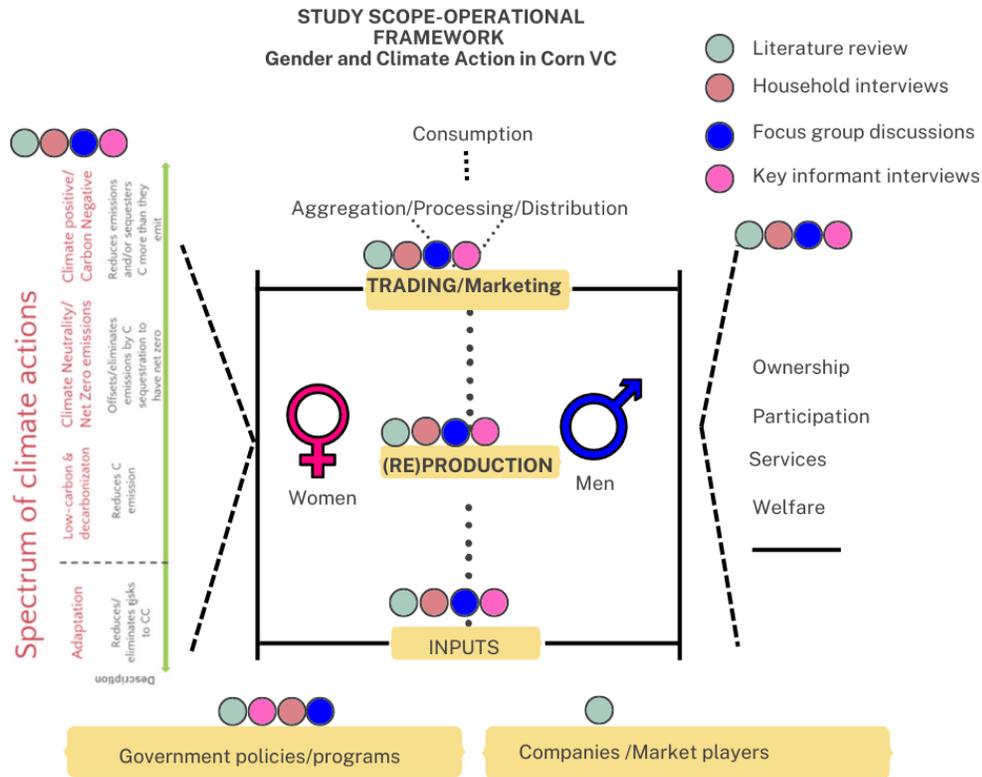
Figure 7. International Rice Research Institute's Spectrum of climate actions



¹⁴ Diagram presented by Yuji Enriquez of the International Rice Research Institute in an invite-only discussion organized by the Philippine Partnerships for Sustainable Agriculture (PPSA) on 07 July 2022.

From these three frameworks mentioned, the resulting operational framework of analysis is a triple-combination of all the frameworks above.

Figure 8. Study scope-operational framework on gender and climate action in gender and climate action in the corn value chain



Bello, M.C. and Baclig, D.G. (2022)

The research was operationalized by investigating the productive and reproductive roles of women and men in the corn value chain. The corn value chain extends back to inputs, which are influenced by government policies/programs and companies/market -players, and go up trading and marketing, right before it reaches consumption. The study also looked at women's and men's engagement in the spectrum of climate actions (IRRI) shown on the left: adaptation; low carbon and decarbonization; climate neutrality or net-zero emissions; and, climate negative or carbon positive. On the right side, gendered access to welfare and services, participation in decision-making, and ownership or control of resources were also investigated. Literature review, household interviews, focus group discussion, and key informant interviews were the main methods to gather data and information.

C. Research Questions and Data Collection Plan

The study plan observed the main research questions¹⁵ with the following data collection plan.

Table 4. List of research questions, data collection methods, and respondents of the study

¹⁵ Derived from the Regional Research Methodology

Research questions	Sub-key questions	Methods/Tools to be used to collect data	Respondents/ participants
<p>(1) What roles do women and men working in agriculture value chains currently play in climate mitigation and adaptation practices?</p>	<ul style="list-style-type: none"> • What activities in the value chains and community do women and men engage in? • Which nodes of the value chain have the majority of women's participants? • Who has ownership of land and other assets? • Who has access to and makes decisions on financial services? • Who has control over the use of income? • To what extent do women and men are involved in productive decisions? • To what extent are women able to influence sales negotiations with traders/markets? 	<ul style="list-style-type: none"> • Household/ Individual interviews • Focus group discussion • In-depth interview <p><u>Note:</u> <i>See links to the data collection tools used below</i></p>	<ul style="list-style-type: none"> • Farm owners (including female headed households), • Agricultural cooperatives/producer groups • Key actors of Value Chain (VC) (including women-run enterprises/business)
<p>(2) What are the barriers and challenges that hinder women's and men's ability to participate in and access resources and opportunities in low-carbon agriculture value chains?</p>	<p>What are the social, economic, and structural barriers and challenges as well as opportunities for women and men engaging in VC and in reducing carbon emission?</p>	<ul style="list-style-type: none"> • Household/ Individual interviews • Focus Group discussion • In-depth interview 	<ul style="list-style-type: none"> • Agricultural cooperatives/producer groups • Key actors of VC (including women-run enterprises/business) • Key stakeholders who are working and supporting ecosystem in intersectionality of gender, value chain development / upgrading, and low carbon economy

