Gender, Climate Change, and Resilient Food Systems
Lessons from Strategic Adaptation by Smallholder Farmers in Cameroon

Lilian Nkengla-Asi
Suresh Chanda Babu
Holger Kirscht
Scarlett Apfelbacher
Rachid Hanna
Amare Tegbaru

Director General’s Office
INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
The International Food Policy Research Institute (IFPRI), established in 1975, provides evidence-based policy solutions to sustainably end hunger and malnutrition, and reduce poverty. The institute conducts research, communicates results, optimizes partnerships, and builds capacity to ensure sustainable food production, promote healthy food systems, improve markets and trade, transform agriculture, build resilience, and strengthen institutions and governance. Gender is considered in all of the institute’s work. IFPRI collaborates with partners around the world, including development implementers, public institutions, the private sector, and farmers’ organizations, to ensure that local, national, regional, and global food policies are based on evidence.

AUTHORS
Lilian Nkengla-Asi is a research associate at the International Institute of Tropical Agriculture (IITA), Yaoundé, Cameroon.

Suresh Chandra Babu (s.babu@cgiar.org) is a senior research fellow and head of the Capacity Strengthening Unit in the Director General’s Office of the International Food Policy Research Institute (IFPRI), Washington, DC.

Holger Kirscht is an advisor for the Advisory Service on Agricultural Research for Development of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, Germany.

Scarlett Apfelbacher is a junior consultant for GIZ GmbH, Manila.

Rachid Hanna is country director at IITA, Yaoundé, Cameroon.

Amare Tegbaru is a senior scientist and gender research coordinator at IITA, Dar es Salaam, Tanzania.

Notices
1 IFPRI Discussion Papers contain preliminary material and research results and are circulated in order to stimulate discussion and critical comment. They have not been subject to a formal external review via IFPRI’s Publications Review Committee. Any opinions stated herein are those of the author(s) and are not necessarily representative of or endorsed by the International Food Policy Research Institute.

2 The boundaries and names shown and the designations used on the map(s) herein do not imply official endorsement or acceptance by the International Food Policy Research Institute (IFPRI) or its partners and contributors.

3 Copyright remains with the authors.
Contents

Abstract iv
Acknowledgments vi
1. Introduction 1
2. Context and Literature Review 3
3. The Conceptual Framework 7
4. Case Study of the Forest Communities in the Southwest Region of Cameroon 11
5. Results and Discussion 18
6. Programmatic and Policy Interventions for Improving Gender Relations to Achieve Climate-Resilient Food Systems 33
7. Concluding Remarks 38
References 39
Tables

5.1 Summary of the gender dynamics in the pre-, adaptive, and resilient stages of climate change: Socioeconomic characteristics and activities 20
5.2 Summary of the gender dynamics in the pre-, adaptive, and resilient stages of climate change: Perceptions 27
5.3 Summary of the gender dynamics in the pre-, adaptive, and resilient stages of climate change: Adaptive strategies and building resilience 31

Figures

3.1 A framework for building resilient food systems by adapting to climate change 8
4.1 Location of case study communities (large blue circle) in the Southwest region of Cameroon 12
4.2 Historical time line of climatic and seasonal changes in Njonji from a female focus group discussion 15
4.3 Transect walk map of Njonji with community resources 16

Boxes

5.1 Female farmer, Njonji village 23
5.2 Female farmer, Bova Bomboko community 25
5.3 Female farmer, Munyenge 27
ABSTRACT

Climate change has major impacts on the food security and livelihoods of smallholder farmers in Africa south of the Sahara. Vulnerable to the vagaries of weather and to being chronically poor, women farmers are unequally and more negatively affected by climate change and seasonal changes than male farmers. This study aims to understand how men and women in Cameroon’s Southwest region differ in their vulnerability to and their coping strategies for climate change impacts. Data collected through focus group discussions and in-depth interviews from four rural communities in the Southwest region showed that most respondents (both male and female) had observed a change in the climate in the previous 10 years. According to respondents, climate variables such as the timing and length of the rainy season had changed, affecting crop production of both men and women. Women were shown to be more vulnerable than men, as the changes led to a reduction in yields, which affected family well-being. Men and women in the researched communities strive to cope with climate change and related seasonal variations in different ways. Whereas most men tend to move away from the area in a search for paid jobs in the cities, women remain in their own communities and work to diversify their livelihood activities. Other coping strategies for men and women in the research communities include income diversification, planting of early-maturing crops, and use of pest-resistant seeds. Men and women have different experiences and different adaptation strategies to climate change and seasonal variations in weather patterns. Understanding such gender differences could facilitate the development of gender-sensitive policies and programs and could help improve sustainable and more inclusive adaptation strategies.

Keywords: climate change, gendered impact, adaptation, coping strategies, smallholder farm communities, Cameroon, gender
ACKNOWLEDGMENTS

This paper was prepared while the first author was a visiting researcher at IFPRI under the Young Scientist Mentorship Program of the Independent Science and Partnership Council (ISPC)-CGIAR, which is gratefully acknowledged. The authors alone are responsible for the contents of this paper. The International Institute of Tropical Agriculture is acknowledged for providing the opportunity for the researchers to conduct field activities, and students who assisted are acknowledged for their participation in conducting the study and for generating data. Leslie Lipper (executive director, ISPC-CGIAR), in Rome, Italy, and Kate Sang (Heriot-Watt University, Edinburgh, Scotland, School of Management and Linguistics) are acknowledged for their motivation and invaluable insights at the initial phase of the work. All the farmers who participated in the study, the facilitators, and the local leaders who mobilized the communities are acknowledged for their time, availability, and willingness to participate.
1. INTRODUCTION

Climate change has major impacts on the food security and livelihoods of male and female smallholder farmers in Africa south of the Sahara. Their differential roles, as well as their access to and control over resources, agency, and opportunities in society, influence the ways in which they are vulnerable to climate change and their responses to its impacts. The different impacts and responses of men and women also affect their ability to build resilient food systems for their communities. This paper seeks to explore the nexus of climate change, gender, and smallholder agriculture by understanding how men and women in Cameroon’s Southwest region differ in their vulnerabilities to climatic and seasonal changes and in their capacity and strategies to adapt.

The broad objective of this paper is to explore the link among gender, climate change, and smallholder agriculture, focusing on men’s and women’s perceptions of climate and seasonal changes, the effect of such changes on productivity, and the differential vulnerabilities and adaptation strategies of men and women. An in-depth understanding of the gender–climate change nexus would inform practitioners, policy, and development agencies and could consequently lead to a decrease in relative vulnerabilities for men and women. Such an understanding could help create interventions that go beyond adapting to climate change and toward developing food systems that are resilient to climate change, with appropriate gender relations identified and nurtured in the community and agroecological contexts. The specific objectives of this paper are to present a conceptual framework for understanding gender relations in the context of climate change adaptations, leading to resilient food systems; recognize specific socioeconomic factors and activities that have implications for climate-resilient adaptations among men and women; understand differences in the perceptions of men and women regarding climate change and its implications; and study the different adaptation strategies followed by men and women for building climate-resilient food systems.

This paper presents a case study of two forest communities in the Southwest region of Cameroon to understand how climatic and seasonal variations have affected the agricultural activities of men and women and the measures being taken to cope with the changes. It seeks to explain why and how men and
women differ in their vulnerability to and coping strategies for climate change impacts. The rest of the paper is organized as follows: Section 2 presents a brief context and a review of relevant literature. Section 3 presents a conceptual framework that links gender dynamics and climate change adaptation strategies in the context of building resilient food systems among smallholder communities in developing countries. Section 4 applies the conceptual framework to a case study of two forest communities in the Southwest region of Cameroon and presents the details of the study area, methods, and data collected. Section 5 presents the results and discussions. Section 6 presents specific lessons from the case study for program and policy interventions. The concluding remarks form the last section.
2. CONTEXT AND LITERATURE REVIEW

Climate change is considered a major challenge in sustainable development and has affected various countries and peoples differently. Climate impacts and vulnerability are highly context specific, varying from one region to another. They have affected communities, as well as the men and women in those communities, differently (Bryan and Behrman 2013). Although there are several studies and reports on climate change, its impacts, and adaption strategies, the topic of gender and climate change has not received much attention. This is because gender has been engulfed in the general term humans; as such, specific issues on gender are often overlooked. Recently, lobbying by gender advocates and civil organizations has resulted in a positive shift in the climate change discourse (Skinner 2011; Aboud 2011). However, integration of gender into climate change adaptation projects is very minimal as they seem to be tension on what importance is gender (Bryan et al. 2016).

