



Climate-Smart Agriculture

Enhancing Resilient Agricultural Systems, Landscapes, and Livelihoods in Ethiopia and Beyond

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ISBN: 978-9966-108-24-1

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Published by:

World Agroforestry (ICRAF)
United Nations Avenue
PO Box 30677, GPO 00100
Nairobi, Kenya

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Suggested citation:

Climate-Smart Agriculture: Enhancing Resilient Agricultural Systems, Landscapes, and Livelihoods in Ethiopia and Beyond. 2019. Kiros Meles Hadgu, Badege Bishaw, Miyuki Iiyama, Emiru Birhane, Aklilu Negussie, Caryn M. Davis, and Bryan Bernart, Editors. World Agroforestry (ICRAF), Nairobi, Kenya.

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Cover photo: Central Tigray region landscape, Northern Ethiopia. Photo credit: Aklilu Negussie Mekuria.

Graphic design: Caryn M. Davis, Cascadia Editing, Philomath, Oregon, USA. Email: cascadia.editing@gmail.com

18. Building Gender-Sensitive Climate-Smart Agriculture Approaches for Sustainable Food-Energy Systems

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Summary

Climate change influences agricultural production and threatens the livelihoods of farming households in Africa. The impacts of climate change have been more severe for poor and marginalized peoples, especially women, than they have been for other groups in the society, due to their disadvantaged access to technologies, resources, information, and power. Conventional agriculture technology interventions aiming at improving productivity and income often do not consider social disparities and fail to enhance equitable benefit sharing among men and women. Similarly, climate-smart agriculture (CSA) approaches often fail to take into account the differences in men's and women's needs and capabilities for adapting to climate change and instead have an implicit male bias that privileges male needs, interests, and priorities in the distribution of opportunities and resources. The poor representation and involvement of women in decision-making processes in the agricultural sector has limited their contributions to addressing the adverse effects of climate change, energy shortages, food insecurity, and poverty. This chapter, by drawing on lessons from past and current agricultural interventions across Africa, especially Ethiopia, aims to foster understanding of the various roles and responsibilities of women in designing and implementing gender-sensitive CSA interventions to achieve a sustainable food-energy system.

Keywords: climate change, food-energy system, gender, governance, women, livelihood

18.1 Introduction

Climate change, in the form of unreliable rainfall availability and increased incidence of droughts and flooding, influences agricultural production and threatens the livelihoods of farming households. Agricultural production in Africa has not increased to meet the demand of the growing population due to climate change and other socio-cultural and environmental constraints (Rosegrant et al. 2008). The negative impact of climate change in Africa on the environmental, economic, and social aspects of smallholder agriculture has become explicit. For example, in the central highlands of Ethiopia, climate change negatively influences agricultural production, income, and the livelihoods of farmers through shortening the length of the crop growing period, increasing crop damage by insects and pests, and increasing the severity of weed infestation (Bewket 2012).

Poor and marginalized peoples are especially vulnerable to adverse impacts of climate change primarily because of their reliance on climate sensitive sectors, including farming and fisheries, and their limited human, institutional, and financial capacities to adapt to the negative impacts of climate change (Lambrou and Nelson 2010). In response to this, in Ethiopia, addressing climate change has been mainstreamed into various national policies, strategies, and programs, such as the Climate Resilient Green Economy (CRGE) initiative supported by the Green Economic Strategy (GES) and the Climate Resilience Strategy (CRS), which focuses on improving crop and livestock production practices for greater food security and better income for farmers, while reducing emissions (Woolf et al. 2018).

However, climate change still disproportionately affects women and girls because of their greater vulnerability to

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extreme weather-related events, such as droughts and floods. In Sub-Saharan Africa, about two-thirds of women work in subsistence agriculture, rely on rainfed farming, and have less access to productive assets and services, such as land, labor, and technology; climate change could exacerbate gender inequalities (World Bank 2008). Climate change affects the factors most essential to women's means of subsistence – food, water, and energy supply (Woolf et al. 2018). In Africa in general, and in Ethiopia in particular, women are the responsible actors for collecting fuelwood, hauling water, cooking foods, looking after children, and performing other home-related work. Their role in the farming practice, particularly in weeding and other farming activities, is notable. Women's lives in rural areas are characterized by overwork, low productivity, and little access to credit, land, training, or use of rudimentary technology. The diminishing capacity of agriculture to provide for household subsistence has increased the workload shouldered by women as men withdraw their labor from the agriculture sector (Labintan 2010).