<p>(3) What climate innovation practices or solutions may help women and men overcome gender-based constraints in agricultural value chains?</p>	<p>Are there any climate innovation practices, including low-carbon emission used by women and men farmers and private sectors for addressing gender-based constraints and helping to promote gender transformation?</p>	<ul style="list-style-type: none"> • Household/ individual interview • Focus group discussion • In-depth interview 	<ul style="list-style-type: none"> • Farm owners (including female headed households), • Agricultural cooperatives/producer groups • key actors of VC (including women-run enterprises/business) • Key stakeholders who are working and supporting the ecosystem in intersectionality of gender, VC and low carbon economy
<p>(4) What are entry points for promoting and scaling women's empowerment and gender transformation in agricultural value chains using a low carbon economy lens?</p>	<p>What hazards affect your agriculture sector, specifically corn?</p> <p>How do these hazards affect corn production in your municipality/barangay?</p> <p>What are the policies or projects of the local government that help communities, especially those reliant on corn production, adjust to climate change in your municipality and community?</p> <p>What are the policies or projects of your local government that help mitigate/stop climate change in your municipality and community?</p> <p>Are farmers, especially women farmers, in any way included in consultations, planning, and programming on climate change adaptation/adjusting to climate change, especially in safeguarding the corn value chain?</p> <p>What are the issues/difficulties/challenges that your municipality/community faces in adapting/adjusting to and</p>	<ul style="list-style-type: none"> • Household/ individual interview • Focus group discussion • In-depth interview 	<ul style="list-style-type: none"> • Farm owners (including female headed households), • Agricultural cooperatives/producer groups • key actors of VC (including women-run enterprises/business) • Key stakeholders who are working and supporting the ecosystem in intersectionality of gender, VC and low carbon economy

	<p>mitigating/stopping climate change?</p> <p>What support do you need from the provincial, regional, and national government to draft/enact policies and implement projects on climate change mitigation and adaptation?</p>		
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D. Research Sites

Selection criteria

The following criteria guided the identification of the research sites:

- Stages in the value chain occur in the same area and/or can be easily tracked or observed;
- Value chain serves the local market and/or has institutional market partners;
- Representation of peri-urban and rural sites;
- Varying cultural norms and/or ethnicities;
- Varying geographic characteristics such as lowland, upland plains, and hilly or sloping sites including variations of water-sources/dependence, i.e., irrigated, rainfed;
- Representation of white and yellow corn varieties;
- Stable Peace and security situation;
- Representation from women entrepreneurs active along the corn value specifically women-led social enterprise, formal or informal, established or start-up;
- Accessibility of the area, respondents, and informants to the research team; and
- Potential for pilot to apply research recommendations

a. **Northern Mindanao: Bukidnon province**

Bukidnon province is the food basket of Northern Mindanao and the largest producer of agricultural products in the (PSA, 2021). Eyed as an agri-tourism site during the 2013 Euromoney Philippine Investment Forum, it is populated by both indigenous peri-urban women and men who are mostly yellow corn upland-plain and hilly/slope farmers. Corn fields are mostly rain-fed, given the local climate in the province where rains are consistent almost throughout the year. From the field observation, many of the visible corn farmers are women.

b. **Bangsamoro Autonomous Region in Muslim Mindanao: Maguindanao province**

Maguindanao is a Special Area for Agricultural Development (SAAD) chosen by the current administration. Its municipalities are considered armed-conflict affected areas. In

one research site, Datu Saudi Ampatuan (DSA) municipality, former women combatants are involved in peacebuilding efforts through a women-led agricultural social enterprise initiative. The women's social enterprise also began processing and distributing corn products while also looking to expand local markets. The research sites DSA and Datu Odin Sinsuat (DOS) are among the 13 municipalities included in the SAAD. In these areas, women and men, who mostly identify as Moro people, grow white and yellow rain-fed and irrigated corn on the vast lowland and upland plains. Despite the fragile security situation, informants and respondents are within reach and community observation is possible through the local contacts of the research team.

4. METHODS

Following the regional research concept and design, the approach to corn value chain research involved three methodologies.

a. Literature review

The review of related literature gathers information from primary research, statistics, and other information relevant to: a) women's roles in the VC including gendered division of labor in the household, and variance in terms of access to resources, based on WEEF; b) multi-level practices on climate action; c) policies, programs, and other instruments related to corn value chains and climate-smart practices focused on green jobs, and women's livelihood; and d) players that are already investing around WEE and climate-positive actions in the corn value chain.

b. Field study

The research team along with its local contacts and facilitators conducted face-to-face household interviews, focus group discussions (FGDs), and in-depth or key informant interviews (KII). The informants and respondents represented the diversity of women's characteristics including but not limited to ethnicity, age, geography, among others.

A total of 80 household interviews were conducted among randomly selected corn farmers' households for both women and men. FGDs and KIIs were conducted with women and men farm owners and key value chain actors, such as traders, service providers, and market agents (local or institutional) who are engaged in the corn value chain. The input suppliers and processors were not interviewed for various reasons that include hesitance in giving company information.

c. Stakeholder Consultation and Validation Workshops

After the publication of this report, the results will be presented with a range of stakeholders for feedback and validate field data collected. Stakeholders include government agencies - national and local levels, development partners, academe, civil society organizations, women's organizations, community-based organizations, agricultural cooperatives, and the private sector - companies.