Social issues relating to climate change are increasingly being acknowledged (Mearns and Norton 2010), and the ability of individuals or groups to participate in adaptation and to reduce risk of exposure are socially linked to aspects such as gender, ethnicity, class, religion, and socioeconomic status (Tikjøb and Verner 2010 in Vittoria Pinca 2016; Bryan and Behrman 2013; Kaijser and Kronsell 2014). Hence, there is a need to consider gender and other social aspects in climate change mitigation. According to Rohr (2006), gender aspects are not self-evident; thus, the complexities and uncertainties of climate change projections, coupled with the context specificity of social dynamics and smallholder agriculture, render it even more complex to assess the gendered nature of climate change impacts (Nelson et al. 2002; Pinca 2016). However, gender is increasingly becoming an important aspect in climate change vulnerability assessments, adaptation strategies, and research planning (Lambrou and Nelson 2010; Pinca 2016).

Gender issues are rooted in a society’s culture, worldviews, attitudes, institutional arrangements, and legal and social systems. In most rural societies, there exists gender inequality as women are often expected to take care of household duties often regarded as menial or secondary while men manage family assets, earn money for daily needs and make society’s decisions (Aoyagi, Suda, and Shinada 2011, 6). The
United Nations Framework Convention on Climate Change (UNFCCC), the overarching international framework for addressing climate change, was the first to acknowledge the role of human interference in the climate system and the need to address carbon emissions. Although there is a growing awareness of the inclusion of gender issues in climate change adaptation and mitigation policies and programs (Aoyagi, Suda, and Shinada 2011), women are generally considered as a homogeneous group (Jackson and Pearson 2005). Some scholars, however, have attested to the need to change the way women, especially “third world women,” are treated as a homogeneous group, as these generalizations and stereotypes could result in misleading information (Kapoor 2004; Narayan 2009; Radcliffe 1994; Sandoval 2012). The misunderstanding of women’s needs and priorities, caused by the widely missing differentiation of social categories among women such as age, lineage, status, ethnicity, and class, makes it difficult to adjust new policies to shifting demands. Women and men include people of different social categories, such as age, education, class, ethnicity, and income, who interact with and are connected to each other in each context and over specific issues, including access to and control over resources and information. It is therefore important to ensure that all levels of climate change initiatives consider the interconnectedness of climate change and gender relations.

Within feminist literature, there exist two opposite mainstream opinions on women’s role in climate change. The writings of Leach, Joekes, and Green (1995) and Dankelman (2010) see women mainly as victims of the effects of climate change (for example, deforestation). In this view, women oversee the provision of food and water for the household, but their positive roles as agents of change are often overlooked (Terry 2009). But women are not necessarily helpless victims of climate change; they are actually powerful agents of change (Aoyagi, Suda, and Shinada 2011). When women are viewed as victims, it leads to the assumption that every new agrarian reform would be adopted by women because they have no other choice than to participate in environmental protection. Strategies and projects on climate change mitigation need to engage women in the planning, design, and implementation for positive changes (Dankelman 2010, cited in Aboud 2011; Terry 2009, cited in Aboud, 2011; Leach, Joekes, and Green 1995). Furthermore, greater collaboration between organization and projects is critical paying greater attention to
gender-specific dimensions in their programs (Bryan et al. 2016) to ensure that women are not only viewed as “victims” but also as “changers”.

Ecofeminism (a type of cultural feminism) emphasizes women’s special relationship to the environment and their essential role in managing natural resources. Women are managers and caretakers of natural resources, especially in rural areas (Leach 1994), and they have unique skills and knowledge that can help them develop more effective, sustainable coping strategies to climatic and seasonal changes (UNDP 2012). Their position and responsibilities within the household and the community provides a basis for their significant contribution to livelihood strategies adapted to changing environmental realities. Also, women do have expertise and knowledge that could be used in climate change mitigation and adaptation strategies (UN Women 2008). From this perspective, women have become key actors in natural resource management and occupy important roles in conservation (Leach 1994; Okali 2012), such as tree planting—for example, the Green Belt Movement by Wangari Maathai in Kenya. This assumption of women has been incorporated into policies, programs, and projects (Okali 2012). Several policy approaches make the mistake of picking up some elements of the roles of women instead of regarding all aspects and creating a whole picture of their roles. Furthermore, the ecofeminism school of thought could further enforce gender stereotypes and lead to exploitation of women. Leach (1994) criticized this assumption as it is either not correct or only partly true; it makes it seem that women are seen only as “fixers” of environmental problems, as it is mainly their task to manage natural resources to provide food and fuelwood for the family.

Research has shown that climate change and seasonal variations have affected men and women, especially in agricultural communities, changing their lifestyles and livelihoods (Aoyagi, Suda, and Shinada 2011; Heinrich Boll Foundation 2007; Rohr 2006). Unequal access and ownership rights over productive resources and assets within the communities have further exacerbated the gendered impacts of climate change and on agricultural productivity (Kristjanson et al. 2015). Closing the gender gap in the agriculture–climate change nexus would mean increasing productivity, enhancing food security, and securing health and improved rural livelihoods for male and female smallholder farmers (Jost, Ferdous, and Spicer 2014). Hence, it is necessary to consider gender in climate change adaptation and mitigation strategies because it
shapes how men and women respond, contribute, and adapt to climatic and seasonal variations (Jost, Ferdous, and Spicer 2014; Pinca 2016).

In the context of studying differential adaptations of men and women to climate and seasonal changes, the goal is to work toward a climate-resilient food system among rural communities. Babu and Blom (2014) identified gender relations as a key immediate factor in determining how fast communities can adapt to climate change and how effective they can be in making their food system climate resilient. Gender dynamics have been recognized as a key factor in the adoption of technologies that are considered climate smart; yet, little is known about how to go beyond the adoption of climate-smart agriculture practices to a holistic approach to transform the food system into a climate-resilient one. This paper explores such an approach, using a conceptual framework developed and described in the next section.
3. THE CONCEPTUAL FRAMEWORK

Climate change and its impact on food systems have been observed for a while in Africa south of the Sahara. Understanding the shocks to food systems from climate change, as well as their implications for developing adaptation strategies and building a resilient food system that can withstand future seasonal variations, requires identifying a broad set of factors that can help design interventions (Babu and Blom 2014; Babu 2014). The conceptual framework presented in Figure 3.1 separates three processes of studying climate change implications in relation to gender dynamics and building resilient food systems. In this paper, the framework is considered as a “loose continuum” from the pre-climate to the post-adaptive and the three stages (Babu and Blom 2014) are “indicators of transition” from one stage to another. In the pre–climate change stage, farmers’ traditional practices are identified and studied. In stage two, the period when the climate change impact is realized, farmers’ adaptation strategies are studied; in the third stage, we look at how such adaptive measures could result in resilient food systems. In all three stages, three sets of factors combine to facilitate the transition.