Gender disparities related to the effect of climate change are attributed to the social position and roles of women within families and communities. The adaptive capacity of women can often depend on their access to land, credit, security of land tenure, and active involvement in decision-making on land and water resources (among other factors). Women are unable to voice their specific needs even though climate change affects women and men differently. Although women are responsible for feeding their families and are therefore more dependent on natural resources such as land, wood, and water, their access to these resources is limited. They are also denied full access to loans, education, and information (Bäthge 2010). Their extreme vulnerability to climate change emanates from the gendered roles in society; for instance, due to common restrictions on their mobility, women are less likely to receive emergency information in time to act upon it (ADB 2013).

Therefore, putting in place strategies and measures that compensate for women's historical and social disadvantages, which otherwise prevent women and men from operating on a level playing field, is important for enhancing fairness (CARE International 2009). Gaps in gender equity influence how men and women contribute, respond, and adapt to climate change (Jost et al. 2014). Thus, understanding these gaps enables the development of strategies that both address them and gain buy-in from both men and women.

Inclusion of gender disparities in climate smart agriculture (CSA) approaches could enhance the adaptive capacity of

women and girls while sustainably increasing productivity, building farmers' resilience, and reducing the release of greenhouse gases (GHG) (Murage et al. 2015). Therefore, addressing the equity and justice issues in smallholder agriculture by understanding the different needs and priorities of men and women in agriculture and landscape management is important for effective strategies for adapting to and mitigating the impacts of climate change (Karlsson et al. 2018). Although some studies have examined the relevance of addressing gender issues in climate change (Lambrou and Nelson 2010, ADB 2013), concrete evidence is lacking regarding how gender equity can contribute to addressing the negative impacts of climate change and sustaining the positive outcomes of CSA approaches. This is unfortunate because such evidence would be useful for developing strategies that consider the different needs of men and women in adapting to the negative impacts of climate change.

This chapter aims to contribute to filling the knowledge gap by examining how inclusion of gender disparities in CSA approaches can contribute to achieving improved agricultural productivity, food security, and livelihoods. The chapter reviews how conventional agricultural technological interventions and CSA approaches are often gender-insensitive, with unintended negative welfare consequences for women. The chapter is based on a literature review and on authors' experiences in gender-related research and development projects.

18.2 Conventional Technological Interventions and Gender

Many efforts have been made to empower women's decision-making abilities on household resources and increase their access to modern agricultural inputs. Consequently, more opportunities have been created for women to ensure their equitable participation in society (USAID/IUCN 2019). For instance, in Ethiopia, women's participation in social and economic aspects, such as their access to education, health, and economic opportunities, has reached 91%. However, their access to modern agricultural inputs and other agricultural technologies is still minimal. New technologies that have been introduced are benefiting men while leaving most rural women in poverty and vulnerable to climate change (Doss 2001). Agricultural productivity has been negatively affected by unsustainable practices and gender inequality, which create high losses for local economies and for governments as a whole (Okwaro 2018). The new agricultural technologies introduced to improve productivity and income often overlook social disparities

and fail to enhance equitable benefit sharing among men and women (Beuchelt and Badstue 2013). The poor access to credit and agricultural technologies used for enhancing women's agricultural productivity is among the known constraints to equitable benefit sharing. This finding is consistent with the study by UNDP (2017), indicating that the number of women who have access to agricultural extension services does not exceed 5%. This difference can be attributed to women's involvement in producing subsistence food crops with low potential for generating higher incomes. Their poor access to markets, finance, and technical advice also restricts them from participating in high-value cash crops farming (Byerlee et al. 2009). Moreover, the lack of gender equity also challenges the implementation of technologies that enhance the productive use of water and land resources. In Ethiopia, for example, domestic workloads of women increased with the development of "modern" irrigation schemes, such as micro-dams, river diversion, spring water use, shallow well increase the workload of women by creating an additional task necessary for working on an irrigable plot, which consequently limits their participation in water-user association committees (Yami 2013). Thus, in designing and focusing on interventions, such as irrigation development, it is useful to understand the various roles and responsibilities of women so that such interventions do not increase the demand on women's labor.