5. FINDINGS AND ANALYSIS

The study sampled a total of 80 farmer respondents in addition to a number of key informants from the local groups and government offices.

Table 5. Farmer Demographic Profile

Gender	Count	Percentage
Male	45	56%
Female	35	44%
Age		
19-39	24	30.3%
40-55	27	34.3%
56-74	28	35.4%
Marital Status		
Married	65	81.3%
Seperated	3	3.7%
Widowed/Widower	7	8.8%
Single	4	5%
Single Parent	1	1.2%
Municipality		
Datu Odin Sinsuat, Maguindanao	20	25%
Datu Saudi Ampatuan, Maguindanao	20	25%
Impasug-Ong, Bukidnon	20	25%
Malabaybay City, Bukidnon	10	12.5%
Sumilao, Bukidnon	10	12.5%

A total of 80 households were interviewed in the municipalities of Impasugong (25%), Sumilao (12.5%), and Malaybalay (12.5%) in Bukidnon province, and 25 percent share for both municipalities of Datu Saudi Ampatuan (DSA) and Datu Odin Sinsuat (DOS) in Maguindanao province.

The respondents' ages were almost equally distributed between ages 19–29 with 30.3 percent, 40–55 with 34.3 percent, and 56–74 with 35.4 percent. The aim was to equally represent male and female respondents. However, in DSA, where the norm is for a household to always be represented by a male and a female can only be a representative when there is no able male around, most of the respondents were male. This resulted in 56 percent of respondents being male and 44 percent being female.

Most of the respondents are married, with 81.3 percent representation. Widows and widowers comprised 8.8 percent. Those with separated civil status comprised 3.7 percent, singles 5 percent, and single parents' 1.2 percent.

Based on **field data**, it is found that policies and plans on climate action in agriculture lack focus on climate change mitigation despite its major contribution to GHG emissions. For the corn value

chain, production relies heavily on nitrogen-based fertilizers that emit GHGs. Moreover, there is no defined plan or strategy in the inclusion of women despite them being included as major stakeholders in climate actions,

Summary of Findings based on the main research questions:

Roles women and men play in the corn value chain that contributes to climate adaptation and mitigation practices:

- Climate adaptive practices are most apparent in yellow corn production where climate-resistant varieties, especially drought and herbicide-resistant ones, are available.
- Mostly women are the ones involved in climate adaptation practices. They diversify crop by supplementing corn production with vegetable gardening. Those in flood-prone areas innovate by hanging vegetable pots.

Barriers and challenges that hinder the ability of women and men to participate in and access resources and opportunities in low carbon corn value chain:

- No operationalized programs in study sites
- No access to consultative or participatory policy/program mechanisms
- From 'No Knowledge' to 'Lack of Knowledge and Awareness' on how they can benefit from and contribute to low- carbon agriculture value chains

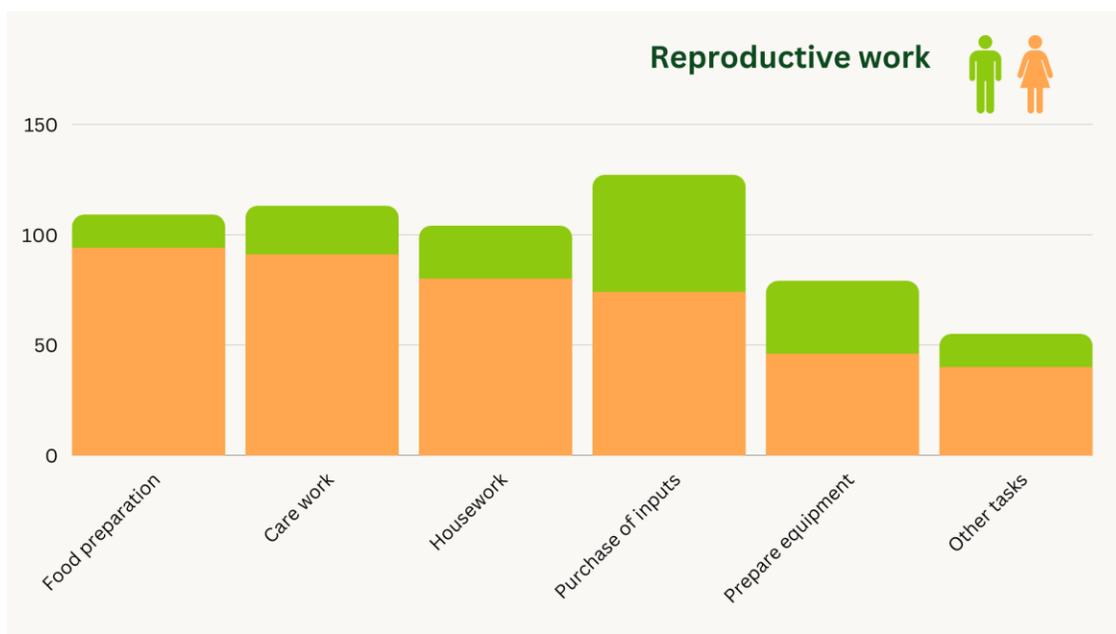
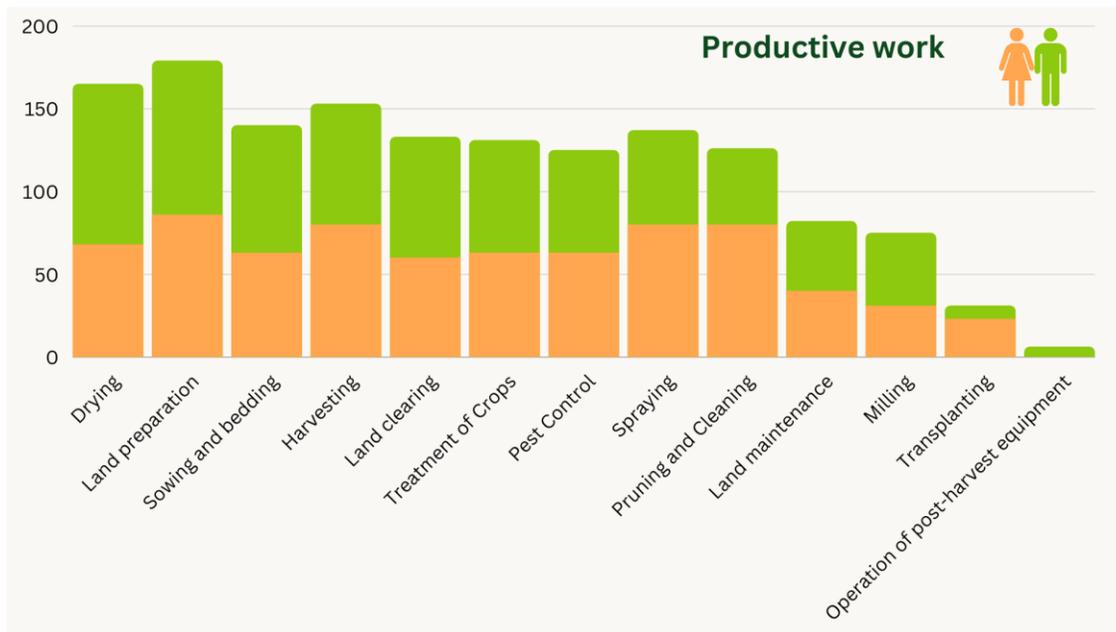
Presence in the Value Chain

