

Integrating Gender Dimensions in the Myanmar Climate-Smart Villages

Working Paper No. 375

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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**Climate Change,
Agriculture and
Food Security**



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Abstract

The Climate-Smart Village (CSV) features a participatory platform that helps address climate change impacts on agriculture in farming communities, taking into consideration the climate-smart agriculture (CSA) options which are ecologically, culturally and gender-responsive. Its design includes providing a portfolio of practices, technologies and innovations that address food security, adaptation and mitigation and support services. In 2017, the International Institute of Rural Reconstruction (IIRR) established four CSVs designed to serve as action research, learning and demonstration sites for engaging partner communities in community-based adaptation. The CSA program in Myanmar put a special attention to studying and responding to the needs of women in smallholder agriculture, their involvement in livelihood activities in the midst of climate-hazards and risks; the study attempted to draw implications for ensuring equal opportunities for women in CSA.

Keywords

Gender empowerment, women economic empowerment, climate-smart villages, CSA, Myanmar

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Acronyms

CCAFS SEA	CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia
CSA	Climate-smart agriculture
CSV	Climate-Smart Village
PCVRA	Participatory Climate Vulnerability and Risk Assessment

Introduction and Background

Agricultural research and innovation efforts have typically focussed on increasing agricultural productivity, through the intensification of existing production systems. These approaches involved, introducing packages of technologies or best practices, to achieve sustainable food and income security particularly for resource-poor households. Typically, these relied on external inputs conferring a high carbon footprint to the production system. Many smallholder farmers have not benefitted from such approaches, and, sometimes these approaches further marginalized them. Gaps between the rural elite and the majority were widened. These efforts did also not pay enough attention to how women and men fit their agricultural activities to their other productive, reproductive and community tasks. There is also a growing emphasis on the importance of understanding social contexts of agricultural research, especially in the midst of a changing climate, ecosystems degradation, and, rising poverty and malnutrition.

UN agencies, research organizations and development and agencies have increasingly focused on gender and climate change, including issues of equity and inclusiveness arising from the differential impacts on men and women. A report from the World Economic Forum strongly affirmed that women are more likely than men to “be displaced by a changing climate”. It says among those displaced, 80% are likely to be women (Katica Roy, July 2020). The same report urges development planners and managers to apply the gender lens in analyzing climate issues by embracing a broader understanding of climate change, including, but not limited to mitigation and adaptation dimensions. The relationship between gender and climate change is now well established and unchallenged.

Development practitioners are encouraged to make efforts to understand the complexities of gendered roles in agricultural production, nutrition and livelihood system in the midst of this changing climate (Quisumbing, et.al. 2014, De Pinto, et.al). This work draws attention to the challenges that women face in accessing productive resources like land ownership, credit, extension services and market. Gender issues in agriculture and livelihoods could be related to inequalities in the status and conditions of female and male members of rural households, including access to education, access to resources and services to improve their productive and reproductive work. As such, gender affects the use, and management of resources that may impact on agricultural and development outcomes as suggested by many studies in the past (Agrawal, et. Al 2006, Resurrecion and Elmhirst 2008). The case for addressing gender inequalities, unfortunately is not a new one. It has simply not received adequate consideration in the design and implementation of projects.

Gender issues need to be addressed through more gender responsive design, monitoring and evaluation.

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) developed the Climate-Smart Village (CSV) approach to address knowledge gaps and scaling of CSA. The work in the CSVs is conducted in different levels and locations that consider broader agro-ecology and landscape where the farms are located. In Southeast Asia, CCAFS through the engagement with various CGIAR centers and other stakeholders established 7 CSVs located in Laos, Vietnam, Cambodia and the Philippines. Building on the key experiences and lessons in these CSVs, CCAFS Southeast systematized the approach to setting up CSVs. (Sebastian et al, 2019).

A CSV is an integrated approach to address the challenges of food security and climate change. With a strong emphasis on inclusion, climate-smart village approaches recognize the differential effects of climate change on women and men. (Barbon et al, 2021a). This may lead to the identification of more appropriate CSA responses and outcomes, based on the gendered differences of women and men, their knowledge and beliefs of their environment, as well as their respective needs, and, constraints with regards to the access and control to productive resources.

The IIRR in 2017 established the 4 CSVs (CSV) in Myanmar aimed at serving as demonstration sites and proof of concept, for the Myanmar stakeholders interested in engaging communities to promote climate-smart agriculture. In 2015, the Myanmar government adopted the Myanmar CSA Strategy (MCSAS, 2015) that laid out the long-term strategy in achieving climate resilience of the Myanmar agriculture sector. The strategy includes targets for research on improving crop varieties, enhancing production systems, strengthening extension and people's participation. (Hom et al, 2015). IIRRs work on developing CSVs in Myanmar is aimed at supporting the Myanmar's CSA Strategy. This three-year effort was supported by CCAFS Southeast Asia and IDRC Canada.

In addition to the traditional challenges of achieving food security, there are new challenges needing attention, such as the challenge integrating gender-responsive approaches in the design and implementation of CSVs. The CSV seeks to facilitate a collective understanding of the realities of women and men in the as they experience climate change-related risks, by co-identifying those challenges and co-creating solutions through participatory technology development processes

This research effort, and, this paper, attempts to provide support for gender-responsive CSV approaches, which take into account the particular, and, unique needs of women and men to equally benefit from, and, commit to gender equality and women empowerment as declared in the UN Sustainable development Goal 5.

This paper attempts to deepen our understanding of gender elements in programming efforts in CSA projects. This wave of interest in CSA should be capitalized upon in our campaign to promote and advocate for the development of location-specific, gender-responsive, equitable, and, inclusive CSV strategies.

The findings presented here are based on action research undertaken in four different locations in Myanmar between 2018 to 2020. The research relied on surveys (baseline and end line) and focus group discussions. The study investigated the following research questions.

- What roles do women play in smallholder agriculture in Myanmar?
- How do women and men view the involvement of women in livelihood activities?
- What are the implications for ensuring equal opportunities here for women in CSA?

