

Catalyzing climate change adaptation capacity

– Potential effects of “GALS” Approach in transforming rural farm households towards gender inclusive climate change adaptation in KIREHE District. Rwanda

Adrien Mutarambirwa



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Adrien Mutarambirwa

Supervisor: Malin Beckman, PhD, Swedish University of Agricultural Sciences, Department of Urban and Rural Development

Examiner: Harry Fischer, PhD, Swedish University of Agricultural Sciences, Department of Urban and Rural Development

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Cover picture: The picture shows the erosion caused by heavy rain in Nyamugali Sector/KIREHE District. Source: Adrien Mutarambirwa

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Keywords: Adaptive capacity, rural livelihoods, climate change, gender relations, coping mechanism

Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Faculty of Natural Resources and Agricultural Sciences
Department of Urban and Rural Development

Abstract

This study explores the impact of climate change on the livelihoods of rural farm households and the adaptation strategies used to cope with the effects of climate change in Kirehe District. To thoroughly understand the case, a particular attention has been paid to gender dynamics and climatic change adaptation; the main intent was to comprehend how gender relations and adaptation strategies are intertwined in rural households which are exposed to climate-related hazards. Through individual interviews and focus group discussions, reliable data have been generated, from the standpoints of rural dwellers that experience the hazards. Moreover, personal observation has been employed to complement other methods and triangulate the sources of information. The research revealed a linkage between gender relations and climate change adaptation in agrarian households. More than men, women are vulnerable to the harmful effects of climate change and they endure a heavier workload to adapt. This trend is exacerbated by the social norms and the customary laws which condone gender inequality in rural households. As a coping mechanism, men opt for labor migration, but in many cases, they do not earn sufficient remittances to support their families. The research studies the example of a local NGO known as SAFE, which successfully boosted the adaptive capacity of rural dwellers in Kirehe. The experience of the men and women beneficiaries of this NGO is studied through the lens of the chosen conceptual framework, focusing on the interplay between gender relations and climate change adaptation. The study concludes that adaptive capacity can be improved through the reinforcement of gender equality and women empowerment.

Keywords: Adaptive capacity, rural livelihoods, climate change, gender relations, coping mechanism

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Abbreviations

FGD	Focus Group Discussion
GALS	Gender Action Learning System
GDP	Gross Domestic Product
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IST	Institute for Social Transformation
IUCN	International Union for Conservation of Nature
MINIRENA	Ministry of Natural Resources
NGO	Non-Governmental Organization
NISR	National Institute of Statistics of Rwanda
OECD	Organisation for Economic Co-operation and Development
OCHA	The United Nations Office for the Coordination of Humanitarian Affairs
RNRA	Rwanda Natural Resources Authority
SACCO	Saving and Credit Cooperative
SAFE	Sustainable Agriculture for Food security and Economic development
UNDP	United Nations Development Programme
UNFCCC	The United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

1 Introduction

1.1 Problem statement

Across the world, substantial efforts are made by international organizations and governments to combat climate change and secure food for the needy populations (FAO, 2018). In Rwanda, 45% of the total land is arable (Byamukama et al., 2011) and agriculture sector is a deciding factor of the economic development as it contributes 32% of the GDP. As an economic activity that employs 80% of rural people, agriculture is considered as livelihood opportunity and a mainstay of poverty reduction (Mikova et al. 2015). However, agricultural production is particularly vulnerable to climate change since it depends on rainfall. Multiple changes in patterns of precipitation, increased temperatures, extreme storms, floods, landslides, erosion and prolonged droughts lead to declination of soil productivity as well as increased “plants disease incidences” The east and south part of the country where KIREHE district is located, is more subject to prolonged dry seasons and desertification (Ngabitsinze et al., 2011).

Adaptation strategies have been taken by government institutions and non-government organizations to mitigate the negative effects of climate change on the agrarian livelihoods. This mainly includes introduction of drought and disease-resistant crops, initiating the kitchen garden programme, promotion of irrigated agriculture, land conservation practices, land consolidation, rainwater harvesting, agricultural terracing and anti-erosive technics and many others. All these strategies have been chosen to counteract the detrimental effects of climate change on agriculture and food security (Huggins, 2017).

While these strategies of adaptation are being reinforced by government institutions and development partners in rural communities, gender imbalance remains an intriguing barrier to climate change adaptation practices at household level. In KIREHE District, farmers’ level of adaptation to climate change and collaboration in making decision between women and men to cope with this challenge is still low (SAFE, 2018). Work-based conflicts, misunderstanding between women and men and power imbalance in relationships in farm households affect the implementation of climate change adaptation strategies. To impede this phenomenon and improve gender inclusive climate change adaptation in KIREHE farm households, a local NGO known as SAFE (Sustainable Agriculture for Food security and Economic development) has been launched in partnership with the International

Fund for Agricultural Development (IFAD). The project aims at transforming households' livelihoods towards sustainable life based on gender equality and this is conducted through the approach which is termed "GALS" (Gender Action Learning System). By using this approach, SAFE helps women and men in households to have common understanding and equal control over their lives through collaboration in decision making on different matters; builds their joint capacity in climate change adaptation as well as increasing agriculture production. The integration of GALS approach in climate change adaptation for small farmers in KIREHE district served as motivational reason to undertake this study to obtain insights on the extensiveness of positive effects and richness of GALS approach in changing behaviors of women and men in farm households towards climate change adaptation.

Considering the overriding purpose of this newly introduced approach, which is to improve the gender relations in households' climate change adaptation, and taking into account the current situation of natural hazards engendered by climate change in Kirehe District, it is of paramount importance to scrutinize the effects of this approach in this particular locality. Another point to consider is that a considerable amount of studies have been conducted climate change and its impact on people's livelihoods but the topic of gender aspects in climate change have not been explored sufficiently. This is due to the fact that people don't easily see how gender dynamics might be pertinent in climate change issues and thus, it is rarely tackled in climate change discourse (Dankelman, 2010).

Furthermore, the amount of data as well as researches on connection between climate justice and gender justice with clarification is still small (Roehr, 2017). This constitutes a remarkable research gap that needs to be tackled in order to thoroughly explore gender dynamics and come up with remedial measures. The results this study will serve as handy toolkits for the organizations which have "Gender and climate change adaptation" in their mandate. Moreover, the findings will be used for relevant development projects and will help policy makers to plan accordingly.

1.2 Research Objectives

The main objective is to explore impacts of climate change to rural farm households in KIREHE District and their adaption strategies. To understand how gender power relations in households affect the implementation of adaptation strategies and explore potential effects of the “Gender Action Learning System” (GALS) approach in helping them to enhance adaptation capacity.

1.3 Research questions

To achieve the objectives of the study, I have chosen three interlinked questions to be answered and they are formulated as follows:

- i. What disasters related to climate change are affecting the livelihood of agrarian households in KIREHE District?
- ii. What are strategies of farm households of KIREHE to cope with climate change impacts and how do gender power relations influence their adaptive capacity level?
- iii. How does GALS approach affect farm households of KIREHE District in their adaptive capacity to climate change impacts?

1.4 Thesis outline

The thesis is divided in seven chapters. The first chapter is about introduction. The second chapter details the thematic background of climate change globally and sheds more light on Rwanda. It highlights the study objectives and the research questions. The third chapter presents the conceptual framework while the fourth one describes the methodology and case study sites. The fifth chapter presents the research findings and the result discussion is presented chapter six. Lastly, the seventh chapter presents conclusions and recommendations.

2 Contextual background

2.1. Climate change adaptation

The detrimental effects of climate change are pervasive in the Global South (Nelson & van der Mensbrugghe, 2013). Researches have revealed that many parts of Sub-Saharan Africa will markedly face the impact of climate change due to demographic pressure, poverty and biophysical effects (Thornton & Lipper, 2011). This will decrease crop production by 50% in some parts of the continent (Schneider et al, 2007; cited in Bezner Kerr, 2014).

Contrarily to many other developing countries, Rwanda does not face sea-level rise constraints because it is landlocked (Huggins, 2017). However, it is exceedingly exposed to demographic pressure which is intertwined with the overexploitation of natural resources, and which, to some extent, can aggravate climate change challenges. Rwanda is characterized by rapid population growth and it is the most densely country in Africa. The average of landholding is only half a hectare per household and more than 75% of the population depends on agriculture to make their living (NISR 2012a).

Following the report of REMA (2011:11), climate change detrimentally affects agricultural sector in Rwanda. This is evidenced by the increased annual temperature (NISR 2012a) and the registered increments of annual precipitation (Climate Service Centre, 2013). These changes considerably affect people's livelihoods as the country becomes much more vulnerable to droughts and floods. The most devastating floods occurred in 1997, 2006, 2007, 2008, and 2009 and engendered loss of lives, demolition of infrastructures as well as crop damage (Ngabitsinze *et al*, 2011). Historically, harsh weather events have imposed heavy costs in Rwanda. This particularly includes droughts and floods which are prompted by climate change and which considerably impair economic growth, health and food security as well (USAID, 2012). The recurrent natural hazards and the constraints in adapting to climate change are severely affecting the local communities in the area (RNRA and MINIRENA, 2013: 23).

Coping mechanisms which do not consider power relations cannot significantly enhance adaptive capacity. In addition, top –down and coercive approach is inherently incompatible with climate change adaptation and resilience. In some instances, policy makers make decisions without consulting the local community. This undermines climate change adaptation because it imposes decisions from central to

local level while asking accountability in the reverse direction (Huggins, 2017). The government – driven strategies of commercial agriculture and crop intensification programs tend to enhance the exposure of rural dwellers to climate-related risks (Huggins, 2017).

Despite the current efforts to render agricultural policies more ‘climate smart’, Rwanda still faces climate related impediments, which, in some instances, jeopardize agricultural production in different parts of the country (Huggins, 2017). Eradicating poverty and hunger are among global priorities to sustain the future world (UN, 2013; FAO, 2018). The world needs to secure food for its growing population which is expected to reach 9.6 billion in 2050 from the current population which is 7.6 billion (UN, 2017) and the main source of food is agriculture (FAO, 2003). Therefore, increasing agricultural productivity and income is a key strategy in eradicating poverty and hunger for a sustainable life. Nevertheless, while there is a need of feeding 2 billion more people by 2050, agriculture is extremely facing climate change impacts which reduce yields of needed crops.

Land and water depletion, temperature variability and changes in precipitation patterns affect negatively both crops, livestock, fisheries, and aquaculture systems in many parts of the world, and threaten global food security (IFPRI, 2009; OECD, 2015). Across sub-Saharan Africa where hunger and poverty are pervasive, 62% of the populations live in rural areas, and agriculture is backbone to their livelihoods (Mercandalli & Losch, 2017). Thus, billions of people in developing countries are more affected by climate change impacts and are food insecure than the rest of the world (IFPRI, 2009; UNDP, 2012; FAO, 2018).

Among others, tailoring international trade is one option of helping some regions of the world to adapt to climate change by eliminating hunger and food insecurity through stabilization of markets as well as taking leftover food from surplus regions to reallocate in deficit ones (IFPRI, 2009). At local levels, policies seek to enhance adaptation capacity to climate change through various possible alternatives for rural small farmers in order to cope with climate challenges. The so called “Community-based adaptation strategies” like improved land-management skills and farming systems as well as diversification of livelihoods, play important role to help people in rural areas in processes of coping with climate hazards and disasters (ibid).

The subject of climate change has received considerable attention and is very well debated in the development arena. In this regard, many governments have made it a priority on their agenda and substantial strategies have been put in place to mitigate and cope with the detrimental effects of climate change. The connection between gender and vulnerability to disaster is an emerging topic in research. Previous studies have revealed that empowering women in climate change adaptation reduces their vulnerability, alleviate poverty, and enhance household’s food security (Dankelman 2010).

The majority of rural dwellers rely on natural resources to maintain their livelihoods. Growing vegetables, fruits and other crops do not only ensure the availability of food at household level but also farmers raise households' income by selling the surplus of their production (Gutierrez-Montes et al. 2009).

The betterment of rural livelihoods heavily depends on the access to natural resources such as water and fertile soil for farming activities. Thus, any changes in access or availability of these resources tremendously impact on households' economy (Ellis 2000; Enarson et al. 2007).

Research has revealed that the limited access to natural resources - which is caused by disasters - may result in women vulnerability and can lead to rapid economic transformation at household level. The increased exposure to natural hazards put women at risk and alters households' gender relations. This adversely affects women's adaptation and coping capacities (Ellis 2000).

2.2. GALS and climate change adaptation in Kirehe District

GALS is an approach which has been successful for many organizations to help women and men to have equal joint control over their lives through collaboration in decision making. It had been used before by SAFE to contribute to the poverty reduction in household especially vulnerable people through adoption of gender equity in decision making for any issue including livelihood, food security, financial services, value chain development, conflict resolution, health and reproductive life. In short, GALS focuses on developing new visions for relationship between women and men as equal human being and implementing changes in Gender inequalities in resources and power (SAFE, 2017). Today, GALS approach is being used in transforming farm households of KIREHE toward sustainable gender-responsive adaption to climate change.