Analysis of field data manifests that women and men in the *sample* covered are mostly involved in the production node of the value chain. They are also involved, though minimally, in the aggregation, processing, and distribution for local consumers.

Roles between men and women

In summary, women do both productive and reproductive functions to make corn production possible.

Figure 9. Comparison between men and women's share in the production activities



Productive activities:

Men mostly do physically-tasking farmworks such as land preparation, plowing, operation of machinery, and drying. They are also heavily involved in sowing and bedding, harvesting, and milling. Their works are mostly concentrated in drying (97 percent), land preparation (93 percent), and land clearing (77 percent). On the other hand, women are mostly present in land preparation (86 percent); harvesting (80 percent), spraying and pruning (80 percent), and farm maintenance work such as treatment of crops (63 percent), pest control (63 percent), and sowing/bedding (63 percent).

Reproductive activities¹⁶:

Based on the research activities, 94 percent of women while 15 percent of men prepare the food, 91 percent of women while 22 percent of men do care work, 80 percent of women while 22 percent of men do housework, 74 percent of women while 53 percent of men purchase farm inputs, 46 percent of women while 33 percent of men prepare the equipment, and 40 percent of women while 15 percent of men do other tasks, such as finding other sources of income, growing other food options, concocting organic inputs, crop treatment, and weeding to support corn production.

These responses evidence that rural women are more involved in corn farming than usually perceived. Their most bankable contributions are in land preparation, and pruning and cleaning activities - i.e., pest-control and application of chemical inputs/ fertilizers. These activities are significant contributors to having quality yields which determine market uptake.

Both women and men are burdened with low income; crop failure; increased prices of farm inputs; various hazards brought by climate change effects and armed conflict or *rido*; lack of financing; risk-sharing mechanisms otherwise known as insurance, and technology training; poverty and lack of food; and landlessness. When incomes are low, the situation either barely returns capital costs and provides for subsistence needs, or perpetuates their debt cycle because they cannot buy farm inputs and seeds for the next cycle.

For women, a few respondents voiced the multiple burden, multi-tasking between unpaid household work (reproductive) and farming/income generating tasks (productive). In terms of managing family life, women also carry the burden of family poverty, including the lack or insufficiency of food.

There was also an observed variance in access to inputs and capital support, as well as equipment and technology. While males are considered heads of the households under whom land titles are named, the usage of the land titles redounds to family's benefits since females are the ones who are usually processing access to these opportunities for support, e.g., financing, inputs, etc.

¹⁶ Based on household interviews.

Access to resources and opportunities to participate

In terms of access to opportunities and resources¹⁷ for economic empowerment and decision-making related to the value chain, corn farmers interviewed felt low to no access to information on climate change. Nevertheless, farmers recognize that they have been experiencing the effects of climate change in their farm lives such as typhoons damaging their crops, which lead to them failing their income expectations.¹⁸

In terms of capability to participate, farmers also felt that they have little space to influence, if not inform, government planning and services and private sector projects or support opportunities. These realities that preview the formal community space to participate, when viewed with the factual finding that men are recognized as heads of households and are land title holders, also reflect how women have much less access than their male counterparts in their informal spaces, e.g., household, immediate communities.

From the data showing productive and reproductive roles above, women are practically considered as leaders of the household secondary to their husbands. On the other hand, the involvement of young women, girls and boys remains unclear and beyond the data gathered.