Methodology

Recognizing the nature of the research questions presented earlier, the researchers utilized a combination of quantitative and qualitative data collection and analysis conducted in the 4 CSVs in Myanmar. The 4 CSVs represent 4 major agro-ecologies in the country. A profile of the four CSVs is presented below in Table 1:

Table 1: Profile of the Myanmar CSVs

Name of Village	Htee Pu	Taung Khamauk (TKM)	Ma Sein	Saktha
Agro-ecology	Dry Zone	Upland	Delta	Highlands
Major crops	Groundnut, pigeon pea, green gram	Rice, millets. Corn	Rice	Rice, corn, vegetables
Township (Tsp)	Nyaung-Oo	Nyaung-Shwe	Bogale	Hakha
State/Region	Mandalay	Shan	Ayeyarwaddy	Chin
Total households	275	94	103	200
Total Population	1,1180	405	453	865
Female	603	215	249	445
Male	577	190	214	420
Distance from Tsp. nearest	35 km	20 km	11 km	32 km
Ethnic Group	Burmese	Pa-o	Burmese	Chin

Source: Barbon et al, 2021a

The quantitative data was collected by conducting household level and individual level surveys in the 4 CSVs in Myanmar. The qualitative data was collected via the conduct of participatory climate vulnerability and risk assessment (PCVRA) in the 4 CSVs.

The household and individual surveys were conducted in 2018 (as baseline) and in 2020 as end line). The surveys included data on household demographics, livelihoods and well-being. The individual surveys were mainly on perceptions of the individuals on specific statements related to gender relations and women economic empowerment. The perception studies were conducted in 2018 and 2020. In the perception studies, the respondents were asked to respond to the set of statements using a 6-point Likert scale (strongly agree to strongly disagree). These same statements were also posed to the men respondents. The perception studies covered the following:

- The perception of men and women towards women's roles in the household and livelihoods
- The perception of women towards their involvement in decision making in their households
- The perception of women of their roles and contribution in community development
- The perception of women of their role and contribution in livelihoods
- The perception of women with regards to their control of livelihood assets

Also included is an analysis of the coping activities of women as well as their ability to access support services.

The questionnaires were translated into the Myanmar language to ensure clarity of the key points featured in the surveys. The survey enumerators were trained in administering the questionnaire. Both surveys were conducted on the same months, between October and November (Wet Season) in 2018 and repeated in 2020 between October-November in the four CSVs. Several meetings were conducted with the respondent-participants, and other village authorities, local NGOs and research centers to inform about the purpose, scope, and procedure of the survey.

The survey data was then encoded into spreadsheets for data analysis using SPSS. For this paper, we used frequency distribution, percentages, test for significance and correlation analysis to illustrate changes in the perceptions between 2018 and 2020 as well as association of perceptions to specific variables. A total of 583 respondents (43% are women) were interviewed in 2018 and 597 respondents (49% are women) in 2020.

For the qualitative data collection, the Participatory Climate Vulnerability and Risk Assessment (PCVRA) was used as a method of assessing the risk that climate variability poses to the village's livelihoods. This method allows multiple stakeholders, such as the youth, women, the elderly, and

ethnic groups, to offer their perspectives on their vulnerabilities to climate change using their personal experiences and observations (Barbon, et. al 2019). To facilitate group discussion, the facilitators of PCVRA used various tools such as mapping, problem tree analysis, seasonal calendars, gender clocks and Venn diagrams. These methods ensured that community members participated and contributed to the discussion. Each PCVRA session in each CSV was attended by at least 25 participants. These were conducted in a very informal venue within the village. The discussions in the PCVRA were documented in a report and photos. These reports were further analyzed to identify similarities and differences across the CSVs. The PCVRA also served as the basis for analyzing the role of women in the livelihood activities in the CSVs.

Results and Discussion

Demographic and Livelihood Characteristics of the CSVs

Table 2 presents the demographic profile of the 4 CSVs included in this study based on the 2020 household surveys. It indicated that across the CSVs, the age profile exhibited a relatively high economic dependent population (0-18 years of age), an average of 30% of the population across the 4 CSVs. More than half of population are also married, which may impact on household labor arrangements and, thus gender relations. Similarly, there is also a low level of formal education across the 4 sites, estimated at just more than one-third who obtained elementary levels of education.

Table 2. Profile of the household members by agroecology/CSV, Myanmar, 2020.

Demographics	Htee Pu	TKM (Shan)	Ma Sein	Saktha
1. Sex (%)				
Male	46.63	53.39	49.37	48.43
Female	53.37	46.61	50.63	51.57
2. Age (%)				
0-18	17.54	35.06	29.56	38.59
19-30	20.7	22.13	17.92	20.96
31-45	25.82	19.54	24.53	15.96
46-60	19.61	16.38	19.81	14.84
60-above	16.34	6.9	8.18	9.65
3. Marital Status (%)				
Single	20.43	16.38	21.07	15.77
Married	58.91	46.33	50.94	40.45
Married with more than 1 spouse	0.54	0.85	0.63	3.53
Widowed	3.91	5.37	2.83	5.38
Sep/Divorced	1.41	1.41	0.31	1.3
Other	0.22	0	0	0

Too young/child	14.57	29.66	24.21	33.58
4. Educational Attainment (%)				
No formal education	8.16	18.64	5.35	15.24
Nursery or kindergarten	6.96	7.91	3.46	5.58
Some elementary school	42	58.47	37.74	20.07
Completed elementary school	13.06	7.34	36.16	27.7
Vocational training certificate	0	0	0	2.04
Some high school	11.64	1.41	14.47	19.89
Completed high school	2.29	0	0.31	3.72
Some college	3.59	0.28	1.89	3.35
Completed college	5.01	0	0	2.04
I don't know	7.29	5.93	0.63	0.37

Source: IIRR Myanmar, unpublished

The Taungkhamauk CSV representing Upland plateau agro-ecology

Taungkhamauk, an upland village in the southern region of the Shan State, has had a history of inconsistent climate variability. However, the village is currently experiencing more expressed and frequent climate variability (e.g., irregular rainfall, later onset of monsoon, and high temperatures) than it had since 1988. Households in the village mainly rely on agriculture and animal husbandry for their livelihood's activities, with casual labor, carpentry, construction working, and vending as secondary livelihood activities. While nearly all types of livelihoods are impacted by climate variability, agriculture remains the most vulnerable. The irregular and intense rainfall, late onset of the monsoon, and high temperatures lead to more pests, diseases and infections, eventually leading to poor germination, lower crop yield, and even crop failure. These also lead to high labor cost for additional required activities. (Barbon et al 2020)

Taungkhamauk Village of the Nyaung Shwe Township is located in the southern region of the Shan State. The village has a population of 373 individuals (198 male and 175 female), who make up a total of 94 households. The ethnicity of the Taungkhamauk Village is 100% Pa-o Tribe. The villagers primarily rely on agriculture and livestock as their main source of livelihood, with 80% of households engaged in some form of agricultural work and animal husbandry. Major crops include corn, upland rice, groundnut, sunflower, and safflower. Around 70 households or 70% in the village are involved in raising livestock such as cows, pigs, chicken, and buffalo. The remaining 20% of the community is engaged in non-agricultural work, such as selling firewood (80 households), casual labor (35 households), construction (7 households), vending, and managing small general stores.