For the purposes of this study, gender relations are a defining factor in all three sets of factors: underlying, intermediate, and immediate. This helps us explore how, at various stages of the process of adaptation to climate change, gender relations and their dynamics can help use better understand the process and further help in developing policies and programs that are gender sensitive and more sustainable in the context of community-level strategies.
Figure 3.1 A framework for building resilient food systems by adapting to climate change

- **Pre-Climate Change Food System**

  - Underlying Factors
    - Policy process/participation
    - External support/donors/budgetary allocation/program implementation
    - Gender relations/culture/custom
    - Internal security/personal freedom
    - Governance/accountability mechanisms
    - Political/legal environment/support

- **STATE I**

- **STATE II**

  - Intermediate Factors
    - Decentralization process
    - Budgetary process: local revenue control
    - Institutional relations: federal, state, and local governments
    - Gender dynamics and institutional reforms
      - Institutional architecture/capacity
      - Research/education extension systems
      - Market institutions/risk reduction insurance mechanisms
      - Local social service networks

- **STATE III**

  - Immediate Factors
    - Farm production system: smallholding focus
    - Household/social protection/transitional support
    - Community/livelihood system/employment
    - Access to knowledge/adoption of innovations
    - Asset building
    - Access to services/primary healthcare/social services
    - Gender relations/mainstreaming
      - Access to land/natural resources management

- **Building Climate-Resilient Food Systems**

  - Sustainability of:
    - Ecological
    - Technological
    - Environmental
    - Natural Resources
    - Institutional
    - Policy Systems

Source: Adapted form Babu and Blom (2014).
In the set of underlying factors, the following elements form the broad basis for developing adaptation strategies moving toward resilient food systems. The policy process, which helps define the policy space and the participation of various actors and players, determines how climate change and resilient food systems appear in the policy agenda, policy design, adoption, implementation, and evaluation. In this process, the effectiveness of implementation also depends on the external support of development partners, combined with the budget allocation for specific programs and interventions. Furthermore, gender relations, tradition, and customs play important roles in the policy process in identifying gender-based constraints. At the macro level, issues related to governance and accountability play an important role in the effectiveness of policy implementation. Finally, issues related to internal security and personal freedom play a major role in the adoption of strategies, as do the political and legal environments that help both men and women play their roles effectively in the adoption of strategies toward resilient food systems.

At the intermediate level, how the decision-making process operates in a country context is important. For example, countries (regional and decentralized governments) with a higher level of autonomy in the budgetary process and local revenue control can be more effective in facilitating the adaptive measures toward climate change. Institutional relations in terms of resource allocation, accountability, and reports at various levels can exert specific pressures to achieve the goals of climate change adaptations and resilience building. At this stage, how institutional reforms help mainstream gender relations becomes important. The capacity and interrelationships of local institutions matter as well. For example, the institutions that provide research and extension services and those that connect farmers to markets and risk-reduction mechanisms can shape the gender relations and their role in climate change adaptation and resilience building.

The nature of farming systems, including land and water resource endowments and other resource constraints, can determine the nature of adaptations to climate change. Further, how communities are organized in terms of their livelihoods, mutual support, social protection, and access to knowledge can also influence gender relations and their differential roles of men and women in adapting to climate change. Such factors could further decide the nature of asset building among communities and access to land and
other natural resources between men and women in all stages of climate change that lead the different levels of resilience of the food systems.

The next section uses the framework from Figure 3.1 to explore gender dynamics and its role in adapting to climate change and building resilient food systems.
This section presents a case study of two forest communities in the Southwest region of Cameroon. According to Molua and Lambi (2014), agriculture and forestry sectors in Cameroon are critical for employment of majority of the population as about 80 percent of the country’s rural poor live and rely on agriculture for their livelihoods. Farmers in Africa south of the Sahara—particularly, smallholders—were vulnerable to chronic food insecurity and poverty even before the recently observed impacts of climate change on farming and food systems. African food systems often depend on unimodal rainfall patterns for producing one crop of a staple food such as maize, millet, or sorghum. Due to low productivity of these crops, arising from inadequate use of modern agricultural inputs such as hybrid seeds and chemical fertilizers, food availability at the household level runs out well before the next season. The smallholder farmers tend to support themselves through the rest of the lean season by performing manual seasonal labor. Such vulnerability has been compounded by the climate changes that these communities have witnessed over the past 10–15 years. Men and women respond differently to these climatic changes and the resulting weather patterns. Yet, it is not fully clear how understanding such gender dynamics toward climate change adaptation among these farming and forest communities can help in the design of gender-sensitive interventions that can contribute to food system resiliency. We explore this further using the case study.

This section begins with a description of the study area, the methods adopted to collect data, and the data used for the analysis.

**Methods**

**Location of the Study Site**

The study was conducted in the forest communities around Mount Cameroon National Park in the Southwest region of Cameroon. The park is located in the Fako and Meme divisions between 4.055°–4.378°N and 9.031°–9.294°E; it covers an area of 58,178 ha and shares external boundaries of 128.73 km with five towns (Buea, Limbe, Muyuka, Idenao, and Mbonge). This region is one of Cameroon’s biodiversity hot spots, with a diverse ecosystem consisting of rich fauna and flora. However, uncontrolled
land acquisition, large-scale agroforestry, illegal timber and nontimber forest product (NTFP) exploitation, poaching, and wildfires, coupled with unpredictable climatic and seasonal changes, have negatively affected the area. The rich, fertile soil has attracted the creation of agro-industrial plantations and the influx of foreigners, which has greatly altered the social system, resulting in changing gender roles in the surrounding communities.

**Figure 4.1 Location of case study communities (large blue circle) in the Southwest region of Cameroon**

The selected communities are located near a national park area surrounded by 41 communities divided into four clusters: Buea (13 villages), Bomboko (12 villages), Muyuka (9 villages), and the West Coast (7 villages). The entire region has a population of about 450,000 people whose livelihoods are largely dependent on resources from the national park and local environments. The indigenes, such as Bomboko, Bakweri, Balong, Isibu, and Wovea (Laird et al. 2011), are dominant in the small villages, which are usually closer to the park; the larger settlements comprise nonindigenes such as Cameroonians from other
regions, Nigerians, and Ghanaians (Ardener 1996; Laird et al. 2011). It is a highly heterogeneous population that relies on farming as the main source of livelihood, accounting for about 80 percent of the income in most villages. Farm sizes range from 0.25 ha to more than 10.00 ha, and the main cash crops cultivated include cocoa, plantains, cocoyams, and cassava. According to Akombi (2011), cocoa and cassava are the most important cash crops for men and women respectively in the Bombo and Muyuka cluster. These communities are patriarchal in nature, with norms and customs such as land inheritance favoring men, as they are considered to be the breadwinners of the family.

Sampling and Data Collection

The Study Team
Enumerators were selected and trained on a standard data collection protocol that was used in all of the study communities. In each of the communities were two enumerators. The enumerators were chosen based on their experience with qualitative research and that they were conversant with the research sites and could speak and understand pidgin English, which was used in data collection. Four enumerators (male and female) participated in the study after completing three days of training on the tools developed for the study. A pretest was conducted and a restitution meeting organized to ensure that enumerators had a similar understanding of the questions and posed questions in a similar manner to ensure that authentic information was collected.

Sampling and Selection of Study Sites
Preliminary field visits were conducted to identify the researched communities, gain knowledge on the sociocultural and biophysical aspects of the communities, and build trust within the local population for the subsequent study. Purposive sampling was used to select the communities based on their proximity to and interaction with the national park, their ethnic diversity, and their extensive dependence on agricultural activities and use of forest resources for their livelihoods. Four communities (Bova Bombo, Njonji, Mapanja, and Munyenge) across the four clusters were selected for the study. The study was conducted in between 2014 and 2015. Gaps in the data were collected in early 2016. The inhabitants of these communities have been using the forest around the national park for a long time and are conversant with the changes
taking place within and around the forest. They are largely dependent on the forest and surroundings for income generation and food security. These communities were selected to give a wide variability on climate change impacts and vulnerability.