With progressive roll out of champions to teach their spouses, relatives, group's mate, neighbour and community members, champions had reached a good stage where almost beneficiaries can testify of the positive achievement from GALS. It had brought to them a mindset change in their socio-economic and climate change adaptation in their activities (SAFE, 2018). This program of SAFE is in line with the proposal found in the article of Mersha (2018) where action in climate change adaptation needs transformative learning of agrarian community focusing on women and men along with technical courses of agriculture extension education.

3 Conceptual framework

This chapter sheds more lights on key concepts and theories that are used to analyze the findings in the next chapters. The theories and concepts, herein explained, have been found to be relevant to the research in question and are used to thoroughly interpret and comprehend the results of the study. This mainly concerns with overview and definitions of key concepts such as climate change impacts, vulnerability and adaptation capacity which are intertwined with rural households in KIREHE District. Secondly, I describe gender-related terms in order to show their implication in adaptation capacity. The chapter brings up farm-households which are subject to climate change impacts and which are the main actors in the adaptation process. Finally, I discuss the main aspects of gender and climate change impacts to help understand the effects they have on each other.

3.1. Climate change impacts, vulnerability and adaptive capacity

Various institutions define concepts around climate change in different ways depending on contexts and objectives. Before defining impacts of climate change, it is important to refer to the definitions of climate change. As defined by The Intergovernmental Panel on Climate Change (IPCC), “*Climate Change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer*” (IPCC, 2014). This change can occur naturally or may be caused by human activities. For natural variability, changes in climate can be influenced by external forces like volcanic eruption and modulations of the solar cycles while human activities are also responsible of global warming due to the emissions of carbon dioxide and since they destroy the structure and functioning of ecosystems (IPCC, 2014). Attributing this responsibility of climate change to human activities has been an emphasize in the definition provided by United Nations Framework Convention on Climate Change (UNFCCC) wherein climate change “*means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods*” (UNFCCC, 1992). Starting from definitions above, it's easier to scrutinize and

understand climate change dynamics and its impacts on rural households. To simplify, impacts means consequences or outcomes (IPCC, 2014). Thus, Climate Change Impacts are consequences of climate change. According to IPCC (2014), impacts refers to “*effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system*”. These kinds of impacts are subset of physical impacts like sea level rise, droughts, floods etc. Similarly, as it appears in the UNFCCC’s definition, changes on physical environment which create harmful effects on the natural and human socio-economic systems are called climate change impacts (UNFCCC, 1992). In the context of this study, drought and flood are physical impacts of climate change in KIREHE District while poverty, hunger, food insecurity, diseases, conflicts in farm households, are social economic impacts. The above-mentioned natural and socio-economic systems are vulnerable to climate change and are damaged by climate change impact. According to IPCC (2014), vulnerability is “*predisposition to be adversely affected*” (IPCC, 2014).

The term vulnerability may be difficult to define in a precise and concise way. Definitions depend on contexts and as well the type of disciplines one is interested in (Fellmann, 2012). In order to help different researchers and stakeholders to collaborate, IPCC tried to put in place a consistent definition which is considered as a leading and transparent one.

“Vulnerability is degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC, 2007 cited by Fellmann, 2012).

From the above definition, it is clear that lack of adaptive capacity is a key component in vulnerability even though exposure and sensitivity are necessary. To my understanding, the adaptive capacity of a system or individual can reduce the sensitivity. Adaptive capacity is, according to IPCC (2014), the ability to adjust or to respond to consequences of climate change on behalf of humans, systems, or other organisms.

3.2. Conceptualizing gender relations

In order to thoroughly comprehend the concepts of gender relations, gender inequality and gender roles, it is crucial to first grasp the content of “Gender” as the basic concept.

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA), defined gender as “*social attributes and opportunities associated with being male and female, the relationships between women and men and girls and boys*” (OCHA, 2012). Considering the nature of this study, which emphatically tackles the gender aspects of climate change adaptation, it is worthwhile to shed more light on gender relations at household level in the studied area.

“Gender relations refer to relations between men and women that are socially determined by culture, religion or socially acceptable ways of thinking or being. These relationships between men and women, as they exist in most societies, are characterized by the marginalization of women in decision making and other forms of power sharing in the home and places of authority” (IST, 2019).

Gender relations are dynamic and can change depending the contexts; they are molded by constraints and the connection between different symbolic dimensions (representation, cultural texts and stereotypes), individual (e.g. identity), institutions (the societal differences between males and females such as labor division as well access and ownership to resources) (Dankelman, 2010).

A number of feminists opine that power structures such as social context, age and ethnicity are intertwined with gender – differentiated vulnerability. This is because they noticeably affect gender roles such as ownership and access to household resources. In this regard, various forms of power relations are intersected by individual, institutional and structural behavior (De los Reyes & Molinari, 2005).

According to Enarson et al. (2007), rural women are much more prone and vulnerable to environmental hazards. This is due to the fact that their livelihoods considerably depend on the exploitation of natural resources to make a living. Many of the tasks which are female dominated basically involve the exploitation of natural resources. To illustrate, more than men, women are engaged in fetching water and collecting firewood. Resultantly, they have less options to diversify their livelihood strategy as in most cases they are less educated than men. Across the world, 60% of the poor are women; they have limited access to land and property and have minimal wages compared to their male counterparts (Ariyabandu in Enarson & Chakrabarti 2009).

Following the research of Doss and Morris (2001), the gender of household head is of vital importance in problem solving and making decision making in agriculture. Female and male are exposed to dissimilar challenges in the households and they most likely solve them in different manners (Doss and Morris, 2001). For instance there is a noticeable difference in taking up agricultural technology between women and men farmers. Men are most likely in a good position to quickly embrace

and practice modern techniques in agriculture because they have access to the required resources (Doss and Morris, 2000; Doss, 2001).

Many studies have concurred that gender relations shape the division of labor in farming activities and can, to some extent, amplify the feminization of certain tasks in rural households (Maharjan et al. 2012; Bever, 2002, Quisumbing, 2003). In sub-Saharan Africa, the division of agricultural labor is based on gender (Doss, 2001); Women and men have different tasks in agrarian livelihoods. Nevertheless, these differences not rigid; they can be altered depending on the prevailing circumstances (Doss, 2001). In harsh and unfavorable conditions, women tend to engage in male tasks which, in some cases, are too laborious compared to their vigor (Jackson, 1999). These traditionally male - dominated domains of work mainly involve labor intensive duties such terrace making, threshing, digging and irrigation (Kasper, 2005; Maharjan et al. 2012; Lokshin and Glinskaya, 2009).

3.3. Gender and climate impacts

Many researches have concurred that the connections between climate change impacts and gender are inevitable (Nelson et al. 2002; Rohr, 2007). Studies conducted across the world have revealed that the impacts of climate change are likely to be gendered and gender is regarded as an important factor in development arena; Climate change affects agriculture, ecological systems, social change as well as gender relations (Nelson et al. 2002). Similarly Rohr (2007), points out that gender is a crucial factor in environmental change debate and particularly in climate change adaptation. In his work, he emphasizes the aspect of gender in climate change and its impacts on women livelihoods.

However, the impacts of gender dimensions on climate change have received less attention and the impacts of climate change on gender relations have not been widely explored to date. Some researchers find it difficult to understand the interplay between gender and climate change and how it should be politically tackled (Rohr, 2007; Habtezion, 2011). This gap is mainly due gender “blindness” which affects development policies and this tendency is amplified by the inaccuracy of climate change predictions. This adds to the lack of mainstreaming of environment problems into development arenas which is among the root causes. It is therefore, important to explore the potential gender impacts on climate change in order to avoid the exacerbation of gender inequality and to promote gender equity (Nelson et al. 2002).

The United Nations are committed to instill gender equality in all programs and policies including climate change adaptation. However, this goal is not yet achieved in different parts of the world; gender inequality is still noticeable in many societies. Men and women are assigned different responsibilities and they do

not have the same decision- making power. Most often, these differences put women in a disadvantaged position. Furthermore, the research has unveiled the gendered vulnerability to the impacts of climate change and the gendered adaptive capacity. In some parts of the world, women experience greater vulnerability to climate change than men (Sellers, 2016). It is therefore obvious that gender relations play a vital role in climate change impacts (Rohr, 2007).

In most cases, the people who are at risk are the poorest including women and thus, they are severely affected. This is due to their prevailing vulnerability to natural hazards and long term climate change and they are less able to cope with rapid environmental change. Moreover, it has been confirmed that women play a crucial role in the aftermath of natural hazards. They contribute greatly in the social and economic change by taking new roles (Nelson et al. 2002). The research by Rohr (2007), has revealed that, more than men, women depend on agriculture, biofuel and forest resources. These are directly affected by climate change resulting in food insecurity and worsened freshwater supply. Also, the same study has unveiled the detrimental effects of climate change on the health of women. Due to their physical vulnerability, their caring roles in families and the additional tasks engendered by the depletion of environmental conditions, women healthiness is considerably affected by climate change. To exemplify, climate change significantly affects the availability of fresh water for domestic use. In addition, floods and prolonged droughts which are engendered by climate affect women who are responsible for fetching water in rural areas (UN Women, 2009). Similarly, Alber (2009), pointed out that the discrimination against women is somewhat connected to climate change in some societies and this is mainly appears in the adaptation and mitigation processes. In this particular case, gender inequality and vulnerability are aggravated by climate change. The intergovernmental panel on climate change (IPCC) predicts that the impacts of climate change will vary depending on the generation, income groups, age, occupation and gender of the affected people (IPCC, 2001). A research conducted in Asia and the Pacific pointed to similar dynamics; the level at which humans are affected by the impacts of climate change depends on their access to natural resources, social status and gender (Habtezion, 2011).

In this regard, Nelson et al. (2002) urges that government policies on agriculture and climate change should be gender- sensitive. All programs tailored to support farmers' adaptation must avoid gender inequality and should aim at increasing the resilience of poor people including women. Policy makers should take into account poor people, particularly women in forming public policies. It is therefore worthwhile to help people adapt to climate change and its consequences on gender relations. Moreover, it is recommended to focus on gender mainstreaming in climate change policy and research. This will promote projects which are intended to help women and men to adapt to the impacts of climate change (Sellers, 2016).

4 Methodology

This chapter describes the research design and the methods used to collect and analyze data. It details the process of data collection, shows the challenges encountered as well as the limitation of the research. Data have been collected in Kirehe during 4 weeks in March - April 2019.

4.1 Research design

This study draws on a “Constructivist” perspective, which stresses people’s personal experience and which considers participants’ views and insights in order to understand a particular situation (Creswell, 2014). Through a constructivist perspective, this research explores the process of interaction between women and men in farm households. This type of inquiry has been chosen because it helps to know how people live and cope with challenges and how they try to make sense of the world they live in (Creswell, 2014). Thus, investigating the case from the participants’ standpoints was convenient for this study. This design suits the qualitative research which is about “*exploring and understanding the meaning individuals or groups ascribe to a social or human problem*” (Creswell, 2014, p. 3). The research focused on describing a lived experience rather than numerical data. The main concern was not to confirm or reject the preconceived ideas (hypothesis), but to collect information from the participants’ experience. According to Creswell (2014), the best way to explore the phenomenon is to hear from the people who have experienced it. Thus, phenomenology was suitable and useful for this particular research.

4.2 Description of case study

The study sites have been chosen from two sectors, namely Nyamugali and Gatore, which are both located in Kirehe District. Kirehe District is one of the 7 districts that make the Eastern Province of Rwanda. It is located in the far south-eastern corner of Rwanda, bordering Burundi and Tanzania. The population density is estimated to 290 inhabitants / km² and it covers an area of 1, 192 km² (NISR, 2012). It is one of the driest districts of Rwanda with 900mm of rain per year against the national average of 1,250 mm per annum and temperature of 21 C against 19 C of national level (Huggins, 2017). Its weather characteristics includes

seasonal variability, which causes difficulties for agriculture, which mainly depends on rainfall because irrigation system is still at low level (SAFE 2018). In some cases farmers fail to plant on time due to delayed rainfall, and in other cases floods damage their crops especially in farmland close to Akagera River (SAFE 2018). More than any other District of Rwanda, Kirehe is prone to natural hazards like droughts and floods, which detrimentally affect farmers at different levels of the agriculture value chain. Furthermore, farmers cannot access markets, due to the impractical roads, and decide to sell their products at low price at local markets. The prevailing situation decreases agricultural income and jeopardizes farmers' livelihoods by triggering food insecurity, malnutrition as well as children's school dropout (SAFE 2018).