Climate-smart Practices

In terms of climate actions, there is minimal involvement from both the women and men respondents. Their actions, particularly of Maguindanao respondents, are concentrated on adapting to climate variability through planting of climate-resistant varieties such as early maturing and drought resistant hybrids. Some respondents, most women, practice crop diversification and alternative livelihoods, i.e vegetable gardening, with those in flood-prone areas innovating with hanging vegetable pots. For others, they undertake water harvesting, especially in anticipation of prolonged dry spells and drought.¹⁹ However, all of the respondents are not aware of any mitigation measures to deal with climate change.

The women in DSA initiated their own actions by bayanihan or community-led actions where group members and their families help other members conduct early harvest of various crops, that may include corn, in anticipation of a typhoon's landfall to minimize production losses. The group also ventured into backyard vegetables growing in recycled plastic water bottles that they hang on bamboo structures. They also process corn, banana, cassava, and other crops to food stuff to sell in their cooperative store.

Climate actions:

¹⁷ Support services, assets, information, participation, economic gains, and decision-making spaces

¹⁸ [Focus Group Discussions](#)

¹⁹ These climate actions are undertaken in Datu Saudi Ampatuan where the former women MILF combatants' local agricultural social enterprise is located. There could be other initiatives but the field coverage of this research is very limited. DSA is the only area that grows mainly white native corn, which is primarily for household consumption, validating the findings of Salazar (2021).

- Tree planting
- Application of purely chemical nitrogen-based fertilizers
- Adjusting planting season to weather cycles
- Intercropping
- Planting of alternative crops
- Use of more heat/pest-resistant varieties

These findings are aligned with the National Framework Strategy on Climate Change (2010) where key result areas focus on adaptation more than mitigation. Though there is a level of awareness on climate change and its impacts among the respondents, much could still be done in terms of climate action. Knowledge, skills, and technology from government programs on climate change enumerated by Buendia (2015) and Labios (2018) have not been transferred to farmers at the ground level as seen in data gathered.

Gender-inclusive approaches seem to be missing at the operational level. This is true for the micro, meso, and macro practices and innovations in climate action among communities, social enterprises, and businesses. There are no women's livelihoods or green jobs run by the government or private sector in the areas covered. There are also no players in the industry working on climate action and/or gender equality mentioned by the household interview respondents and discussion participants.

Access to decision-making

Both women and men also lack access to consultations on government programs and plans related to corn production. Government, private companies, and traders (consolidators) all have a stake in this situation.

In summary, the research found that the issues affecting women corn farmers pertain mostly to:

- Sporadic access to government training, technology, planning, financing, crop protection
- Inability to implement learnings from training programs due to existing traditional distribution of labor in the household routines
- Lack of capacity to influence or negotiate on the selling price of produce
- Lack of decision-making capacity
- Multiple burdens and multitasking of women in the reproductive and productive aspects of corn production.
- Burden of family poverty and indebtedness
- Low income
- Lack of and high prices of farm inputs
- Crop failure
- Effects of hazards including pests and diseases
- Drying corn on the road results in toxins in the product and loss of quality²⁰
- Gaps in encouraging active participation of women in climate actions
- Policies and plans on climate action in agriculture lack focus on climate change mitigation despite its major contribution to GHG emissions
- Philippine corn production relies heavily on nitrogen-based fertilizers that emit GHGs

²⁰ Shared by Ministry of Agriculture Fisheries and Aquatic Resources- BARMM-Maguindanao

- No defined plan or strategy on women’s inclusion even if women are included as major stakeholders in climate actions

6. CONCLUSIONS

Legal Framework

In terms of policy, the Philippines has laws and mechanisms in place to address and promote gender equality and climate action. The Climate Change Act²¹ and the Magna Carta of Women²² have been in effect since 2009 with government instrumentalities operationalizing the tenets of the law into action. Essentially, these policies aim at mainstreaming “climate change” into government policy formulations, establishing the framework strategy and program on climate change and sets oversight for the promotion of gender equality, respectively. There are also existing plans and programs to implement. Most importantly, these already recognize distinctive effects of climate change on men, women, and children. However, policies and programs are still yet to seep through ground level changes into the lives of farmers.

Apparently, there is a perceived gap between policy and practice. Field data suggests that policy and program implementation fails to respond to the different experiences of women, often negatively disproportionate to those of men, by the adverse effects of climate change and disasters. As men continue to be recognized as head of the household, government services assume the male farmer as beneficiary and the female farmer only comes forward when gender budgets are used.

Existing programs on climate action directed at the corn production still fall short to make corn farming as productive and profitable for farmers. More importantly, the research found that women actually play a real significant role in corn farming, evidenced by their presence in most of the value chain activities, specifically in bringing quality yield attributed to women’s diligent upkeep of the farms using climate friendly practices. Nevertheless, existing programs from the government are still bereft of proactive solutions to ease multiple burdens of women farmers, including the existing legal challenges, e.g., land titles being male-dominated, as well as lack of access to corn production facilities. Women also continue to be relegated to care work duties and are not seen as farmers even if they do visible and critical farm work such as land preparation, sowing and bedding, transplanting, pruning and cleaning, pest control, crop spraying, land clearing, drying, milling and other tasks. Some climate adaptation practices include the use of genetically upgraded or modified varieties of seeds in corn farming. These varieties have higher yield but also demand a higher quantity of inputs such as chemical fertilizers, pesticides and glyphosates .