**Data Collection Techniques**
Results of this study are based on multiple qualitative methods. Qualitative methods are ideal for this study as it provides depth and details on climate change issues also allows respondents to share their experiences and expand on their responses which could open up new topics. It is appropriate for the study due to their characteristics of openness and flexibility appropriate for the study (Fossey et al. 2002). Data were generated from different participatory tools, such as focus group discussions (FGDs), key informant and in-depth interviews using semi-structured questionnaires, observations, and informal talks. Enumerators conducted 6 FGDs and 26 in-depth interviews in four rural communities in Cameroon’s Southwest region; questions focused on the perceptions and responses of men and women to climatic and seasonal variability and their strategies for maintaining resilience. A greater part of the data was collected through open guideline interviews and conversations supplemented by direct observation. FGDs were organized between men and women separately; trained enumerators conversant in the local language asked open-ended questions to explore perceptions on climate change; its impact on farming practices, land tenure systems, and household access; and control over productive assets and adaptation strategies to the changes. This allowed for participants’ freedom of expression during discussions and gave room for the disadvantaged and women to express their views on especially sensitive topics, such as land rights and access and control over household assets and resources. Mixed-group discussions in this patrilineal society might have resulted in missing information or misinformation from either sex. Key informants were identified during FDGs for subsequent in-depth interviews based on their likelihood to be knowledgeable about the requested information, having farming experience with climatic and seasonal changes over the years, and being able to present information in an unbiased manner. A total of 26 key informants were interviewed in the four research communities. These key informants included community leaders, important male and female farmers, extension officers, and government officials. They were asked open-ended
questions so that they could express their views freely. Direct observation enabled the triangulation of information obtained during FGDs and the in-depth key informant interviews.

A wide range of participatory rural appraisal techniques included ranking and scoring, proportional piling, transect walks, historic time lines, and direct observation. During FGDs, the historical time lines of the different communities were developed, and piling and ranking of certain activities were conducted with interviewees. The historical time lines were used to provide facts and information about key events related to climate and seasonal changes and shocks over a period in the studied communities (see Figure 4.2). This was done for male and female groups separately.

**Figure 4.2 Historical time line of climatic and seasonal changes in Njonji from a female focus group discussion**

![Historical time line of climatic and seasonal changes](image)

During group discussions, interviewees listed the different shocks experienced in the past 10 years; they then ranked each shock in relation to the severity of its impact on households. The interviewees used piles of stones to provide weights indicating how long the impact from the shock was felt by households and the community. This ranking was usually through a consensus, as members of the group would sometimes have different opinions, leading to heated discussions and debates. In the end, however, all
members of the group would come to a consensus. “Why” and “how” questions were asked throughout the process, such as why certain events were ranked higher or lower than the others. Further probing and reiterative analysis led interviewees to map out community resources and important events and how they have changed over time. Probing questions were related to resources found in a community and where they could be found, the perceptions of respondents on changes occurring in the community, the shocks they have experienced, and how this has affected their livelihoods. Transect walks were used to triangulate information obtained during group discussions, which led to the establishment of a community map (see Figure 4.3). The use of several techniques allowed for the emergence of patterns and reasons for specific patterns. The selected qualitative methods were suited to the study, as they showed the interactions among interviewees, as well as the interconnectedness and integration of the different groups in the community, thus enhancing the representativeness of the results.

Figure 4.3 Transect walk map of Njonji with community resources
Information from group discussions, interviews, and direct observations were systematically documented and analyzed qualitatively. Information recorded during FGDs and key informant interviews, including field notes, were transcribed, translated, and analyzed using a content analysis approach (Berg, 2009). This step involved developing ideas about the information into different categories to look for patterns based on the meaning they seem to convey.
5. RESULTS AND DISCUSSION

The results of the study are discussed here in three sections. First, we describe the socioeconomic activities of the communities studied. This is followed by the perceptions about climate change and its impact on the livelihoods of communities. Finally, we present the adaptation strategies followed by the farming communities in terms of their differentiation between men and women and the lessons drawn for climate-resilient food systems.

Socioeconomic Characteristics and Activities in the Study Communities

Characteristics of the communities, such as socioeconomic, institutional, cultural, and educational factors, had an influence on the different perceptions or knowledge of respondents to climate-induced hazards. These characteristics include age, marital status, land size, occupation, access to information, location, and education of the respondents. For instance, the educational level does not only shape how farmers perceive the hazards resulting from climatic and seasonal changes but can also influence their responsiveness to such changes. A more educated farmer uses the media and other channels to access information on climate issues, whereas an uneducated farmer may not. In all the study communities, about 73 percent of the respondents have some form of formal education (42 percent at the primary level and 31 percent with secondary education). Informal education registered (25 percent) made up of mostly women due to early marriages, unwanted pregnancies, and traditional norms of a preference for males to preserve the family lineage and inheritance. In general, male respondents recorded higher in formal education (65 percent) compared with women (35 percent). In this study, the educational level of the male and female respondents is important, as it affects the individual’s ability to use information technologies to gain more knowledge on climatic issues, which in turn influences perception.

According to information on socioeconomic characteristics from the study communities, respondents obtained income from both agricultural and nonagricultural activities and income sources. Similar studies on forest conservation and community participation in wildlife management around Mount Cameroon indicated that more than 80 percent of the population relies on agriculture for food security and
income (Akombi 2011; Akumsi 2003). Major sources of income in the study communities include harvesting of NTFPs, sale of food crops from fields, livestock, petty businesses, hunting, logging, and working in nearby plantations for wages. The presence of large plantations in the area has led to the migration of mostly male members of households for paid wages. Similar to the findings of Oka (2000), female de facto households in which husbands work in the nearby PAMOL Plantation (as occurs in Njonji) have the greatest income from remittances and income from off-farm activities. Poverty and vulnerability are intertwined in these communities, as income or financial means determine each household’s adaptive capacity. In the study communities, households with high income and more diversified income sources were found to have better adaptive capacities to climate change compared with those with restrained income opportunities.

Results from the study show that factors such as religion and gender have the ability to shape the farmers’ mind-set regarding climate change. Three types of religious practices exist in these communities: Christianity, Islam, and African traditional religion. Each is a tool for social networking and connectedness. Members of a specific religious group adhere to certain rules and norms that influence their decision making and judgments. Although religion can be restrictive to development by excluding other stakeholders, it can also improve the efficiency of economic relations through mutual trust and obligations (Modumbi 2011). Hence, an understanding of the different religious groups and other social groups in the communities is useful in the spread of information related to the adoption of innovations and adaptations to climate change.

Institutional characteristics, such as access to extension and rural advisory services, were identified as a major indicator of adoption of innovation toward climate change and resilience building in communities. Access to extension rural advisory services is vital for climate change adaption and mitigation, as it provides farmers with information on weather data, new technology, and adaptation strategies, among others. The national government provides each district with an extension officer who sensitizes and provides up-to-date information on agricultural-related issues to farmers, although the coverage is not adequate. Access to extension is a function of farmers’ awareness and sensitization to the development and use of technologies (Modumbi 2011). However, the differential roles and responsibilities
of men and women in the community relating to social and economic activities and power relations make it difficult for certain individuals to benefit from extension services. For instance, due to their multiple roles at the farm and household levels, women rarely participate in extension meetings due to limited time. This contributes to the difference in their understanding of climate change implications on their farming and food systems. Furthermore, the location and timing of meetings are unfavorable, especially to women in the study communities, as they would have to travel long distances to attend extension meetings. According to Ngigi (2009), inadequate integration of gender issues in development projects would compromise their sustainability and differential access to extension services by men and women; overcoming this inadequacy is paramount in developing coping strategies that can be adopted by both men and women within households.