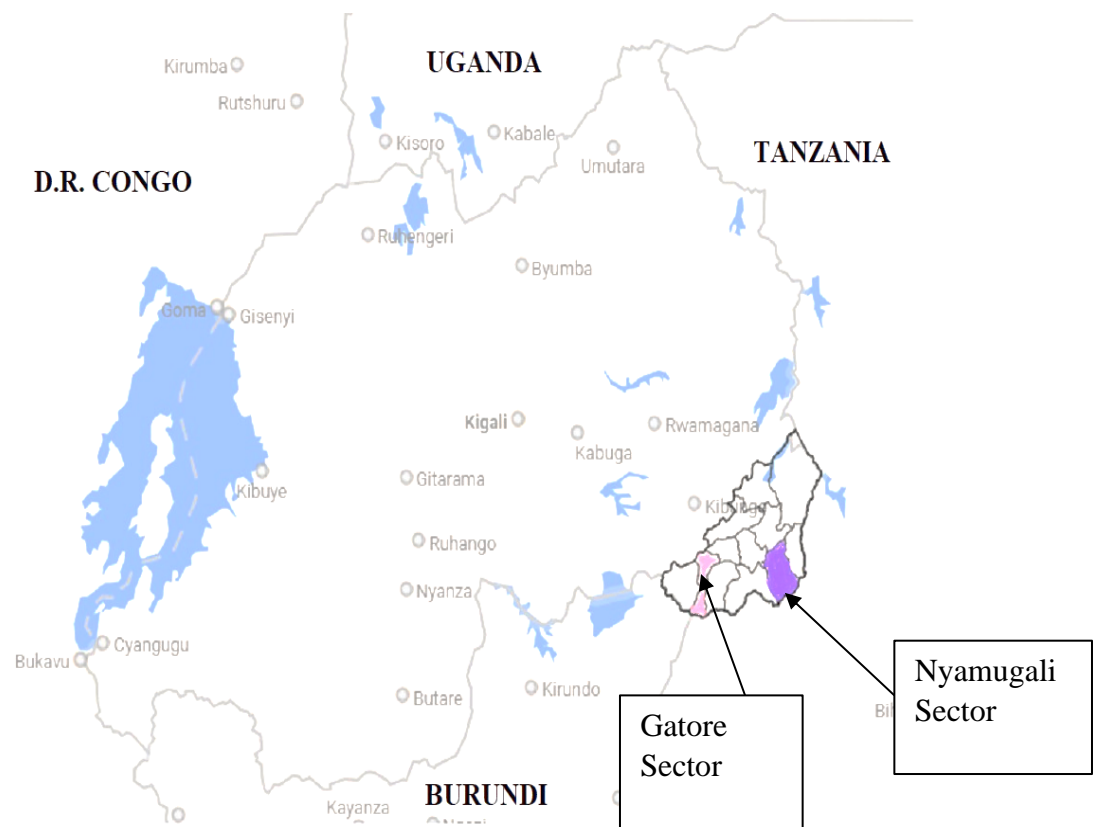


Figure 1. Map of case study sites

Source: Adapted from Google image retrieved from <https://www.citypopulation.de/php/rwanda-sector-admin.php?adm1id=55>

4.3. Methods for field work

The choice of appropriate research methods is indispensable for every study and it mainly concerns with collecting and analyzing data (Creswell, 2014). For data collection, I used individual interviews, focus group discussions as well as observation, which are qualitative methods. Before embarking on the field work, I had to contact so called gate keepers, mainly the administration of the District and SAFE staff and I held meetings with them on March 15th, 2019 and March 18th, 2019 consecutively. These preliminary sessions were helpful for the field work because they facilitated access to the informants.

4.3.1. Interviews

For individual interviews, I opted for semi-structured interviews because I wanted to thoroughly explore the case by hearing from individual informants. This was done by asking open and broad questions so as to come up with comprehensive data. I had chosen the topic for discussion before interviews but could add in some ad-hoc questions in the course of interviews, if issues needed elaboration. This method was particularly important as it provided information which other methods could not provide; discussions in individual interviews have stimulated interviewees to talk freely about their livelihoods and could even share some households' secrets. For sensitive topics like households' secrets, individual interviews are very important. I have to mention that I was trusted to the extent that some participants could unveil confidential information. In order to keep the source of information confidential, I anonymized the respondents by using pseudonyms and this was done for the sake of respondents' safety.

I have conducted individual interviews in 2 sectors namely Gatore and Nyamugali which are among 5 sectors where SAFE implements the project of GALS approach on climate change adaptation. I used the list of all beneficiaries of the project that SAFE had given me and I made a temporal list for participants. These beneficiaries are local farmers who have been trained by SAFE on the GALS approach. The choice of participants was based on different factors; champions and non-champions, women and men. For each one for the selected sectors, I visited the study sites and I was accompanied by SAFE staff that helped me to reach interviewees.

To make a final list of participants, I discussed with 2 SAFE beneficiaries who know better all beneficiaries in order to have information about some other characteristics of participants such as poverty and household-based conflicts. This helped me make some changes on my shortlist and confirm the final list. The sampling was purposive, since I chose participants according to certain criteria, among "GALS" approach beneficiaries as well as other key informants. The main selec-

tion criteria were gender, conflicts at household level, champions and non-champions. After agreeing on the list, the guides (SAFE staff) started to call the selected participants the same day in order to confirm their availability. I selected 12 participants in each sector and 24 participants were supposed to be covered in total. I spent 3 days in each sector and all interviews covered a period of 6 days. I have to mention that I did not interview couples. Instead, I interviewed wives separately from their husband; this was done because interviewing wives together with their husbands would impede women to freely unveil their problems. Interviewees have been conducted in participants' homes and they were conducted in both mornings and afternoons.

	Gatore sector			Nyamugali sector			
Time	Number of participants			Number of participants			TOTAL
	March 20 th	March 21 st	March 22 nd	March 25 th	March 26 th	March 27 th	
Morning	2	2	2	2	2	2	12
Afternoon	2	2	2	2	2	2	12
Total	4	4	4	4	4	4	24

Table 1. Timeframe of interviews according to the plan

Source: Adrien Mutarambirwa

Due to unforeseen circumstances, I have missed 4 interviews in Gatore sector. One participant went to the burial of family member on 20th, another changed his mind. He left home for his own private business on 21st. On the 22nd I failed to reach 2 participants because the road was unpractical due to heavy rain. For Nyamugali sector, all participants were interviewed according to the plan. Therefore, the total number of interviews was 20 and they lasted between 30 to 45 minutes each.

Location	Number of interviewees	Champions	Non – Champions
Gatore	8	2 F & 1M	3 F & 2 M
Nyamugali	12	4 F & 2 M	3 F & 3 M

M: Male F: Female

Table 2. Details of participants for individual interviews

Source: Adrien Mutarambirwa

4.3.2. Focus group discussion

For the Focus Group Discussions, I had planned to discuss with 3 groups composed by 8 members each. I have selected one group for women, another for men

and the last was mixed. For this to be achieved, I have to target their usual gatherings for collective activities in order to meet them. On March 29th, SAFE had an activity of providing chicken to some beneficiaries who are in farmer groups for the sake of diversifying rural livelihoods in Gatore sector. I took that opportunity to meet with some of them in the afternoon after receiving chickens. Unfortunately, the activity was delayed so that some participants refused to wait for the group discussion and went home. I only discussed with 5 persons mixed women and men, champions and non-champions.

In Nyamugali sector, I found enough people because many farmers had a meeting with a team from a Japan project, which is supporting them to develop marshlands for vegetable farming. In this sector, I changed the plan; I preferred to separate champions and non-champions, women and men in order to avoid influences on responses, based on the experience from the previous FGD conducted in Gatore sector.

Gender	Champions	Non – Champions
Male	7	9
Female	9	0

Table 3. FGDs in Nyamugali Sector

Source: Adrien Mutarambirwa

All three FGDs were conducted the same day (1st April 2019) and they lasted between 1h10min to 1h30min each.

This method was useful and relevant to this research because it generated information, which complimented what have been said during individual interviews. In the course of interactive discussion, some participants' answers could ignite others to bring up additional information on a particular subject matter. In this study, FGDs have played a big role in providing relevant examples of cases on some phenomena that had been mentioned during the discussions.

4.3.3. Observation

The aforementioned methods were useful and provided relevant information. However, it was crucial to add observation because some facts could be more easily seen than being explained. I therefore decided to add the observation method for the sake of triangulating information from different sources. The use of this method in data collection increased the validity of my research findings and this was backed up by what farmers said during FGDs "Seeing something once is better than hearing about it a hundred times. Once you see you don't doubt". This method seemed to me like verification method. The method of observation was very

crucial for this particular research but as Vinten (2014), argued, it takes a lot of time.

I had a look at different GALS' tools drawn by household members to guide them in planning. Finally I observed different facilities provided by SAFE to boost climate change adaptation in their zone of intervention. This mainly involved observing, taking notes and taking photos of water harvesting tanks and kitchen gardens.

4.4. Challenges and limitations

The research has been conducted in a conducive environment and the methods used were suitable enough to generate relevant and thorough information. However, I have encountered some constraints, and some of them were due to unforeseen circumstances. This section is worth highlighting because some of the challenges could affect the research findings to certain extent. As aforementioned, I have missed some interviews and participants did not join FGD due to personal reasons. The field work has been conducted within a period of rain season and the road was dreadfully damaged by heavy rains. This seriously affected the process of data collection because I could not reach some participants' homesteads and I missed 2 interviews. In addition, one participant missed his family member and I could not interview him. The time I had planned to conduct FGDs, SAFE had organized an activity of donating chicken. This caused some participants to leave without joining FGD because the activity took too long to be done. The lack of financial means was a hindrance because I could not add more days in order to recover the missed interviews.

5. Empirical findings

This chapter presents in detail the results of the research which are obtained from individual interviews, focus group discussions and personal observation. The section focuses on three research questions highlighted in the first chapter of this work. It describes climate change disasters faced by agrarian households in KIREHE and emphasizes on how these households are affected by disasters. In addition, it shows the adaptation strategies used by farmers and unfolds how gender relations are key factors which may “hinder” or “enhance” the implementation of these strategies. Finally, this chapter dives into how GALS approach intervenes in building households’ capacity towards climate change adaptation. The analysis (in the next chapter) of the research question on climate adaptation, clarifies better the ultimate objective of the study. This is mainly concerned with obtaining insights on the extensiveness of effects and richness of GALS approach in changing behaviors of women and men in farm households towards climate change adaptation. Quotes in this chapter are exact extracts of words from the interviews conducted with respondents during data collection.

5.1. Farm households’ lived experience of climate change impacts in KIREHE District

In this section, much emphasis is put on the main types of disasters faced by farmers in KIREHE District and how they affect farmers’ livelihoods.

5.1.1. Description of the major natural disasters and their impacts in the studied area.

Many parts of KIREHE District, especially sectors surrounding Akagera River, encounter variability in rainfall. Drought or prolonged dry period, and heavy rainfall in a short period, are major disasters confronting farmers in the District (District staff, individual interview, Kirehe & FDG Nyamugali, March 2019).

Drought in KIREHE is a natural disaster which has been encountered by farmers during the past two decades. The way the rainfall variability happens is different from time to time, to the extent that it is harder for farmers to make adequate plans. For example, the staff of the District said that two years ago there has been a

prolonged drought, which affected two agricultural seasons (season A and season B) from 2016 to 2017. Moreover, most participants through individual interviews and group interviews agreed that there has been lack of rain from 2017 to 2019 especially in Nyamugali sector. In this sector, a prolonged period of low rainfall has led to drought for several months.

Respondents in Nyamugali sector witnessed that from May, 2017 to February, 2019 (22 months), they experienced a severe drought where the rainfall has been in disorder. Sometimes it rained once in 2 weeks, once in a month or even once in 2 or 3 months. On the one hand, according to them, some farmers who dared to plant their fields after one rainfall, their crops were damaged. A short period after planting, plants leaves and roots started to dry up, pests started to attack plants like “Fall-army-worms” which have attacked maize and sorghum and other red flying insects which have attacked beans. On the other hand, farmers who were worried to plant immediately because they were not sure whether it would rain soon, experienced delays in planting, which also reduced their crop yield. In Gatore sector, farmers have been confronted with a drought period which covered the whole agricultural season A (Sept 2018-Dec 2018). Similarly to Nyamugali, crops in Gatore sector have dried up and have been attacked by pests. The drought situation in both sectors has led to crop failure; Corn, sorghum and beans yield have greatly shrunk. In addition, some participants have mentioned that cows have died due to the lack of feed as most of the forage grasses had wilted.