Ma Sein CSV representing the Delta agro-ecology

Ma Sein village is located in the Delta region of the Bogale Township. The village has an average of 30 inches of annual rainfall. Like other villages in the delta region, Ma Sein was affected by the 2008 Nargis Cyclone which disrupted both the village's livelihood systems (primarily, the agriculture sector) and water resources. The village continues to face other phenomena of climate variability, such as flooding, heavy rainfall during harvesting periods, summer droughts, and a scarcity of drinking water due to their reliance on rain water as a clean drinking water source. The major livelihoods of the village include paddy production (casual labor in rice production), coconut, and betel leaf production, betel nut and banana trading, are all vulnerable to the effects of climate variability. (IIRR, 2018a)

Ma Sein Village is located in the Bogale Township, situated in the low-lying and flood-prone Ayeyarwady Delta region. The region is frequently affected by storms and other hazardous climate conditions, such as riverbank erosion, saltwater intrusion, and periodic flooding, which disrupt the agricultural activities (as in Ma Sein).

Agriculture is the main livelihood activity of Ma Sein households, with rice paddies, coconuts, and betel nut taking up most of the village's cultivated land. Poorer households without access to arable land rely mainly on casual labor (e.g., trading, backyard animal husbandry, small scale fishing and aquaculture, motorcycle/taxi, and betel nut and coconut trading) for their income. During monsoon seasons, farmers rely on rainwater to feed their rain fed crops, while irrigation is used during the summer, when farmers can afford it.

Htee Pu CSV representing the central dry zone agro-ecology

Htee Pu Village is located in the Nyaung Oo Township, in the Dry Zone region of Myanmar. The region is generally arid, receiving very little rainfall and experiencing consistently year-round high temperatures. The village does not have access to irrigation canals and it completely relies on rainfall as a water source. However, due to changes in the onset of the monsoon, the amount of rainfall received by the village has been decreasing, interfering with the traditional crop calendar and agricultural activities. Major crops include groundnut, sesame, tomato, pigeon pea, sorghum, and mango; secondary crops include lablab bean, butter bean, horse gram, and green gram. Animal husbandry is the second largest source of livelihood after agriculture. (IIRR, 2018b)

Women (more than men) in the Dry Zone are engaged in the provision of farm labor both during the monsoon and dry seasons. In particular, women are tasked with weeding, pest control, and

harvesting, while sharing equal involvement with men in soil preparation. Other farm duties performed by women include caring for livestock, cultivating vegetables, post-harvest activities (winnowing, grinding, husking), and collecting water, fuel wood, and forest products. Despite this disparity in gender-based work allocation, women only earn 75% of what men earn on a daily basis for farm labor.

Livestock such as cattle, goats, pigs, poultry, and horses are raised by the villagers for income. Both agriculture and animal husbandry are negatively impacted by the decreasing rainfall and prolonged dry periods. Since climate variability leads to much uncertainty regarding agricultural yields in the (once a year) rainfed cropping season, nearly 70% of the village's households also rely on non-agriculture-based livelihoods, such as carpentry, construction work, car drivers and conductors, loudspeaker rental, small general store/shops, toddy palm workers, and tamarind processing and trading.

Saktha CSV representing a upland mountain agro-ecological setting

Saktha village is in the Haka Township, located in the middle of several natural sources of water, such as the Arr Suang Stream and Lung Ko Stream in the north, and the Fan Fang Stream and Thiva Stream to the southwest. The Saktha village relies on these bodies of water, particularly the Thiva Stream, for both domestic and agricultural use. Furthermore, the village has large areas of land for livestock to graze freely, mostly secondary forests. Agriculture and animal husbandry are the two main livelihoods in the Saktha Village. (IIRR, 2018c)

Sixty-five percent (65%) of households in the Saktha Village own less than one acre of agricultural land, while 15% of households own more than two acres. Major crops include elephant yam foot, cherimoya, potatoes, pigeon peas, eggplant, banana, upland rice, and corn. Climate variability, such as heavy rainfall from September to October, disrupts agricultural activity by decreasing rice yields and causing destruction of several fruit trees. Heavy rainfall in July and August also lead to flooding, landslides, erosion, and destruction of farmland. Irregular climatic conditions resulted in an increase in pests and diseases further decreasing agricultural output, and in effect, leading to food shortages and a loss of household income. Among crops, potatoes, rice, and pigeon pea are the crops most vulnerable to climate change, while banana and taro are the most adaptive.

Ten percent (10%) of households in the Saktha Village own between 1 to 15 units of livestock, and are mainly engaged in raising chickens, piglets, and small-scale aquaculture. 5% of households own more than 20 units of livestock, and mainly care for cattle, mythuns, and medium scale aquaculture.

5% of households are involved in both livestock and non-agriculture means of livelihood. Besides owning between 1 to 15 units of livestock, they are involved in casual labor, personal business, skill employment, and working for the church. In terms of types of livestock's adaptability to climate change, chickens are the least adaptive (due to their propensity to catch and spread flu), while cows and buffalos are the most adaptive.

Access, Ownership and Changes in Land Resources for Agriculture

Access to land, by households in the four CSVs, was studied, because it could be a determinant in the adoption of certain CSA options eg trees and agroforestry interventions. Table 3 below shows land ownership and land sizes of the households in the 4 CSVs. Land access and ownership in the four locations was high at 80-95% of the households owning/or have assured long term access to the land that they farm. The Ma Sein CSV however is the only CSV where the majority did not have access to land, with 76% of its households not owning or having access to land in 2020. Land ownership in Myanmar is not however primarily indicated by land titles. Farmers are given rights to use the land. For Myanmar, access and having assured tenure is tantamount to land ownership.