Table 5.1 Summary of the gender dynamics in the pre-, adaptive, and resilient stages of climate change: Socioeconomic characteristics and activities

<table>
<thead>
<tr>
<th>Socioeconomic activities of the communities</th>
<th>Pre–climate change stage</th>
<th>During climate change—adaptive stage</th>
<th>Postadaptive—resilient stage</th>
<th>Remarks for the programmatic and policy interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education levels of men and women</td>
<td>Men and women are engaged in subsistence farming.</td>
<td>Subsistence farming (women mainly cultivate food crops, and men mainly cultivate cash crops such as cocoa.)</td>
<td>Subsistence farming using highly improved varieties with short maturation period</td>
<td>Provision of training to male and female farmers on the production and management of hybrid varieties</td>
</tr>
<tr>
<td>Cropping activities of men and women</td>
<td>Hunting is dominated by men.</td>
<td>Limited or traditional hunting and harvesting of forest resources</td>
<td>Restricted hunting and extraction of forest products and logging</td>
<td>Government development of policies restricting hunting and extraction of timber from the forest</td>
</tr>
<tr>
<td>Livelihood diversification and income sources</td>
<td>Women fish for crabs and lobsters in rivers and streams.</td>
<td>Limited domestication of animals</td>
<td>Diversification of livelihoods, such as petty businesses</td>
<td></td>
</tr>
<tr>
<td>Substance vs. market orientation</td>
<td>Men and women extract nontimber forest products.</td>
<td>Fishing of crabs and lobsters in rivers and streams</td>
<td>Large-scale livestock rearing for income generation</td>
<td></td>
</tr>
<tr>
<td>Religious and social networks</td>
<td>Petty businesses by men and women offer an additional livelihood.</td>
<td>Petty businesses</td>
<td>Movement out of the village to sell produce from the farm in local and regional markets</td>
<td></td>
</tr>
<tr>
<td>Institutional factors</td>
<td>Animal husbandry and livestock production by men and women</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential roles and integration of gender issues</td>
<td>Logging forest trees mostly by men</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ compilation.
Table 5.1 summarizes the findings of the case study from the perspectives of pre-, during, and post-climate change scenarios as described in the conceptual framework presented in Section 2. The results from the in-depth discussions also reveal ideas and options from the study communities on how gender dynamics can be shaped such that the farming households could go beyond adoption of climate smart practices to build a climate change–resilient food system.

Findings from the study related to socioeconomic characteristics and activities (Table 5.1) reveal that men and women have differential roles and power relations relating to access to and control over productive resources and services. Both men and women are engaged in different agricultural and nonagricultural activities, such as subsistence farming, hunting, fishing, petty trading, animal rearing, and logging, among others. These roles have changed as a result of climatic and seasonal changes as the farmers seek to cope with the effects of the changes. To adapt to the adverse conditions, farmers are opting for new ways of managing their farms; they are also engaged in off-farm activities and diversification of income sources. Further, social institutions, such as local associations and religious groups, help with networking and exchange of agricultural-related information as an addition to the usual objective of the institutions. Access to extension services and provision of training and information by private organizations has fostered adoption and resilience building for men and women in the communities.

**Perception of Climate Change and Its Impact on Rural Livelihoods**

According to Wehbe et al. (2006), perceptions of climate change and its implications on livelihood is a key factor in determining how smallholder farmers think and behave in response to climatic and seasonal variations. Legesse and Drake (2005) argued that a single theory is not sufficient to understand the complex nature of rural life, which varies with the socioeconomic, cultural, gender, historical, and environmental context. Hence, an assessment of the perception of climate-induced hazards is vital to understand the nature of risk and the underlying and associated consequences. An understanding of the vulnerability context and other extremes could help develop and reinforce adaptation measures that are resilient to future changes in the climate and weather patterns (O’Brien et al. 2006). It is in this context that this section seeks to
understand the perceptions and impacts of climate change on smallholder farmers in the communities of
the Mount Cameroon area.

To gain more knowledge on how villagers perceived changes in climate, a range of questions about
the fundamentals of agriculture were asked. Questions raised such issues as changes in rainfall, different
ripening times of fruits, increases or diseases on plants, and irregular rainfall. Results show that the rural
farmers had limited knowledge on the concept of climate change. Many asserted that some changes resulted
from climatic and seasonal variations, but none of them were sure. Some attributed the changes to
witchcraft, and others to punishment from the gods for disobedience. Farmers’ existing knowledge of
climatic changes included streams drying up, changes in the usual seasons, increased occurrence of diseases
and pests, and decreases in the amount of animal source for food (such as fishes), among others.

In the forest communities, there was no difference in the perceptions of men and women on climate
change and seasonal variability. However, there was a general assertion that there has been a change in
weather and seasons. Both male and female respondents attested to the fact that their communities have
seen a remarkable change in precipitation and temperature. They have seen a rise in temperature and
irregular occurrences of rainfall (such as a decrease in the amount of rainfall and a shorter duration of the
rainy season). In the study communities, more than two distinct seasons (rainy and dry season) which had
existed is changing in the past 10 years with unexpected rains and drought, and this has affected crop
production and yields. Seasons are shifting, and rainy months are changing, and this has affected crop
yields. Seasons are shifting, and rainy months are changing, making planting and harvesting periods
unpredictable. Sporadic rains characterized by frequent floods have resulted in the destruction of soil and
crops. Furthermore, the constant shift in seasons makes it difficult to know when to plant and when to
harvest, resulting in low yields.
Box 5.1 Female farmer, Njonji village

“I grew up in this village [Njonji] and has been working with my mother on the farm until I got married and has continued working. Every year, I notice changes in the time and duration of especially the rainy season. The rain does not only start late, but it is irregular rainfall, destroying our crops. Unlike in the past, when we plant crops in early March, now we wait even into mid-March and early April, because even if it rains in late February, it might rain once and only rain again in March. This inconsistency makes it difficult, because if we plant early, then the sun will destroy our crops. When these changes keep occurring, it does not only affect yields, but we have also started witnessing some diseases attacking our crops that never used to exist in this community. This has been happening for some years now, and we don’t know what is wrong. Maybe we have wronged the gods of the mountain [Mount Cameroon National Park], and they are angry and want to punish us.”

A precipitation characterized by irregular rainfall, shifting rainy and dry seasons, a decrease in rainfall, and uncertainty about the intensity of rainfall was acknowledged by all respondents in all communities studied. However, all farmers interviewed, irrespective of sex, indicated that a general change in weather has negatively affected crop yields, food security, and income, though some respondents were uncertain about the cause of the changes. Respondents acknowledged that changes in weather and seasons have affected their crops and disrupted production cycles, leading to a general decrease in crop production, livestock, forest products, and fishing. The rise in temperature has led to a change in ripening seasons—in particular, fruits tend to ripen faster than in the past. In addition, the harsh, dry temperatures cause stunting of crops such as cassava and cause the leaves of plants (especially vegetables) to dry up. Female respondents in particular, noted that some crops die before maturity because of the sun’s high intensity. Increase in incidences of disease and pests on crops has led to reduction in quality and yields of some crop species, such as colocasia and cassava, in the study area. Flooded areas and rising sea levels have also affected some quarters in Njonji community, leading to the abandonment of fields and settlements to relocate to other quarters and nearby villages. In addition, stagnant water from floods is a breeding ground for mosquitoes, leading to increases in diseases such as malaria.
Excessive harvests of forest products and felling of trees for fuelwood and construction, coupled with logging activities by indigenes and foreigners, has led to negative impacts on communities. According to some respondents, uncontrolled logging activities and encroachment into the forests have exposed the topsoil to floods and drought, leading to diminished forest products and low yields. Rivers dry up faster, and fodder for livestock has become scarce. These changes, resulting from human activities and natural disasters, were felt by men and women differently, because men and women attach different values to various livelihood activities. Whereas men indicated that the effect was greatly felt on livestock (inadequate fodder for goats and cattle) and cocoa fields, women felt it most at the household level—for example, having to travel longer distances to fetch wood and water.

In Bova Bomboko, many streams and rivers (such as Musoke, which in the 1960s and 1970s would overflow its boundaries) have dried up. Both communities acknowledged that a reduction in forest resources is mainly due to human activities, such as hunting, logging, and large-scale cocoa plantations. Forest vegetation, which provided shade to streams and protected crops, has been destroyed; as a result, crops are exposed to the sun more and are easily washed away by torrential rains and floods. Unlike in the past, rampant occurrences of these natural disasters have led to destruction of crops and even houses, rendering some people homeless. These events affect women more, as they have an increased social responsibility to care for children and the elderly in the communities.

Respondents stated that they have witnessed an increase in diseases affecting their crops over the years. Diseases mentioned included panama disease on cocoyam, black pod disease on cocoa, insects eating up plantains and cocoyam leaves, and cassava green mites. Farmers have attributed the early ripening of fruits and the increase in rotting of tuber crops (cassava) and black pods (cocoa) to seasonal changes; these occurrences have resulted in low-quality, poor yields.