Heavy rain mixed with violent wind and hail is the second main natural disaster which endangers lives of farmers in KIREHE District. According to the experience of participants from Gatore and Nyamugali sector, this mixture of heavy rain, wind and hail comes after a long period of drought while farmers are waiting for rain. For example in Gatore sector it rained abundantly in December 2018 after a shortage throughout four months as illustrated above. This rain was also mixed with hail and strong wind (Individual interviews, Gatore, March 2019). In Nyamugali sector this kind of rain occurred in March and April 2019 after a long time of little rain. Participants in Nyamugali sector affirmed that the severity of this mixture of rain, hail and wind was high so that many houses roofs were blown away by the wind and many crops like banana trees, cassava and maize were damaged by hail and erosion. In addition, the flood has killed many domestic animals, especially goats and sheeps. During the fieldwork, I have personally experienced the severity of this mixture of rain, hail and strong wind in Nyamugali Sector (Individual interviews & FGDs, March 2019).



Figure 2. Fields of Cassava and banana damaged by rain mixed with hail and wind in Nyamugali sector KIREHE District.

Source: Adrien Mutarambirwa, March 2019

5.1.2. Impacts of disasters on the agrarian livelihoods in Kirehe District

Agrarian households in KIREHE District have been chocked by drought and rain-fall disasters at high level in a few recent years. As explained by respondents in this study, the most common impacts to their livelihood are summarized in three categories: Poverty, food insecurity, conflicts and increased vulnerability to women

A) Poverty

For the last three years, agricultural losses (crops and livestock) that resulted from climate-related disasters have led to economic losses since agricultural income have decreased. Droughts and heavy rain have highly destroyed the main crops to the extent that the little harvest obtained has been used only for households' survival and there was no surplus for market. Livestock in agrarian society in Rwanda plays an important role; It financially supports households during periods of crops losses as it is stated by a Rwandan adage "*Ukena ufite itungo rikakugoboka*" – which literally means "When temporary poverty comes, livestock supports you". Thus, this saying could not work for some households during strong climate-related disasters because of livestock death. Interviewed individuals in both sectors (Nyamugali and Gatore) explained that during and after natural disasters, their financial ability declines so that they cannot fulfill what they had planned. One respondent said that harsh environmental conditions and natural hazards can impair the relationship between rural dwellers and local authorities. "*Sometimes we are not in good terms with local administrative authorities because we don't ad-*

here to government policies” (Individual interview, Gatore, March 2019). This is the first statement provided by one interviewed people in Gatore sector when I asked her to explain more about poverty caused by climate-related disasters. According to her, since their financial ability decreases during and after disasters, they sometimes fail to pay “Mituweli” (originated from French “Mutuelle de Santé” which means “medical insurance”) which is strictly obligatory according to local government.

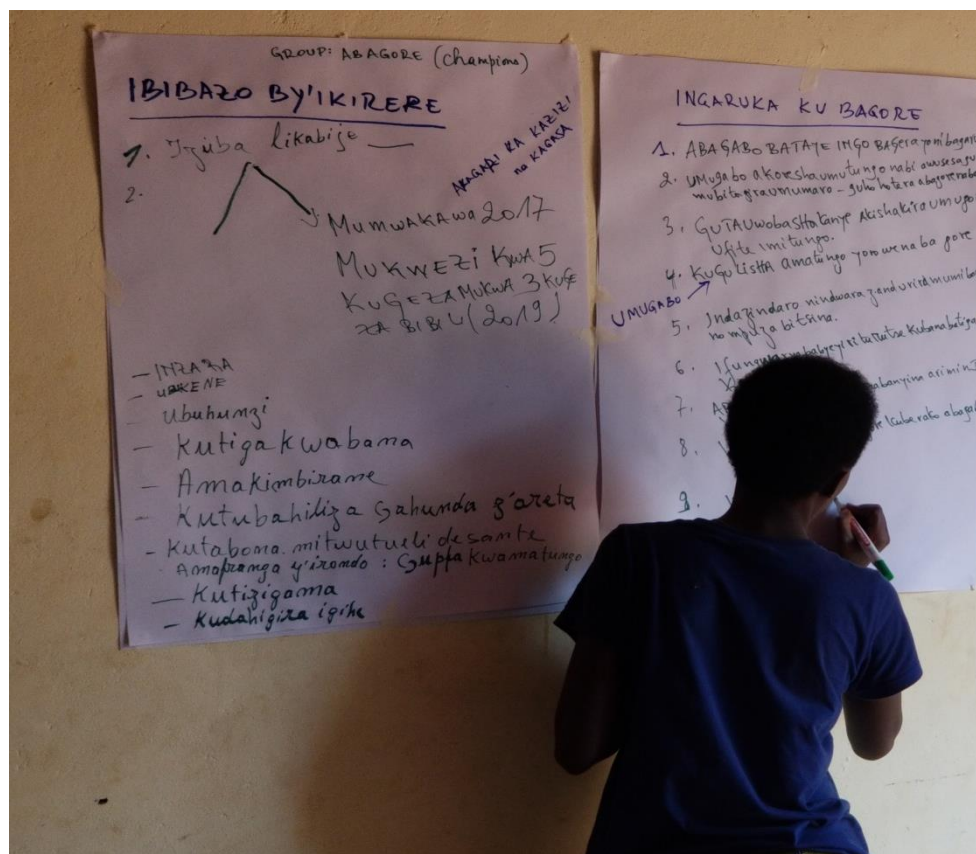


Figure 3. Focus Group Discussion of women (champions), Nyamugali sector/KIREHE

Source: Adrien Mutarambirwa, March 2019

This issue has also been mentioned by a group of women interviewed in Nyamugali sector who said, “since we cannot harvest marketable surplus, it is so difficult for us to deal with some local government obligations like “Mituweli” and contribution to community security service”(Individual interview, Nyamugali, March 2019).

Furthermore, due to this financial crisis associated to low agricultural income caused by disasters, many farmers also fail to pay tuitions fees and clothes for their

children as well as implementing other plans like buying livestock and extending agricultural land etc (Individual interviews & FGDs, March 2019).

A) Food insecurity

Agricultural production losses caused by climate-related disasters affect farmers' livelihood in terms of food security. During and after disasters, there is lower availability and access to food in many farmers' households (Individual interviews & FGDs, March 2019). All respondents argued that during these periods they eat less in terms of quantity and quality. Concerning the quantity, many interviewees have explained how they have reduced the quantity of consumed food in households per day. For example a participant in Nyamugali sector said that in normal period they eat 5 kgs of potatoes per day for a household of 6 members (4 children plus parents) but when disasters come, they switch to 4 or 3 kgs depending on the severity of the disaster. In some cases parents (adults) take one meal per day, or one meal and porridge (breakfast) per day while in better conditions they take 2 meals and breakfast.

Secondly, the quality of meals taken changes in times of disasters, and this depends on unavailability of food variety in the fields together with unaffordable markets. *"In that situation beans become dollar in our home, and we forget meat"* (Dollar =Rare in Rwandan sayings). One respondent in Gatore sector said. Due to these changes in balanced diet, in some households' disease prevalence increases especially for children (Individual interviews & FGDs, March 2019). A participant in Gatore sector witnessed a case of food shortage in households caused by environmental migrants from other villages.

"I remember the time we received in our home nine people from other sectors who escaped a serious storm. Some are relatives, others are friends and they came to sleep in our home because their house roofs were taken away by the violent wind, and their crops and livestock had died. We were obliged to accommodate and feed them before the intervention of government, which came after 4 days. This situation caused food depletion in our household and we were hungry at least 2 weeks before my husband got a small job in a masonry" (Individual interview, Gatore, March 2019)

Banana and cassava are the main crops which are drought tolerant and which support several households during a prolonged dry period. Thus, when this heavy rain mixed with hail and strong wind come, these crops become damaged so that they cannot resist and increased hunger (Individual interviews & FGDs, March 2019). Moreover, sometimes erosion and floods block and destroy roads and food transport cannot be performed. Therefore, from one side, farmers who have crops for selling cannot access market and get losses, since they are obliged to sell at lower prices. External sellers who bring various food commodities to the villages can either not travel, or have to raise prices.

B) Intra-households conflicts and increased vulnerability to women

Climate-related disasters in recent years have been a driver of intra-households conflicts and male migration which, in many cases, have also caused new structures of households. Food scarcity in households has escalated bad relationship between women and men in many farm households where in most cases men are root causes (Women FGD, Nyamugali, March 2019). The interviewed group of women in Nyamugali sector explained through the example of how some men who have habit of going in pubs to take alcoholic drinks every evening, do not want to reduce or stop this kind of unnecessary expenditures during disaster periods. These men use to go back home around midnight while they are drunk asking food from their wives. Wives are obliged to provide food according to social norms in rural agrarian society. If wives fail to provide food, disputes start and, in some cases, wives are insulted and even beaten by their husbands (Women FGD, Nyamugali, March 2019).

When this conflict escalates, some wives decide to go back to their parents and leave kids with husbands. After few days due the increased burden for husbands left by wives, some husbands can negotiate their wives to come back otherwise men decide to date new women. After understanding this situation, a new question came up and I asked to the men group their views-about what have been said by women. Men in general have agreed to what women said, arguing that husbands who like to drink a lot of alcohol, notably in periods of disasters and hunger, always cause problems in their households. A quarter of the group of men argued that it is hard to stop definitely with alcohol because it's also a time for them to refresh their mind, to build network as well as collect important information while they're in pubs, but they advised to reduce the quantity of consumed alcohol and the frequency of going to the pubs (Individual interviews & FGDs, March 2019).

On the other hand, male migration which is caused by climate-related disasters has led to conflicts and structural changes in households. Male migration in search of jobs during disasters is common worldwide. During disasters, notably drought in KIREHE district, some men have migrated to other regions where there is no hunger like in north-eastern part of Rwanda (Umutara region) to look for farming related jobs, while others have moved to urban areas for off-farm activities. Before shifting, these men promise to their wives that they will send remittances to their home to support wives and children's survival, as reported by the women FGD in Nyamugali sector.

As explained by the interviewed group of women in Nyamugali sector, some husbands keep their promises while others fulfill promises in the beginning, and then gradually they reduce remittances till they stop to send them. The main reason of these changes in behavior for some husbands to reduce or stop sending remittances back home is that they date new wives, even widows, where they have moved to.

When they stop to send remittances, they get in conflicts with previous wives and even divorces occur (Women FGD, Nyamugali, March 2019).

The interviewed women witnessed about the household (that we can give a pseudonym of “*Alpha household*” in this thesis), which had the same problem where a wife left by a husband, started to struggle with household problems alone with four kids. The elder child was a teenage girl who decided to abandon school and go to look for a job in the city (Kigali) as a maid. After a while, the girl got pregnant and gave birth. It became harder for the young girl to keep the job or find another one so that she decided to take her kid to her mother in the village and come back to look for another job. That was also an increased burden to the divorced wife to take care of the newborn grandchild. This story explains how life can be more complicated if women and men have misunderstandings, that can become worse during climate-related disasters periods.

Many cases like this one are found in KIREHE district (Women FGD, Nyamugali, March 2019). Women’s burdens of keeping grandchildren have increased due the growing number of teen pregnancies. Both group and individual interviewed people argued that during hunger in relation to climate change, the number of teen pregnancies increases. According to one participant

“We have many cases where hungry young girls are trapped into sex intercourse by men and boys who give them “mandazi” (fried bread) to eat. Many of them get pregnant and others catch sexual transmitted diseases like HIV, and we are obliged to take care of them”

This research has revealed that all activities that are related to taking care of children are, in most cases, attributed to women and this entails a heavy workload to women because they combine them with many other domestic chores. In one of the Focus group discussions, women in Nyamugali Sectors affirmed that they are much more burdened during and after disasters. This is due to the fact that some of the domestic chores are wholly left to women and in most cases these activities become more difficult during and after climate related disasters. To illustrate, more than men, women are engaged in collecting firewood, fetching water and cooking (Women FGD, Nyamugali, March 2019).

The above situations are good examples of how women are more vulnerable than men during and after disasters, and how women are experiencing worsening impacts due to men who deceive women in bad situations. Women in Nyamugali sector affirm that in most households of Kazizi cell, men have migrated. In few households where you can find husbands in this cell, a big number of them are old men who have not enough energy to go to other places to look for jobs. Another case raised by participants in this study about vulnerability to women is that during droughts there is a problem of miscarriage (spontaneous abortion) especially in neighboring sector “KIREHE”. This is a phenomenon which many of participants associate with hunger or food insecurity (Women FGD, Nyamugali, March 2019).

5.1.3. Perceptions of farmers of Kirehe on Climate change causes

In this research, after exploring impacts of climate change to livelihood of agrarian households in KIREHE district, I was also interested in getting insights into farmers' perceptions on climate change causes. My question to this point was "*What do you think are causes of weather or season variability?*" On the one hand, the results to this question showed that almost a half of participants in this study, notably non-champions, perceive climate change as natural effects rather than a result of human activity ("anthropogenic induced"). According to them, it is the will of God. One participant stated "*we are unable to command the weather because we are not God, the way God has planned things, that's how things must be, we have to accept*". On the other hand, based on their responses, other participants, mostly champions, were aware of some causes of climate change, which are related to human activities. The dominant response to this question was "*there are not enough forests in the region*". Afterwards I asked how forest scarcity can be a cause to climate change and related disasters, and many of them argued that trees play an important role in water cycle "*trees attract rain and stop strong winds from the neighboring country Tanzania which destroy crops in fields and houses*". On this matter, participants' knowledge is basic. Other benefits of trees in relation to climate change may appear to them more scientific if we consider their level of education.