Access to land often determines the capacity of the household to diversify and increase agriculture productivity. For instance, in Ma Sein CSV where majority of the households do not have access to land, households in the village only use the small patches of land around the house for agriculture production—growing some vegetables, growing betel leaves and raising small animals. For CSVs where households with assured land tenure, households are more inclined to diversify their production, including long-cycle activities such as agroforestry or the planting of fruit trees on the farms.

Table 3: Change in the Land Ownership and Land Sizes between 2018 and 2020

Parameters	Htee Pu			Taungkhamauk			Ma Sein			Saktha		
	2018 (%)	2020 (%)	p-value _a	2018 (%)	2020 (%)	p-value _a	2018 (%)	2020 (%)	p-value _a	2018 (%)	2020 (%)	p-value _a
Land Ownership												
• Yes	80.25	80.25	1.000	87.06	91.76	0.344	55.81	24.14	0.000	80.56	95.54	0.001
• No	19.75	19.75		12.94	8.24		44.19	75.86		19.44	4.46	
Land Size ^b												
• Less than or equal to 1 acre	5.64	0	0.001*	24.32	21.79	0.839	29.17	9.52	0.002*	52.87	37.38	0.018*
• 1.1 acre to 2 acres	20.51	13.85	0.112	43.24	33.33	0.025*	22.92	38.1	0.008*	34.48	30.84	0.871
• 2.1 acres or more	73.85	86.15	0.001*	32.43	44.87	0.023*	47.92	52.38	0.011*	12.64	31.78	0.000*

a McNemar's test was conducted to determine if there is a significant difference on the proportion (increase or decrease) over time.

b Only households who owned land were included in the analysis.

If *p*-value < 0.05, then the proportion is statistically significant at 5%

If *p*-value < 0.01, then the proportion is statistically significant at 1%

Source: Barbon et al, 2021a

Table 4 presents the tillage practices across the four CSVs. A significant decrease of respondent participants reporting the use of manual/hand tools was observed in Htee Pu CSV and, in Ma Sein CSV. These two CSVs have reasonable access to animals for tillage in Htee Pu CSV and, to tractors in the case of the rice paddies of Ma Sein CSV. Thus, the reduction in the use of hand tools for tillage in these 2 CSVs. On the other hand, Taungkhamauk and Saktha CSVs—both representing upland agro-ecologies have seen an increase in the utilization of hand tools for cultivation (both are statistically significant at 1% and 5% respectively). Both villages rely on livestock husbandry for livelihoods, some households resorting to home gardening. Htee Pu and Ma Sein on the other hand raise more agricultural crops on farm lands. Interestingly, Saktha village, where majority of HH own less than one acre of land, reported increasing their use of tractor in 2020 for land preparation. It can only be inferred that the increase could be attributed to government support to farmers. With regards to gender roles, and associated gender-differentiated technology, the use of farm animals and tractors might seemingly be tailored to responding to the stereotypical roles of men across the CSVs who perform labor demanding tasks like land preparation. The use of hand tools generally associated with women.

Table 4: Change in the Methods of Tillage between 2018 and 2020

Parameters	Htee Pu			Taung Khamauk			Ma Sein			Saktha		
	2018 (%)	2020 (%)	p-value _a	2018 (%)	2020 (%)	p-value _a	2018 (%)	2020 (%)	p-value _a	2018 (%)	2020 (%)	p-value _a
• Method of Tillage ^b												
• Farm animal	72.43	72.84	1	7.06	2.35	0.219	0	0	N/A	28.7	3.57	0
• Tractor	76.13	64.2	0	72.94	78.82	0.359	27.59	9.2	0.001	1.85	6.25	0.219
• Manual/ Hand Tools	62.96	0	0	18.82	54.12	0	42.53	1.15	0	75	88.39	0.012
• No response	0	0	N/A	1.18	0	N/A	29.88	89.65	N/A	0	0	N/A

a McNemar's test was conducted to determine if there is a significant difference on the proportion (increase or decrease) over time.

b Only households who owned land were included in the analysis.

If p-value < 0.05, then the proportion is statistically significant at 5%

If p-value < 0.01, then the proportion is statistically significant at 1%

Climate Vulnerabilities across CSVs

The PCVRA reports and climate change vulnerabilities in each of the CSVs (Table 5) were analyzed. These CSVs represent areas where impacts of climate change are exhibited differently across these ecologies.

Table 5. Climate Vulnerabilities of CSVs (CSVs) in Myanmar

Name of CSV	Agro-ecology	Vulnerability	Livelihood System
Htee Pu	Central Dry Zone	<ul style="list-style-type: none"> • Delayed onset of monsoon • Rainfall received by the village has been decreasing 	<p>Agriculture-groundnut, pigeon pea, green gram and animal husbandry</p> <p>Non-agriculture-based livelihoods (casual labor in towns)</p>
TaungKhaMauk	Upland Plateau	<ul style="list-style-type: none"> • Irregular onset of monsoon; • Fewer rainfall and more frequent periods of intensive rainfall; • Higher daytime temperatures as compared to previous years; • Irregular rainfall during harvest period; • More frequent heavy rain and stronger winds 	<p>Agriculture-rice, millet, corn and animal husbandry</p> <p>Casual labor, carpentry, construction working, and vending</p>

Ma Sein	Delta	<ul style="list-style-type: none"> • Storms and other hazardous climate conditions, • Riverbank erosion, • Saltwater intrusion: and • Periodic flooding 	<p>Paddy production (casual labor in rice production),</p> <p>Coconut, and betel leaf production, betel nut and banana trading</p>
Saktha	Mountain Uplands	<ul style="list-style-type: none"> • Flooding, landslides, erosion, and destruction of farmland. • Irregular climatic conditions lead to increase in pests and diseases 	<p>Agriculture-rice, corn, vegetables and animal husbandry</p>

Gendered Perception of Climate Change Experience

On the gendered perception of climate change (Table 6), men and women were required to comment on their perception of climate change. More women than men felt that high rainfall caused flooding to the village and to the farm. The difference in their responses is significant at 1 percent. Conversely, the climate change experience of “rain not coming as expected” is identified more by men than women. This is not surprising given the men’s role in rainfed cropping systems of millets, corn, rice and groundnuts. Furthermore, the male and female participants shared the same experience that “daytime temperature is getting hotter than before”. On the experienced changes in crop performance and growth experienced by male and female participants, both expressed men and women were concerned about rainfall scarcity for the farm and household. Similarly, they observed the appearance of new pests and diseases to crops, animals and to people. However, both male and female participants remain hopeful that the weather and climate conditions will get better so they can grow more and new crops.