The different roles of men and women in society make their vulnerability to climatic and seasonal changes differ. Understanding the differences in gender roles and relations is vital for responding to the differences in climate change impact and vulnerability. Men and women are affected by climate and seasonal changes differently, largely due to the differential social, economic, and cultural norms.
underpinned by unequal social relations in the society. Also, worth noting are the differences among different groups, ages, and social status found within the communities; these differences may require specific interventions. In the research communities, women are more vulnerable to climate change impacts compared with their male counterparts. In addition to restriction from resources such as land, women bear the brunt of household chores as they trek long distances in search of already-scarce resources, such as fuelwood and water to care for their families.

**Box 5.2 Female farmer, Bova Bomboko community**

“We are greatly affected by the long dry seasons with sporadic rains, as we are bound to move long distances to fetch water. All our streams are dried up. Unlike in the past, where we had streams all over even 10 minutes away from here. We now trek for over 45 minutes just to fetch water, and the same thing is happening with fuelwood. This has greatly increased our [women] burden, as we have to ensure that there is drinking water at home, water to clean the children, cook and wash clothes. We hardly have anytime for relaxation after farm work. An organization provided us with a borehole some years ago, but since we do not drink water from the ground, we still move to streams to fetch water for drinking. However, the borehole helps as we can now wash dresses in the village.”

As observed by Aoyagi, Suda, and Shinada (2011, 11), women are generally more vulnerable to climate change impacts because “they are in a more vulnerable economic, institutional and political situation, which not only applies to the damage but also the recovery process.” Because of their social roles, women are more affected by climate and seasonal changes in the research communities. Moreover, limited access to resources such as land, insecure land rights, and the resulting lack of collateral make women poorer and more vulnerable than men. Studies from World Bank (2011), FAO (2011), WHO (2011), and IPCC (2007) reveal that women do not have easy access to adequate funds to handle weather-related loss. Furthermore, women have restricted access to land, social capital, technologies, and financial services, making it difficult for them to cope with the increasing changes. A study conducted in Burkina Faso and Congo by UNDP (2012), showed that the proportion of women by affected crop changes resulting from climate change range from 48 percent in Burkina Faso to 73 percent in Congo.
Climatic and seasonal changes accentuated the burden of members of the study communities; this is especially true for women, as they already face issues of gender disparities regarding access to, use of, and control over land and other productive resources. Barriers to women’s access to and control over land are embedded in traditional customary laws and discriminatory cultural practices at the community level, where men are regarded as heads of households and with land inheritance favoring the male. The studied communities are patrilineal, meaning that the majority of women are dependent on husbands or other male family members for farmland or other productive assets. Thus, women are engaged mainly in the production of food crops with a short maturation period, as decisions on the sale of farmland is at the discretion of their husbands. For instance, women are hesitant to cultivate perennial crops such as cocoa as it requires several years before first harvest and the family or husband might want to use the piece of land for other purposes or sale resulting to destruction of their crops. Women prefer to cultivate especially perennial crops in their own purchased land. In a similar study in Ghana, women have restricted access to productive land, other resources, and property rights and are often described as “victims of gender-biased social systems.” The burden of additional household tasks further gives women little time for training or leisure activities as compared with men (Aoygi, Suda, and Shinada 2011).

Furthermore, in Cameroon, the creation of the national park led to the dispossessing of the local communities of their customary land, which has significantly affected their incomes and livelihoods (Kümpel et al. 2010). This further frustrates the communities, adding more of a burden on women, especially because no compensatory or alternative sources of income have been made available. Thus, many farms are now situated in the park’s buffer zone; future development of the park is bleak, as the already impoverished population has little or no choice but to violate park management and embark on increased poaching and encroachment of farming activities.
Box 5.3 Female farmer, Munyenge

“The main piece of land I am working on belongs to my husband; the little he now has after the creation of the park led to seizure of part of our land. It is family land that he inherited from his father. I cannot cultivate crops such as cocoa that takes several years to mature because he could decide to sell it. I do not pray for trouble, but I know that especially if the family is faced with difficulties, he will prefer to sell the land where I am working on than his cocoa farm. I prefer to plant crops such as tomatoes, beans, cassava, cocoyams as they have a short maturation period. More so, planting these types of crops helps me to provide food for my family and sell surplus. I equally have a small piece of land which I bought last year. I am thinking of cultivating cocoa on it as cocoa, though seasonal, brings in large sums of money.”

Table 5.2 Summary of the gender dynamics in the pre-, adaptive, and resilient stages of climate change: Perceptions

<table>
<thead>
<tr>
<th>Perceptions of climate change</th>
<th>Pre–climate change stage</th>
<th>During climate change—adaptive stage</th>
<th>Postadaptive—resilient stage</th>
<th>Remarks for the programmatic and policy interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High temperatures and precipitation</td>
<td>Regular rainfall with normal temperatures and precipitation</td>
<td>Cultivation of crops at riverbanks and catchment areas</td>
<td>Introduction of irrigation</td>
<td>Revise water policy to preserve water in the communities by prohibiting farming around riverbanks and catchment areas</td>
</tr>
<tr>
<td>Changes in seasons and weather (irregular rainfall)</td>
<td>Less occurrence of pests and diseases on crops</td>
<td>Use of insecticides and pesticides due to increased occurrence of pests and disease on crops</td>
<td>Availability of affordable insecticides and pesticides</td>
<td>Training farmers on the use of pesticides and insecticides</td>
</tr>
<tr>
<td>Changes in planting and harvesting seasons</td>
<td>Regular planting and harvesting periods</td>
<td>Mulching of crops to preserve moisture</td>
<td>Training on new technologies to improve and increase production</td>
<td>Sensitizing farmers to negative customs and tradition</td>
</tr>
<tr>
<td>Increased occurrence of pests and diseases</td>
<td>Availability of streams near homesteads</td>
<td>Planting based on weather forecasts</td>
<td>Educating of farmers on climate change and its effects to prevent myths and traditional beliefs related to climate change effects</td>
<td></td>
</tr>
<tr>
<td>Quick ripening periods of fruits</td>
<td></td>
<td>Mixed cropping for soil fertility using leguminous plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drying up of streams</td>
<td></td>
<td>Change of seasonal cropping calendar and crop choice (improved and high-yielding varieties)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Witchcraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punishment for disobedience by the gods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ compilation.
Table 5.2 summarizes the findings on perceptions for pre-, during, and post–climate change scenarios as described in the conceptual framework presented in Section 2. The results presented in this table, obtained from the in-depth discussions, revealed ideas and options from the study communities about how gender dynamics can be shaped so that the farming households could go beyond adoption of climate-smart practices to build a food system resilient to climate change.

Perceptions of climate change are generally negative and include mainly climatic and social perceptions, such as changes in temperatures and precipitation, increased occurrence of crop pest and diseases, and fast ripening periods. Climatic and weather changes are also attributed to witchcraft and punishment from the gods. Educating and training both male and female farmers—and even the youth—on the consequences of climate change and new technologies would help eliminate myths and traditional beliefs related to climate change impact and boost production in the communities. A change in water policy would also help preserve the few streams remaining in the communities, thus lessening the burden of women and children, who must trek long distances to fetch water for the household.

