C6 The role of gender in Climate-Smart Agriculture

Overview

The impacts of climate change affect everyone. However, not everyone is equally vulnerable, and not everyone has the same capacity to adapt to these impacts. It is clear that climate change will be felt by different groups of people in different ways. Due to differences in socially constructed gender roles and social status, women and men experience the impacts of climate change differently.

If climate-smart agriculture interventions are to deliver sustainable benefits and do so in an equitable way, they cannot afford to neglect these differences. Rural women are crucial to agricultural production. In developing countries, on average, women make up 43 percent of the agricultural labour force, ranging from about 20 percent in Latin America to often over 50 percent in Eastern and Southeastern Asia and sub-Saharan Africa. They also comprise 2/3 of the world's small livestock managers. Between 1980 and 2010, the share of women employed in agriculture increased from about 30 percent to 43 percent in North Africa, and from 35 percent to 48 percent in the Near East (FAO, 2011).

There is now a broad consensus that the constraints associated with gender inequality, which unfairly disadvantage and marginalize women in agricultural communities must be addressed to increase agricultural productivity, improve food and nutrition security, reduce poverty and build the resilience of rural populations. To make

agricultural development climate-smart, a gender-responsive approach is needed to gain a nuanced understanding of the root causes of vulnerability and factors that determine adaptive capacity, and allow gender-based inequalities to be addressed effectively. Implementing programmes and strategies that address the differential needs and capacities of women and girls, and men and boys, and improve the social positions of women and vulnerable groups, is critical for making the transition to climate-smart agriculture and meeting the food and nutrition security needs of an expanding population in an equitable and sustainable way.

This module draws on insights from the Gender in Climate-Smart Agriculture module of the Gender in Agriculture Sourcebook (World Bank, FAO, IFAD, 2015) and other resources. It synthetises recent research evidence and experiences with climate-smart agriculture to provide guidance to a wide range of stakeholders on opportunities for future gender-responsive climate-smart agricultural investments and interventions.

Key messages

- Women are responsible for much of the world's food and agricultural production. They will play a pivotal role in climate change adaptation and mitigation in the agriculture sectors.
- Men and women differ in terms of how they experience the impacts climate change, the degree to which they are vulnerable to these impacts, and their capacity to adapt to them.
- The costs and benefits associated with adopting climate-smart agriculture technologies and practices are not evenly distributed among household members. Gender analysis must be an integral part of climate-smart agriculture interventions.
- It is essential to improve women’s access to resources, services, information and jobs, so that they can increase their productivity and contribute to meeting the objectives of climate-smart agriculture and broader development goals.
- A gender-responsive approach to climate-smart agriculture helps identify and address the different constraints faced by various vulnerable groups, targets their specific needs and interests, and ensures that women, men, girls and boys can benefit equally from climate-smart interventions and that the outcomes of these interventions will be sustainable.

Gender-differentiated impacts of climate change

There is ample evidence that climate change is having serious effects on agricultural production and the livelihoods of millions of farmers. Climate variability and the degradation of land and other natural resource are changing rural landscapes across the world.

It is also evident that women and men experience climate change impacts differently due to their socially constructed roles and responsibilities. For example, in developing countries, climate change affects the availability of surface water, and as a result rural women, who are usually given the task of fetching water, have to cover greater distances to collect the water, increasing their already substantial workload. Studies have also shown the strong links between climate-related disasters and female mortality, with women, boys and girls more than 14 times more likely than men to die during a disaster (Peterson, 2007, DFID, 2013).

Women often have more limited rights than men, limited mobility and less access than men to resources, information, and decision-making authorities. Consequently, they are significantly more vulnerable to the impacts of climate change and have fewer capacities to adapt and diversify their livelihood options.

The Intergovernmental Panel on Climate Change (IPCC) in its 5th Assessment Report (2013) states that climate change hazards ‘increase or heighten existing gender inequalities, thereby contributing to the greater climate

change vulnerability of many women’.

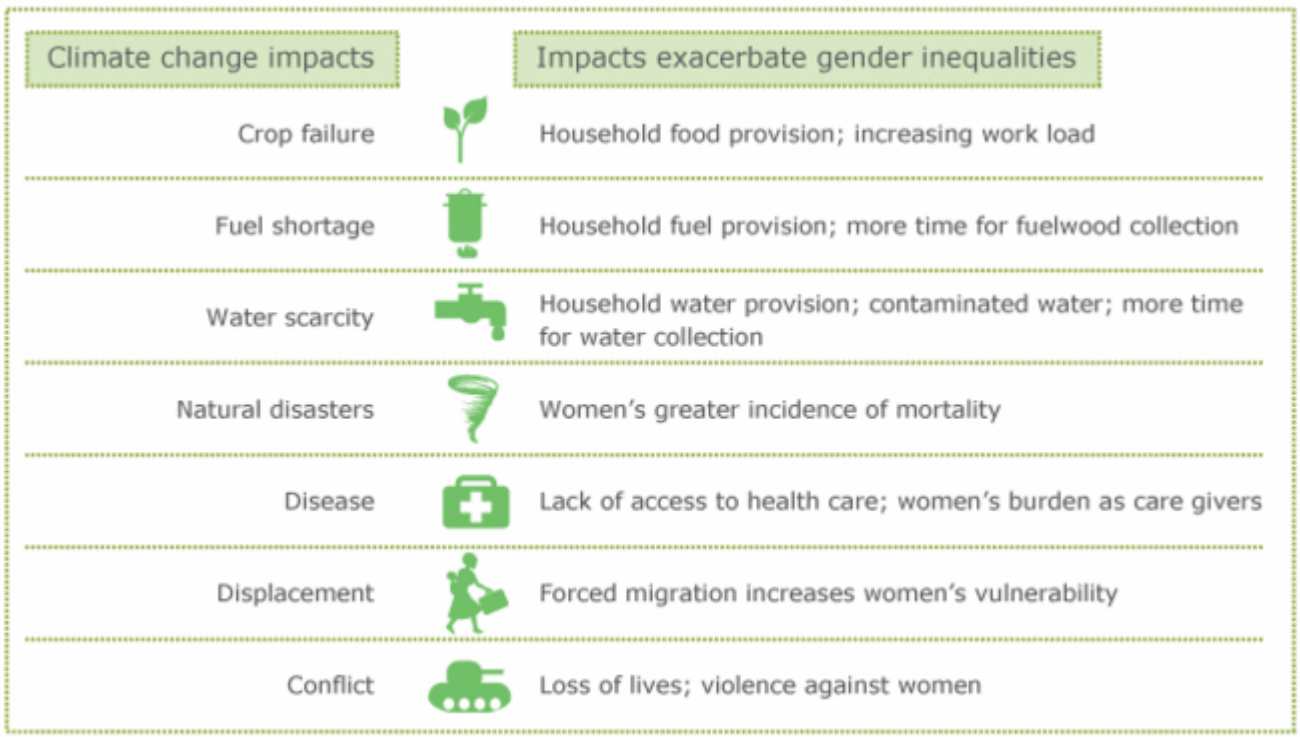
According to the IPPC, an individual's vulnerability and capacity to adapt to climate change are influenced by the following factors, which are heavily differentiated across gender lines:

- human capital, which includes elements such as literacy, education, skills and access to information, health and nutritional status;
- levels and sources of income and livelihood diversification strategies, and access to economic capital and productive resources;
- social capital, including the quality of informal and formal institutions and support networks (e.g. membership in social groups, co-operatives and associations); and
- the availability of and access to technology (e.g. transport and telecommunication networks) public utilities and agricultural inputs.

There is a need for a better understanding of how these factors determine the differences in the specific constraints men and women smallholder farmers[1] face when making choices concerning climate change adaptation and the adoption of climate-smart agriculture practices. A meaningful consideration of these differences in climate-smart agriculture interventions is likely to make these interventions more effective in helping both men and women farmers cope with the impacts of climate change and build resilient and inclusive food systems.

Figure C6.1 illustrates the differentiated impacts of climate change on women that are most relevant to the agriculture sectors. It indicates the various social, economic, political and environmental factors that influence vulnerability and adaptive capacity and that may make women, as a specific group, more susceptible to adverse changes.

Figure C6.1. Gender-differentiated impacts of climate change on women



Source: World Bank, FAO, 2017.

The gender-differentiated impacts of climate change are especially pronounced among rural women, as they rely more on biomass (e.g agricultural crops, wastes, and wood and other forest resources) than men for their energy needs and livelihoods. Rural women also depend more than rural men on ecosystem services for food security[i], as they are often heavily involved in agricultural production and the management of natural resources. For example, a recent study conducted in Malawi (Asfaw and Maggio, 2017) found that in situations where extreme weather events significantly reduce consumption and nutrition, the effects are more pronounced in areas where the share of land area owned by women is higher. This suggests that when climate variability is high, women involved in agriculture are much more vulnerable than men and less able to cope with shocks.

The gendered differences in the dependence on natural resources and ecosystem services explain differentiated adaptive capacities and exposure to risk and vulnerability to losses in biodiversity and changes in access to and management of natural resources. In many areas, women have more limited access to agricultural advisory services and formal rural institutions. This further reduces their opportunities to learn about coping strategies and climate-smart agriculture.

Climate change can exacerbate existing gender inequalities in agriculture and beyond. However, if the important role women play in agriculture is recognized, and they are provided with equal access to resources and services, climate change can also offer significant opportunities for women to become agents of change. To identify the most appropriate climate-smart agriculture practices and technologies for a given area, it is necessary to analyse its specific socio-economic and institutional setting, the prevailing agro-ecological conditions and the projected climate change scenarios and possible future impacts.

The following section looks at the significance of the gender gap in agriculture in the context of climate change. It also presents a number of tested tools to assess and address gender inequalities and unlock the potential of rural women to become agents of change in the agriculture sectors and contribute to making the transition to climate-smart agriculture.

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1 **Smallholder** refers to small-scale agricultural producers in general, including farmers, livestock keepers, and fishers.

i **Ecosystem services for food security**: Agriculture, while delivering provisioning services (such as water, food, wood), operates at the intersection of different compartments, such as air, water, soil and biodiversity, and diverse socio-political compartments. In each of these compartments, agriculture influences key regulating services (such as climate stabilisation; water supply and water quality, preservation of genetic diversity). With regards to the socio-economic compartment, agriculture constitutes an important source of employment for men and women, improving rural livelihoods, and an environment conducive to the transmission of farming knowledge and traditions.

The gender gap in agriculture and its implications on the context of climate change

In developing countries, women are heavily involved in small-scale agriculture, often in temporary or unpaid activities. The trends towards agricultural feminization[ii] are prominent in all regions.

The visible rise in women’s responsibilities in agriculture is a result of increasing diversification out of family farming, which is being driven by demographic pressures and land fragmentation. It also reflects the intensification of agricultural production, which affects the demand for female and male labour. The growth of jobs in other sectors and significant male out-migration from rural areas is another factor that is increasing women's workload. (Slavchevska *et al*., 2016)

There is growing evidence that neglecting the large ‘gender gap’ that persists in agricultural productivity and

development in most countries carries with it substantial costs (Ali, 2015; Peterman *et al*., 2014; UNWomen, 2015). It is estimated that closing the gender gap in agriculture would raise total agricultural output in developing countries by 2.5 to 4 percent, and would reduce the number of hungry people by 12 to 17 percent globally, the equivalent of 100 to 150 million people (FAO, 2011).

Evidence also points to the fact that more equal gender relations within households and communities contribute to agricultural and rural development, including gains in productivity and nutrition (Farnworth *et al*., 2013).

Two primary areas of concern have emerged from interventions related to gender and agriculture:

1. gender-specific use, control and ownership of assets and their effect on the adoption of agricultural practices; and, conversely,
2. the impacts of agricultural interventions on the gender-differentiated use, control and ownership of assets.

