Livelihood diversification of coffee farmers in Eastern Uganda

Perceptions of young men and women

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Degree project/Independent project • 30 credits
Swedish University of Agricultural Sciences, SLU
MSc Agroecology
Alnarp 2024

Livelihood diversification of coffee farmers in Eastern Uganda: perceptions of young men and women

Diversifiering av kaffegårdar i Östra Uganda: uppfattningar av unga män och kvinnobönder

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Credits:	30
Level:	Second cycle, A2E
Course title:	Independent project in Agricultural science, A2E – Agroecology – Master's Programme
Course code:	EX0848
Programme/education:	MSc Agroecology
Course coordinating dept:	Department of Biosystems and Technology
Place of publication:	Alnarp, Sweden
Year of publication:	2024
Copyright:	All featured images are used with permission from the copyright owner.
Keywords:	Mt. Elgon, coffee, diversification, resilience, youth, gender, agroecology

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Abstract

Coffee production on Mt. Elgon, Eastern Uganda has increased substantially over the past decades. Most of this coffee is produced by smallholder farmers with an average farm size of less than 1 ha. Climate change, soil degradation, and various socio-economic factors are impacting farmers' resilience, especially young farmers. Using qualitative research methods and agroecology as a framework, this study explored young men and women coffee farmers' perceptions of on- and off-farm diversification as strategies to improve household resilience, and the challenges and opportunities that follow with diversification. Income security emerged as primary driver for diversification, with food security following shortly after. Environmental factors also play an important role in farmers' decision making toward diversification with tree planting being an important strategy to mitigate the effects of climate change. Financial constraints, knowledge gaps, labour considerations, access to market, and gender differences in current and future needs, underscore the necessity for inclusive perspectives. Furthermore, varying perceptions of challenges across different altitudes along the slope gradient of Mt. Elgon call for locally tailored interventions. Finally, fostering social capital, enhancing knowledge access, and promoting peer influence emerged as pivotal elements for successful agroecological development in the region. Despite challenges, the study stresses farmers' motivation and willingness to engage in sustainable practices, calling for participatory initiatives to overcome barriers and secure the future of young farmers on Mt. Elgon.

Keywords: Mt. Elgon, coffee, diversification, resilience, youth, gender, agroecology

Foreword

Welcome!

You are about to embark on a journey with me exploring smallholder coffee farming on the slopes on Mt. Elgon in Uganda. Before we do so, I would like to give you some insight in my personal journey studying the master's program Agroecology at the Swedish University of Agricultural Science (SLU).

Three years ago, when I finished my bachelor's degree at Wageningen University in the Netherlands, I did not think I would be going back to university any time soon. Instead of being stuck in the theoretical world of academia I wanted to do something practical. I continued working at my internship placement organisation for a while, but soon enough I found myself wondering if that was really the path I wanted to go down. On a quick internet search for master programs around Europe, I found the Agroecology program at SLU. The interdisciplinary and holistic nature of agroecology immediately spoke to me. As a half-Swede born elsewhere, it had always been on my mind to move to Sweden at least temporarily, so this felt like the perfect opportunity. Within a day I had submitted my application, and about six months later I arrived in Malmö, ready for a new chapter of my life.

Through the Agroecology program, I have been able to familiarize myself with various disciplines, theories, and concepts. In true Agroecology style, I have tried to choose a portfolio of courses which would enrich my knowledge as holistically as possible. Aside from the introductory courses on Agroecology, I have followed both natural sciences focussed courses such as Horticultural Microbiology and Integrated Pest Management, and more social science-oriented courses such as Environmental Psychology. If there is something that Agroecology teaches us though, it is the importance of putting theory into practice. Solutions are not good solutions if they are not practically feasible.

Fortunately, there is Alnarp's Agroecology Farm, which I have had (and still have!) the pleasure of being a part of. Alnarp's Farm is a student-run non-profit farming organization located on Alnarp's campus. Brought to life during the pandemic to repress the boredom of online classes, this place has now grown into a place where we gather to learn about small-scale organic farming, try to bridge the gap between academia and practice, and connect the local community with beyond organically produced food. Through an

internship and various board positions, I have learnt the beauty and hardships of farming, what it means to run a farming business, and how important it is that we challenge our current food systems through initiatives such as the farm. Though I never envisioned myself becoming a farmer, I think by now I have, in fact, become a (vegetable) farmer, and I am very much looking forward to continuing to learn and work at the farm after my studies.

Besides following various courses and being part of Alnarp's Farm, I have also had the opportunity to conduct my thesis project in Uganda which has lifted my educational learning experience beyond my expectations. It was a great pleasure collaborating on this with Mara Agribusiness, a company essentially built on agroecological principles. Aside from the privilege of getting to know a completely new culture, I also learned a great deal from the farmers and their production systems, the coffee business, and how small businesses like Mara Agribusiness contribute to agroecological development on a local, regional, and global level.