²¹ Republic Act 9279, also known as the Climate Change Act was enacted in 2009.

²² Republic Act 9710 also known as the Magna Carta of Women was enacted in 2009.

Existing opportunities to leverage support and positive actions are also noted as follows:

- Ordinance on Sustainable Land Management - prescribing that not more than 18 percent of the slopes are to be cultivated²³
- Policies on organic agriculture providing funds for organic agriculture
- Conducted integrated pest management (IPM) trainings
- Promotion of the drought-resilient and herbicide resistant²⁴ corn variety
- Consultations and engagement of women farmers through rural improvement clubs (RIC) in municipalities/cities, and federated rural improvement club for the whole province
- Engagement of young farmers through 4H (young unmarried farmers) to start earlier in organic agriculture and climate mitigation education and practices
- Tree planting initiatives²⁵
- Conduct and mainstreaming of Information-dissemination through training programs including the old farming technique called 'daro' - a cultivation method which opens the soil by putting fertilizer and closes by covering it again with soil
- Deployment of drought-resistant seeds
- Distribution of fruit trees to promote carbon sinks
- Information dissemination to farmers not to burn corn stalks after harvest, and convert the same of fertilizers

Multi-stakeholder perspective on farmers' access to resources and decision making

On Climate-smart Initiatives

From the review of literature and field data, it was concluded that there are still no climate action initiatives with clearly established gender equality or women's empowerment lens for access to services or training, representation and participation in planning and decision-making, and land or assets ownership. This fact is evidenced by the lack of data on the percentage of farming households, inexistence of sex-disaggregated data on agricultural households, and lack of proactive efforts in reaching out and addressing insufficient participation of women in local planning opportunities, and in facilitating greater involvement of women to access information and support services, and in farming activities.

On Enabling Environment for Women's Economic Empowerment

The lack of government operationalization of gender-transformative climate action, invisibility of private sector efforts to support smallholder production, and problem associated with price control by traders make corn production difficult and economically unstable for smallholder farmers, who, when gathered, make a big contribution to the entire corn value chain.

On the other hand, the dilemma reflects systemic challenges. From the key informant interviews, the provincial government respondents also recognize the following limitations and vulnerabilities:

- Bukidnon has the most degraded soil affected by soil erosion, landslides, flash floods, and sometimes, dry spell

²³ Office of the Provincial Agriculturist - Bukidnon

²⁴ Ministry of Agriculture Fisheries and Aquatic Resources- BARMM-Maguindanao - Basic Integration for Harmonized Intervention (BINHI) Program

²⁵ Bukidnon Environmental and Natural Resources Office (BENRO) and pest management with Office of the Provincial Agriculturist (OPAg)

- Droughts, too much rain, typhoons, floods, rain-induced landslides, pests especially rodents and Fall ArmyWorm (FAW), armed conflict, land-based conflicts and rido (violent clan feud)²⁶
- Farmers have already become dependent on herbicides, no tillage and inputs-intensive yellow corn variety
- Difficulty in changing current behaviors of farmers that rely on inputs-intensive corn farming. OPAg has been encouraging farmers to shift back to the open and close method of farming but older farmers (and perhaps women also) do not want to shift because of the tediousness of the task and it is time intensive
- Local governments need further support for its programs, including fertilizers, machinery and post-harvest facilities
- Local agricultural technicians need transportation support to reach farm areas and render technical assistance to farmers

Other concerns:

- Lack of laborers during harvests
- Lack of post-harvest facilities
- Drying corn on the road results in toxins in the product and loss of quality

The interviews confirm the findings of the household interviews and focus group discussions. Although national policy and program on climate action and gender equality is in place, operationalization on the ground is either limited or absent. Government on the ground has to prioritize the economic aspect of corn production to help farmers increase yields such as by giving out hybrid corn varieties.

Specific issues for government and other actors to consider:

- Price control: Producers who mostly have low income or income failure, sell corn at the prices determined by the traders, who in turn are determined by the manufacturers. The manufacturers also determine the prices of their products in the market. Price control that is not consultative and does not take into consideration the production costs is seen as oppressive for farmers and puts greater burden on women who have to stretch the household budget and find ways to supplement the meager earnings from corn farming.
- Corn Inputs: Maguindanao is gearing towards glyphosate-tolerant such as RR herbicide resistant corn. DOS farmers would like to leave the native varieties and go for the GMO corn with higher yields. Meanwhile Bukidnon, seeing the damaged soils, is problematizing how to encourage farmers to return to the open-close tillage method and non-use of herbicides. Organic agriculture is still limited as most farmers prefer the ensured bigger harvests and buyers (profit) for high-yielding inputs-intensive yellow corn.
- Women Farmer Migration: Most of the farm laborers doing the cheap cleaning/weeding labor were women. Many of them are now working abroad as domestic helpers. The research gathered how women's underpaid farm cleaning work has pushed women to leave the farms and work for a slightly higher pay abroad.

Herbicides respond to the practical gender need of women corn farmers. Because weeding, pruning, and weeding are mostly taken on by women, time saved for the use of herbicides is

²⁶ Maguindanao

time allotted for work to source additional income and for multiple tasks at home and community, including caregiving. When women leave their undervalued work in the farm to find jobs abroad mainly as domestic helpers, the farming communities suffer lack of laborers and weed invasion. This builds dependence on herbicides that also damage the soil and emit GHGs.