It is important to note that female farmers are just as efficient as male farmers. They produce less because they control less land (as illustrated by Figure C6.2), use fewer inputs and have less access to labour and important services, such as agricultural extension (FAO, 2011). In addition, when crops traditionally managed by women farmers become commercially profitable, men will often take over their production and marketing (Berti *et al*., 2004; Doss 2001; Momsen 2010).

When climate-smart interventions are being designed, all the stakeholders must give a thorough examination of the important role women play in small-scale farming. Policy-makers and development practitioners need to carefully weigh, from a gender perspective, the potential trade-offs that may need to be made. What appears as progress from one perspective, may actually have negative side effects for women. Improvements in one area may increase women’s economic dependence and diminish their income opportunities and status. There is a clear need for careful gender analysis in all climate-smart agriculture interventions.

There is compelling evidence that climate change can reinforce or exacerbate inequalities. However, it is important to recognize that resolving gender inequalities is not only a matter of 'righting a wrong'. It also represents an important opportunity to make use of previously underused and under-recognized abilities, knowledge and talents. Providing equal access to women and men farmers to land and other productive resources can provide a 'triple dividend' of greater gender equality, improved food security and enhanced climate change adaptation and mitigation. It opens up the possibility of a cost-effective and transformative approach to climate-smart agricultural development. To make this a reality, there is a need for a careful re-evaluation of current agricultural practices and any proposed climate-smart innovations.

Paying attention to gender equality is essential for meeting the objectives of climate-smart agriculture, as it will serve to increase agricultural productivity and incomes, build resilience to adapt to climate change and contribute climate change mitigation.

C6 - 2.1 Challenges for sustainable production intensification for women smallholder agricultural producers

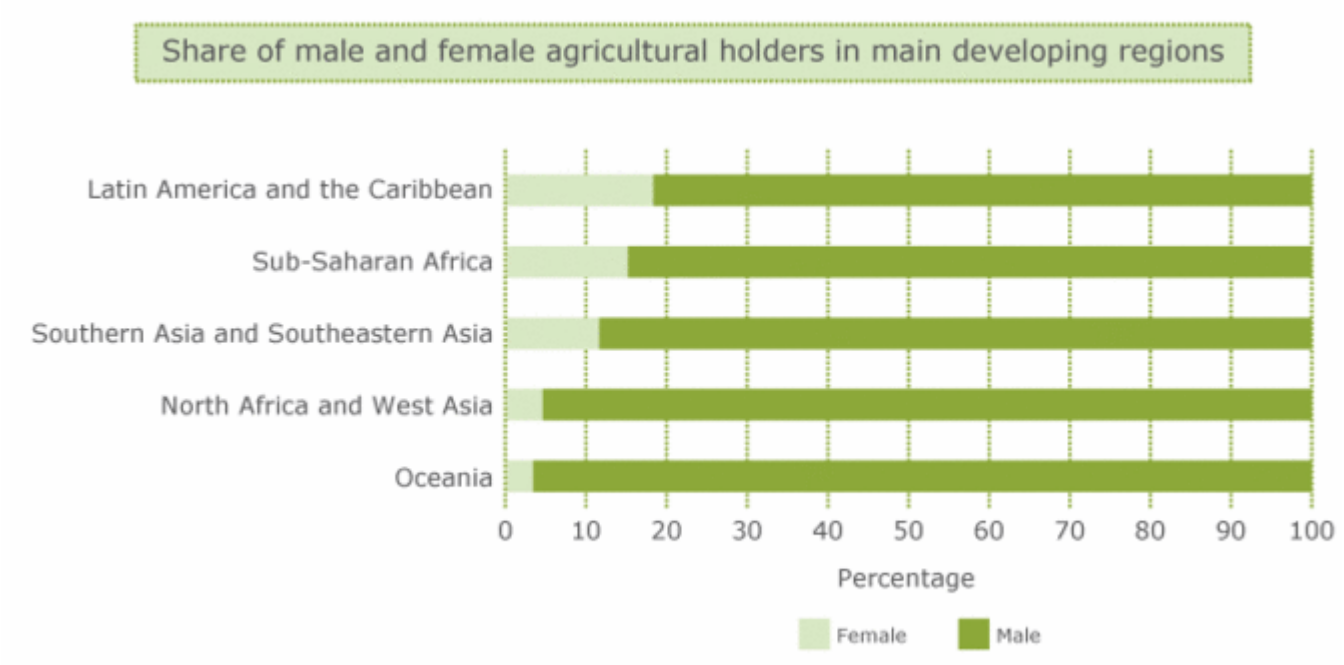
It is clear that the significant gender gap in agriculture must be addressed to achieve a shift to climate-smart agriculture. The factors that contribute to this gender gap are described below. This section also looks how taking gender-sensitive approaches during the planning and implementation processes of climate-smart agriculture interventions can support the uptake of transformative practices that have the potential to make rural households and communities more productive and resilient.

Land tenure and soil quality

- Even though women make up 43 percent of global agricultural labour force, women own, operate and manage fewer, smaller and less valuable plots than men (FAO, 2011). Figure C6.2. illustrates regional figures on male and female agricultural land ownership.

Limited ownership and tenure security seriously limit women's access to credit, which compromises their adaptive capacity. Without formal title to land, they cannot finance climate-smart agriculture innovations. It also means that women have little access to services that could help facilitate investments to obtain new technologies, improve their natural resource management practices, and adopt more efficient and productive cropping and livestock management, all of which could help them address the degradation of natural resources and build their resilience to climate change (World Bank, 2009).

Figure C6.2. Share of male and female agricultural land holders in developing regions



Source: FAO, 2011.

Defining land ownership is complex, particularly in sub-Saharan Africa. Nevertheless, the maps in Figure C6.3 show clear differences in areas where women tend to own more land, and the relative importance of sole ownership compared to joint ownership. The left column shows by district, the share of land owned only by women, the land owned only by men, and the land owned jointly by women and men as reported in the survey.

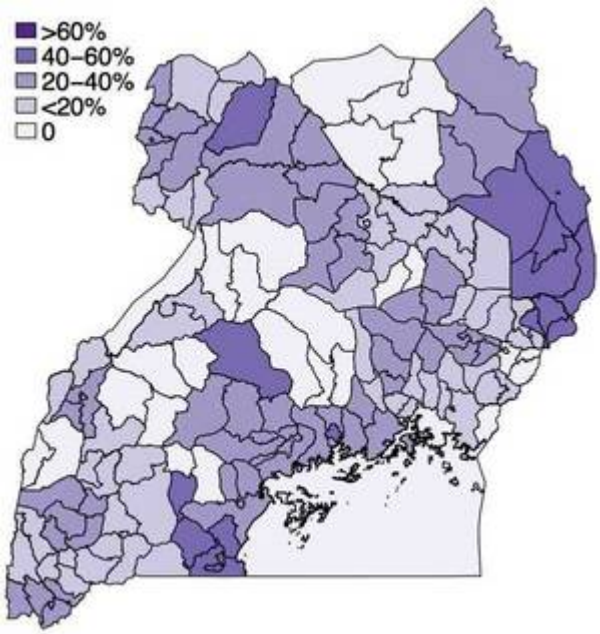
The right column presents the share of landownings for each group where soil quality is reported to be 'fair' or 'poor', as opposed to good quality. It shows that women's landownings are much more likely to have poor-quality soil (about 47 percent overall, compared to about 35 percent for male-owned and jointly-owned land); and the areas where these gender disparities are more prominent. These maps can be further compared with available spatial data, such as Geographic Information System (GIS) data to capture climate and weather patterns. In this way they can be used to demonstrate specific driving factors for the gender gap in agriculture.

Figure C6.3. Agricultural land ownership and soil quality distribution by gender across districts in Uganda

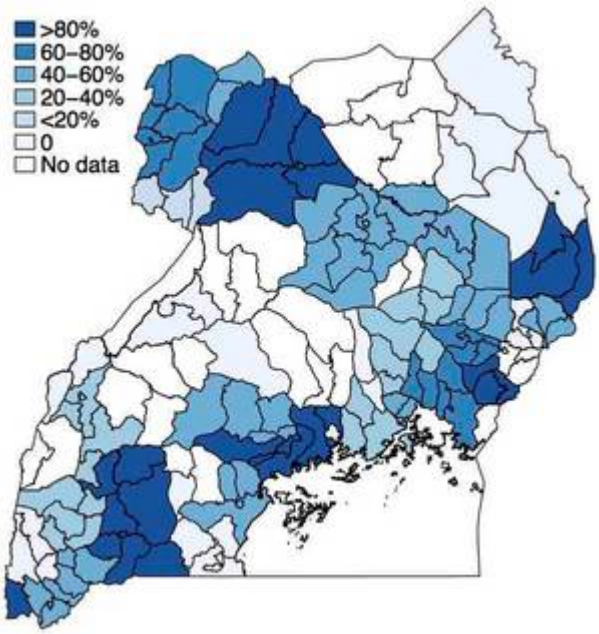
2011 Uganda The Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA)

Survey

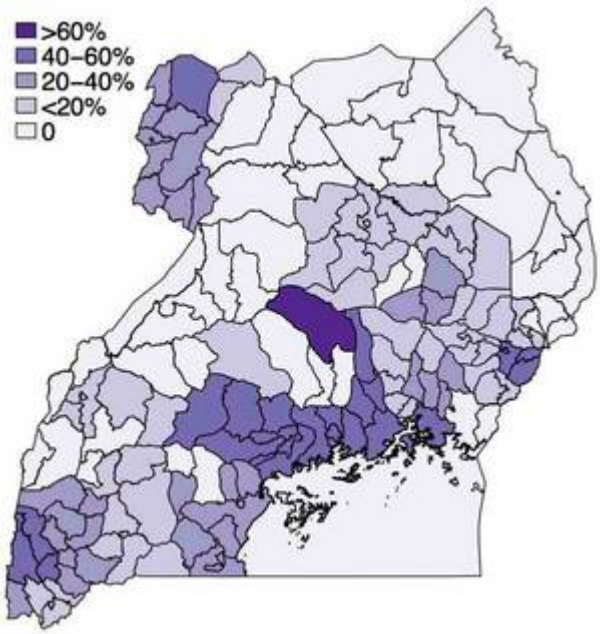
Share of parcels owned by: (Only women)



Shared parcels where soil is "fair/poor" quality and owned by: (Only women)



(Only men)