Table 6. Gendered perception of Climate Change experience

Changes in the Environment Experienced	Male %	Female %	Fisher’s Exact Test
Too much rainfall causing flooding to the village and in the farm	28.80	35.96	6.084**
Too less rain making it difficult to grow crops and animals as well as secure water for the household	75.22	70.64	2.758
The rains are not coming as we expected, sometimes they come late and sometimes they come early	79.58	74.04	4.484*
The daytime temperature is getting hotter than before		81.91	3.599
Some new pests and diseases are happening to the crops, animals and to people	69.46	66.38	1.124
The weather and climate conditions are getting better now that we can now grow more and new crops in our farm	9.60	13.40	3.727

*significant at 5%, **significant at 1%

Fisher's exact Test was used to determine if there is a statistically significant difference in the proportion of the perception of climate change experience between male and female

Roles of Women in Smallholder Agriculture in the Myanmar CSVs

From our analysis of the PCVRA reports and household survey results, we summarized our findings as follows.

In the CSV in an upland plateau represented by Taungkhamauk, women do the majority of agricultural work (68%) as compared to men (32%), and they are responsible for most tasks, aside from land preparation. The distribution of management activities in the livestock sector is nearly equal between women (48%) and men (52%), but women take on more tasks and duties. In non-agricultural livelihoods, heavy duty work (e.g., masonry, road construction, rock collecting, and brick production) is performed by men, while lighter duties (e.g., vending, managing general stores, other casual labor) are performed by women. While men's involvement in non-agricultural labor is higher (70%) than that of women (30%), both are equally involved in making decisions. In general, domestic labor (e.g., house chores, cleaning, baby-sitting, washing, and cooking) is performed mainly by women, who still need to also work in the farms. This is in contrast to men, whose labor is mostly performed outside of the home.

Interestingly, in Ma Sein Village located in the Delta region, men are responsible for the majority of the tasks in paddy production (68%). Even though women are less involved in this work (32%), 90% of the marketing decisions are made by them. The village adopted several adaptation and coping strategies to manage the effects of climate variability on their livelihoods. Such measures included small scale aquaculture and the raising of ducks, which can be raised all season, and are resistant to disease. Betel nut, resistant to short term flooding (in areas where drains are dug), easy to grow and market locally, surfaced as attractive adaptation option. Women are also beginning to seek training in Market Based Income Generation Activities (e.g., liquid soap production and basketry) in order to find other less vulnerable sources of livelihood.

In the Central Dry Zone represented by Htee Pu, forty percent (40%) of the heavy agricultural work (e.g., land ploughing and harrowing, spraying, and harvesting) is performed by men. The remaining 60% of agricultural work, such as buying seeds, sowing, fertilizer application, harvesting, and storage are performed by women. Transportation of goods to markets in the city is done by men. However, decisions regarding selling prices and family matters, are jointly done by men and women in the household. Overall, men spend at least 5 hours a day in heavy agricultural duties (e.g., ploughing and

harrowing), while women spend about 8 hours a day, on “minor” agricultural activities (e.g., weeding, seeding, sowing, transplanting), but nonetheless equally important agricultural tasks.

Men perform 80% of the work required for livestock rearing (e.g., buying and selling animal stock, feeding, livestock building preparation, and fencing), while women are in charge of the remaining 20%, which consists of daily management work (e.g., feeding and cleaning). Overall, men spend approximately 4 hours a day engaged in livestock-related work. Men get about 4 hours of rest during the day, while women get 1- 2 hours of “rest” per day, which is spent doing household work, such as cooking, cleaning, and babysitting. Both men and women get around 8 hours of sleep at night.

In the mountain uplands where Saktha village is located, 60% of heavy agricultural labor is performed by the men in the village. These include ploughing, weeding, thinning, harvesting, threshing, and carrying goods from the farm to the village. Women are responsible for the remaining 40% of agricultural work, which involves nursery, transplanting, weeding, and drying. Men and women mostly do an equal amount of work in raising livestock. However, 60% of the daily tasks, such as feeding, management, and cost management are performed by women. The remaining 40% of the work involved much more physically strenuous tasks, such as buying, fencing, and selling, and these were performed primarily by the men.

An analysis of the activities of men and women in Saktha households revealed that men get to sleep for an average of 8 hours, while women sleep for an average of 6 hours. Men spend at least 8 hours daily on agricultural work (e.g., land preparation, ploughing, irrigation, weeding, harvesting, threshing, carrying), while women spend approximately 10 hours daily on household duties (e.g., preparation meals, cleaning, laundry, and looking after children).

Perceptions of Women and Men towards women economic empowerment

In the perception study, the respondents were presented a set of statements to which they are asked to respond using a 6-point Likert scale. This same set of statements were also asked to the men respondents. These same statements were also used in both 2018 and 2020 surveys.

Figure 1 presents the graph of the mean responses (presented as percentages) of men and women whether they agree or dis-agree to a same set of statements about specific expectations and roles of women and men in the households and livelihoods activities. These set of statements we are asked in 2018 and 2020. From this graphic, it was noted that there is general alignment of the mean responses of men and women, for both 2018 and 2020. The researchers also noted that the mean percentage of responding to “agree” to the statements has increased to ‘both men and women’

between 2018 and 2020. This implies that there is an improvement on how both men and women view the roles of women in households and livelihood activities.