5.2. Adaptation strategies for farm households in Kirehe to cope with climate change impacts and gender relations implications

5.2.1. Survival and functional strategies to recover from disorders

During and after climate-related disasters, farm households in KIREHE district have survived in different ways depending on available alternatives to each household. In this presentation of empirical findings I have addressed the most common alternatives which have been used. Almost all participants argued that in bad situations caused by climate change, they use to consume little food that they had kept in previous seasons or little food gotten from the market and reducing quantity and quality of food to eat per day. To reduce quantity was, on one hand reducing volume of meals taken, and reducing number of meals per day on other hand, while reducing quality refers to uniformity or lack of variety in food. Some households have been also saved by drought resistant crops that they had in their fields, like sweat potatoes and cassava.

A respondent in Gatore sector explained how during one prolonged dry season in 2018, they only had a field of sweet potatoes, which helped them to survive (Individual interview, Gatore sector, March 2019). In their household, they used to eat sweat potatoes almost every day for a period of more than five weeks (Individual interview, Gatore sector, March 2019). During individual interviews, some women told me that they have used to do small business of selling vegetables, fruits in order to get money for other food they needed. These women have been involved in buying vegetables and fruits from other regions or from some farmers in cooperatives that cultivate in wetlands, in order to retail them in their nearby small markets and neighborhoods (Individual interviews & FGDs, March 2019).

Another alternative which has been used mostly by men was to go temporarily to other rural areas which had no problem of hunger to look for jobs, while other men have used to go for non - farm jobs in cities. For the issue of jobs in rural areas, some of the poorest villagers have survived by obtaining jobs through support of local government program “Umurenge Programme (VUP)”, called Integrated Local Development Program to Accelerate Poverty Eradication, Rural Growth, and Social Protection. Community saving groups have been a key survival alternative to many households since some of them have used their savings while others have asked for loans to access food market even if prices were higher. This option has played an important role in supporting livelihood of farm households in KIREHE District as explained by many respondents in this study.

Many saving and credits groups (SCG) in this district are mainly promoted by CARE Rwanda (A national branch of an international NGO), in order to help them to depend on member savings rather than depending on external loans (Individual interviews & FGDs, March 2019). In addition, one of the government entities known as BDF (Business Development Fund) has intervened in climate change adaptation. During the drought of 2018, a group of farm women who are organized in a cooperative in Nyamugali sector has also got a loan from BDF to support them to cultivate in greenhouses with irrigation systems for vegetable production and doing some small businesses. Selling livestock, especially goats is one of options which have been used by farmers in KIREHE to get money for their basic needs during climate-related disasters. Keeping small livestock is a mode of saving in kind adopted by farmers.

“We prefer to keep livestock instead of saving money. When you have a small problem today, you take a little money to solve it. Tomorrow you do the same and so on till you end up consuming the whole saving. However when you have a small problem it is harder to decide to sell a livestock, you have to look for another alternatives”

According to participants in this research, the intervention of Government has also occurred sometimes to support households through the distribution of food, seeds and other necessary supports.

5.2.2. Adaptation strategies and measures of reducing risk

To cope with climate-related disasters, farmers in KIREHE District have various strategies which help them to prepare themselves for next bad situation in relation to climate change, although they still have many challenges. Nearly half of participants have described their farming practices which enable them to survive. First, they practice anti-erosive techniques like planting grass, creating drainage canals, planting some adequate types of trees and terracing. Other farming system practices are cultivating drought tolerant crops (cassava, banana), using appropriately manure and pesticides, and kitchen gardens agriculture. Kitchen gardens are very important for many households since they produce vegetables to eat with droughts tolerant crops to have balanced diet. To keep these kitchen gardens alive during droughts, many households have systems of harvesting rainwater through tanks for irrigation. Furthermore, farm households in KIREHE have strategic storage facilities for food during good seasons, which can help them in case of subsequent season becomes worse.

Also, saving money through saving groups or microfinance institutions as well as keeping livestock is another alternative. To reduce the severity of violent winds, they try to plant trees according to their capacity.



Figure 4. Underground tanks for rainwater harvesting, Gatore sector/KIREHE

Photo: Adrien Mutarambirwa, March 2019

5.2.3. Implementation of adaptive strategies and gender relations implications

Even though almost all interviewed farmers are aware and try to implement adaptation strategies as it is illustrated in the above section, many of them don't succeed, mainly due to the lack of collaboration between women and men. Relations between women and men in agrarian households in KIREHE District are key factors which can "hinder" or "enhance" the implementation of climate change adaptation strategies. The way decisions are made, and behaviors and attitudes among

members of households, shape adaptive mechanisms to climate change related disasters. Thus, as the study results have shown in the next section, GALs approach has started to transform some households towards enhanced adaptive capacity to climate change through building collaboration and common understanding between women and men based on gender equality.

A) Decision-making on land use

According to the information provided by participants in the study, decisions on land use especially for agricultural practices are made differently depending on power relations between women and men. Therefore, I have classified the way decisions are made into three categories.

Bilateral decisions: women and men sit together and make decisions collaboratively about different matters like buying, selling, and renting land. They also select together a land to cultivate and appropriate crop, seeds as well as farming system etc. This type of decisions can be found in few households (Individual interviews & FGDs, March 2019).

Quasi-Bilateral decisions: for this type of decisions I found two different situations. When it is a sensitive matter for household like buying, selling, and renting land, they both take decisions together sometimes with a major role from husbands. On the other hand, when it is the matter of farming, in most cases husbands seem to not be involved. As it has been explained by women of Nyamugali sector, wives make decisions because their husbands do not care much about farming activities. This is seen mainly in households where husbands have non-farm jobs in the cities (Individual interviews & FGDs, March 2019).

Unilateral decisions: this is the situation where husbands are dictators. They make decisions alone and impose on their wives. According to participants these cases are not many, since the government of Rwanda has strictly asked local government entities to oblige unmarried couples in households to marry and register their matrimonial property. This has protected many poor rural women about land rights and a man cannot sell a shared family land without a signature of his wife. However, some men still take alone decisions about land use without any consultation with their wife (Individual interviews & FGDs, March 2019).

B) Gender roles

To find information about gender roles in taking and practicing strategies of climate change adaptation, participants in this research have been asked the following question “*To put into action those measures, what is your role and what is your spouse’s role?*” The results to this question showed that collaboration between women and men in climate change adaption activities has two levels. The *first level* is where both collaborate entirely. Here both can do all activities togeth-

er, or each one can do his/ her own activities depending on experience, physical capacity or division of work as long as they accomplish what they have planned together. For example concerning the physical capacity or division of work, both male and female respondents agreed that in most cases when it is time to plant anti-erosive plants/trees, husbands dig holes while wives plant trees. Husbands are also more likely to make erosion control drains while wives plant grass like vetiver or reed. Here, it does not mean that wives cannot help their husbands.

In addition to that, the task of looking for money is mainly assigned to husbands rather than wives, as affirmed by most respondents. In the case, when husbands are not around, wives occupy agricultural tasks combined with domestic roles while their husbands send money for support (Individual interviews & FGDs, March 2019). However, participants affirmed that in some cases men can stay home with kids while women have gone for small business, like selling fruits and vegetables grown in marshland. For the *second level*, the collaboration between women and men is very low due to the intra households' conflicts which are, in most cases prompted by men. Responses on this issue have shown that men are causing the conflicts which occur in these households even though some cases of women causing conflict have been also raised.

According to the research participants of (both men and women) who witnessed something to this issue, the misunderstanding between women and men occur mostly when men have bad behavior of irresponsibility and unconsciousness to issues of household especially during worsen situation of climate disasters. In some instances, the narratives of participants have revealed the cowardliness or weakness of men in front of household's problems. Some husbands plan together with their wives what to do as survival functional strategies, but they fail to accomplish plans.

"During drought-related hunger I used to plan with my husband together to look for part time jobs. Early morning we go, and evening we come back. When I arrive home, I take the money gotten and look for something to eat home, but my husband instead of bringing money home for food support, he passes in the bar to enjoy with his friends while taking alcoholic drinks. When he arrives home, If I ask him money for children's food, he says "it's up to you to take care of them because you gave birth to them" (Individual interview, March 2019).

This is the sad story from one woman interviewed in Gatore sector (pseudonym "*Bravo household*"). This woman said that the behavior of her husband has caused conflict so that during climate disasters it's hard for them to collaborate and cope with the situation. This case is similar to other cases which have been emphasized by some women and men, in FGD in Nyamugali sector.

According to the interviewed farmers, rural women use to keep small livestock like goats, pigs and sheep. When hunger comes men and women agree to sell one

of the livestock in order to find money for food. Therefore many wives permit their husbands to take a goat for example to the market since men are better in bargaining and sell at good price. After selling men take half of the amount received to buy food and keep the rest. After a few days when that food is over, wives ask husbands the remaining balance in order to buy other necessary food. In this case many husbands do not provide the remaining money because they have already spent it for alcohol drinking instead of households' issues (women & men FGDs, March 2019).

On the other side, women have witnessed that some men are coward in front of problems of their households during climate-related disasters. Participants in this study have also mentioned some men who turn away from the stress due to the complexity of households' issues in relation to climate change, notably hunger and poverty. Most of these men prefer to go to cohabit with widows who have everything to take care of men (Women FGD, March 2019).

However, participants mentioned some cases of women who do not accomplish their households' roles and responsibilities. Even though men are more often the reason for conflicts in households due to their improper behavior, it does not mean that all women are perfect, as it has been discussed by both interviewed groups (group of women and groups of men). These participants agreed that if a woman does not fulfill domestic roles, has no characteristics of femininity, and makes her husband unhappy, this can be a source of domestic conflicts (women & men FGDs, March 2019).

According to them, such cases are more seen in households where men have moved to other parts of the country notably in cities in search of jobs. To this point of view, a participant in Gatore sector has highlighted a case of her neighbor household (pseudonym "*Delta household*") where conflict has been caused by a woman who did not accomplish her roles as a wife. When her husband moved to Kigali for job purpose, after few months, she started to join a group of women who have inappropriate behaviors and attitudes. She started to frequent pubs for drinking local beer as well as taking drugs like "urumogi" (cannabis). She had no time for agricultural activities, taking care of children, washing, and cooking for them and other domestic cleanings. When that information reached her husband, he came back home, but the woman did not change, with no respect to her husband. From there, conflicts started till they even used to fight each other. They became poor and faced hunger hence agricultural production has been totally curtailed (individual interview, Gatore, March 2019).

Households with conflicts have more challenges of making plans for their lives including climate change adaptation, as compared to non-conflict households. Gender inequalities affect the ability of farmers to respond to climate change. Violence, lack of decision making and communication between spouses caused by bad behavior, attitudes, and lack of responsibilities of one spouse, hinders the planning

and implementation of climate adaptive activities. As it has been explained by KIREHE District staff, lack of common understanding between spouses is a barrier to household's adaptation ability, as behaviors and attitudes of one spouse discourages the other one to work hard to cope with climate hazards.

“Here at the District, in the office of the department of Local Governance we receive many cases of children and even women who have problems of hunger because of conflicts in their households. Households with conflicts, spouses lose their time in disputing, fighting instead of working. If for example they need to go to mulch their field to avoid soil erosion, they cannot have the courage of doing it if they have been fighting along the night. Even when someone is in conflict with his/her partner, cannot plan and implement common goals. So, this has a big impact to the household's livelihood” (Individual interview, District staff, March 2019)

According to the interviewed group of men in Nyamugali sector, many decisions at household level are taken at night when both spouses are together. As these men have explained, a “bed” is a right place to take right decisions and plans. When spouses are in unresolved conflicts, it's always hard for them to agree on something important for them. It is difficult for them to agree on land use and farming system, they also fail to make savings for agricultural production as well as food for future climate hazards and shocks in case they happen. Thus, when they have common understanding, it's easier for them to collaborate and put into action what they have planned to include climate change adaptation measures. A Rwandan proverb says *“abishyize hamwe nta kibananira”* (literally translated “union is strength”), to mean that when people join their efforts, they become more powerful and achieve their goals easily in comparison to people who work by themselves (Men FGD, March 2019).