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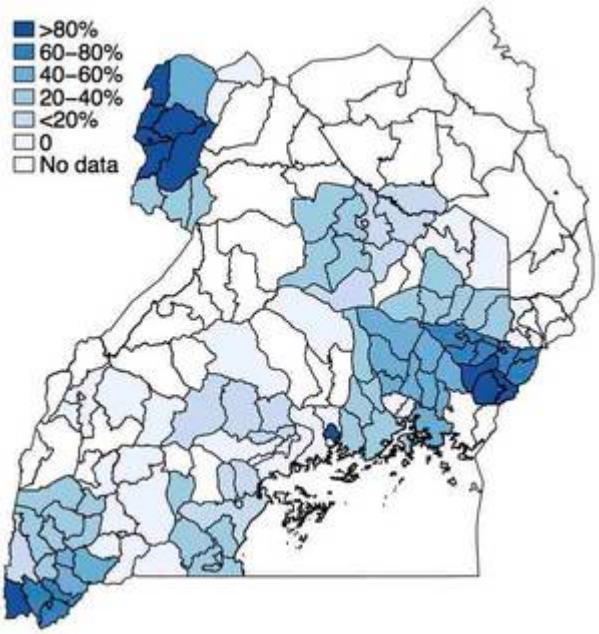
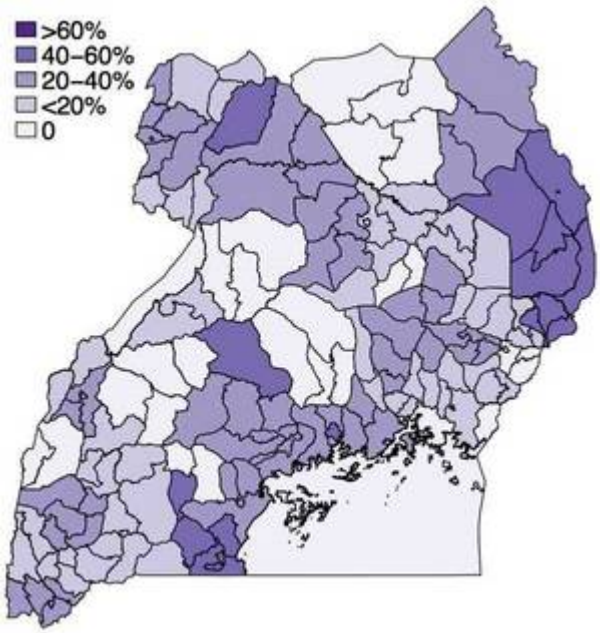
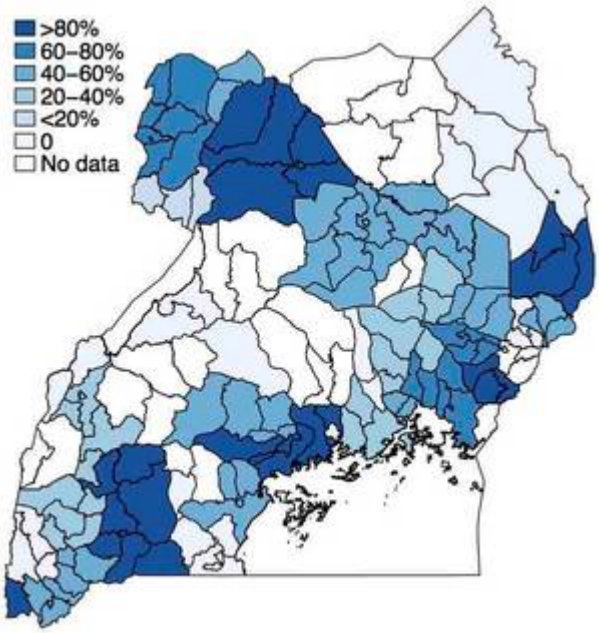


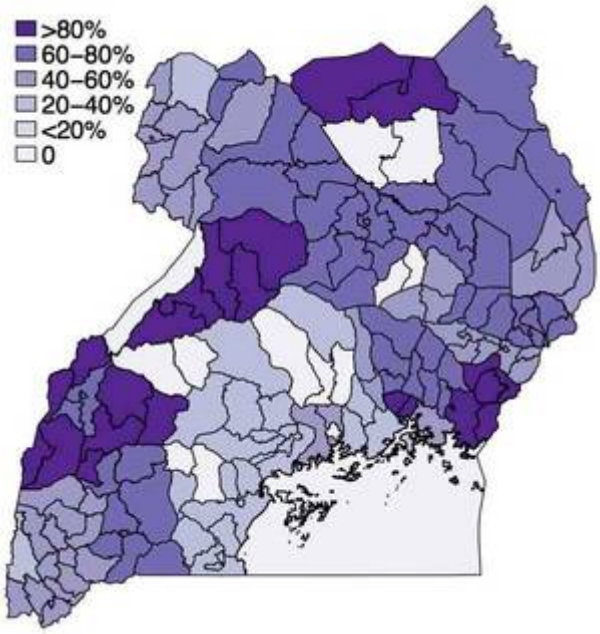
Share of parcels owned by: (Only women)



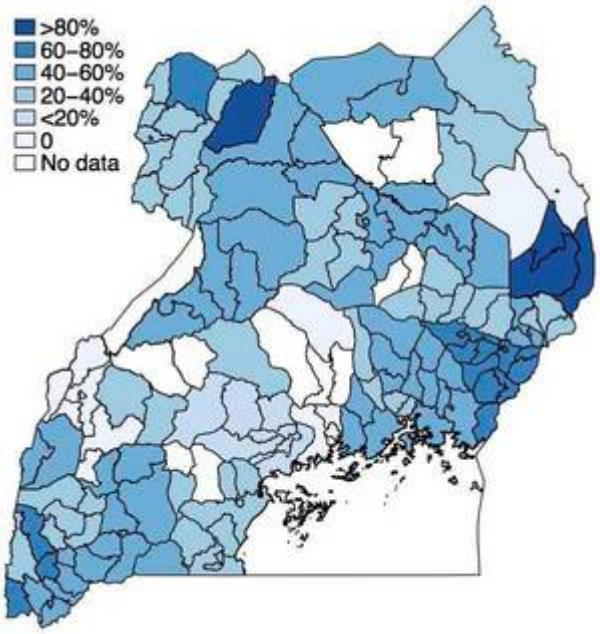
Shared parcels where soil is "fair/poor" quality and owned by: (Only women)



(Women and men - Jointly)



(Women and men - Jointly)



Access to extension and climate-related services

Improving men and women's access to climate information is another crucial aspect for making the transition to climate-smart agriculture. In 2011, out of 97 countries, only 5 percent of extension services were directed to women; and only 15 percent of extension personnel were female. In some cultures, women working in agriculture were effectively barred from engaging with these services (FAO, 2011). In some countries, staff of advisory service providers may have attitudes that reflect a bias against farmers who lack access to credit and have less education. Extension workers tend to target resource-rich farmers, and women, who typically have poorer access to resources, are neglected (Elias *et al*., 2015).

Women's work burden

The gender gap in agriculture is also manifest in women's work burden. Their multiple and competing roles lead to their time poverty, which can imply asset and income poverty[iii].

Women are farmers, workers and entrepreneurs. They also spend a significant of amount of time ensuring that other members in their household, including children and the elderly are adequately fed and properly nourished. Rural women often manage complex households and pursue multiple livelihood strategies. Their activities typically include producing agricultural crops, tending animals, processing and preparing food, working for wages in agricultural or other rural enterprises, engaging in trade and marketing, caring for family members and maintaining their homes. They also look after the energy needs of the household, collecting fuelwood and water. These domestic activities are time-consuming tasks that limit women's opportunities to participate and benefit from climate-smart agriculture initiatives. The burden of work that women take on must be alleviated to allow them and their families to spend their time in more rewarding and productive ways. Case studies from Bangladesh Ghana and Uganda show that one of the most significant social impacts of environmental stress in farming systems is the intensification of women's workloads and the decreases in the assets of poor households (Jost *et a*l., 2015; Goh, 2012).

Many climate-smart agriculture practices require relatively high investments in time and/or labour (e.g. building stone bunds and terraces) – investment that many households with few working-age adults or with more women than men cannot afford to make.

Women's entry and presence in the labour force will vary depending on their personal situations. Shifts in the labour market are bringing about fundamental changes to women's workload and power relations in the home and the community. Women's disproportionate responsibility of unpaid care work traps them in 'time poverty'. They do not have the time to participate in agricultural development initiatives and other social, economic and political activities, which deprives them of the full enjoyment of their economic and social rights (Action Aid, 2013).

Viewing climate-smart agriculture practices through a 'work and time burden lens' can help lead the way to effective gender-responsive interventions. For example, some climate-smart agriculture interventions, such as the introduction of improved cooking stoves, and the use of biomass for energy and biogas, are more attractive to women because of their labour-saving features.

Box C6.1 describes a tool developed by Action Aid to monitor and evaluate women's workload, including activities related to climate-smart agriculture practices.

Box C6.1 Action Aid Time Diary Tool

The Action Aid Time Diary Tool was developed and piloted in the framework of Action Aid's Women's Rights to Sustainable Livelihoods project. It is a participatory and self-administered time diary, providing a detailed report on how the diarists' time has been spent and the number of activities they have carried out. Women track on an hourly basis any changes that result from various interventions, such as opening child care centres and the introduction of water harvesting and other climate-smart agriculture practices.

The main objective of using the time diary tool is to track the amount of time women spend on each activity, such as fetching water and fuelwood, and caring for children compared to the time they spend doing unpaid work that could be counted as contributing to the gross domestic product (GDP). Women also note the amount of time they spend resting, engaging in social activities, and activities related to project interventions. The tool was also used to record the income generated from agriculture and other activities as a means of tracking the financial progress and improvements in women's self-reliance that

had been achieved through a voluntary savings and loan scheme.

In Rwanda, by using this tool it was possible to confirm that there was a 15 percent reduction in women's unpaid care work due to the project's activities. In Ghana, a 10 percent reduction in time spent on child care was observed following the introduction of community child care centres and water harvesting technologies. A considerable increase in time spent on GDP-quantifiable work, rest and relaxation was also noted. Many of the men who used the time diary tool were also reported as becoming change agents in their communities as they were more likely to take on unpaid care work within the household. The time diary format has also proved to be an influential advocacy tool for public sector stakeholders.

Source: Action Aid, 2016

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ii **Feminization of agriculture**: Based on the latest internationally comparable data, women comprise an average of 43 percent of the agricultural labour force of developing countries. The female share of the agricultural labour force ranges from about 20 percent in Latin America to **often over 50 percent in Eastern and Southeastern Asia and sub-Saharan Africa**. The trends towards agricultural feminization are especially prominent in the Near East and North Africa. Between 1980 and 2010, the share of women employed in agriculture increased from about 30 percent to 43 percent in North Africa, and from 35 percent to 48 percent in the Near East. (SOFA, 2011)

iii **Gender roles** include: (1) **productive** roles that generate an income – women engage in paid work and incomegenerating activities, but gender disparities persist in terms of wage differentials, contractual modalities, and informal work; (2) **reproductive roles** related to social reproduction, such as growing and preparing food for family consumption and caring for children; (3) community managing roles that include unpaid and voluntary activities, mainly carried out by women, to complement their reproductive role for the benefit of the community, such as fetching water for the school; and (4) **community** or politics roles related to decision-making processes, such as membership in assemblies and councils. Women's role can be identified as reproductive, productive, and community managing, while men's roles are categorized mainly as either productive, community, or politics. Women's multiple and competing roles lead to their time poverty, which can imply asset and income poverty. The unequal value placed on roles of women compared with men is mainly responsible for their inferior status and the persistent gender discrimination they experience.

Gender analysis as a prerequisite for gender-responsive climate-smart agriculture interventions

This section looks at the basic considerations that must be taken into account for conducting a gender analysis for climate-smart agriculture interventions. It describes vulnerability assessments, data requirements and gender-sensitive indicators that can be used in the formulation and implementation of climate-smart agriculture projects.

Gender analysis is the study of the different social and economic roles of men and women play in a given context. The purpose is to understand what women and men do, what resources they have, and what their needs and priorities are. The results of gender analyses provide the basis for addressing inequalities in policies, programmes, and projects and they can be conducted at multiple levels (household, community, and national).

Gender analysis helps to develop a better understanding of the gender, cultural and socio-economic diversity in a specific context. It can contribute to the planning of gender-responsive climate-smart agriculture interventions by exploring the differences between women and men in the following areas:

- individual vulnerability to climate risks;
- access to and control over assets and productive resources;
- access to climate information, services, institutions and markets;
- willingness and capacity to take on risk;
- specific needs and participation rates; and
- power relations (e.g. in decision making) within households and communities.

An in-depth gender analysis involves the collection of sex-disaggregated data and information, which can be done in a variety of ways, including through vulnerability and capacity assessments, and stakeholder and livelihood analyses[iv].

Gender-responsive guiding questions can be used to organize data, collect information and structure interviews and consultations with men and women stakeholders. Gender analysis helps clarify how women and men are affected by an intervention. It also can help identify opportunities for women to become agents of change and improve the effectiveness of climate-smart interventions.