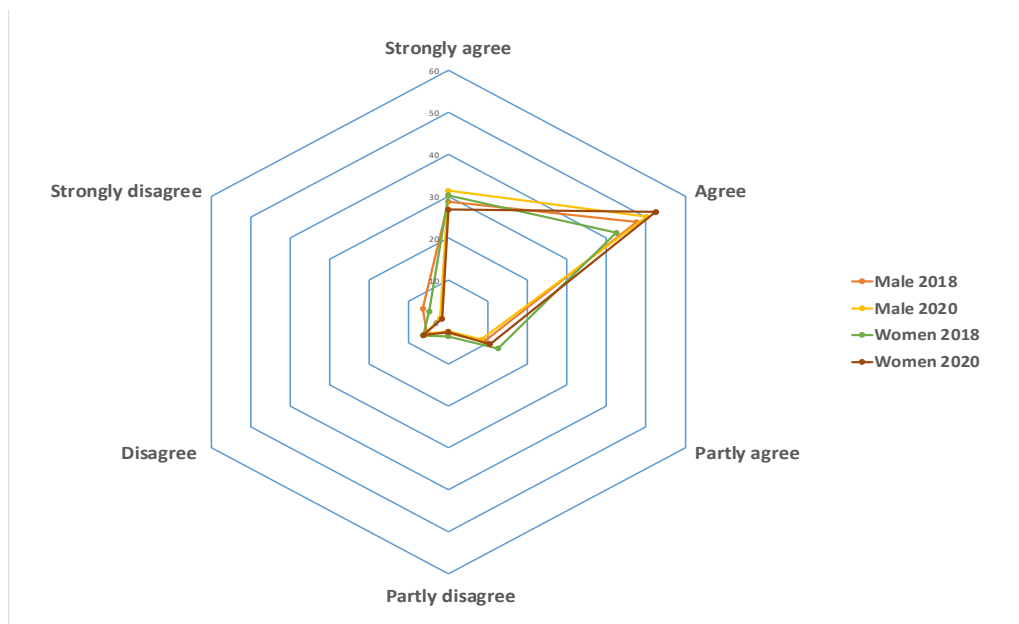


Figure 1. Distribution of Mean Responses (in mean %) of men and women for 2018 and 2020 across 4 CSVs

Generally, gender related surveys in Myanmar are always challenging, more so in a survey that involves both men and women. While the interviews are conducted separately, there were factors that influenced the responses of women and men to survey questions. Htun and Jensenius (2020) identified three possible barriers to the effective participation of men and women in the surveys. One is that the participant-respondents are not familiar with surveys, and, are uncomfortable in providing their true responses. Second is the failure to accurately translate the questions. Finally, people in the villages after decades of repressive rule, discourages people to share and reveal their opinions and views related to household and community dynamics.

Understanding the barriers for better responses, the results obtained with regards to decision-making in the households, Figure 2 remain to be “decisions are made jointly by men and women. The prevailing perception of women across the 4 CSVs both in 2018 and in 2020 remain to be the same. This is a neutral response which could be influenced by factors affecting how women are responding to the survey questions as discussed earlier.

On the other hand, Figure 3 demonstrates a positive shift in the perceptions of women when in 2018, women’s responses were leaning towards disagreeing to the roles and contribution of women to community activities. The 2020 survey results showed that women shifted their response towards

the agree response, an indication that the women in the CSVs have started to value their role in the community as a result of their participation in the CSV activities.

Figure 4 illustrates the level of control of women of important livelihood assets of the households. Similar to decision making, the control of livelihood assets is generally joint control with the men in the households. It also worth noting that the assets where women have exclusive and very strong control are the use of the homestead area and small animals therein. The percentage of women indicating exclusive and very strong control for these assets even increased from 2018 baseline. The result is consistent with the women's perceived role that homesteads and raising small livestock is their domain. This observation was shared by the research team as potential or prospective household adaptation option that can be controlled and led by women.

In smallholdings, women are experiencing drudgery and multitasked for the family's reproductive roles of attending to family's welfare, including food preparation and taking care of young children and the elderly. There is a need to provide women with capacity building to sustain and transform economically lucrative homestead production and small livestock production, to supplement field production of crops dominated by men. This has been demonstrated in other IIRR sites such as with the women of Koh Kong and Mondulkiri in Cambodia where IIRR has promoted a native chicken production coupled with the setting up of village development fund and savings group (VDFSGs)—both of these are mostly led and participated by women. (IIRR, CEDAC, 2020a and 2020b)

To enable women and to sustain better household level financial flows, it is important to know the level of access of women to external services as shown in Figure 5. The women respondents' increase in the percentage of accessing external services such as training programs for women livelihoods, cash to start a business must be examined carefully in the context of gender equality in the midst of climate change. As described earlier in the vulnerability study, productive resources like land, credit, and small animals are economic assets that are highly dependent in agri-based activities. Similarly, women also access reproductive health services that are exclusive health services for women and child care. This is a positive improvement as more women have started to access support for them to engage in meaningful livelihood activities.

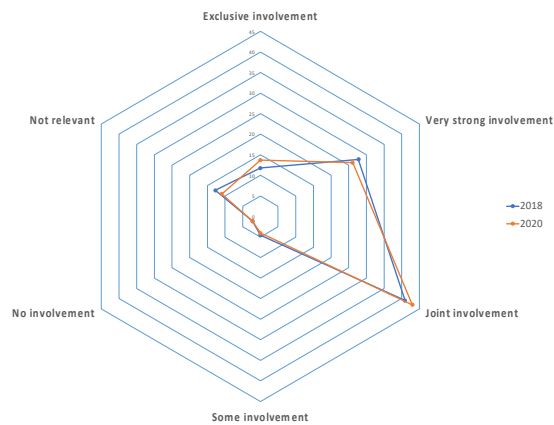


Figure 2. Involvement of Women in Decision Making (in mean %) at the Household Level for 2018 and 2020 across 4 CSVs

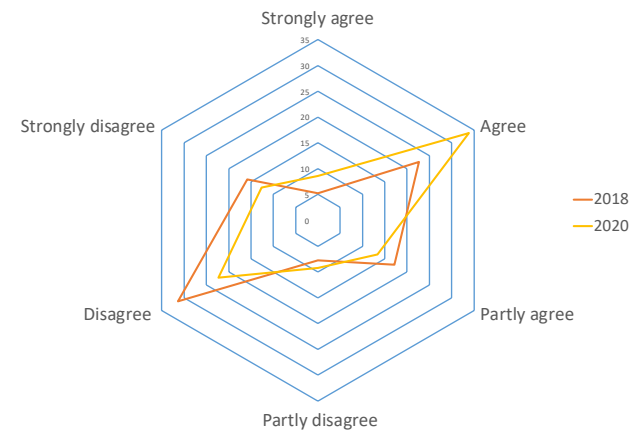


Figure 3. Involvement of Women (in mean %) in Community Development Activities for 2018 and 2020 across 4 CSVs