5.3. Adaptation strategies Intervention of “GALS” approach in empowering farm households' adaptation capacity to cope with climate change impacts

5.3.1. How des GALS work to change behaviours?

To change behaviors of farm household members, the NGO SAFE provides trainings on how to change farmers' livelihood in different areas such as agriculture, food security, health, education, gender equality, financial services etc using the approach “GALS” (Gender Action Learning System). Some trainees called “champions” receive advanced lessons in order to enable them to train others in different villages through field visits. Therefore, during fieldwork, I was interested

to know if all participants in my study recognize GALS, and their opinion on whether farmers' behaviors towards climate change adaptation have been changed by GALS or/and if there have been other interventions. Few farmers, who were not champions, had no idea about GALS or SAFE.

Some farmers who have appreciated GALS approach, have explained how GALS has changed them. Among them, some told me that they will never forget some GALS tools which have made great changes in their households. Popular tools mentioned by participants were, "Diamond dream", "Gender balance tree" and "Vision road journey" (Individual interviews & FGDs, March 2019). According to a SAFE staff, many different tools have been used depending on different elements, such as objectives of the lesson, participants' characteristics, and history, etc. She additionally explained how for the first days of training participants start by evaluating their behaviors using "Diamond dream" tool. In this case, women share what they like and dislike to men and vice versa. After sharing good and bad behaviors, they discuss about what needs to be changed and what needs to be enhanced.

In this lesson, every participant thinks about his/her bad behavior which causes problems in the household and commits to go and change. After a certain period, they come back to do progress evaluation where they share benefits and challenges from new way of behaving and get advices from others. According to SAFE's report, this evaluation is made through an exercise called "Participatory Gender Review" (PGR) which aims to evaluate achievements, and change made by beneficiaries of GALS lessons in their households. Main tools used in this exercise are achievements journey, challenges and solutions related to climate change, and multiline highway (SAFE, 2018).

When participants start to understand roots of their problems and look for solutions, it is from there that other tools can be used to help them to know their rights, gender equality, collaboration, life goals and plans, climate change adaptation, climate adapted agriculture, financial services etc.

5.3.2. Transformative changes in households' lives

To transform livelihoods of farm households in KIREHE District, systematically through "GALS" approach, SAFE helps women and men to change their behaviors and attitudes in order to cope collaboratively with climate change impacts. First of all, improving the quality of relationship of spouses in households is the foundation upon which other steps are built on. When spouses have common understanding and are jointly ready to collaborate in addressing all households' matters, then SAFE helps them to plan and put into action strategies of adaptation to climate change for increased production in particular and fighting poverty in general (Individual interview, SAFE Staff, March 2019).

A) Gender equality and conflicts resolution

Before helping couples to improve the strategies of climate change adaptation, SAFE use to empower their relationships. Therefore, SAFE has facilitated some couples which had perpetual conflicts to achieve solutions. Despite these households in perpetual conflicts, SAFE has helped many other couples to improve the quality of their relationship through avoiding any form of gender violence and respecting rights of every household's member. During the interviews with the District staffs, they affirmed that they knew three couples who had endless conflicts which affected their livelihood, worsened children's' lives like malnutrition and school dropout. Nevertheless, after learning GALS, those couples have achieved likable step so that even neighbors have appreciated the good work done by SAFE. According to the District staffs, all those couples have ended conflicts, have increased agricultural activities and production, their children get good diet and have gone back to school. (Individual interviews, District staffs, March 2019). As it has been also testified by one male participant in Nyamugali sector, GALS is considered as "*amababa y'umumarayika*" (literally means "angel wings") which have guided their household.

"I am a man of sixty-five years old who have a wife and three children. The elder is a girl and others are boys. One day, my daughter has been pregnant without a husband, which caused me to become very angry. During her pregnancy time, I used to treat her in improper way. I have insulted her even sometimes beaten her. But my wife was against what I was doing against her and my sons were not happy for that. I suspected my wife to influence my children to be against me. From there, conflicts started nonstop in our home until I decided to stop them to access some fields. However, after attending GALS trainings, I tried to think twice and change my mind. I realized that conflicts in our household were based on my worst fault. I asked forgiveness to my family and now we pray, we plan and work together with equal rights to every property including land. We have a good farming system adaptive to climate change so that we have increased agricultural production" (Individual interview, Nyamugali sector, March 2019).

B) Improved climate change adaptive capacity

Almost all participants in this research, especially champions, have explained how they have achieved good step in increasing agricultural production due to the efforts made on methods of adaptation after learning GALS. They argued that the collaboration between households' members in planning and implementing adaptive farming systems, has changed their lives at noticeable level (Individual interviews & FGDs, March 2019).

Research participants have revealed some improvements done by farm households in practicing farming systems which are adaptive to climate change. The results showed that depending on type of crops, land physical character, soil type, period and type of climate disaster, every household choose its own method accordingly. To simplify the presentation of these practices, I classified them into two categories basing on two types of climate related disasters found in KIREHE District.

Practices against drought: Drought is the most common climate disaster in KIREHE District and the big part of South Eastern Rwanda. It is also the most common disaster which severely decreases agricultural production in the region. Therefore, farmers have improved different practices to adapt, like increasing the cultivation of drought tolerant crops like banana and cassava. According to participants, cassava can last four years in field without a problem. Some farmers have also joined cooperatives, which cultivate rice in marshlands. For some crops, especially maize, farmers have increased mulching system by covering soil with dry grass to keep the soil moist during the dry season. Another technique of maize farming learnt by farmers through GALS, as it has been explained by some participants, is to plant maize on lines with convenient spaces and dig small holes beside every plant to maintain water for some days (Individual interviews & FGDs, March 2019).

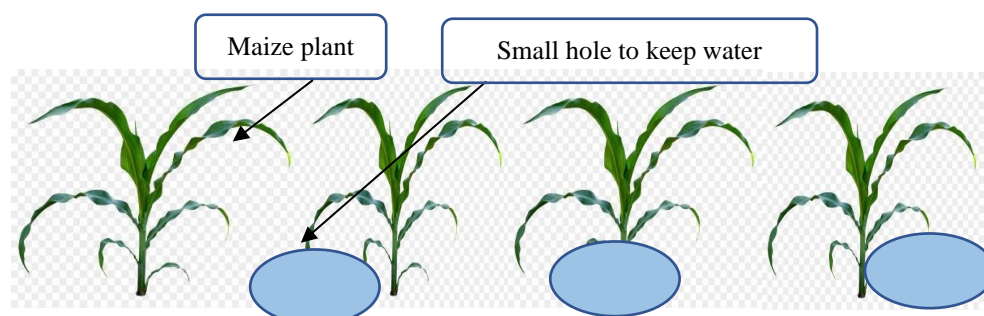


Figure 5. Adaptive techniques in maize planting

Source: Adrien Mutarambirwa, 2019

To grow vegetables, many households have also increased kitchen gardens and rainwater harvesting systems to irrigate vegetables.

Practices against storm: heavy rain mixed with violent wind has a great negative impact on farmers' agricultural production. Therefore, after GALS' lessons, households have also improved the technics for coping with erosion, landslides and wind. For erosion and landslide, common technics are digging anti-erosion trenches and plant grass lines (Vetiver, reed plants etc). They additionally plant some fast-growing trees, which can protect their fields against the strong wind and

landslides, like cassia trees as well as grevillea. Beside protection, these trees fertilize their fields, and produce animal fodder (Individual interviews & FGDs, March 2019).

Some participants have emphasized the importance of use of manure and mulch based on double function. According to them, due to GALS lessons they have had a good experience in practicing farming systems, which is adaptive to both droughts and heavy rain. On one side, when manure is used properly, it enables soil to have stability since it allows water to infiltrate quickly and avoid erosion during heavy rain.



Figure 6. Anti-erosion trench with reed plants lines, Nyamugali sector

Photo: Adrien Mutarambirwa, March 2019

Manure can also hold some amount of water to be absorbed by plants during droughts. Mulch helps the quick infiltration of water during heavy rain and decreases evaporation of water from the soil (Individual interviews & FGDs, March 2019).

A) Livelihood diversification and change in gender roles

Interviewed farmers notably champions have also mentioned that GALS' approach has increased the level of collaboration between women and men. For them, during climate-related disasters which came after complying with GALS approach, women and men started to diversify livelihood collaboratively in order to cope with natural shocks. Among possible forms of adaptation explained by participants in this study, many of them were based on diversification of income like moving in search of wage labor, starting small business etc.

These have changed traditional roles and responsibilities assigned to both women and men. For instance, traditionally men used to leave home and go to look for money through business or jobs while women stay home for other domestic roles. However, during recent drought (2018), some women left home for small business such as selling fruits and vegetables while men stayed home doing other activities including taking care of children. In addition, some men have allowed their wives to move more times for meetings in saving and credits groups supported by some projects operating in the District. As most of these projects provide financial education, some women start to practice savings, borrowing and investing. Thus, some women were involved in small business and had short time for doing domestic tasks. In this case, some domestic tasks were performed by their husbands. Women in this study affirmed that when there is collaboration among household members during natural disasters, it doesn't matter for men to do tasks which are traditionally assigned to men such as cooking or taking care of children. Moreover, throughout drought a number of men are responsible for fetching water since distance is too long. Furthermore, concerning the agricultural activities or activities of reducing risk, participants affirmed that when there is collaboration between households' members, the task assignment is no longer gender based. For instance, traditionally weeding and sowing were an activity assigned to women but when natural disasters come, men and women need to work together in all agricultural activities including weeding in order to cope collaboratively with climate change (Individual interviews & FGDs, March 2019).

B) Increased productivity, profitability, and sustainability

Changes made on behaviors and attitudes of households' members especially women and men, have improved conditions of life. Men participating in this study have argued that GALS has changed their bad behaviors including over-expenses linked to alcohol and cheating their wives, and lack of respect to women's rights. Some women have also explained how they changed. They received new knowledge and could take part in some activities of adaptation in agriculture like making anti erosion channels and planting trees. The increased collaboration and common understanding on different matters of household, from planning to the execution, has been pivotal pillars of households' development (Individual inter-

views & FGDs, March 2019). Almost every participant in this research had something to say about the benefits got through changing behaviors and attitudes. Changing farming systems collaboratively has increased agricultural production, increased food security, and reduced poverty. For instance, the drought that occurred in 2016 has severely affected farming activities. Due to some intervention in climate change adaptation that took place in 2017, the subsequent drought that occurred in 2018 did not have drastic effects on farming activities because farmers had improved the coping mechanisms. Some of participants have testified how they have increased agricultural income generation, increased assets and livestock, and how they have increased financial services like opening bank accounts and savings. A man who participated in FGD of men (non-champions) witnessed how GALS converted his bad life into wellbeing.

“Before GALS, I was lazy and dictator and my wife had been doing almost all agricultural activities alone. Even the little money I had been getting from part time jobs, I used to spend it in drinking alcohol instead of supporting household’s plans. However, since I joined GALS, I started to recognize my bad behaviors and feel sad of many disappointments that I did against my wife. It was very hard for me to ask pardon from wife because I was so ashamed. I tried to reduce drinking alcohol and increase help to my wife in agricultural activities. Therefore, our relationship has started to be ameliorated and one day I dared to ask pardon in front of her. She forgave me. From there, we made plans for our household’s development according to lessons from GALS, notably farming system in accordance with climate change. I also used to save money from off farm jobs for agricultural activities support especially for renting land, paying labor and buy fertilizer. After only one year, we are now cultivating three fields instead of one as it was before. Each season we try to increase agricultural production to the level of taking surplus to the market, last month we bought one cow and now we have 80,000 Rwf (Approximately 85\$) of savings on SACCO bank account and we are planning to start renovate our house next year or build another house instead” (FGD testimony, March 2019)

To sustain lives of farm households of KIREHE District, SAFE uses a particular systematic transformation process to avoid households’ future falls. According to a SAFE staff, the objective of GALS in the project context is to support farm households to improve in sustainable way *“we help them not to build on sand”*. “Build on sand” is the idiomatic saying taken from the Bible to mean “putting something on insecure or unstable foundation. It is commonly used in relationships or business. In this context, SAFE did not want to push small farmers towards climate adaptation while they are not stable in their households.

5.4. Constraints encountered in GALS implementation

The above-mentioned cases revealed the success stories of GALS approach in encouraging collaborative climate change adaptation and gender equality in rural households. However, there are still ample cases of constraints encountered by both SAFE staff and champions in persuading SAFE beneficiaries to change their attitudes. Challenges were faced by SAFE staff while trying to teach farmers gender equality in their households. The first stage was the training of trainers (champions) who were in turn supposed to train their spouses and neighbors. The resistance of trainees was mainly due to the traditional beliefs of farmers who are conservative. In addition, champions have also been challenged while training their neighbors and partners. Many of the identified champions were female and they could not easily teach men who, in most cases, scorned them.

5.4.1. Hindrances faced by SAFE in the implementation of GALS approach

In general, all champions know the GALS approach better than others, but a few non-champions do not know GALS at all. For those who do not know GALS, they have explained that what they do as adaptive farming systems, they have learnt it from agricultural instructors sent by local government agricultural officers. However, some of them mentioned about “*champions*” but they do not know who sent them.