For gender analysis, some of the most important guiding questions for assessing the impacts of climate change and obtaining information that is disaggregated by sex and age are:

- What is the impact of climate change on individuals, households and communities?
- What factors determine women and men's differential vulnerability to climate risks and how do these factors affect their adaptive capacity and mitigation measures? If these climate-smart agriculture practices are scaled up, what are the implications for gender relations and the environment, and how are these implications connected?
- How can the environmental, social and economic sustainability of climate-smart interventions be ensured, and especially, how can the equal and equitable participation and distribution of benefits to women and men be guaranteed?

The recently published training module, entitled How to integrate gender issues in climate-smart agriculture projects (World Bank, FAO, 2017), presents a comprehensive set of tools for integrating gender into the design, implementation, monitoring and evaluation of climate-smart agriculture projects. It highlights gender issues in stakeholder, livelihood, and situation analyses, needs assessments and presents participatory methods to support gender-responsive interventions across the entire project cycle. Module C8 provides complementary information on climate impact assessments and appraisals of climate-smart agriculture options. Module C9 addresses the monitoring and evaluation of climate-smart agriculture programmes and projects.

C6-3.1. Understanding the causes: gender-sensitive vulnerability and capacity assessments

Vulnerability and capacity assessments provide important information to policymakers and development practitioners about the needs of the populations targeted by climate-smart agriculture interventions. They help to indicate what policy interventions are likely to be most effective in helping both women and men farmers respond to shocks and build resilience.

These assessments consider the different livelihood assets of the communities, such as human capital (e.g. education, health, knowledge, and skills), social capital (e.g. social networks, formal and informal groups, common rules and sanctions), economic capital (e.g. savings, credit and tools), and natural capital (e.g land and water resources, trees, wildlife and biodiversity). Women and men have different amounts of livelihood assets and different combinations of assets. They participate in different activities. All of these differences will influence their vulnerability to climate change and their adaptive capacity.

To understand gender dynamics in agriculture, it is not sufficient to compare female and male farmers, or female-headed households to male-headed households. Instead, there is a need to understand the heterogeneous systems of households embedded in the agricultural economy and analyse the different situations of women in both female-headed households and male-headed households in terms of their access and control of productive resources, services and employment opportunities. It is for this reason that the collection of sex-disaggregated data for individuals in each household is needed (see section C6-6).

The effects of some policy interventions are often unequal for different types of farmers, especially for men and

women farmers (Kilic *et al*., 2014). The adoption of new climate-smart agriculture technologies depends on whether the decision-maker is the husband or the wife, and if the decision-maker is also the head of the household. The household should be considered as a network of interactions between different agents who act together to maximize their own outcomes. In this context, gender influences decision-making over the allocation, negotiation and exchange of resources and labour.

Various approaches can be used to inform decision-making related to climate-smart agriculture including tailored vulnerability and capacity assessments and related quantitative and qualitative methodologies (described in section C6-5). Listed below are three examples of tested vulnerability and capacity assessment tools.

Climate Vulnerability and Capacity Analysis (CARE International)

The Climate Vulnerability and Capacity Analysis (CVCA) methodology provides a framework for analysing a community's vulnerability to the impacts of climate change and its capacity to adapt to these impacts. Recognizing that local stakeholders, both men and women, must have the opportunity to shape their own futures, CVCA places local knowledge on climate risks and adaptation strategies at the forefront of the data gathering and analysis process and at the same time integrates climate science into planning and into the understanding of future projections.

The main objectives of CVCA are to:

- analyse vulnerability to climate change and adaptive capacity at the community level with data disaggregated by sex; and
- combine community knowledge and scientific data to provide a deeper understanding about local impacts of climate change.

The participatory exercises help gain understanding of the implications of climate change for men and women, and the risk climate change poses to markets and ecosystems services. They lay the foundation for a risk analysis and tailored climate change adaptation planning.

THE SHARP TOOL

As part of the Integrated Approach Programme on Fostering Sustainability and Resilience for Food Security in Sub-Saharan Africa (IAP), FAO as a Global Environment Facility (GEF) Implementing Agency has applied the Self-Evaluation and Holistic Assessment of Climate Resilience of Farmers and Pastoralists (SHARP) tool to assess the resilience of farmer and pastoralist households to climate change.

The SHARP survey questionnaire considers a range of topics (e.g. land degradation, sustainable land management, agricultural biodiversity, resilience, decision-making regarding major and daily purchases and other financial decisions) that can be measured through indexes, scores and scales. The SHARP methodology, which disaggregates information by gender, can be used to gain a better understanding of different aspects of households' agricultural activities, their vulnerability to shocks, their access to water and land, food insecurity, and climate-related factors that affect production.

The results of the survey can help inform the design and implementation of the projects' gender strategy, including the development of Farmer Field Schools' curricula and interactions with advisory services.

The Multidimensional Poverty Assessment Tool (IFAD)

The Multidimensional Poverty Assessment Tool (MPAT), developed by the International Fund for Agricultural Development (IFAD), is designed to support project design, monitoring and evaluation, targeting and prioritization at the local level. It is a survey-based thematic tool that combines different indicators that provide an overview of 11 fundamental and interconnected dimensions related to human well-being and rural livelihoods in a sex-disaggregated manner. The first six dimensions relate to food and nutrition security; domestic water supply; health and healthcare; sanitation and hygiene; housing, clothing and energy; education. These can be considered fundamental needs. Other aspects, such as farm and non-farm assets, exposure and resilience to shocks, gender and social equality and adaptation to climate change address central aspects of rural livelihoods, life and well-being.

Wide-ranging expert input has been solicited to create and test household and village-level surveys. These surveys, which are used to collect data from rural people, use indicators that are calculated for each household and then averaged for each village. This is done to organize the data so that they can be summarized and presented in a clear, standardized fashion. The results, which highlight the strongest viable sectors and the most pressing gender-differentiated needs of households and communities, can be used strategically to guide interventions and address priority gender concerns.

Choosing adequate tools helps ensure that efforts will not only reach the appropriate groups but will also lead to fair, inclusive and affirmative actions and decisions for groups who are most vulnerable to the impacts of climate change.

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iv Among the qualitative methods, **stakeholder analysis and livelihood analysis can** be undertaken to assess the problems, interests, needs, and potential of different groups of stakeholders – including potential project participants – from a gender perspective. Stakeholder analysis: indicates the different priorities, risks and vulnerabilities linked to climate change, what people have at stake, what they are willing to invest in changing, and what benefits they can expect to get from a proposed intervention Livelihood analysis: a gender-sensitive analysis that allows us to understand men's and women's options; their access to services, education and markets; their vulnerabilities to climate change; and their coping strategies and opportunities.

Gender-specific impact of climate-smart agriculture practices

Almost all climate-smart agriculture activities assume that individuals or groups, depending on their property rights, can make decisions about how to use land, forests, water, and other resources and derive some benefits when improvements are made in how these resources are managed. However, due to gender-specific constraints, this assumption is often not valid. There is a need to promote careful gender-responsive programming and implementation for climate-smart agriculture initiatives.

Climate-smart agriculture practices differ in terms of labour and time requirements, the degree to which they lead to greater empowerment for agricultural producers, and their economic benefits and costs. Their introduction may have direct implications for women's welfare, working conditions, agricultural production, gender relationships and women's empowerment.

Figure C6.4 assesses the gender impact of selected climate-smart agriculture practices based on evidence to date, and insights are provided in the boxes below, related to agroforestry, conservation agriculture, fisheries and livestock management.

Figure C6.4. Analysis of climate-smart agriculture practices from a gender perspective

Climate-smart agriculture options/ practices	Contribution to climate-smart agriculture objectives relating to:			Gender impact
	Climate change adaptation	Mitigation (reducing greenhouse gases)	Women's control of income from practice	Relative amount of time until benefits are realized
Stress-tolerant varieties	High	Low	Low	Low
High-yielding varieties	Low	Low	Low	Low
Conservation agriculture	High	Medium	Low	High
Improved home gardens	High	Medium	High	Low
On-farm tree planting	High	High	Low	High
Composting	Medium	Medium	Medium	Low
Small-scale irrigation	High	Low	Low-Medium	Low
Fodder shrubs	High	Medium - High	High	Medium
Herbaceous legumes	High	Medium	High	Medium
Improved grasses (e.g. Napier)	High	Medium	High	Low
Livestock genetic improvement	High	Medium	Low - High	High
Restoration of degraded rangeland	High	High	Low	High

Climate-smart agriculture options/ practices	Requirements for adoption of practice					
	Relative amount of time until benefits are realized	Potential for women to benefit from increased productivity	Female and youth labour availability	Female access to and control of land	Female access to water for agriculture	Female access to cash and ability to spend it
Stress-tolerant varieties	Low	Medium	Medium	High	Low	High
High-yielding varieties	Low	High	Medium	High	High	High
Conservation agriculture	High	High	Low-Medium	High	Low	Low
Improved home gardens	Low	High	High	High	High	High
On-farm tree planting	High	Medium	High initially; Low later	High	High	Medium
Composting	Low	Medium	High	Medium	Low	Low
Small-scale irrigation	Low	High	Medium	High	High	Medium
Fodder shrubs	Medium	Medium	High	High	Medium	Low - Medium
Herbaceous legumes	Medium	High	High	High	Medium	Low - Medium
Improved grasses (e.g. Napier)	Low	High	High	High	Medium	Low
Livestock genetic improvement	High	High	Low - High	Low	High	Medium
Restoration of degraded rangeland	High	High	Low - High	High	Low	Low

Source: World Bank, FAO and IFAD, 2015

Box C6.2 Gender implications in agroforestry development

Women often have a strong preference for engaging in agroforestry (see Module B5). It requires minimal inputs, particularly in terms of cash and labour, and the benefits it delivers (e.g. food, fuelwood and

fodder) are particularly important in times of need. Agroforestry also plays an important role in activities that are generally considered part of women's domain, such as the harvesting and processing of indigenous fruits and vegetables, and the gathering of fodder and mulch.

However, women's involvement in marketing agroforestry products is usually confined to small retail trade, while men dominate the wholesale trade and timber production. Women also have less access to the productive resources and services they need to improve agroforestry practices, and limited opportunities to obtain information and training.

Possible interventions aimed at reducing the gender gap in agroforestry include integrating tree species that provide fuelwood, fodder, shade, and fruit into the agroforesty production system rather than concentrating on tree species used for poles and timber, which are managed largely by men. Other possible interventions involve improving storage and processing methods; increasing women's access to extension services, market information and financial institutions; strengthening women's participation in local institutions and farmers' organizations; and developing new high-value agroforesty products, such as oil, soap and juices.

A CARE forest management project in Zanzibar in the United Republic of Tanzania, supported women in engaging as key producers and consumers of forest goods and services through community forest management agreements. The project also reduced unsustainable wood consumption by promoting improved cook stoves, which also improved domestic air quality. This shows that when gender is considered at design phase in climate-smart agriculture projects, multiple benefits can be gained in terms of livelihoods, women's empowerment, governance and health.

Box C6.3 Gender aspects in conservation agriculture

Conservation agriculture, which involves minimizing mechanical soil disturbance, keeping a permanent organic soil cover and diversifying crop rotations, can deliver many benefits (see module B1). However, conservation agriculture usually alters workloads over time, and this has important implications for labour requirements and the allocation of tasks both within and outside the household (Beuchelt, 2013). When adapting conservation agriculture systems to the specific needs of a given household or community, there needs to be a clear understanding of who will benefit and in what way. This involves taking into account the gender relations within the specific social context; the gender roles in decision-making over the adoption of new technologies and practices; access to productive assets and extension and advisory services, including climate advisories; and women's specific roles in the production system.

The FAO Conservation Agriculture Scaling Up (CASU) programme in Zambia has developed a comprehensive database and monitoring and evaluation system that allows gender-disaggregated analyses at the household level. Studies from CASU sentinel sites also provide information on the effects of the adoption of conservation agriculture on women's time-poverty and work burden.