- Value of Social Enterprises in Localities: The only site found with climate change adaptation and women's leadership actions is Datu Saudi Ampatuan (DSA) where Sigay nu Babay, a women's local social enterprise of former MILF combatants, is located. The local field work was conducted through Sigay. Women of Sigay implements farm to home and local store practice, use of recyclable plastic containers for flood-adaptive vegetable gardening, collective rapid harvesting of crops pre-typhoon landfall, alternative food and livelihood source (mushroom crispies, banana crisps)

Even with a small scale social enterprise, the women's group in DSA are showing how climate action with women's empowerment lens can be done in the context of peacebuilding. While farming cash crops, the group has its own vegetable garden and mushroom growing facility. The group processes bananas, peanuts, corn, cassava, mushroom and other harvests to be sold as ready-to-eat food. Some vegetables such as eggplant and okra are maintained on big recycled plastic water bottles so they can be hung on bamboo poles whenever there is flooding. To avoid crop wastage, the women and their families help each other in harvesting crops that they can save from the coming typhoon. With the income from the store, a few savings can help during emergencies or times of disaster. Gaining a certain level of resilience, the group is able to quickly act to bring relief to others' needs such when Typhoon Paeng wrought havoc in the entire province, bringing too much rain and flooding in many areas, including the corn fields.

Gendered perspective on farmers' access to resources and decision making

Corn farmers are mainly women but they have limited access, participation, and ownership. Climate action can incentivize this untapped potential.

The group discussions validate the results of the household interviews where males mostly have the lands in their names. Practically, males own the decision-making on finances, as well as the manner of corn production —.

To illustrate, KII gathered that women are doing the labor 60% of the time and mostly 70% females comprise the attendance in training programs, while most of the males are not joining the training sessions. Ironically, even if the females are learning, they cannot implement because the males do most of the heavy farm work and decide on farming practices.

Another situation was observed in a consultation session organized by a local government where there were only five (5) percent of the women who participated, as against 95 percent of men. In practice, men are still considered as official representatives while women only

come as volunteers - a sheer disregard of the fact that both women and men do their respective significant share in farm work.

This then poses critical implications in pursuing sustainable climate action. Based on the data gathered, women are the ones involved in the application of farm inputs - i.e., fertilizers, pesticides, and herbicides. Moreover, weeding has been found as the job of the women. Women also do the sowing of seeds because they tend to become more meticulous in the spacing and depth. Given this, there is a window of opportunity for women to be engaged in climate action in the reduction of the use of nitrogen-based fertilizers that are the main drivers of GHG emissions in the agriculture sector.

As yellow corn yields more profit than white corn, more farmers prefer to plant it and intend on continually producing it despite the fact that the prices of yellow corn inputs are steadily increasing and the buying price of traders continue to be unpredictable. Corn production as it is now steadily contributes to GHGs through its aggressive use of chemical inputs and is felt to be increasingly affected by climate change effects. As the threat of crop and income failures become more imminent, corn farmers become more susceptible to poverty. Men mostly own the land, control the income, and decide on corn production. Women are the hands that sustain the farming families by finding ways to survive such as growing food, trying organic inputs, and combining it with chemical fertilizers, finding alternative sources of income, and performing the time-consuming crop treatment, cleaning or weeding, land maintenance, and other farm tasks alongside their multiple functions in the home.

But there are contextual challenges that need to be hurdled in attempting this. There are significant contextual differences between Bukidnon and Maguindanao corn farmers in the purchase and acquisition of production inputs. Unlike in Bukidnon, Maguindanao farmers source their inputs - i.e., seeds, fertilizers, and pesticides/herbicides - from trader-lenders, usually in-kind. The payment comes in terms of harvest per kilo, which is bought by the trader-lender at a really low farm-gate price, thereby sequestering the income potential and raising the debt of farmers even more due to interests, especially during bouts of crop failures. In this scenario, the shift from the use of purely chemical fertilizer to partly/wholly organic will be much more difficult as Maguindanao farmers would need to clear their debts first before endeavoring the shift to more climate-friendly input alternatives.

In terms of market access, the study found out that corn enjoys a sure market uptake when compared to other crops. However, despite the high market access, what remains wanting is the gap between the big market players' direct link with the farmers. There is no direct relationship between corn farmers and the big players. The local traders/consolidators act as the middlemen. Field data gathered shows that local traders are contracted by the companies²⁷, and other companies that process corn for their products, poultry, and livestock. Based on claims by the local traders, the companies buying their supplies are also the ones dictating market prices at which they base their buying price of corn with farmers. This finding is subject to further inquiry.

7. RECOMMENDATIONS

From the household interviews, focus discussions, and key informant interviews, the finding is that women do almost as much as productive corn farm work as the men (around 10 points difference) while also doing most of the reproductive tasks that make production possible. Men do more land preparation such as plowing and operation of farm equipment, which are physically heavy tasks.

²⁷ Unnamed

Women mostly do the weeding, which takes time to do and can also be physically taxing. Women's weeding task is an invisible and undervalued role that affects corn production's reliance on herbicides.

In Maguindanao, women are leaving the corn farms to find work as domestic helpers abroad. Having fewer women who can do weeding, cleaning, and land maintenance roles (in addition to reproductive functions) leaves the corn fields in a mess. Weeds takeover the corn fields as women's invisible weeding work becomes no longer available. As a result, from farming white native corn, men are preferring the glyphosate-tolerant high-yielding corn varieties. These varieties are drought-tolerant and so is a form of climate change adaptation but are also input-intensive, costly, and result in higher GHG emissions.