The interventions that aim to increase agricultural production through the expansion of improved agricultural practices also result in unintended consequences in gender equity. Often, the practice requires intensive use of hand weeding, which is mainly performed by women, and might therefore contribute to an unacceptable increase in the burden of labor on women in Sub-Saharan Africa (Giller et al. 2009). Beuchelt and Badstue (2013) also pointed out that women's labor burden can increase with new technologies when women take on additional tasks and when current tasks become more burdensome to women, such as when applying fertilizer leads to more weeding or more output process.

Therefore, failure to consider gender disparities and the different needs and priorities of men and women in agriculture has resulted in limited contribution of new technologies to agricultural production and income generation. Thus, it is critical to develop gender-responsive technologies and practices through ensuring the active participation of women in planning, designing, and implementing interventions that could enhance agricultural production, income, and livelihood diversification. It is essential to improve

women's access to climate smart labor-saving technologies for agricultural production, as well as for household use in order to save labor in unpaid care and domestic work, such as through improved access to water and energy (Okwaro 2018). It is also indicated that gender-responsive climate-smart agricultural extension services are vital for increasing agricultural productivity. Empowering women to have access to and control over land and other resources is vital, as they are central to the household economy and to the welfare of their families (African Development Bank Group 2015). Moreover, the participation of women in CSA technologies enables them to improve the food security of the household (Meron and Gebermedihin 2018). Women are not necessarily victims of climate change, but they can be crucial actors in finding solutions on how to cope with climate change (FAO 2016).

18.3 CSA Approaches and Gender

A gender-responsive approach to CSA means that the particular needs, priorities, and realities of men and women are recognized and adequately addressed in the design and application of CSA so that men and women can both benefit equally (Nelson and Huyer 2016). It reflects the inclusion of women in improving the integration of agriculture development and climate responsiveness in order to achieve food security and broader development goals under a changing climate and with increasing food demand (Aweke 2017). CSA initiatives are playing a vital role in the economy through enhancing resilience and reducing/removing GHG. Evidence also reveals that CSA efforts have made efficient, productive, and resilient technologies, practices, and approaches more available (Mersha and Van Laerhoven 2016). CSA interventions have resulted in increased yields, diversified crops, improved soil fertility, saved labor, and other benefits (Sterrett 2011).

Despite these benefits, CSA approaches often fail to take into account the differences in men's and women's needs and capabilities in adapting to climate change, and instead have an implicit male bias that privileges male needs, interests, and priorities in the distribution of opportunities and resources (Skinner 2011). The achievement of positive outcomes through interventions should depend on whether the measures have considered gender dimensions of climate-change adaptation. For instance, understanding the cultural construction underlying the crop choices made by female and male farmers is important in devising gender-sensitive experimentation to help identify crops with high resistance to the adverse impacts of climate change. A study by Mersha and Van Laerhoven (2016)

indicated that petty trade, hairdressing, and the sale of local drinks, spices, firewood, and charcoal, as well as working as a daily laborer, were all widely used climate-adaptive measures employed by female household heads. Carpentry work and the sale of charcoal and firewood were the preferred adaptive measures taken by male household heads. This implies that it is essential to consider disparities in gender during the implementation of CSA approaches for mitigating climate change and increasing productivity. Understanding how men and women respond to low agricultural production resulting from climate change is important to finding effective entry points for building resilience and for sustainable development. For example, men often respond to the effects of climate change by investing in cash crops and increasing their incomes, while women respond by producing low-value subsistence crops to meet the food demands of the family (Perez et al. 2015). Furthermore, women are assigned multiple roles related to the reproductive and productive aspects of their lives. The varied roles they play in society can enable them to switch between their different identities and adapt to the adverse impacts of climate change (Marshall et al. 2010, Perez et al. 2015). Failure to consider such differences in climate change adaptation and mitigation interventions contributes towards further aggravating gender inequity in terms of income and livelihoods.