SAFE has strengthened gender equality in a number of households as it has been affirmed by people interviewed, both individually and in groups. The key informant from SAFE has explained that most households of farmers have problems of gender inequality which hamper their progress. Therefore, strengthening gender equality among them is pivotal strategy before building their capacity towards climate change adaption for increased agricultural production. However, it was not easy to change the mindset of men towards gender equality; some of them have categorically refused to adhere to GALS approach. Changing behaviors of GALS beneficiaries especially men, is not an easy task for SAFE.

According to SAFE staff and some GALS champions who participated in this study, the first challenge, which had come up during the first trainings was to convince someone to change his/her negative behaviour which in most cases bothers others. In some cases, men did not understand the purpose of SAFE; they thought that the intention was to belittle their traditional ways of ruling in their households and hence undermine their power. Some men who are too radical and stubborn could not understand how a “real man” can stay home in the evening waiting for the food to be ready instead of going to the village centre to meet other men while drinking beer. SAFE decided to extend the time of trainings and increased the budget in order to provide strategic lessons which could help to progressively per-

suade categorical beneficiaries. Gradually, some started to understand that collaboration with their wives have a lot of benefits to achieve their goals. Others accepted but failed to execute what they had promised to change like reducing drunkenness, beating and harassing their wives. In the phases of follow up, SAFE's GALS trainers had used to carry out special visits to households which had resisted, in order to convince them. In addition, SAFE had conducted study tour for couples in conflicts to observe and learn from other couples who had already adhered to GALS approach.

In other instances, men did not feel comfortable to be taught by women who are traditionally thought to be inferior. It appears that the approach of teaching female champions who are supposed to teach other, failed to some extent. Due to the traditional structure of the society which tends to underestimate women, the identified women did not manage to convince men. In this case, SAFE had to organize a second round of training which included a larger number of men. During field work, I personally had an interview with a woman in Nyamugali sector who is in conflict with her husband. The interview took a long time because she emotionally started to cry incessantly when we were discussing about collaboration with her husband.

"We have a field where we normally get a yield of 600kg of beans. But in last season due to the prolonged drought we only harvested 150kg. Because I and my husband had planned to organize baptism ceremony for our child at the end of the season, I decided to sell only 50kg of beans to get at least little money to help us to in ceremony. In the 100kg remained beans we took some as planting seeds for next season. But last week when I came back from a meeting of farmers' cooperative, I saw that my husband had sold almost all of the rest of beans. When I asked him, he told me to shut up and pushed me away till I fell down. I could fight with him but because I have recently started to learn GALS, I became patient otherwise one of us could be injured or be in jail".

After this story in (pseudonym "Tango household"), I asked the woman if her husband doesn't learn GALS, she said "no". I asked "why?" she told me that champions came a few times to teach her but that she is not yet able to teach him. However, she suggested that SAFE should come and teach both since her husband is "umunyamahane" (truculent), it is not easy for her to teach him.

5.4.2. Challenges faced by GALS' beneficiaries

While practicing what they have learnt, GALS' beneficiaries met ample impediments. As they have explained, some farmers who are trained and convinced, fail

to put in practice the lessons due to a number of reasons, which include the following.

- In GALS' lessons they have been mobilized to plant as many trees as they can, but they cannot find enough trees to plant because of insufficient tree nurseries to provide enough trees in the region. Available tree nurseries have mostly a type of "grevillea" which is not compatible with their crops. They need "calliandra" and "cedrela" instead. There are other issues like insects (termite) which feed on planted trees.
- There is a dearth of microfinance institutions which would help small farmers to get loans without complications in order to enhance climate adapted agriculture. As they have argued, available IMFs like SACCO require a lot of money for deposit (25 percent of the loan sum) in order to give a loan. Informants suggested to insert a component into GALS, which can link farmers to IMFs
- It is not easy for champions to teach others. Non-champions think that champions get money from SAFE and want to use their time for nothing.
- Some female champions face a problem of teaching their husbands who are dictators. They suggest SAFE to approach men who are dictators in their households to help their wives to have starting point.

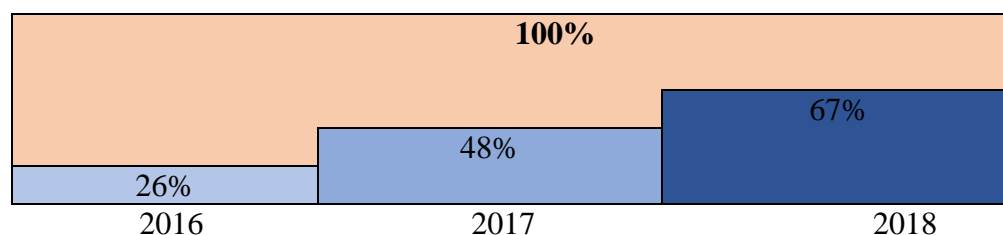


Figure 7. Timeline of behaviors change in rural households subsequent to GALS initiative

Source: SAFE Overall report (2018) (reproduced with permission from SAFE)

The figure above shows the timeline of the process of SAFE beneficiaries in adhering and adapting to the GALS approach. As indicated on the figure, the mindset of farmers has been changing gradually from 2016 up to the end of 2018. The figure illustrates the resistance of farmers in the beginning of the process; only 26% of the approached rural dwellers accepted to adhere to the GALS approach in 2016. As afore mentioned in the challenges that GALS has gone through, SAFE has encountered difficult impediments and most of them were related to the resistance of some household members who could not be easily convinced. Based on the success stories of the farmers who had accepted to adhere, others, but not all, have eventually been persuaded and accepted to change in accordance with the regulations of GALS. Generally, it's not easy to change people's culture and

mindsets, that's why some households started to understand and change behaviours after a relatively long time, from one year and more.

6. Discussion

This chapter discusses about the major themes and insights that emerged from the empirical findings of the study. In light of the theoretical framework and the literature review presented in the first parts of this work, this section analyzes the results of the study in relation to the research objectives. Based on the interpretation of findings, this discussion sheds more light on the research problem and also backs up the generated ideas by the information retrieved from relevant literature. The discussion particularly focuses on how gender relations and climate change adaptation are connected. In this regard, three themes have emerged from the results of this study and are critically scrutinized.

The first theme discusses about the interplay between gender relations and climate change adaptation while the second part concerns with the role of male out-migration as climate change adaptation. Lastly, the discussion stresses on the adaptive capacity of rural households subsequent to the implementation of GALS approach.

6.1. Connection between gender relations and climate change adaptation

6.1.1. Unpacking womanhood and climate vulnerability in agrarian settings

As aforementioned, one of the aims of this study was to scrutinize the gender aspects of climate change adaptation in the Kirehe District. Although climate change affects the livelihoods of both women and men, this research has revealed that the vulnerability level and adaptive capacity differ remarkably. Through discussions and researcher's observation, this study has unveiled the differences in adaptability to climate change between men and women. In most of the cases, women are likely to be more vulnerable than men as they directly face the burdensome effects of climate change. This becomes more severe when their husbands are troublesome

and do not work collaboratively in coping mechanisms. More than men, women endure heavy workloads during and after climate change related hazards. For instance, female dominated tasks such as fetching water, collecting firewood and harvesting in the fields that are affected by the hazards, as well as searching for food for cooking, becomes more burdensome during drought periods. This is in line with a number of studies conducted in different parts of the world, which point to the same conclusions. For instance, Arntzen (2015) argued that the complexity of managing household issues leads to increased workload to women during and after natural disasters, and put them into vulnerable situation. Similarly, the existing gender inequality is magnified by climate change impacts and women are more affected than men (UNFCCC, 2015). In defining vulnerability, IPCC (2007), stresses on the level at which a system or individuals are susceptible to climate change effects. In the context of gender and climate change impacts in Kirehe, vulnerability is understood as a state of being exposed to the detrimental effects of climate change and not being in a position to properly cope with them. Although women face increased vulnerability to climate change, they are good managers and have various skills to resist and survive in harsh conditions. Some women in KIREHE expressed how they have tried to manage situations alone without help of their husbands. For them, if they had benefited from support from their husbands, they would have achieved suitable adaptation to climate related disasters. These insights are in consonance with the report of UNDP (2011) which affirms that women can help to respond to climate change since they have local knowledge and skills which complement that of the men, and in most cases, it is unrecognized. These may include growing crops that are suitable to climate conditions, selecting appropriate seeds and sowing seasons (UNDP, 2011).

The vulnerability of women to climate change in Kirehe is exacerbated by the social norms and customary laws, which gives men an authoritarian power and which strictly assign distinct tasks between men and women. Following Jerneck (2018), social norms can shape responsibilities in production and decision-making. In the case of vulnerability, men and women are affected in different ways. In the studied villages, men and women are assigned different tasks in farming activities and some of the duties which are related to climate change adaptation are wholly left to women. For instance, women are engaged in harvesting wild edible varieties during and after disasters.

Furthermore, research participants in this study, notably women, have also argued that men are in many cases irresponsible and selfish in household's chores. This irresponsibility of men is, to some extent, attributed to the culture and religion which give them the headship of the family or "*umutware w'urugo*" in local language. Even if this is culturally and traditionally accepted in Rwandan society, women still consider this attitude as irresponsibility of men. This puts men in an autocratic position (Overall chief) and in some cases they are the sole decision

makers. By doing so, their behaviors play a big role in increasing vulnerability of women to climate stressors since women are solely engaged in the domestic chores which are related to climate change adaptation during and after disasters. This traditionally accepted culture exacerbates gender inequality and pushes men to flee their responsibilities even during and after climate related disasters.

As I have presented it in results section, many wives take care of children alone without being helped by husbands. For instance, if I recall the case of a wife (in Bravo household) who went together with her husband to look for a job in order to obtain money for survival during drought-related famine, the wife used her money to feed children while her husband used the money to buy alcoholic drinks.

The worst behavior is that when the wife asked the husband to support her, the response was *“it’s up to you to take care of them because you gave birth to them”*. One may wonder if the husband is aware of his parental responsibilities. Who should be in charge of looking after children and who should not? Many wives in farm households of KIREHE are disappointed by their husbands’ behavior when it comes to responsibility sharing and climate change adaptation in particular. This is because during and after climate related disasters, women are more burdened as they work in harsh conditions and have heavy workloads compared to the time without climate stressors.

Many studies have concurred that rural women are overly burdened, and it is culturally accepted in many societies. In addition to taking care of the children, women are wholly engaged in other domestic chores and farming activities (UNDP, 2011; Yavinsky, 2012; Haque Mondal, 2014). During and after climate-related disasters, the workload of women increases since women have multiple roles and responsibilities as family breadwinners (Arntzen, 2015).

As food producers and providers as well as care givers, women are likely to perform all activities required such as collecting firewoods, fetching water, prepare food, washing clothes, prepare food, taking care of children and husband. Most of these activities are based on natural resources and it becomes harder to perform them in time of hazards caused by climate change. This is due to depletion of natural resources and decreased agricultural productivity notably during droughts (Arntzen, 2015; Haque Mondal, 2014). For example, distances to travel in search of water, fuel and fodder for livestock increases during droughts (Yavinsky, 2012; Rao et al., 2017). This increases their vulnerability to climate change impacts and decreases their adaptive capacity (UNDP, 2011). Similarly, Yavinsky (2012) argues that women are still engaged alone in traditional roles of taking care for not only children, but also elderly as well as sick family members.

There is an apparent paradox involved in the exaggerated irresponsibility of men in Rwandan culture and many other cultures. Culturally, a man, so called *“umugabo”* in Rwandan society is to have qualities of provider and protector for family members instead of using leadership responsibility as an opportunity of mistreat-

ing them. This falls into the same line with what some participants in this research called “cowardliness” of some men who deviate from qualities of a “*umugabo nyamugabo*”, which literally means “real man” according to Rwandan culture. Nevertheless, increased vulnerability of women to climate change is not only caused by social and cultural norms which give less power of decision making to women and heavier roles and responsibilities. It can also be due to biological reasons as in a few cases raised by participants during field work. During droughts, some pregnant women in KIREHE district face a problem of miscarriage. Other studies have revealed that vulnerability may be increased by biological factors like and physical conditions. For instance, increased heat or humidity affect women’s health status and high temperatures during prolonged droughts lead to more malaria transmission (Yavinsky, 2012). However, higher vulnerability of women to climate change is mostly caused by social institutions rather than biological or physical factors (UNFCCC, 2015).