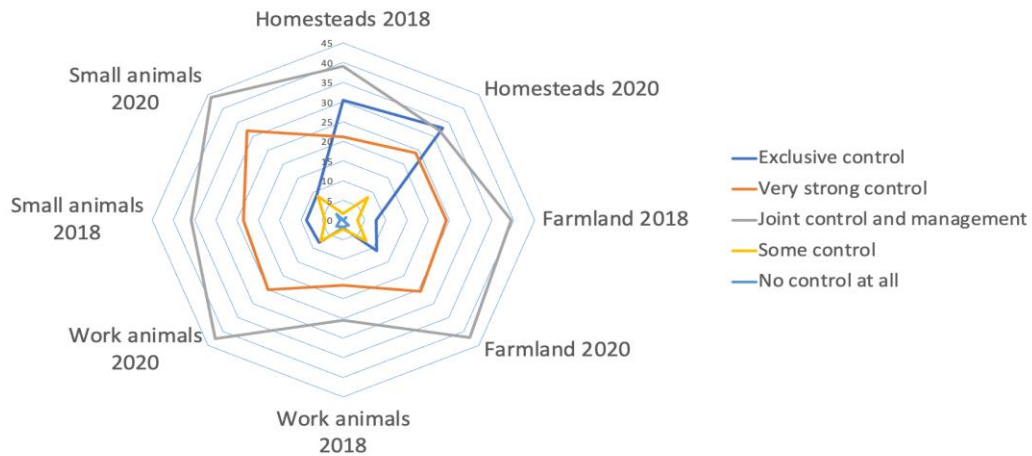


Figure 4. Level of Control of Women of Livelihood Assets for 2018 and 2020 across 4 CSVs

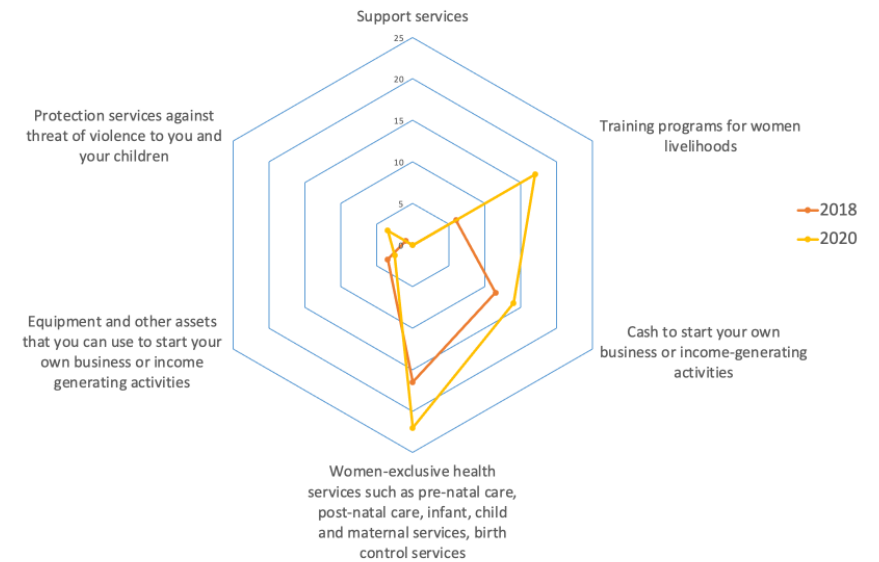


Figure 5. Percentage of Women Accessing External Services for 2018, 2020 across 4 CSVs

Asset Ownership, Adaptation Options and Gender Perceptions

Beginning in 2018, IIRR-Myanmar tools has engaged community members—farmers, women and community leaders through the use of participatory action research socio-technical. (Barbon et al, 2021a). This engagement has resulted to the identification and promotion of climate change adaptation options for agriculture and livelihoods for the community. Table 7 presents a summary of the adaptation options promoted and supported by IIRR in the 4 CSVs and the number of individuals adopting these options.

Table 7: Numbers and Location of Adopters of Identified Adaptation Options, Myanmar, 2020

Climate Change Adaptation Options Supported and Promoted	No. of Individual Adopters (unless otherwise indicated)			CSVs where the Options are Implemented			
	2018	2019	2020	Htee Pu	Taung Khamauk	Ma Sein	Saktha
1. Participatory Varietal Selection (PVS) for new improved varieties	38	65	122	•	•		
2. Diversification of farm production with vegetables; legumes with crop trials for new introduced crops	30	61	80	•	•		•
3. Integration of fruit tree in farms (avocado, mango, banana, jackfruit, oranges)	70	109	125	•	•	•	•
4. Planting of legume trees in farms and along boundaries (<i>Alnus spp</i> , <i>Cassia spp</i> , <i>Gliricidia spp</i>)	17	13	89	•	•		•
5. Homestead production of vegetables, fruits and cash crops	40	70	132	•	•	•	•
6. Small livestock production in homesteads	32	44	150	•	•	•	•
7. Aquaculture (homestead and farm ponds)	7	21	20			•	•
8. Community-based animal propagation centers (pig, chicken, duck and fish)	0	16	1	•	•	•	•
9. School gardens (vegetables, fodder, fruit trees)	3 sch	4 sch	4 Sch	•	•	•	•
10. Improving water storage facilities (at HH)	0	1	7				•

Source: Barbon et al, 2021(a)

In the Myanmar CSVs, IIRR has targeted to promote climate-smart production options for the farms, homesteads and schools. (Barbon et al, 2021a) The provision of a range of adaptation options, by IIRR is referred to as the “portfolio approach”. Promoting a portfolio approach will give the target communities a diverse set of opportunities to adapt to climate change tailored to the unique socio-

economic context of the household. For example, landless households will an adaptation option that will not require access to farmlands.