The operationalization of government policies and programs on climate action should be pursued actively and aggressively at the ground level. To make these climate investments sustainable, the following are potential interventions with gender and climate perspectives that were gleaned from the results of this study:

1. Align and appropriate targeted climate action initiatives would be ideal. Some suggestions are:
 - a. Assess local carbon footprint per commodity including the corn production
 - b. Conduct local research and development activities for practical and cost-effective adaptation and mitigating actions that are feasible based on ground context
 - c. Promote engagement and collaborations between and among local actors to implement local solutions
 - d. Invest in developing farmers' *agency* to be champions of climate action in agricultural-based production by providing an enabling access to information, local planning exercises, and necessary capital focused on climate adaptation and mitigation activities
 - e. Scale up or innovate existing good initiatives on climate action that are already practiced with cost-effective and sustainability considerations taken into account.
2. Implement real and equitable transfer of knowledge, skills development, and technology that integrates the development of gender, climate, and crisis lens of farmers
 - a. Boost the effectiveness of rural improvement club (RICs) in municipalities/cities and federated RICSs to facilitate women's access to relevant information, support programs, community connection, participation in local development planning, and dissemination of climate-smart farming techniques;
 - b. Tap local civil society organizations to reach more areas, especially last mile communities for extension of local government programs such as tree planting, etc.²⁸ While tree planting is a good initiative for carbon sinks, as a climate mitigation activity, programs should go beyond tree planting;
 - c. Go beyond information dissemination campaigns and upgrade actions to more in-depth support to farming communities on climate smart practices - invest in infrastructure development, farming technologies, knowledge and technology transfer
3. Design various forms of investment that incentivizes climate-smart initiatives at the local level by providing tangible and intangible benefits and opportunities. Some suggestions are:
 - a. Gender and Development (GAD)-Agriculture Office to develop more focused partnerships on local community programs/projects for climate action, i.e., partner with farmers and local researchers in working on farming innovations

²⁸ This is also acknowledged and affirmed by the local DA offices covered in the data collection sample.

- b. Implement massive information and communication campaigns for social and behavior change promoting women's contributions in climate mitigation
 - c. Support innovative climate mitigation initiatives of community women social enterprises by helping them become climate mitigation leaders that can soon lead and teach profitable climate mitigation farming practices and distribution/marketing to others like them
 - d. Refocus local allocations on gender and development plan and budget, disaster risk reduction and management plan, and other local plans similar thereof for empowering local communities for economic benefits and climate action
 - e. Design local job generation initiatives on green jobs in coordination with relevant national government agencies
4. Rethink regulatory measures and engagement with the private sector
 - a. Understand differences and engage private sector players to facilitate direct connection with farmers for product uptake or other value chain investments
 - b. Gather information and develop strategies to maximize the economics of the corn value chain
 - c. Facilitate the market availability of less expensive farm inputs by providing incentives for the private sector
 - d. Capitalize on corn value chain facilities for farmers to boost production and empower farmers
 - e. Initiate infrastructure investments and ease of doing business measures to promote inclusive business practices locally

Climate innovation practices or solutions may help women overcome gender-based constraints in agricultural value chains

Specific climate-smart actions that also work for women's economic empowerment are also derived from the study as follows:

- Introduction of organic and low-cost farm inputs and corresponding incentives towards decreasing greenhouse gas emissions
- Gender-responsive consultative and participatory mechanisms for government policies and programs to be attuned to corn farmers' needs and ways of transition to climate mitigation practices (gender-responsive and gender-transformative climate governance)
- Shift to more gender-responsive and gender-transformative government climate action programs for farmers (household and community levels; organization-focused)
- Creation and effective operationalization of women's equality and empowerment programs (client-focused)

What are entry points for promoting and scaling women's empowerment and gender transformation in agricultural value chains using a low carbon economy lens?

- GAD-Agriculture Office focusing partnerships on customized community programs/projects on climate action
- Promoting women farmer stories for social and behavior change promoting women's contributions in climate mitigation. Current social values need to change so farmers can accept and implement the programs that promote crop diversification, with less or no reliance on herbicides.

- Formulating incentivization schemes to facilitate women farmers' significant contribution in climate-smart farming practices
- Supporting innovative climate mitigation initiatives of community women social enterprises by helping them become climate mitigation leaders that can soon lead and teach profitable climate mitigation farming practices and distribution/marketing to others like them
- Implementing private sector initiatives on capacity building, collaboration with local governments on infrastructure and job generation, responsible labor costing afforded to women farmers, business development for social enterprises, provision of access to capital and sustained market access on a fair price
- From the farmers perspectives:
 - The support respondents indicated that to pursue climate-friendly production, they need crop insurance, farmer financial assistance and subsidy, farm inputs support, training, technology access/acquisition assistance, government subsidy for inputs, land acquisition assistance, capital assistance, loan availability, loan relief, and end to armed conflict and *rido* and glyphosate-tolerant variety to control the weeds.

LINKS, APPENDICES, ANNEXURES. Please click the links to access the annexes.

- Data collection tools used [LINK](#)
- Photos [LINK](#)
- Attendance sheets and Consent [LINK](#)
- Letters [LINK](#)
- Interview/Survey Responses [LINK](#)
- Recordings [LINK](#)
- SDD (sex-disaggregated data) [LINK](#)
- [Selection of Value Chain Report](#)

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