Women's access to land and water resources also influences their involvement in decision-making processes such as investing in the restoration of degraded grazing and agricultural lands. For instance, women in northern Ethiopia, with access to land and water resources, have contributed to sustainable watershed management interventions, including the construction of stone bunds and other soil and water conservation practices and in land rehabilitation efforts for degraded communal grazing lands through the establishment of exclosures (Mengistu et al. 2005). Such interventions have resulted in positive outcomes, such as lowering soil erosion, increasing biodiversity, and increasing groundwater recharge, all of which contribute to increased agricultural production and greater resilience of the farming systems (Mekuria et al. 2007). Yet, women's participation in decision-making processes, particularly in establishing and managing exclosures, has been limited by the general assumptions of villagers that men are more assertive than women and because of the decision-making bodies' use of informal get-togethers to make major decisions regarding the management of exclosures (Yami et al. 2013). The lack of inclusiveness in decision making has, therefore, limited the desired positive outcomes of watershed management practices, including adaptation to climate change and

building resilience of rural communities to the adverse impacts of climate change. Women's high labor input, if accompanied by a more inclusive decision-making process, would maximize the positive outcomes of the interventions (Nedessa et al. 2005, Yami et al. 2013).

Thus, the active involvement of women in decision-making processes and interventions is important to formulating and implementing gender-sensitive CSA policies, which could facilitate the implementation and scaling-up of productive, sustainable and resilient production systems, while reducing rural poverty, improving rural livelihoods, and contributing to climate change adaptation and mitigation. CSA technologies used for mitigating the adverse impacts of climate change on agriculture must consider the need for women's involvement and contributions in decision-making processes.

18.4 Energy and Gender

For most of the developing countries, biomass collected from natural forests and crop residues is the major source of household fuel consumption. The heavy dependence on these natural resources results in forest degradation and low agricultural productivity. This shows that there is a close relationship between agriculture and energy demand. Agriculture, through providing bioenergy, is becoming a source of energy, while fossil fuels have become a major input in modern agricultural production (FAO 2013). With the focus on increasing agricultural productivity, agricultural practices are highly dependent on the use of energy, and this necessity is now more apparent than ever. Despite high demand, the gap between energy needs and actual access to energy is widening, however. This energy demand gap, in turn, increases the burden on women and girls, since they are the actors responsible for collecting fuel for use in households. Hence, to empower women and build capacity for responding to climate change, there is a need to develop energy efficient technologies, practices, and approaches that can minimize the burden faced by women and girls (Khatri-Chhetri et al. 2017).

Employing energy-smart activities (i.e., activities that enable efficient use of energy) is important for achieving increased productivity, sustainability, and resilience of production systems and livelihoods. Moreover, promoting energy-smart food chains, which improve access to modern energy services and can increase energy diversity, can strengthen resilience capacity of women and households. For instance, in Ethiopia, engaging women in promoting multipurpose trees, which can serve as both an energy source and as a means of improving soil fertility, could be

an essential instrument for enhancing their responsiveness to climate change. Tailoring such approaches could thus enhance the adaptive measures taken by women toward climate change (Kiptot and Franzel 2012). This is because energy, for women, is a means of carrying out household duties, like heating and cooking, and is also a means of income generation, through the sale of fuelwood and charcoal. Energy is required for women to carry out all of these duties and it has a pivotal role in their livelihoods. Thus, shortages in the availability of and access to energy increase women's vulnerability (Murray et al. 2016).

However, one of the major issues in gender equity and energy use is women's limited access to affordable and appropriate choices of energy (Woroniuk and Schalkwyk 1998, FAO 2013). Quite often, women with improved access to alternative energy sources have a better chance of directly supporting and improving their households' agricultural productivity. For example, the practice of using animal manure as fertilizer can be an effective means of increasing productivity, although manure (dung) is also sometimes needed as fuel. If women gain access to alternative energy, however, the manure can then be used to enhance soil fertility, and consequently, increase agricultural productivity (FAO 2010).