Box C6.4 Gender aspects in fisheries and aquaculture

Though women are involved as fishers and make up half of the workforce of this sector, there are many constraints and barriers on their active involvement. "Pond tenure" in the aquaculture sector is also highly gendered: due to restrictions on their mobility, women tend to be managers of backyard aquaculture ponds. While women are highly engaged in all fisheries subsectors (fish, seaweed, crab, shrimp) they tend

to be involved in less profitable components of the value chain, like post harvest processes and vending. The lack of access to capital and to the resources required for refrigeration can result in higher losses and lower quality of products among women entrepreneurs, gradually undermining their efforts. Gender-responsive climate smart activities can be designed to enhance feed management, access to higher value markets, flexible capture strategies to allow for change in fish distribution. Activities can also include community based small-scale fisheries management, mangrove forests management, supporting diversification strategies for coastal communities, marine and coastal ecosystem improvements and adaptation planning, waste management from aquaculture. For example, micro-savings groups among women aquaculturalists have proved to allow them to expand their production through the adoption of new, climate-smart practices in Nepal (Pant *et al.*, 2012).

Box C6.5 Gender aspects in livestock management

Livestock defines the lives and livelihoods of hundreds of millions of rural men and women across the world, many living in dryland conditions. Pastoral communities, who depend on livestock and opportunistic farming for their livelihoods in particular, are the hardest hit by the impacts of climate change and climate variability. Livestock is often one of the few sources of income over which women have complete control, and such smaller livestock can have significant implications for household nutrition, income and health. Women also do not have equal access to trainings and other resources for livestock rearing, as extension systems are often insensitive and unresponsive to their production needs. Climate change is impacting water sources as well as pasture ecosystems that livestock depend on and the frequency of various vector-borne livestock diseases as well. Along with improvements in water management practices, feed and pasture management to ensure availability of feed during times of stress is a critical area of intervention. Key gender-responsive activities can include participatory rangeland planning and management, improved extension, access to technology, improvements in feed, animal vaccination programs, preventing parasites and vector borne diseases, management of herd size and age, increasing heat tolerance of animals through breeding programs or introduction of new breeds, and installation of specific cooling technologies for livestock. Increasingly livestock insurance and early warning systems for various hazards are being piloted. In Niger, CARE's Adaptation Learning Programme developed innovative community-based adaptation approaches and strategies with pastoralist communities, assessing the implications for women, men, households and the community as a whole, in terms of time, labour, resources and social relations. Different roles and responsibilities were then negotiated between women and men in the communities to encourage a more sustainable and equitable division of labour as part of increasing the adaptive capacity of the community as a whole. An example of integrated interventions was providing Village Savings and Loans, institutional capacity building, training and improved access to climate information. These interventions worked together to improve women's livelihoods and place in society and built community resilience.

Data and information needs for gender-responsive climate-smart agriculture and key elements of a gender-sensitive indicator framework

Data required for gender analysis and gender-responsive interventions can be collected from different sources, using various methods and tools, such as sex-disaggregated statistics (if available), meetings, discussion with focus groups, key informant interviews and other participatory data collection methods. It is important to combine quantitative and qualitative data to understand the points of view of men and women and different stakeholders. A

combination of quantitative and qualitative data is also required to carry out triangulation, a process that uses different data collection methods and compares data from different sources to obtain a more reliable and comprehensive understanding of the local context. The results of this data collection help stakeholders make informed decisions about the most effective project activities and how to implement and monitor their impact by incorporating gender-sensitive indicators throughout the project's life cycle. Some useful approaches are described below.

Quantitative methodologies

Quantitative methods are mostly applied when evaluating, examining and integrating data from a large amount of information obtained through standardized questionnaires. An important requirement for conducting an empirical study is the employment of detailed and reliable surveys. Researchers use the responses to these questionnaires to isolate the causal relations between a social or agricultural phenomenon and environmental events. For surveys exploring gender relations in the context of climate-smart agriculture, data from individuals should be collected with a common identifier for all the members in the same household to track common characteristics and features. It is important to focus on all the determinants of gender-differentiated adoption of climate-smart agriculture.

Data collection needs to highlight:

- climate-smart agriculture practices adopted by individual men and women;
- women’s accessibility to resources and agricultural technology;
- women’s labour status and legal rights;
- land ownership and conditions for both men and women; and
- social norms and other factors that influence women and men farmers’ livelihood strategies.

Approaches that use data obtained through household surveys depend on the availability and quality of information on the specific constraints and outcomes of interest to women and men, as well as on climate-related shocks and events.

Many quantitative studies combine traditional household surveys that include Global Positioning System (GPS) data of households and communities with other geocoded data on rainfall, soil quality, and other agro-climatic characteristics (e.g. Asfaw and Maggio, 2015). An increasing number of studies using GPS data on communities and land parcels can visually pinpoint vulnerable areas. This has useful applications for the formulation of policies related to gender and climate change (Kilic *et al*., 2013).

The use of both socio-economic quantitative data and spatial data can quickly shed light on areas and communities that are the most affected by depletions of natural resources and variations in climate. This technique, referred to as vulnerability mapping, can also help indicate whether women agricultural producers are more at risk to changes in climate.

These techniques can also reveal the extent to which gender differences in agricultural productivity and adaptation strategies can be explained by different constraints, such as limited access to credit and markets, and/or inadequate infrastructure. Household panel data, which involves collecting data from the same households over time, can help increase the understanding of the dynamic processes that shape household agricultural production, income and consumption over several years. They can also reveal the gender-differentiated progression of adaptive strategies to climate change and their outcomes over time.

Qualitative methodologies and participatory frameworks

In any climate-smart agriculture intervention, broad-based participation is crucial for achieving sustainable outcomes. Ultimately, it is the local stakeholders who will be responsible for implementing the climate-smart agriculture activities and practices. Extensive community participation enhances self-reliance and local ownership of outcomes, and increases the likelihood of success. Qualitative approaches for gathering data and information can help foster community participation. In qualitative approaches, respondents can express opinions freely without the constraints imposed by pre-determined questionnaires. This can give a clearer picture of the roles and needs of women and men, household dynamics, and other sensitive topics.

Many participatory approaches have been developed based on analyses of socio-economic patterns and the identification of women's and men's priorities and potential. These participatory approaches include tools that can help provide an accurate account of community dynamics and the relationships between the different social, economic and environmental factors that shape these dynamics.

A number of dedicated training guides offer insights on how to conduct gender-responsive and socially sensitive climate change research and development interventions in the agriculture and food security sectors. The two manuals listed below provide practical guidance on participatory approaches:

- Gender and Climate Change Issues in Agriculture and Food Security Research and Rural Development (FAO/CCAFS, 2012)
- Gender and Inclusion Toolbox: Participatory Research in Climate Change and Agriculture (CCAFS, 2014).

In general, qualitative approaches are characterized by the use of small, often targeted (rather than random) samples. They gather information through relatively unstructured conversations and interviews, instead of using fixed questionnaires, with both women and men from different socio-economic groups. The potential weaknesses of qualitative approaches are associated with difficulties in ensuring their statistical representativeness and the generalization of findings.

Focus group discussions and interviews are some of the tools used in qualitative methodologies. Interview work is conducted at the community level using well-trained facilitators to guide the discussions and get a clear picture of why a service is or is not meeting the needs of a particular user group. The sampling procedure should try to capture the 'true averages' of the population targeted by the intervention and use a control group as well. Focus groups, while limited to small samples, can be an important tool for understanding the different perceptions women and men have regarding coping strategies, the adoption of new technologies, and the conservation of natural resources. This information can be valuable at the household level and the community level, and shed light on gender gaps in decision-making in agriculture in both spheres. Other topics that can be addressed include the differences in priorities between women and men in how they use their time, and the trade-offs they make when undertaking other productive work both within and outside agriculture.

Disaggregating agricultural outcomes by distributional effects[v] and regional aspects is also important from a policy-making standpoint, as it can shed light on the differences among various socio-economic groups and across regions. This is especially important given the growing impact of climate change on the livelihoods of rural areas, and ongoing questions about which geographical areas and social groups (including women) are most affected.

Applying these qualitative approaches allows for the collection of gender-sensitive information during the project identification and design phase and gender-responsive project implementation and monitoring and evaluation.

Gender-sensitive indicators

Gender-responsive indicators measure the status and roles of women and men, and changes in gender relations in the household and communities over time. Examples of indicators related to performance of a particular climate-smart agriculture practice or technology include the numbers of women and men engaged in testing or applying practices; and measurements of the expected long-term changes. These changes may include greater control over productive assets, higher rates of participation in decision-making, increased knowledge, positive changes in behaviour and attitude, awareness, empowerment, and improved economic status and food security and nutrition of women and men.

Box C6.4 presents a list of indicators that can be used to monitor and analyse the gender-related impacts of climate-smart agriculture in the medium and long term. These indicators can form a basis of a gender-sensitive indicator framework for climate-smart agriculture interventions. Module C9 addresses monitoring and evaluation in greater detail.

Box C6.4 Selected gender-sensitive indicators for climate-smart agriculture

- The number of gender-responsive technologies applicable for climate-smart agriculture
- The rate of participation of men and women in the selection process for a climate-smart practice or technology
- The number or percentage of women and men participating in climate-smart agriculture-related Farmer Field Schools or farmer-to farmer extension services
- The proportion of services dealing with climate-smart agriculture, including credit services, that are accessible to to both women and men
- The number of women farmers and number of men farmers who have regular access to weather and climate information services and price information services, and make use of them
- Changes in property (e.g. land, livestock, trees) owned and controlled by women and men in different age and ethnic groups
- Perceptions of women and men on the usefulness of the climate-smart agriculture technology and that benefits that would accrue from its adoption
- Percentage change in crop yield per hectare and year as result of the climate-smart agriculture intervention, with figures disaggregated by female-headed households and male-headed households and household members
- The number of farmers participating in functional associations as a result of the project, with the numbers disaggregated by sex and by type of association (e.g. market cooperative or producer association)
- Farmers who consider themselves better off (e.g. in terms of livelihood, income, nutrition, wellbeing, social status or empowerment) due to the climate-smart agriculture intervention, with the numbers disaggregated by sex.
- The number of women in leadership and decision-making roles or positions in the community
- The changes in the labour burden of women and men (e.g. number of persons reporting a significant reduction in the time spent for collecting water or fuel).

(Adapted from FAO, IFAD, World Bank, 2015)

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v **Distributional effects**: Accrual of a phenomenon's / initiative's costs, benefits and other socio-economic impacts to specific population groups, distribution of these costs, benefits and impacts among these

groups (e.g. women, rural women, youth, etc, various income quintiles, etc)

Successful gender-responsive communication and extension approaches and climate change mitigation innovations

It has been demonstrated across a wide spectrum of field interventions that effective partnerships and collaboration with local groups and institutions, and participatory community-led development approaches can generate substantial synergies and speed up the adoption rate of climate-smart agriculture practices by women and men.

In general, group participation is a widely used mechanism for protecting or enhancing assets and encouraging the pooling of risks, particularly for women. Groups and community-based institutions represent a key strategy for climate change adaptation. They serve primarily as a mechanism to facilitate the development of assets through group purchase of large farm appliances (physical capital), group loans (financial capital) or capacity development (human capital).

Listed below are approaches that have proven to be successful in promoting gender-sensitive group-based extension and communication services.