**Adaptation Strategies and Building Resilient Food Systems**

Adaptation to climate variation is the action taken to help communities and ecosystems moderate, cope with, or take advantage of actual or expected changes in climatic conditions (Magadza 2000). This adaptation could be done by modifying traditional practices or by taking new approaches; the various adaptation measures could be private, public, autonomous, or planned. Adaptation can take place at both the farm level and the national level. For the purposes of this paper, adaption measures are considered at the farm level for men and women for such crop production activities as dry planting, early planting, use of drought-tolerant seeds, livelihood diversification, diversification of crops, mulching, water storage, and natural barriers, among others. Collectively, these activities, when adopted at the food system level, can lead to improved resilience.
In the study communities, we found gendered coping and adaptation strategies to climate or seasonal changes related to men or women; these differential strategies resulted from the economic, social, and cultural roles in society. Male and female farmers are both affected by climatic variations; as noted by Tingem and Rivington (2008), both use mainly traditional or indigenous knowledge in different ways to cope with climatic hazards based upon interpretation of natural phenomena. In general, the strategies used include change of crop choice to drought-resistant varieties, change of seasonal cropping calendars (planting periods) based on forecasts, and livelihood diversification. Many farmers acknowledged changing their cropping patterns as they replaced local varieties with improved high-yielding or disease-resistant cultivars. Women especially attested to adopting improved crop varieties with a short maturation period to meet family needs. Furthermore, farmers are changing their farming and cropping patterns by engaging in the production of several crops, with some farmers using techniques such as terracing and mulching to preserve their crops. Others have resorted to cultivating near watersheds crops such as tomatoes.

Agricultural extension and rural services are critical for climate change resilience as they provide information to male and female farmers alike. As noted by Ragasa (2012), access to agricultural extension information for women is lower compared with men in rural communities. In a changing climate, agricultural and climate information are important for agricultural development and food security; in addition, weather forecasts over different timeframes with a choice of new options for farm management can support farmers as they adapt to climate change and make efficient use of inputs (Tall et al. 2014a; Huyer et al. 2015). Male and female farmers in the four community clusters have adopted new techniques of breeding hybrids with help from extension services and development organizations. While women are more engaged in new crop varieties such as cassava, men are interested in improved cocoa varieties. Farmers in these communities are adopting new cassava varieties introduced by the International Institute of Tropical Agriculture (IITA); these varieties are notable for their short maturation period and high yields as compared with the local variety. In relation to cocoa production, farmers (who are mostly male) have resorted to the use of insecticides and pesticides to destroy pests and boost yields. Although extension officers are present in both communities, there is a need for additional, targeted services, as not all farmers
are benefiting from their services. For example, fewer women than men tend to attend community meetings and visit demonstration plots, as women have limited access to communication services (radio, mobile phones) and have different forms of information access, such as women’s social groups and marketplaces.

Irregular rainfall coupled with high temperatures has resulted in a reduction in yields and an increase in diseases; these changes have affected the level of food intake in households. Given that in all the four communities, women are responsible for providing food for the home, many have attempted several ways to improve the soil. Women in the communities have applied ash after planting such crops as cocoyams, maize, yams, and potatoes in an attempt to protect crops from diseases. They also used compost manure and chemical inputs to help improve the soil. Women also tend to do mix cropping—for example, they plant perennial crops such as cassava with leguminous crops such as beans, sweet potatoes, and pumpkins—with the notion of enriching the soil with leaves from leguminous crops. Unlike men, who use more advanced skills, especially in cocoa production, acquired from farmer field schools, women tend to use more indigenous knowledge. Because women plant different types of crop varieties, they would need different management methods to thrive given the climatic and seasonal changes.

Men and women in the communities studied are connected to the environment, as it is the main source of their livelihoods. Farming and NTFP collection are the main activities of the farmers (men and women) for food and income. Unlike the ecofeminist approach, which postulates that women have a stronger affinity with nature than the more culture-associated men (Ortner 1974), men and women in these communities, though engaged in different activities, are both highly dependent on the forest and its resources. According to ecofeminists, women are seen as being closer to nature because of their function and their social role of providing food for the family. This, however, is not the case within the communities under study. In these communities, irrespective of sex, specific knowledge is transferred from one generation to the next regarding the daily interactions on specific issues related to the environment. Both male and female farmers in both communities had knowledge about the use of natural products, such as cola nuts, to ease digestion and of special leaves and herbs as medication against certain illnesses.
In the research communities, men and women are opting for alternative income-generation activities in order to cope with climate and seasonal changes. Men in particular are finding work as laborers on palm plantations or have moved to nearby cities in search of jobs, while women are mainly engaged in petty businesses within the communities or are taking jobs such as seamstresses, restaurant workers, hairdressers, and so on. The movement of men out of the community has led to a shift in power relations; many women have now attested to making decisions in the absence of their husbands. Although farmers showed changes in livestock production, the priority was in crop production and other income-generating activities; this is likely because there are more accessible markets for crops than for livestock.

### Table 5.3 Summary of the gender dynamics in the pre-, adaptive, and resilient stages of climate change: Adaptive strategies and building resilience

<table>
<thead>
<tr>
<th>Adaptive strategies and building resilience</th>
<th>Pre–climate change stage</th>
<th>During climate change—adaptive stage</th>
<th>Post-adaptive—resilient stage</th>
<th>Remarks for the programmatic and policy interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Changes in seasonal cropping patterns and crop and planting location</td>
<td>• Limited need to change to new crops or new crop varieties</td>
<td>• Changes in cropping patterns (mulching, cultivating near catchment areas, and so on)</td>
<td>• Increased availability of improved and disease-resistant crop varieties</td>
<td>• Training of male and female farmers on new breeding technologies</td>
</tr>
<tr>
<td>• Adoption of improved and high-yielding varieties</td>
<td>• Extensive cultivation, relying mostly on areas near the villages and communities</td>
<td>• Adopting high-yielding varieties of crops with short maturation period</td>
<td>• Introduction of varieties that are stress and disease tolerant</td>
<td>• Training in soil fertility management</td>
</tr>
<tr>
<td>• Implementation of knowledge gained from training, workshops, and social networking</td>
<td>• Traditional varieties that are moderately resistant to stresses and diseases</td>
<td>• Learning new methods of breeding hybrids</td>
<td>• Introduction of soil fertility management practices</td>
<td>• Provision of credits and/or options for livelihood diversification (livestock)</td>
</tr>
<tr>
<td>• Diversification of livelihood options</td>
<td>• No soil nutrient management</td>
<td>• Use of insecticide and pesticide (cocoa)</td>
<td>• Creation of alternative sources of income and livelihood diversification options</td>
<td>• Subsidizing male and female farmers for large-scale production</td>
</tr>
<tr>
<td>• Employment in nearby plantations and companies for wages</td>
<td>• Limited livelihood diversification</td>
<td>• Soil improvement (application of wood ash and mixed cropping with leguminous plants)</td>
<td>• Large livestock accessible to all types of households and to both male and female farmers</td>
<td>• Training of male and female farmers on new breeding technologies</td>
</tr>
<tr>
<td></td>
<td>• Livestock limited to rich households</td>
<td>• Livelihood diversification</td>
<td>• Availability of wage labor always</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wage labor seeking only in lean periods of food availability</td>
<td>• Livestock production</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Change of crop choice</td>
<td>• Wage labor in plantations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Change of seasonal cropping calendar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ compilation.
Table 5.3 summarizes the findings in relation to adaptive strategies based on the case study from the perspectives of pre-, during, and post–climate change scenarios as described in the conceptual framework presented in Section 2. The results from the in-depth discussions also revealed ideas and options for how gender dynamics can be shaped so that farming households could go beyond adoption of climate-smart practices to build climate–resilient food systems.

An understanding of the different cropping choices and patterns and the different roles of male and female farmers in the study communities will inform extension services and private organizations on efficient, targeted interventions and policy changes that could lead to substantiality and resilience. For instance, men rank cocoa as a first-choice crop, while women ranked cassava first. These two crops require different management techniques and different inputs. Hence, an understanding of the differential roles and activities for men and women would require different ways of intervention for resilience.
Gender roles, relations, and norms have a bearing on the susceptibility of people to different climatic and seasonal changes, thereby affecting their livelihoods and well-being. Such climatic changes have an impact on socioeconomic lifestyles, leading to differential vulnerabilities and needs. Gender differential roles also affect men’s and women’s access to and uptake of services and interventions. Hence, there is a greater need for an in-depth understanding of these differences to achieve effective and targeted intervention.

**Lesson 1: Recognition of Gender in Policy Processes and Programming for Climate Change Resilience**

Owing to the gaps identified in the studied communities, programs seeking to respond to climate impacts need to understand gender differences in terms of access to and control over resources such as training, land, and assets. Such policies should develop targeted interventions for the different groups appropriately. An understanding of the differences would be reflected in the procedures, guidelines, and training manuals. Programs should ensure the inclusion of women and should take into consideration the timing and location of meetings; they should also address the needs and interests of both men and women.