According to Murphy (2001), the major problems in gender equity and energy use include a lack of addressing women's total energy needs for reproductive and productive purposes; the lack of recognition of the economic value of women's work, by making their labor contributions invisible at all levels of the energy system; gender disparity in ownership of land, trees, and other productive assets required to access and control energy services; and gender-inequitable decision making at all levels in the energy system.

Women's minimal power in making domestic financial decisions plays a big role in reducing their access to modern energy. Because of the diminished control women have over household income, financial decisions fall under the control of men, which prohibits women from purchasing new and preferable energy products and services or financing energy-related community projects (Berhe et al. 2017). Investments to improve stoves, kitchens, and cooking fuels tend to be considered as marginal items when men make the decisions about household purchases (Murray et al. 2016). Women interested in acquiring new energy equipment may lack the capital to buy it or be unable to obtain the money (Lambrou and Piana 2006). This, coupled with their reduced ability to secure loans and credits from different institutions, curtails women's ability to gain access to various alternative energy sources. For example, women

rarely decide upon whether to purchase a biogas digester (Farnworth et al. 2013). Biogas-purchasing households are typically male-headed, and ownership is vested on male household heads because the purchase of energy and other key resources is traditionally seen as a male task. This impediment makes women less productive and more vulnerable (Berhe et al. 2017).

Lack of access to various alternative forms of energy has devastating consequences for women. Women must travel long distances and spend several hours a day collecting fuelwood as well as work long hours doing household chores under unsafe conditions. Being deprived of basic energy services denies women many opportunities (Murray et al. 2016, Berhe et al. 2017). They are, therefore, less likely to be involved in other income earning activities, such as agriculture or trade, which could diversify their livelihoods; less likely to be economically independent; and less likely to have improved resilience to the impacts of different shocks, including those arising from climate change (Asfaw and Maggio 2016). Therefore, providing women with alternative energy sources could simplify their burden and strengthen their responsiveness to climate change.

To reduce the excessive reliance of households on biomass energy and decrease GHG emissions, different alternative energy options have been employed in Ethiopia and other Sub-Saharan African countries. Investing in hydropower energy, geothermal energy, wind energy; the distribution of cook stoves and biogas; and the expansion of agroforestry are all among the various alternative energy interventions in Ethiopia. However, these alternative energy interventions still lack the involvement of women. Women are not getting adequate benefits from these energy-related development interventions. Inequitable sharing of benefits undermines the realization of the development goals of the climate smart approach, as there is a direct relationship between energy and agriculture. Hence, a holistic approach, which integrates sustainable energy use and agricultural production, is necessary to enhance the livelihoods of women and strengthen their responsiveness to climate-related shocks. Integration can also greatly reduce the pressure on natural resources and minimize the need for external inputs (e.g., energy, chemical fertilizers, and pesticides). In order for CSA to have an all-around and better chance of success, it should be gender-sensitive and inclusive of women. Involving women in the production of on-farm renewable energy sources, like agroforestry, would be a feasible approach for achieving CSA objectives. The introduction of multipurpose trees on farms, for example, can enable farmers to sustainably increase income through

Case Study 18.1 Fuel-Efficient Stove Production in Yeku Watershed, Amhara Region, Ethiopia

Background information

A very large number of women in Ethiopia use traditional open-wood fires for cooking and heating. This mechanism of obtaining energy is highly inefficient and is harmful for health. The use of improved stoves for cooking is highly beneficial to curbing the adverse impacts of the traditional open-wood fire system. This is the rationale behind the fuel-efficient stove production project in Yeku Watershed, which is part of the AMAREW (Amhara Micro-enterprise Development, Agricultural Research, Extension and Watershed Management) project funded by USAID.

Approach

In 2004, a total of 10 women were trained by the project in the production of fuel-efficient stoves and then supplied with the required molds to start off their venture. The women contributed their own money as capital to initiate stove production. Currently, the women have reached a stage of being registered as a cooperative by the Cooperatives Promotion Bureau.