- Farmer Field Schools (FFS), originally championed by FAO, can serve as hotbeds for farmer innovation and experimentation. Because women and men participate fully during all stages of cultivation, marketing and decision-making, FFS permit gender inequalities to be addressed in a comprehensive manner. This includes the incorporation of gender considerations in the development of innovative and climate-smart agricultural technologies practices, such as alternative fodder/food for livestock (for example, paddy/grass varieties that tolerate saline soils); new poultry and cattle genotypes; introduction of mulching; wet resources utilization; and homestead plant nurseries.
- In CARE's Pathways Program, which has been implemented in Bangladesh, Ghana, India, Malawi, Mali and the United Republic of Tanzania, applies a Farmer Field and Business School model. Through this approach, women farmers have become involved in climate-smart agriculture interventions and have adopted climate-smart practices. Yields have increased, bringing in higher revenue for female farmers and businesses. Working together as a group, women have been able to set prices in the market, ensuring they receive fair prices for their crops. Women have also gained access to land for production. Women and men work together in all project areas and have entered into more equal relationships and decision-making at home. In remote villages in India, the Care Pathways program has also promoted innovative extension methods, such as the network of agri-kiosks. The agri-kiosks, which help meet the gap in supply and demand of agricultural inputs, are a one-stop shop for all agricultural needs, providing services such as soil testing, seed selection, farm inputs and and rental of the latest agricultural equipment. By investing in the agri-kiosks, development partners can increase their outreach to cover remote and diverse agro-climatic areas and provide more accessible and timely services. The agri-kiosks help redefine the scope of extension to suit the diverse, dynamic and emerging needs of women farmers, and introduce new standards for production and marketing.
- The Gender Action Learning Systems (GALS), developed by Oxfam Novib (Netherlands) and rolled out in a number of African countries with the support of IFAD, is a methodology for addressing unequal gender and social relations and enhancing ownership of project activities by target groups. GALS can be applied at the household, group, or community level and in many thematic areas, including climate-smart agriculture. This approach has successfully strengthened the capabilities of non-governmental organizations (NGOs) and civil society organizations to integrate gender-sensitive methodologies into their work, and facilitate gender-equitable collaboration with businesses and local government bodies. GALS helps advocate for community-led empowerment methods to be integrated into policy, programme design and implementation. GALS was successfully implemented in Viet Nam in a programme targeting small-scale farmers in the chicken, pork

and shrimp value chains.

Experience from a wide range of development interventions and expertise has highlighted the degree to which women's and men's adaptive approaches are intertwined. For climate-smart agricultural interventions to be successful they need to engage with both men and women as interdependent members of a household and community.

Gender-responsive innovations for climate change mitigation and food security

Women and girls in developing countries are usually expected to look after household energy needs, manage waste and collect water. Gender inequalities hinder their ability to adopt climate-smart agricultural practices that can reduce greenhouse gas emissions. When pursuing practices that contribute to climate change mitigation, it must be acknowledged that women and men are often not in the same position to take up these practices. For example, for people with weaker tenure rights, agroforestry may be less accessible or deliver fewer benefits. If hiring labour is not possible, some soil and water conservation practices may be difficult to implement. However, some technologies and practices, like improved cooking stoves and the use of biomass for energy and biogas, may be more attractive to women because they save time and labour. Programmes that support women farmers to adopt efficient agricultural production practices, including water management for irrigation and use of bioslurry as fertilizer for crops, should be encouraged.

Listed below are some examples of gender-responsive agricultural innovations with strong potential to mitigate climate change and strengthen food security.

The FAO-Thiaroye fish processing technique: enhancing food security, reducing post-harvest loss and cutting greenhouse gas emissions

In most tropical developing countries, smoking and drying are common processing and conservation techniques used in small- and medium-scale fisheries. Women make up the majority of labourers in these activities. In some cases, these processes can create problems related to food safety. Food contamination from polycyclic aromatic hydrocarbons produced by burning wood is a particularly significant concern. Also, post-harvest losses from outdated processing operations, inadequate storage facilities and poorly functioning marketing systems can undermine food productivity. Many of these processes are sources of environmental pollution and emit high levels of greenhouse gases.

The Thiaroye fish smoking technique (also known as FTT-Thiaroye), which was developed in 2008 by FAO and the National Training Centre for Fisheries and Aquaculture Technicians in Senegal (CNFTPA), is widely used in Côte d'Ivoire, Ghana, Senegal, Togo and the United Republic of Tanzania. It uses an innovative smoking kiln that produces superior and safe products, and expands the range of species that can be processed. The process, which cuts post-harvest losses by up to 50 percent compared to natural drying, also reduces drying and smoking times. The technology also lessens the workload of the women and increases their income. Another advantage of this technique is its improved energy efficiency. Less charcoal is consumed, and the use of biomass (i.e. plant and organic residues and manure) is optimized, which lowers greenhouse gas emissions (Source: World Bank, FAO and IFAD 2015).

Flexi biogas systems

Since 2012, IFAD has promoted the installation of Flexi biogas systems in a number of countries (e.g. Kenya, Rwanda, India, Sao Tome and Principe, Mali and Viet Nam). The systems uses cow dung to produce methane gas, which is harnessed to provide energy for cooking in farming households. Flexi biogas systems deliver a number of

environmental, economic and social benefits.

- Women spend 2 to 3 hours less per day gathering fuelwood, which allows them to dedicate more time to income-generating activities.
- Environmental benefits include the improved management of livestock manure, which reduces methane emissions, and the decreased need for fuelwood, which reduces deforestation and land degradation.
- Crop productivity is enhanced when the bioslurry produced as a waste product is applied to fields as an organic fertilizer. This improves soil health and can increase yields by 6 to 10 percent. In households that raise chickens, the biogas stoves are also used to keep the temperature suitable for chicks, which decreases poultry mortality, reduces women's labour and increases farm income.
- The ability to use biogas stoves inside the house, instead of cooking on fires outside their homes, allows women to engage more with family members and increases their status within the family. The ease of using biogas compared to open fires makes men more willing to assume responsibility for cooking.
- Women, girls, and other household members suffer less from the chronic respiratory diseases and eye infections caused by cooking over wood or charcoal fires.

More recently a farmer-driven process, which has been supported by IFAD and Biogas International, has contributed to an incremental improvement of the Flexi biogas systems. Low-cost enhancements have improved the reliability of the systems. Different sizes have also been developed to respond to the needs of the entire household throughout the year (Sovacool *et al*., 2015).

Genetic diversity as a risk-mitigating strategy for climate-smart agriculture

Genetic resources for food and agriculture are key resources for building the resilience of agricultural ecosystems. They provide the crop varieties and breeding stocks that are needed to adapt production to changing climatic conditions. Their conservation and sustainable use are a prerequisite for coping with climate change.

The out-migration of men from rural areas has put an excessive burdening on women and redefined gender-specific roles and eroded knowledge regarding biodiversity management. This situation has led to a loss of agricultural biodiversity.

The FAO project, From Machupicchu to Lake Titicaca, uses a gender-sensitive approach to help conserve 177 varieties of potatoes and quinoa. This initiative, which has benefited 3 500 families in 18 rural communities in Peru, is part of a GEF-funded FAO-led Global Partnership Initiative on the conservation and adaptive management of Globally Important Agricultural Heritage Systems (GIAHS). The project in Peru has followed an integrated approach to addressing the impact of climate change, which has strengthened the food and nutrition security of local families. Local institutions and community participation, especially the engagement of women farmers, is helping raise awareness about the tremendous value of these ingenious agricultural technologies and guarantee their conservation. Fostering the participation of local institutions, communities and men and women farmers in climate-smart agricultural activities contributes to establishing the conditions for sustainable development in the Andes.

Enabling policies and institutions for gender-responsive climate-smart agriculture

In climate-smart agriculture, the focus is often placed on technical issues. However, institutional and policy aspects are also vital for the successful implementation of climate-smart interventions intended to deliver sustainable benefits to both men and women. This section looks at issues that must be considered when implementing an integrated approach that can ensure coherence and convergence across the complex gender-climate-agriculture nexus.

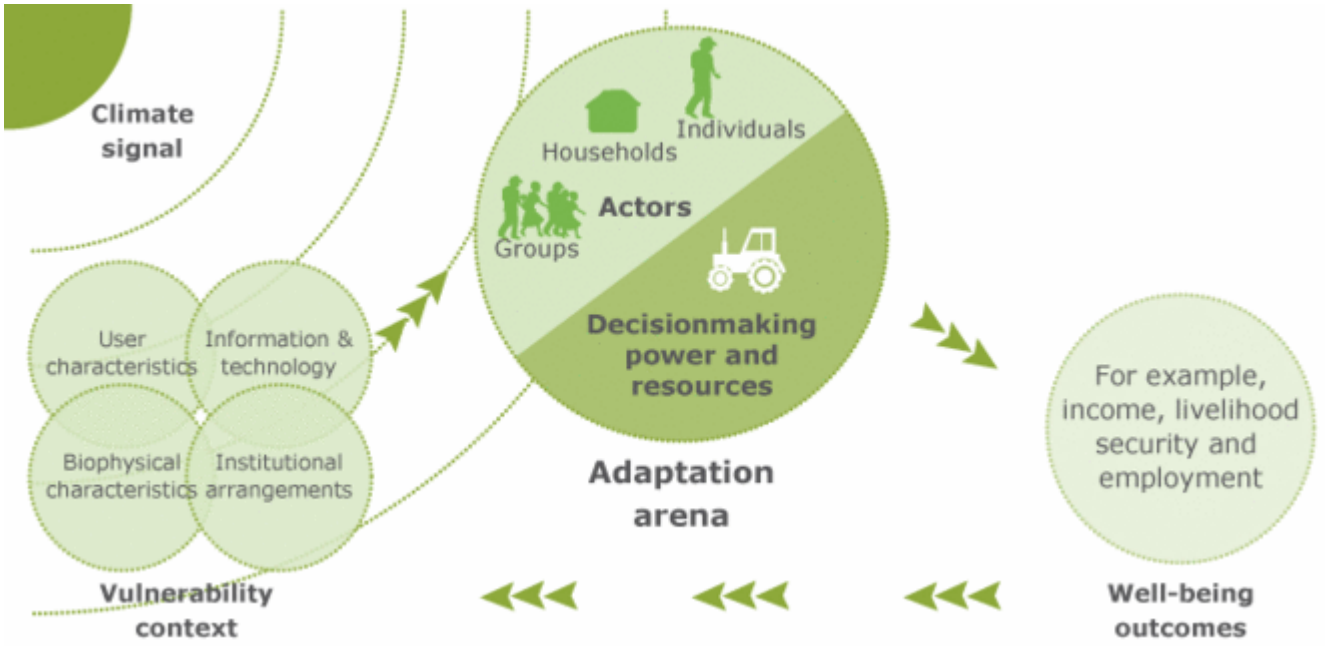
To translate policies into tangible benefits on the ground, policy-makers must address a host of challenges simultaneously, which may involve making some trade-offs.

The capacity of a community to mitigate and adapt to climate change depend on its institutional capacity. This relates to the degree of social capital within the community; the ability of community members to work collectively; and their ability to access resources and information from higher-level institutions, such as government agencies and NGOs. To identify technologies that are affordable and easy to adopt, particularly for women smallholder agricultural producers, government advisory services and climate information need to be tailored to local agro-ecological conditions (Warburton *et al*., 2011). Also, beneficial are multistakeholder processes in which local people can evaluate and make their own decisions about the value of the proposed technologies (Newsham and Thomas, 2011).

There are some successful strategies for integrating gender into climate-smart agriculture, such as the national Climate Change Gender Action Plans, which the Global Gender Office of the International Union for Conservation of Nature (IUCN) has facilitated in a number of countries. One of the earliest examples of these action plans was Mozambique's Gender, Environment and Climate Change Strategy and Action Plan. The plan, which was formulated in 2010, identifies the linkages, trade-offs and risks, as well as synergies that need to be taken into account when addressing climate change in an environmentally sustainable and gender-responsive way. The Bangladesh Climate Change Gender Action Plan, delineates, for the full range of government agencies, development partners, NGOs, research institutions and the private sector, the policies and initiatives that should be put in place to address climate change in a gender-responsive manner.

A transformative and integrated approach to climate-smart agriculture requires greater attention to gender relations. This involves more than simply using information on gender differences to maximize rates of adoption of climate-smart technologies.