In Table 8, the highest number of households preferred Participatory Varietal Selections opportunities. Another remarkable increase was observed with option to integrate fruit trees in farms. This CSA option is accepted as minimizing the risk of losses, because trees are more tolerant to rainfall variability and farmers can still grow their annual crops between the trees for the initial few years while trees are growing.

In order to locate women in the context of these different CSA options, IIRR developed a facilitation tool during the identification and prioritization of these options that considers gender equity as a criterion. During the options identification workshop—men and women separately discussed options to be prioritized. A scoring system was adopted to collectively decide on what options to promote that best address all the agreed criteria as follows:

Criteria 1: Is it climate-smart?

Criteria 2: Is it ecosystem friendly (environment-friendly)?

Criteria 3: Is it nutrition-sensitive?

Criteria 4: Does it address food insecurity?

Criteria 5: Is it gender-friendly?

In the process of identification for the options, options 5,6,7 and 8 were identified as the domain for women economic empowerment. These options are related to intensification of homestead production including the raising of small livestock for commercial gains.

Using quantitative data from the surveys, we ran a correlation analysis between 2 positive perceptions of men and women as it correlates to variables related to asset ownership of the household (land, small animals) and to the adoption of CSA/adaptation options indicated in the table above. Table 8 presents the correlation of women's and men's perception affecting factors (Assets) and CSA adoption.

Table 8: Correlation of Men and Women Perceptions vs. Land, Ownership of Animals and CSA Adoption, 2018, 2020, Myanmar CSVs

Variables	Type of Measure	Land ownership (1=yes, 0=no) Nominal	Land size (0=no own land, <=1 acre, 1.1 to 2.0 acres, >2 acres) Ordinal	Ownership of animals (1=yes, 0=no) Nominal	CSA adoption (1=yes, 0=no) Nominal
Men perception: (Q701) Women’s livelihood work is equally as important as their domestic work (Likert scale) ^b	Ordinal	-0.007	-0.159**	-0.025	0.083*
Women perception (Q801) Decisions related to buying big assets that are important for your household’s livelihood activities such as agricultural equipment or other items for income generating activities. (Likert scale) ^c	Ordinal	0.133**	0.214**	0.069	-0.107*

b 1-Strongly agree, 2-Agree, 3-Partially agree, 4-Partially disagree, 5-Disagree, 6-Strongly disagree

c 1-Exclusive involvement, 2-Very strong involvement, 3-Joint involvement, 4-Some involvement, 5-No involvement

* significant at 5%, ** significant at 1%

Measures of association

Pearson correlation coefficient- Continuous vs. Continuous

Spearman rank correlation coefficient- Continuous vs. Ordinal / Ordinal vs. Ordinal

Point biserial correlation coefficient- Continuous vs. Nominal

Rank biserial correlation coefficient- Ordinal vs. Nominal

Phi coefficient - Nominal vs. Nominal

In this correlation table, for men, having land, owning more land and owning animals, tends to agree that women should be involved in livelihoods work (very weak correlation). The implication being that as more assets are accumulated, the more tasks are needed to make those assets (land and animals) productive hence the tendency for men to agree that women should be involved in household livelihoods work.

For women, unfortunately as more assets (land and animals are accumulated) the more the tendency of the women to see themselves less involved in decision making. Based on the earlier analysis that in the CSVs, decision making is still more of a joint-undertaking between men and women. Again, this data showing the tendency to adopt a joint-decision making for household assets can be driven by the challenges of getting an accurate response from the study participants as explained earlier.

In terms of CSA adoption, as the HH adopts CSA, men tend to disagree to the statement that women should be equally involved in livelihoods work. This can be driven by the notion that CSA activities

are still an activity conducted in the farms where its currently run and controlled (decided) by men. For women, as the HH adopts CSA practices, they tend see themselves more involved in decision making. Perhaps women view CSA as not just a farm-level activities but also homestead level productive activities where it is emerging as an important domain of women, a location where they can control the production activities.

Conclusion

CSV is a participatory approach that helps communities address climate change in agriculture, taking into consideration the best CSA options that are ecologically, culturally and gender -responsive. Its design focuses on developing a portfolio of practices and technologies that address food security, adaptation and mitigation and on climate -information services. Agriculture in Myanmar accounts for 36% of its economy has been the focus of the CSV approach to demonstrate the four agro-ecologies representing different types of climate vulnerabilities that challenge the agricultural productivity.

Access to land by households participating in CSA work in four CSVs was studied and found to be a determinant in the adoption of certain CSA options i.e., for trees and agroforestry interventions. Land access and ownership in the four locations was high, with 80-95% of the households owning/or have assured long term access to the land area that they farm. For Myanmar, access and having the assured tenure is considered as good as land ownership and served well those interested in adopting medium and long cycle CSA options.

This research suggests a need for integrating gender considerations that will support the re-designing of CSVs that will help address practical gender needs of women, especially those exposed in high climatic risks as demonstrated in the CSVs in Myanmar. Based on the results it is reassuring that there were CSA options available that promoted women's economic empowerment.

The endline survey results showed positive results of women's engagement in options that gave them new economic opportunities in agriculture. Women have also learned to access external services such as training programs for potential livelihood. There is a need to provide women with capacity building to sustain and transform economically lucrative homestead production and small livestock production, to supplement field production of crops dominated by men. This has been demonstrated in other IIRR sites such as with the women of Koh Kong and Mondulkiri in Cambodia where IIRR has promoted a native chicken production coupled with the setting up of village development fund and savings group (VDFSGs).

Similar to decision making, the control of livelihood assets is generally joint control with the men in the households. It is also worth noting that the assets where women have exclusive and very strong control are the homestead area and small animals therein. The percentage of women indicating exclusive and very strong control for these assets even increased from 2018 baseline. The result is consistent with the women's perceived role that homesteads where, value addition activities, intensive vegetable market gardens, high density fruit tree orchards and the raising of small livestock are important adaptation pathways for women. This observation was shared by the research team that in countries like Myanmar, Cambodia and Laos, where households have access to relatively larger homesteads (1,000 to 2,000 sq. meters)-- homestead based climate-smart agriculture are prospective household adaptation options that can be controlled and led by women. To help women secure and sustain better household level financial flows, it is important for future intervention programs to know the level of access of women to external services and productive resources like land, credit, grant mechanisms, and small animal.

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