Impact

Of the various benefits of fuel-efficient stoves, one is the reduced fuelwood consumption. Through the use of fuel-efficient stoves, it is possible to maintain local vegetation cover by reducing deforestation. Fuelwood consumption per capita is estimated at 1 m³ of dry wood per annum, and, taking the household size of Yeku Watershed to be 220 households, the equivalent amount of dry wood is required for the annual incremental yield from the vegetation cover of the watershed. Because of the 50% fuel efficiency of the improved stoves to be produced, it is possible to reduce deforestation rate by 50%.

Moreover, the increased fuel efficiency reduces fuelwood requirement for households. This opportunity eases the various problems related to collecting fuelwood; thus, the women will have enough time and can devote the effort required to be productive in other activities like farming and going to school. In addition to these positive impacts, the women can gain economic benefits through selling the stoves to local markets. The women of Yeku Watershed began the production of fuel-efficient stoves with an initial capital of 500 Birr, and they currently have managed to raise this amount to over 7,000 Birr. Within a year of production, each member of the association received a 500-birr dividend, in addition to setting aside 2,000 birr as working capital. The involvement of the women in off-farm income generating activities such as this is very important in building their adaptive capacity. It is important to mention the health benefits that come from using energy efficient stoves beyond the income generated.

Policy implication

This project supports Ethiopia's energy policy, which has the objective of improving the energy supply and efficiency of energy utilization and ensuring a reliable supply of energy at the right time and at affordable prices, particularly to support the country's agricultural and industrial development.

To find out more see: Kidane Georgis. 2009. *Integrated watershed management for improved resource management and agricultural production in the semi-arid regions of Ethiopia*. Addis Ababa, Ethiopia, 64 p.

diversifying agricultural production, as well as sustainably meet their energy demands (FAO 2013). In addition, women involved in on-farm renewable energy production, such as agroforestry, will have less demand for fuelwood, which in turn eases the pressure put on local forest resources (FAO 2010). Thus, implementing CSA approaches should also ensure gender sensitivity and equity, and this inclusiveness must be integrated into rural development policies and strategies (Shikuku et al. 2017, Karlsson et al. 2018).

With all of the multifaceted energy problems women face today, their chances of becoming productive and resilient to climate change and other shocks are slim to none. Fortunately, these problems can be resolved, and their impacts curbed, if gender equity is assured in energy use. Understanding and mainstreaming energy-smart production into CSA and ensuring that this energy-smart approach is gender sensitive will be instrumental in realizing the goals set forth in accomplishing CSA objectives.

18.5 Conclusions

Climate smart agriculture approaches that include and address gender disparity and enhance and enforce technologies, practices, and strategies for achieving gender equity can result in fair benefit sharing among men and women. This, in turn, contributes to more ownership of the outcomes of interventions, such as livelihood improvement and prevention of land degradation. Nevertheless, the failure to ensure gender equity has challenged technology and development interventions in achieving CSA objectives. Gender inequity in accessing agricultural technologies and farm inputs, and the lack of devising gender-responsive technologies with the active involvement of both female and male farmers in designing, planning, and implementation of the technologies will constrain the achievement of increased agricultural production and improved incomes. Moreover, women's poor access to land and water resources has influenced their adaptive capacity and their contribution to building resilient farming systems through watershed management and other sustainable land-management practices. Gender inequity in the use of energy resources also results in poor outcomes, due to sociocultural and political factors that lower women's access to energy-efficient technologies and practices.

To sum up, the lack of inclusive decision-making processes in agricultural production, land- and water-resources management, and energy use have lowered the effectiveness of the interventions for achieving sustainable CSA outcomes. The findings imply that addressing gender inequity, beginning at the onset of technological and development

interventions, by involving both men and women in decision-making processes, is important for sustaining the positive outcomes of CSA approaches. Moreover, understanding the different needs and capabilities of men and women in adapting to the negative impacts of climate change, as well as the similar and varied effects of the technologies and practices, on both women and men, should be considered in gender-sensitive, equitable, and women-inclusive CSA approaches.

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