Figure C6.5 An integrated framework on gender and climate change



IFPRI, 2014

This consolidated framework, developed by the International Food Policy Research Institute (IFPRI), illustrates the

pathways[vi] through which climate change affects individual, household and community well-being. It can be used to promote a better understanding of the differential impacts of climate change on men and women, and their differential responses. This framework emphasizes the value of information, livelihood resilience, institutions, and asset accumulation when addressing issues related to vulnerability to climate change and the process of adaptation.

The policy goal is to ensure a gender-equitable distribution of assets and gender-equitable decision-making in situations where gender asymmetries are the underlying cause of women's vulnerability to climate change. Policies must also strengthen national and local institutions, and foster coherence between financing and public investments related to climate change and agriculture.

Financial, physical, human, and natural capital, as well as social networks, institutions and adequate legal and policy frameworks are critical, as they can help ensure gender equity regarding entitlements to assets, resources and social capital (Kasperson *et al*., 1995; Adger, 2003).

There is a need for a more holistic, integrated approach to gender and climate change in agriculture that involves all institutional stakeholders. In this respect, institutions can be grouped into four main categories:

- public sector institutions, including local governance institutions;
- collective action institutions, including farmers' unions, cooperatives, local groups and civil society organizations;
- research institutions; and
- the private sector (industrial and financial).

The following section focuses on the key functions of these four groups of institutions in relation to climate-smart agriculture and gender.

The primary roles of institutions related to climate-smart agriculture and their gendered implications

Without appropriate and supportive institutional structures in place, acquiring the knowledge and technical innovations required to implement climate-smart agriculture may be overwhelming for women and men smallholder agricultural producers. In this process, stakeholders include not only markets interests and state institutions, but also informal and customary institutions at the local level. All of these stakeholders have the potential to influence and facilitate the adoption of climate-smart agriculture approaches.

This chapter, which complements module C1 on system-wide capacity development for climate-smart agriculture, provides an overview of gender considerations concerning the four key functions of institutions dealing with climate-smart agriculture: information, investment, innovation and insurance. It provides examples of successful gender-responsive interventions from around the world. Module C1 provides more operational guidance on how to conduct joint stakeholder institutional assessments.

Information

Key function of institutions: to facilitate access to climate-smart agriculture-related information and knowledge to beneficiaries, particularly women, through the most suitable technologies and information channels.

Making a transition to climate-smart agriculture is a knowledge-intensive process. To support the development and uptake of good practices, it is necessary to strengthen the institutions that can deliver this knowledge to both women and men. Baseline studies conducted by the CARE Pathways Program in India revealed that less than 25 percent of women farmers reported access to agricultural extension services in the previous 12 months; less than 40

percent reported having to agricultural inputs; and less than 15 percent reported having access to markets for their products. Over 43 percent of women farmers indicated they had not received any market information (CARE International, 2013).

Recent research by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) in Kenya has also demonstrated that traditional channels of information in agricultural development programmes (i.e. extension services, farmer organizations, and agri-service providers) do not consistently have a strong positive effect on women's awareness of climate-smart agriculture (FAO, World Bank, IFAD, 2017). To channel information on climate-smart agriculture so that it reaches women and other vulnerable groups, institutions need to make special efforts to target their services to these beneficiaries. A variety of media can be used, including mobile phones, radio and television, and delivering messages in places where small-scale agricultural producers gather (e.g. markets, places of worship).

Complex institutional arrangements govern how climate-related knowledge can become an action resource. Effective use of climate information requires developing the management skills of women smallholder agricultural producers so that they can use these new services and information products (Hansen *et al*., 2011). To achieve sustainable results, the enhancement of individual skills needs to be anchored in effective learning approaches and linked with organizational development.

One approach to enhancing management skills and increasing adaptive capacity is through Participatory Scenario Planning. This approach, which was pioneered by CARE International, brings together national meteorological and hydrological services, local forecasters, community representatives, government departments, research institutions, NGOs and community-based organizations. Collectively, stakeholders discuss and integrate scientific and local forecasts into a downscaled forecast that responds to local decisions related to livelihood, disaster risk management, sustainable development and climate change adaptation. For example, where women's priorities may focus on family nutrition, their use of climate and market information will be different from men. Making equality of access to this information is a critical area for attention. Participatory Scenario Planning multiplies the impact of climate change information by institutionalizing climate communication at a local scale, while giving a voice to vulnerable people and supporting their efforts to adapt to climate change.

Impact assessments of this kind have shown positive results in Ghana, Kenya and Niger. Farmers have adjusted planting times, diversified their seed and crop choices, and moved livestock and assets away from flood prone areas. They are now actively listening for and gaining trust in climate information (CARE International, 2012).

Investment

Key function of institutions: provide investments for improving physical infrastructure, increasing access to markets and developing farmers' capacity to work together in a coordinated fashion to manage land, forest and water resources across landscapes using equitable land tenure systems, natural resource-user groups, farmer's organizations; provide credit for investing in sustainable land, forest and water management and timely access to different types and amounts of inputs (e.g seeds) for enhancing the contribution agricultural production systems make to food and nutrition security.

The investment requirements for climate-smart agriculture are one of the most common factors that restrict smallholders, especially poor farmers and women, from being able to adopt promising practices.

Many women small-scale producers lack access to the cash or the financial services that would enable them to invest in improving production. Millions of smallholder producers, often working in isolation, have little power and influence, and tend to be disconnected from support systems. Many live and work in remote areas where the demand for their produce is extremely low. Consequently, they have relatively low need for credit.

As the climate changes, there is a need to shift from a traditional approach to financing, based on borrowers' credit capacity and traditional loan guarantees, to one that manages risks and leverages innovative sources of finance. This involves moving towards financing schemes based on the borrower's performance capacity, and credit based on future profits.

There have already been many innovations made in financing for agriculture. Examples include financing models that use moveable assets, such as harvested commodities in warehouses, as collateral, or rely on buyers as the repayment sources. Innovative funding mechanisms may be needed to establish 'aggregation points' in the value chain where funders can deal with women farmers as a group. This would reduce the risks and transaction costs of working with individual smallholder producers and others working in the agricultural value chain.

Distribution models that use mobile banking, branchless banking and mobile phone payment systems can be particularly effective when aggregation is not possible. These distribution models make it possible to finance smallholder producers directly in rural areas, reduce transaction costs, and improve efficiency and inclusiveness.

Credit can help ease cash constraints for climate-smart agricultural investments, but even formal credit institutions may not be available in rural areas, or they may be unwilling to lend to women smallholder agricultural producers. Microfinance institutions, rotating savings and credit groups can provide a viable alternative when access to formal credit is unavailable.

The potential of these alternatives is evident from the CARE Pathways Program in India where women farmers reported their own savings and their self-help groups as a source of agricultural finance in over 89 percent of cases. Formal agricultural co-operatives met the financial requirements of just 2.5 percent of women farmers (Njuki *et al*, 2013). However, larger loan requirements for agricultural investments remain unmet as women do not own assets (e.g. land) and cannot take out bank loans or provide collateral to lenders.

Another successful model of agricultural finance are the Village Savings and Loan Associations (VSLAs) pioneered by CARE International. These associations, which are complementary to micro-finance institutions, serve women and men living in remote places, whose income is low and irregular and who need to save small amounts of cash. Significant benefits can accrue from linking VSLAs to climate-smart agriculture programming.

The transition to climate-smart agriculture has particular implications for the timing of the required financing. Often there can be a considerable period of time between the implementation of a climate-smart agriculture intervention and the realization of its benefits. For example, some practices (e.g. the construction of stone bunds or terraces to improve soil and water management) require significant upfront investments, but their impact in terms of reducing vulnerability to climate variability only becomes apparent after a number of years (World Bank, FAO, IFAD, 2015; and FAO, 2011b). This creates a need for targeted income support and financing over extended periods.

Given the fact that financing for climate change adaptation, mitigation, and agricultural development must span a range of sectors to meet climate-smart agriculture's inter-related objectives, funds deployed by public sector institutions or development partners will need to be used in an efficient and mutually supportive manner.

The decision to implement climate-smart agriculture opens up the possibility of accessing climate finance for adaptation and mitigation. However, local communities, and women in particular, are not well connected to these sources of financing. Creating conditions that can ensure equality in access to climate financing is crucial. Where critical assets are required for investment, some form of external assistance by the state or development partners may be necessary to enable women to engage in climate-smart agriculture. Financial resources can be directed toward obtaining productive inputs, such as technical expertise and technologies, and providing incentives to adopt more integrated approaches. There is also a continued need to use tailored safety nets to increase smallholder agricultural producers' access to financing, and different local and national investment schemes to support gender-responsive climate-smart agriculture. These safety nets need to be developed in parallel with initiatives to develop institutional capacities.

Private firms become increasingly involved in crops, livestock, and agroforestry production when there are profits to be made, for example, through sale of improved seeds, machinery, or inputs. Markets tend to favour large farms over smallholder agricultural producers. Also, farmers who live closer to markets can take advantage of market opportunities more easily than those who live in remote areas. Changing agronomic management practices requires an initial capital investment to make the transition to climate-smart practices. Institutions that can provide equitable access to microfinance loans to smallholder women farmers can be an effective entry point for overcoming the financial barriers these women face in adopting climate-smart agriculture practices.

Innovation

Key function of institutions: facilitate agricultural innovation and farming systems that promote agricultural development (see module C1); develop, disseminate and share new practices and technologies; and select the most appropriate gender-responsive innovations for the local institutional and technical context.

The strength of local institutions and infrastructure often directly shape farmers' access to new technologies. In many cases, the most binding constraints occur at the initial adoption stage. Several factors can impede the adoption of new technologies by impoverished women and men small-scale farmers. Gender-responsive technologies are defined as:

- technologies based on needs and interest of both female and male farmers;
- technologies that reduce time and labour for women farmers, and
- technologies that are accessible and affordable to both women and men.

Knowledge services, and research and development are widely understood to be critical for expanding climate-smart agriculture. Empirical evidence shows that access to knowledge increases women farmers' propensity to adopt innovations intended to address climate change (Twyman *et al*., 2014). Participatory, inclusive approaches aimed at building adaptive capacity, such as farmer-to-farmer extension services or farmer-led innovation, can help develop climate-smart practices with greater potential for scaling up. However, innovations that have been by developed by individual farmers, including innovations that are particularly attractive to women, are more difficult to scale up, as they are suited to highly specific environments and social contexts. Another lesson that has been learned from climate change adaptation projects is that it is valuable to recognize that, because of their knowledge of local production systems and skills, women can make an active and important contribution to climate adaptation. It is limiting and simplistic to view them as passive victims of climate change (Otzelberger, 2011).

Particularly at the local level, women's knowledge is a valuable resource and should be used to inform climate-smart agriculture adaptation and innovation measures. Women often have in-depth knowledge of the local crops, trees, herbs and wild edible plants that thrive in local climates. They are also knowledgeable about local farming practices related to sowing seasons, multicropping, seed selection and storage, and the preparation and application of organic fertilizers and pesticides. Women also have expertise in post-harvest activities and the processes that add value to farm production (UNDP, 2013a; Lane and McNaught, 2009).

Many training and technology-promotion programmes are designed to engage with community groups or cooperatives. They often require or encourage a level of cooperation between individuals and groups, as well as with government programmes and market agents. In some cases, however, female and male farmers have different technology needs. National Agricultural Research Services are critical for promoting information and technologies that can improve smallholder farmers livelihoods and practices. Universities and research institutions can also

provide tailor-made pre-training and in-service training for extension workers (Swanson and Rajalahti, 2010).

Insurance

Key function of institutions: enable farmers to cope with risks caused by climate shocks and stresses and adopt of new practices that support effective risk management on farms through coordinated actions, which may include insurance, safety nets, income diversification and improved storage.