Policies that ignore gender norms, roles, and relations often reinforce gender-based discriminations, because they do not take into consideration the differential opportunities and resource allocation in communities. For instance, the Cameroon forestry policy of 1994, which calls for the direct participation of communities in forest management, considered the community as a homogeneous entity, neglecting the patriarchal nature and inequalities in power relations existing in the communities. This fact, coupled with other shortcomings, resulted in a policy with little success. For policy makers to reduce gender-based inequities, they must provide equal opportunities and chances for men and women to access and control social, economic, and political resources—for example, equal access to training, services, and inputs. Thus, policies and programs should consider the differential needs, preferences, and interests of men and women in the design of policies and regulations.
Climate-related policy processes and approaches should move beyond representation to establish mechanisms that promote a woman’s agency, that is the ability for women to make effective choices and transform them into desired outcomes. This could be by providing room for freedom of expression during of women meetings and their ability to take the initiative and influence agricultural- and climate-related decisions in the community. Furthermore, water and forest policies should be revised and community by-laws established regarding the harvesting of forest resources (such as the felling of trees and farming activities at riverbanks or catchment areas) to reduce the impact of climate change. Such a policy should facilitate and govern water use so that communities can access water easily and in a responsible way, without destroying the source.

Lesson 2: Institutional Reforms for Climate Change Resilience
The Cameroon government is aware of and recognizes the importance of including gender aspects in policy and intervention; in fact, it has created the Ministry of Women’s Empowerment and the Family. However, the activities are largely centralized, and many institutions at the grassroots level are not aware of or hardly consider gender aspects in their activities. Other ministries do not have specific departments to ensure that gender aspects are mainstreamed in their activities.

Further, there is a misunderstanding of the concept of gender, especially at the grassroots level, and local institutions and gender-specific departments and expertise are often not sufficient. Indeed, there is a need for cooperation and collaboration among different ministries to help get climate change messages across to the intended audiences in the communities. In addition, partnerships with universities, civil society, and rural organizations will facilitate and expand the spread and accessibility of agricultural- and climate-related information to men and women.

Decentralized structures and institutions related to agriculture and park management should be created in rural communities to easily address the specific needs of male and female farmers. Policies adopted should be made available to the decentralized systems, with staff trained on gender issues. Specific departments or offices created for gender-related information and programming are necessary to ensure that
climate change documents, programs, and trainings consider the participation of men and women at all levels. The concerns and experiences of both men and women should be an integral part of the design, implementation, monitoring, and evaluation of policies and programs at all spheres and levels to ensure that women and men benefit equally.

Decentralized institutions and park staff working directly with farmers to improve food security and well-being should consider specific needs and priorities of women and men and intentionally target and benefit specific groups to meet their different needs. This might mean organizing different trainings or providing different inputs to ensure equal opportunity for both men and women; such situations need to consider the realities of men’s and women’s needs resulting from climatic and seasonal changes in the communities. Admittedly, this strategy is limited, as it does not address the underlying causes of the differences between men and women resulting from societal discrimination and norms. However, identifying the needs of a specific group and building an adaptive capacity would improve on that group’s well-being. In general, institutions and programs should strive for gender-responsive interventions that consider gender norms, roles, and inequality and that include measures to reduce any harmful effects on men and women.

Lesson 3: Change in Customs and Beliefs in Communities for Climate Resilience
Gender relations in patriarchal societies often create hierarchies between and among women and men, resulting in unequal power relations that have a negative impact on one another. Some ways to address include finding ways to transform the harmful gender norms, roles, and relations in the community through dialogue, workshops, or sensitization seminars that promote gender equity. Doing so could lead to changes in gender roles and power relations between men and women.

The study communities are patriarchal and deeply entrenched in beliefs and customs that have existed for generations. These beliefs often reinforce mistreatment of one group or sex over the other and have an influence on differences in power relations and opportunities. Hence, there is a need to educate the leaders and the elites of these communities on the harmful effects of some of their traditional beliefs and to
show the importance of considering the rights of both men and women in the community. Traditional leaders and elites are influential in the community and act as agents of change. A change in their attitudes and behaviors toward the affected group would subsequently result in a change in beliefs and customs of other community members.

**Lesson 4: Change in Agricultural Research System**

Women and men have differential needs, interests, and vulnerabilities to climate and seasonal changes, and they use various coping strategies for climate change resilience. Similar to Kristjanson et al. 2015, people of various groups and status in the society experience climatic change impacts differently and so too are differential benefits to resources and assets as a result of social and gender norms existing in the society. To facilitate interventions therefore, research should ensure that the needs of women and men are considered and assessed in studies, taking into consideration that changes occur given the context and time. In particular, there is a need to engage qualitative data collection methods in order to understand the underlying reasons for entrenched gender norms and continuous implementation of these gender norms that are harmful to the different groups in the community and how it has affected men and women differently. Researchers should implore a gender lens during data collection and analysis to capture the differences. This would inform the design of interventions to include the needs of men and women.

**Lesson 5: Extension and rural advisory services**

Although extension services are present in the study communities, access to agricultural extension services in the communities for women is lower compared to men. Given the changing climate and seasonal variations, information related to agriculture and climate should be provided to male and female farmers to boost production and food security. Extension officers should ensure that extension services and information reach and serve both male and female farmers. It is important to use various user-friendly communication channels (radio, mobile phones, television, “town crier,” and so on) that are available to female farmers in the community. Policies should also encourage women to access resources and should improve adult training so women can adopt improved varieties and gain access to inputs.
Lesson 6: Intrahousehold Dynamics and Climate-Resilient Food Systems

Information sharing on climate change between couples and within the household is vital to foster climate-resilient food systems. For instance, men can share information learned from trainings, and women can share what they learned from the marketplace, leading to a win-win situation. There should be a complementarity of roles between men and women at the farm and household levels to empower women, who are too burdened with household chores to attend trainings and meetings. Men and women should work in cooperation, sharing experiences and expertise and making decisions relating to climate change together. Agricultural related information should be shared with other members of the household including male and female children.
7. CONCLUDING REMARKS

In this paper, the gender–climate change–smallholder agriculture nexus is shown through the perceptions of men and women farmers, the effect of climate change on their productivity, and their differential responses to changes leading to food systems that are resilient to climate change. Climate and seasonal variations have affected the agricultural activities of male and female farmers in Cameroon, resulting in low yields and low income. Although men and women have experienced similar climatic changes and effects, their adaptation strategies differ considerably. For instance, women tend to respond to changes in climatic conditions based on local knowledge related to their household roles; men opted for modern methods of agriculture, such as using chemical fertilizers and pesticides and applying skills learned from farmer field schools.

Contrary to the popular ecofeminist notion of the relationship between women and nature, adaptation measures in the study areas were based mainly on indigenous knowledge and sensitization and services provided by extension officers and development organizations. Several issues, such as unequal access to land and productive resources and inadequate gender equity and equality in the decision-making process, undermine the status of women in their societies and consequently affect their adaptation to climatic variations. Recognizing the differential gender roles and the specific socioeconomic factors that have implications for climate-resilient adaptation strategies, the different perceptions of men and women and their differential adaptation strategies would help develop gender-sensitive approaches to male and female farmers for improved, sustainable, and inclusive adaptation strategies for resilience.
REFERENCES


RECENT IFPRI DISCUSSION PAPERS

For earlier discussion papers, please go to www.ifpri.org/publications/discussion_papers. All discussion papers can be downloaded free of charge.


1651. Role of media in shaping the policy process: Comparative lessons from the food price crisis in Bangladesh, China, India, and Viet Nam. Suresh Chandra Babu, Smita Aggarwal, and Junjie Chen, 2017.


1642. Insurance structure, risk sharing, and investment decisions: An empirical investigation of the implications of individual and group weather index insurance. Laura Munro, 2017.