6.1.2. Paradoxical perspectives on male-out migration – A livelihood strategy or a flight from responsibilities?

As observed in many parts of the world, a diversified rural livelihood is more resilient and sustainable than undiversified livelihood because it enables adaptation to natural stressors (Ellis, 1998). Thus, in agrarian communities, farming alone, is not sufficient as means of survival. Households need diversified income generated from other off-farm and non-farm activities to reduce livelihood vulnerability (Ellis, 1998). As a key livelihood strategy, temporary male migration, in search of jobs, is an important source of income and increases adaptation capacity for rural households in KIREHE District. Households decide to send men to look for jobs in urban areas, since women have a lot of domestic responsibilities as it has been discussed in the sections above. However, evidence in KIREHE have also showed controversial outlooks on male migration as an adaptation strategy to climate related shocks. Based on the prevailing situation in the studied areas, one would not doubt that outmigration of men is a livelihood strategy which is used to cope with natural hazards. On the other hand, some men use male out- migration as a way of fleeing responsibilities especially in time of households’ ill-being. Participants in this study notably women said “*Yes! We agree that when husbands have left us for job target, it helps us to recover from environmental shocks since they send remittances, but for many of us things changed slowly to the worse situation*”. They affirmed how in some households; women left by their husbands are more vulnerable to conditions of climate change. Their perceptions are similar to the research findings of the study conducted in northern Mali where men consider migration as an easy and quick adaptive strategy whereas it increases vulnerability to women

(Mersha, 2018). Similarly, IOM (2013) pointed to similar dynamics; inequalities between women and men can be exacerbated by migration since it can amplify poverty and increase vulnerabilities of left- behind women (IOM, 2013).

To illustrate, in one of the studied households in Kirehe District (Alpha household), a man migrated to the city in search of employment opportunity. For the first months, the man managed to send remittances as promised to his wife but gradually reduced the amount of money and finally stopped. The man married a second wife in the city and the livelihoods of the old woman was detrimentally affected because they were experiencing prolonged drought in Kirehe.

For Chandni (2019), migration can improve wellbeing of household as mode of adaptation since it leads to positive outcomes that help to cope with climatic shocks, but it also exacerbates vulnerability because it puts heavier burden on those left behind (Chandni, 2019; Assan et al., 2018). Looking at the burden of the wife left at home and the miserable situation of the whole family in “Alpha household”, it is beyond doubt that male migration can change household structure and lead to intensified vulnerability to climate risks. The “Alpha household” started to face poverty, hunger and even diseases. The first born of the family who is a teenage girl dropped out of school and became a maid in Kigali in order to earn money to support her mother and siblings. The worst thing is that the young lady became pregnant and decided to take the new baby to her mother in the village, even though the household was not economically stable.

According to IOM, (2013), *“Environmental migration should not be understood as a wholly negative or positive outcome – migration can amplify existing vulnerabilities and can also allow people to build resilience”*. However, my view is that many researches have emphasised on positive effects of climate change migration as important strategy of adaptation and paid less attention to its negative impacts to households’ livelihoods.

6.2. Adaptive capacity of rural households subsequent to the implementation of GALS approach

Referring to the empirical evidences presented in this thesis, testimonies of trainees in GALS approach has revealed that it has helped them to address gender issues, especially in situations of dealing with climate change related hazards, and to overcome some problems in their households. This research has revealed that the GALS approach has considerably altered the mind set of rural households with regards to climate change adaptation. These changes are, in most cases, prompted by the betterment of gender relations at household level.

Women and men have been taught to collaboratively diversify their livelihoods, in order to cope with shocks and optimize adaptive interventions. To exemplify, through GALS lessons, women have acquired business skills and have joined saving and credit groups. This has enabled women to start petty businesses that helped households to generate additional income. Moreover, GALS approach has affected the decision-making process at household level; after the training, men and women decide on land use especially on the appropriate crops to be grown on a particular piece of land. Regarding farming activities, men and women have opted to work together on agronomic practices that are intended to reduce the harmful effects of climate change. These involve growing drought tolerant crops such as cassava and banana, mulching to maintain soil moisture, appropriate spacing between plants, establishing rainwater harvesting systems and kitchen gardens that helped to improve nutrition during prolonged droughts. In order to cope with drought and floods, farmers have been trained on erosion control by using anti-erosion trenches, planting fast growing trees to protect crops against strong winds, fertilize fields and provide fodder for livestock.

Following Mersha (2018), action in climate change adaptation needs transformative learning of agrarian community focusing on women and men along with technical courses of agriculture extension. This backs the above-mentioned findings that shows how GALS' trainings have helped SAFE beneficiaries to cope with climate related shocks in farming activities.

However, as noted in the previous chapter, the situation is quite different in households that categorically resisted or refused to adhere to GALS approach. In some

instances, the trained farmers did not immediately accept the advice of SAFE and refused to comply with GALS approach. They decidedly stuck to the traditional gender-based task assignment which, in most cases overburdens women and exacerbates their vulnerability to climate change.

6.3. Improved gender relations as a road to improved adaptation

SAFE has enhanced the adaptive capacity of rural households by bringing about income-generating activities. This initiative helps to diversify the sources of income and hence cope better with the hazards, which jeopardizes their usual source of income (agriculture). In addition, many projects in the District tend to target women as beneficiaries. These projects encourage women to join saving groups and microfinance institutions.

As most of these projects provide training in business, some women start to practice savings, borrowing and investing. Thus, some women were involved in small business and had short time for doing domestic tasks. In this case, some domestic tasks are performed by their husbands. To me, this is a milestone in climate change adaptation because, by being engaged in non-farm activities, women will create sustainable livelihoods.

These findings complement what has been found by CARE in different African countries where some women played greater roles in income generation during climate related hazards, while their husbands were taking up new roles of taking care of children as well as food preparation (CARE, 2015).

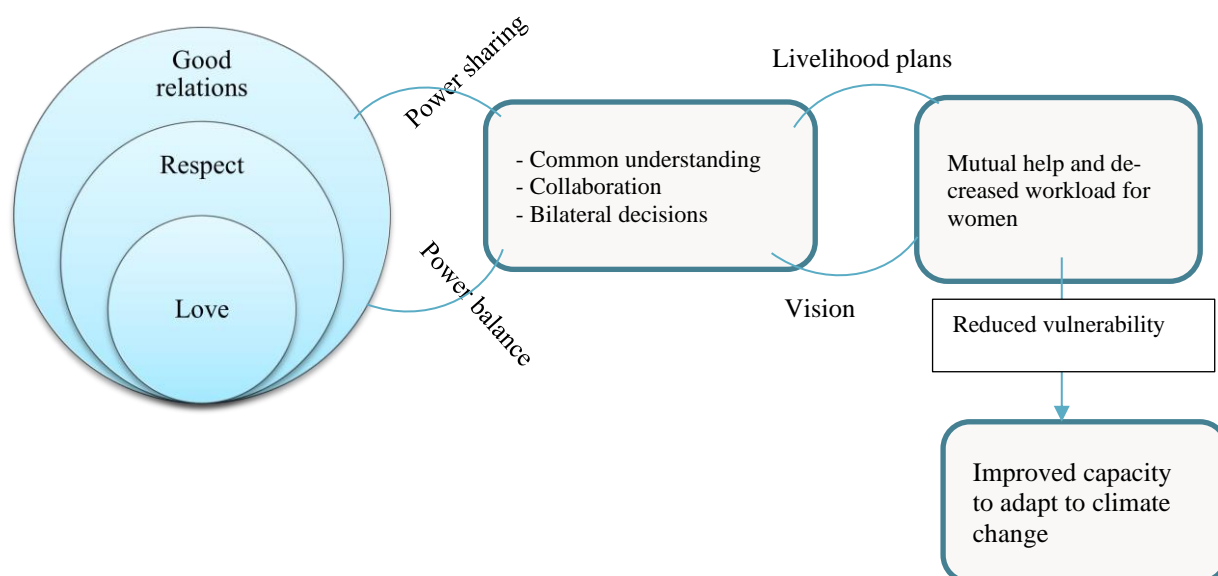


Figure 8. Gender equality as a driver of climate change adaptation

Source: Adrien Mutarambirwa, 2019

Women in this study affirmed that when there is collaboration and mutual respect between household's members, it is much easier to adapt to natural disasters. For instance, during prolonged droughts, a number of men take responsibility of fetching water since distance is too long. This goes in line with CARE International's report which stresses on how women and men take new roles to manage climate change impacts (CARE, 2015). Similarly, this research has revealed that women participate in activities of making anti-erosion trenches and planting trees which are traditionally assigned to men. In the same way, men participate in weeding, which is socially attributed to women. Both men and women together select the type of crops to cultivate, suitable time for planting and mode of fertilizing and harvesting.

6.4. Connection between SAFE's mission and the prevailing situation. Are the goals achieved?

As aforementioned, through GALS approach, SAFE has remarkably contributed in the livelihood change. In many instances, these changes are due to the transformation of gender relations in the households of the rural dwellers that benefited from the training of SAFE. The research has revealed a betterment of power relations between men and women subsequent to the training provided by SAFE. The noted improvements are, to some extent, connected to the change of farmers' attitudes towards climate change adaptation. However, as shown in the previous chap-

ters, SAFE has encountered a number of constraints in the implementation of GALS approach and this has undoubtedly affected the results.

One of the missions of SAFE was to help farm households of KIREHE District to increase their adaptive capacity to climate change through improved gender relations in rural households (SAFE, 2018). However, the research has revealed that there is still a long journey for SAFE to change behaviours of all beneficiaries which will cost extended time, financial means and new strategies. Despite empirical evidences and reports of SAFE which have shown a better change in GALS beneficiaries notably champions, the study has unveiled some households which are still resisting and which need further assistance.

Almost a third of participants, especially non-champion women, have disclosed that adaptation capacity is low due to some bad behaviours of their husbands like drunkenness and dictatorship as it has been shown in the case of “Tango household” (mentioned under section 5.4.1) Based on this information, I have found out that the process of changing behaviours of non-champions will take longer than compared to my previous expectations due to two reasons: The first reason is that it’s harder for women to change their husbands, especially those who are stuck to the traditional cultural norms. This impediment has been encountered by SAFE during the training of the champions where some of the identified women failed to convince their spouses and neighbours. From then SAFE decided to carry out a second-round training which included a reasonable ratio of men (SAFE, 2018).

From my understanding, the selection of GALS’ beneficiaries was gender-sensitive and has to some extent exaggerated in prioritizing women. The prominent weakness of this approach resides in the fact that the training of trainers has considered more women than men and yet men have more bargaining power than their wives in Kirehe District. The second reason is that champions have difficulties of convincing some men who are dictators in their households as it has been mentioned above in challenges faced by champions. As champions have revealed it, when a champion arrives in this kind of household, such a husband takes him/her as a marketing agent who is being paid by a company and who wants to waste his time telling nonsense things. These men are too radical and consider GALS approach as a way of undermining their power and authority in favour of their wives. Men of this kind do not want to sit down and listen to what is being taught by champions.

Moreover, SAFE had reported that beneficiaries of GALS notably champions had achieved to make tree nurseries (SAFE, 2018). However, some interviewed participants in Nyamugali sector have confirmed that they are constrained because they do not have enough seedlings to plant. This would help to reduce the impact of violent winds from Tanzania and to fertilize their fields as well.

7. Conclusions

7.1. Summary of the key findings

The overriding purpose of this study was to scrutinize, from rural dwellers' perspectives, the impact of climate change on the livelihoods of rural households in KIREHE District and the adaption strategies used to cope with the effects caused by climate change. The study has paid particular attention to gender dynamics in adaptation; the main intent was to comprehend how gender relations and adaptation strategies are intertwined in the households which are prone to climate-related hazards.

Through individual interviews, focus group discussions and researcher's personal observation, the study has pointed to the different insights in relation to the research questions. Regarding the connection between gender relations and climate change adaptation, the study has revealed that gender dynamics enormously affect the coping mechanisms in times of climate related shocks. More than men, women endure a heavy workload when counteracting the detrimental effects of climate change in agrarian livelihoods. This is exacerbated by the social norms and the customary laws which condone the gender inequality in rural households. The study has also revealed that male opt to migrate to the cities as a livelihood strategy especially after natural hazards such as droughts and floods, which may have severe effects on agriculture. This coping mechanism does not always yield fruitful results. In some instances, men migrate and send insufficient remittances to support the left-behind family members or do not send anything at all. In other cases, they never return and can even marry a second wife.

This study has found out that through GALS approach, SAFE has remarkably helped rural households to overcome climate change -related challenges. The research has revealed different mechanisms put in place by SAFE, and which are in line with climate change adaptation. These mainly include trainings which aim at improving gender relations within rural households and eventually boost their

adaptation capacity. Through GALS, women are endowed with entrepreneurial skills which enable them to start micro-businesses by joining saving and credit groups. In addition, beneficiaries are trained in improved agricultural techniques and rainwater harvesting which increase their adaption capacity in time of droughts and floods.

7.2. Concluding remarks and recommendations

The overriding purpose of this study was to scrutinize, from rural dwellers' perspectives, the impact of climate change on the livelihoods of rural households in KIREHE District and the adaption strategies used to cope with the effects caused by climate change. The study has paid particular attention to gender dynamics in adaptation; the main intent was to comprehend how gender relations and adaptation strategies are intertwined in the households which are prone to climate-related hazards.

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