Several innovative models exist for managing risk, including weather and disaster index-based insurance. These indexed insurance schemes compensate farmers on the basis of a pre-determined indicator (e.g. rainfall level) for loss of assets and investments resulting from extreme weather events and disasters. The role of informal insurance systems, such as social and familial networks, in cushioning against shocks have been widely documented (see Quisumbing *et al*., 2012 for example from the Philippines).

Shocks are considered 'idiosyncratic' when they are restricted to a single household. These shocks commonly result from poor crop yields associated with adverse microclimatic conditions, local wildlife damage, pest infestations, illness (especially chronic rather than infectious), and one-off events, such as property losses due to fire or theft. Idiosyncratic shocks can, in principle, be managed at the local level through traditional social institutions

Covariate shocks, on the other hand, affect virtually everyone in a community. These shocks, which are commonly the result of natural disasters, war, price instability and financial crises, are difficult to insure locally and require some coordinated external response. It is expected that increases in complex, covariate shocks resulting from climate change will undermine traditional insurance systems. Consequently, hybrid models and innovative institutional arrangements to provide financing and insurance will likely become important. Experimental models, for example in Ethiopia, are attempting to link the provision of insurance with the provision of credit (Shukri *et al*., 2017). The state is playing an active role in encouraging private sector involvement. In the future, it seems likely that such hybrid institutions will be needed to deliver the necessary financing and insurance products that can cater to the specific needs of women smallholder farmers.

It is evident that institutions have significant influence on how climate risks and impacts are distributed among different social groups and populations. Institutions affect the rules governing the access to and control over the resources and assets that are necessary for climate change adaptation and mitigation (Meinzen-Dick *et al*., 2013). Taking into consideration gender aspects is important to ensure that men and women benefit equally from the services provided by these institutions.

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vi Figure 1 captures the key drivers of adaptive change. Exposure to climate change is represented by the ***climate signal***, that includes long-term, average changes in temperature and rainfall, as well as changes in the frequency of extreme weather events, such as droughts and floods. Adaptive capacity from the IPCC framework is represented by the '**vulnerability context**', made up of user characteristics, information and technology, biophysical characteristics of the context in which adaptation decisions are made (e.g. characteristics of the soils, rainfall patterns, etc.), and the institutional context. Biophysical characteristics influence exposure and sensitivity to climate risks as well as adaptive capacity. The institutional context and user characteristics impact sensitivity to climate risks and adaptive capacity; and access to information and technology affect adaptive capacity. While the biophysical and institutional context may be the same for men and women in a household, they may affect men and women differently. These factors combine to influence the ***range of response options*** that are available for individuals, households, and groups to adopt in the adaptation arena. **The adaptation arena** is where actors use resources and their own decision-making authority to respond to perceived climate changes or future climate risks. Given their higher vulnerability to climate change and limited adaptive capacity, certain individuals or groups may experience greater difficulty in coping with climate changes and in increasing their resilience over the long term.

Gender equality on the global climate change agenda and the role of climate finance

Social inequality and social exclusion, particularly in relation to gender, have been recognized as critical issues in international development. There is a growing global awareness of the disproportionate impact of climate change on women and girls, and a broad acknowledgement of their roles as change agents capable of building the climate resilience of their households, communities and nations.

This evolution is reflected in the progress made towards integrating gender into global climate negotiations, climate planning and climate action. Parties to the United Nations Framework Convention on Climate Change (UNFCCC) now fully recognize the importance of integrating gender in UNFCCC processes and national climate policies. UNFCCC's Lima Work Programme on Gender, adopted in 2014, and the Paris Agreement, ratified in 2016, mandate wide-ranging gender-responsive adaptation and mitigation actions and capacity-building interventions. The UNFCCC alone has more than 50 gender-specific decisions by Parties.

The Intentional Nationally Determined Contributions (INDCs), which helped build the Paris Agreement, highlight the importance countries' place on the agriculture sectors for addressing climate change. More than 40 percent of the nearly 170 submissions mention gender-related issues to varying extents. As many as 75 percent of sub-Saharan African Parties reference 'gender' or 'women' in their INDCs, making the region a global leader in integrating gender equality into sustainable development priorities (FAO, 2016). Thirty-five countries refer to the role of women in adaptation, while 18 countries recognize the specific role of women in climate change mitigation, primarily in relation to energy emissions, sustainable or biomass energy, and livestock.

This indicates the potential to address gender-related issues and climate change adaptation simultaneously, and points at the need to further support the integration of gender issues in future national determined contributions. Agriculture has been highlighted as a priority sector that provides diverse opportunities for empowering women and reducing their vulnerability to climate change. Gender-responsive finance mechanisms will be critical for translating these ambitious policies into on-the-ground action.

Adaptation to climate change in the agricultural sectors is expected to entail a cumulative cost of USD 225 billion until 2050 (Lobell *et al.*, 2013). In 2014, annual global climate finance flows totalled approximately USD 391 billion. Thirty-eight per cent of this flow came from public sources, and the rest from various private sector funders (Climate Policy Initiative, 2015).

There is compelling evidence of that women are more vulnerable than men to the impacts of climate change. It is also clear that women have tremendous untapped potential to contribute to climate change adaptation and mitigation. To date, however, only a small portion of global grants address climate change and women's rights in an integrated manner. Official development assistance (ODA) intended to both address climate change and support the achievement of gender equality accounted for 31 percent of bilateral ODA to climate change in 2014, a total of USD 8 billion. However, just 3 percent of this assistance had gender equality as a principal objective (OECD, 2015). There is clearly room for improvement in this area.

To ensure sustainable and positive results, all aspects of climate-smart agriculture, including climate finance, must recognize the gendered dimensions of climate change and actively promote gender equality and women's empowerment in climate responses in the agricultural sectors.

Both GEF and the Green Climate Fund have corporate policies dedicated to gender equality. They request a gender-differentiated assessment of potential social and economic co-benefits of projects and programmes and explicitly call for “projects that produce economic, social and gender development co-benefits” (ODI, 2015).

The Green Climate Fund project approval process gives additional preference to projects with well-designed gender elements. One of the Fund’s high-level investment criteria focuses on gender-responsive development impact. The Green Climate Fund and UN Women have also recently published two comprehensive guidance materials: Mainstreaming Gender in Green Climate Fund Projects and Leveraging co-benefits between gender equality and climate action for sustainable development.

The Green Climate Fund Readiness Programme also provides a dedicated funding window to strengthen gender capacities of national designated authorities and improve gender integration in national investment planning.

These positive incentives can unlock additional innovative sources of finance, both public and private, and spur more gender-responsive climate investments, ensuring that climate initiatives benefit women and men equally and fully leverage women’s agency to scale up climate-smart agriculture.

Transitioning to gender responsive climate-smart agriculture

As has been underscored throughout this module, strengthening climate-resilience in a gender-responsive way require will require an integrated approach. Interventions need to simultaneously address a host of structural issues, including improving access to land tenure and other natural and productive assets and services, and integrating women farmers into agri-food value chains and relevant decision-making processes (FAO, 2016).

This can be achieved by developing and scaling up socially and environmentally sustainable technologies, practices and employment opportunities and other measures that take into account the diversity of agricultural systems and are responsive to socio-economic and gender issues.

The most important recommendations for charting a sustainable pathway to gender-responsive, climate-smart agricultural development are listed below.

Improve the productivity and reduce the time and work burdens of women small-scale farmers by ensuring equal access to the productive resources and information required to implement climate-smart agriculture.

Building the resilience of women farmers requires improving their access to productive resources, especially land. This can reduce their exposure and sensitivity to shocks and increase their yields.

It is also essential to enhance the capacities of agricultural extension workers to promote new technologies. Greater investments in climate information services are needed to make them accessible, timely and user-friendly for women farmers. Access to information and technology will help women farmers make crop management decisions that can increase their revenues and/or reduce their workload. To ensure the uptake of new technologies, it will be important to promote favourable social attitudes and practices about women’s role in agriculture and the use of new technologies. Rural advisory services will need to become more responsive to gender issues.

Remove financing barriers to allow women farmers to invest in climate-smart agriculture

Even if women farmers had secure land tenure and productive assets, they need access to affordable long-term finance to increase their capacity to invest in climate-smart agriculture. To reduce the key financing barriers women face due to their limited collateral, the lending practices of public and private financial institutions need to become more gender-equitable. This may require regulatory changes and incentives to increase the levels of credit to women farmers. This could include industry-wide voluntary actions, direct lending, and credit enhancement mechanisms.

Promote opportunities for women farmers to participate in, and move upward in the sustainable value chains

In looking at the value chain from a gender perspective, it becomes clear that markets are often structurally set up to exclude marginalized producers. It is important to take a coherent and rigorous approach to understanding market operations and undertaking interventions that ensure markets function more efficiently and sustainably for women and men. These types of interventions would support women farmers to form market associations or cooperatives, and strengthen their capacity to participate in the value chain, allowing them to move from production to other activities, such as aggregation, processing and distribution. With this support women can contribute to making the value chain more sustainable. Preferential access through quotas, targets, and tax exemptions for women cooperatives may be needed. More investment will be necessary in local infrastructure (e.g. roads, sustainable transport, post-harvest storage facilities and cooperative processing plants) to improve women's access to markets and make their work less time-consuming. Creating synergies between targeted and innovative rural employment programmes and green growth strategies has the potential to lift rural women out of poverty and promote the development of sustainable and climate-smart agricultural landscapes.

Ensure small-scale food producers' and women's participation in planning, policy, and budget processes

Transparent, consultative processes for developing policies, setting budget priorities, and establishing plans and strategies promotes accountability and helps ensure that climate-smart interventions are appropriately targeted and resources are directed where they are most needed. Participatory processes are key for ensuring the priorities, perspectives and knowledge of small-scale food producers and women are reflected in climate-smart initiatives, and validating the value these stakeholders place on their role and contributions.

Conclusions

Making the transition to climate-smart agriculture in gender-responsive way requires an integrated approach that simultaneously addresses a host of structural gender issues. All stakeholders have an important role to play in this effort.

Development agencies and NGOs are in a position to successfully advocate for equitable tenure, access and control rights, and socially and environmentally sustainable technologies and employment opportunities for both women and men. This can make a crucial contribution to promoting the adoption of climate-smart agriculture in communities that depend on agriculture and the management of natural resources.

Crucial policy-level actions that support climate-smart agriculture include the enactment and enforcement of conducive and inclusive agricultural policies; the improvement of infrastructure, the introduction of appropriate

agricultural incentives; the provision of pertinent weather-related information; and the delivery of gender-responsive extension services.

Future efforts need to be directed at strengthening country-level planning in collaboration with private investors and development partners. As the climate changes, public programmes, such as disaster risk reduction, social protection, and insurance, will become increasingly important.

Countries and regional economic communities are becoming more and more committed to mainstreaming gender in climate policy in the agriculture sectors, especially in their implementation of nationally determined contributions to the UNFCCC, National Adaptation Plans and National Agricultural Investment Plans.

There are wide-ranging opportunities to develop capacity-building interventions linked to specific analyses of key gender issues. These interventions can be part of a larger process that elaborates projects on gender-responsive climate-smart agriculture; promotes women's roles in agricultural value chains; and addresses the gendered impacts of climate change in the design of policies and programmes. This will lead to more effective and equitable participation of women smallholder farmers in climate change adaptation and mitigation efforts and enhance the overall resilience of food systems.

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Notes: New module

Acronyms

CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CVCA	Climate Vulnerability and Capacity Analysis
FFS	Farmer Field School
GALS	Gender Action Learning Systems
GEF	Global Environment Facility
IFAD	International Fund for Agricultural Development
INDC	Intentional Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
MPAT	Multidimensional Poverty Assessment Tool
NGO	Non-Governmental Organization
SHARP	Self-Evaluation and Holistic Assessment of Climate Resilience of Farmers and Pastoralists
UNFCCC	United Nations Framework Convention on Climate Change

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