Agroecology to me provides holistic solutions to complex problems concerning our food systems. At times it may seem like the world is going in the opposite direction of what is needed, but meeting so many people through university, through the farm, and during my time in Uganda that are motivated and willing to find and implement those solutions that we need, makes me feel hopeful that a sustainable and fair future is possible for all of us. I look forward to being a part of that movement.

Thank you for taking the time to read my thesis. I hope you enjoy!

Yours sincerely,

Ingrid

Acknowledgements

There are a few people that have been vital for conducting and completing this thesis to whom I would like to extend my heartfelt thanks.

First of all, I would like to thank my supervisor, Johanna, for all the support throughout my thesis journey. From beginning to end you have supported me; watching out for me while I was in Uganda, encouraging me to participate in the 2023 NorDev conference (and making my participation possible!), always giving me constructive feedback on my writing and in general, inspiring me to deliver the best work I could possibly do.

Second, I would like to thank Teun Dekker for connecting me to Mara Agribusiness and more so, being the most engaged teacher I have ever had. Your enthusiasm elevates the agroecology program tenfold.

Maybe most important of all, I would like to thank the whole team at Mara Agribusiness, for welcoming me into their organization and making it possible for me to conduct my research in the beautiful Elgon region of Uganda. In particular I extend my gratitude to Boby Ogwang, founder, and CEO of Mara Agribusiness for supporting my research, giving me the full internship experience, and connecting me to all sorts of people in and outside of Uganda. I truly admire how much passion you and the team put into the business.

I would also like to thank Fungo Roggers, my field supervisor, for connecting me to the farmers and supporting me during my field work. Apart from work, I appreciate our many conversations, especially the ones that touched upon our cultural differences.

Furthermore, I extend my thanks to all the farmers that participated in my study. You welcomed me with open arms, and I learnt so much from all of you. I hope I have done you justice with my research!

I would also like to thank Emma, Dickson, Sandra, and little David for making my time in Uganda and Mbale unforgettable. Looking back, I am instantly filled with joy and happiness. It is an experience that I will always treasure in my heart, and I am very much looking forward to visiting again someday.

Last, I thank my family and friends who have supported me throughout this journey. I could not have done it without you!

Table of contents

Abstract ..... **iii**

Foreword ..... **iv**

Acknowledgements ..... **vi**

Table of contents ..... **vii**

List of tables **1**

List of figures **3**

Abbreviations **5**

1. Introduction **6**

1.1 Study objective and research questions 7

1.2 Structure of thesis report 7

2. Theoretical framework **9**

2.1 Agroecology 9

2.2 Agricultural research and participation 10

2.3 Diversification 11

2.4 Youth and young women in agriculture 12

3. Background **15**

3.1 Uganda 15

3.1.1 General country overview 15

3.1.2 Coffee sector and national policy 16

3.1.3 Youth, gender, and policy 17

3.2 Site Location 18

3.3 Local environment 19

3.4 Mara agribusiness 19

4. Methodology **21**

4.1 Philosophical worldview: constructivist approach 21

4.2 The landscape and revenue diversification project 22

4.3 Research design 23

4.3.1 Participatory Rural Appraisal (PRA) 23

4.3.2 Sampling and participants' profile 23

4.3.3 Data collection methods 26
4.3.4 Limitations to research design 29
4.3.5 Data analysis 32
4.4 Ethical considerations 32
4.5 Researchers' reflexivity 33
4.6 Credibility of study 35
5. Results 36
5.1 Land ownership & household practices 36
5.2 Coffee management & general farming practices 39
5.3 Current issues 41
5.4 On- and off-farm diversification 44
5.4.1 Off-farm income diversification 45
5.4.2 On-farm diversification strategies 45
5.4.3 Sales channels 50
5.4.4 Engaging in new diversification strategies 51
5.4.5 Determinants to adopt diversification practices 58
5.4.6 Challenges for adopting diversification strategies 59
5.5 Knowledge sharing & extension services 62
5.6 Future ambitions and scenarios 64
6. Discussion 71
6.1 Young men and women's perceptions on diversification 71
6.1.1 Financial perceptions 72
6.1.2 Social perceptions 73
6.1.3 Environmental perceptions 75
6.2 Constraints and opportunities of diversification 77
6.2.1 Financial constraints 78
6.2.2 Matching farmers' needs 78
6.2.3 Supporting women 79
6.2.4 Access to knowledge, information, and market 80
7. Conclusions and recommendations 82
7.1 Key findings and practical recommendations 82
7.1.1 Practical recommendations for Mara Agribusiness 84
7.2 Suggestions for further research 84
References 86
Popular science summary 94
Appendix 1 – Interview guide 96
Appendix 2 – Consent form 100

List of tables

Table 1. # of participants of SSIs and their profile (HL = highlands, ML = midlands). 24

Table 2. # of participants and their profile for different FGDs (HL = highlands, ML = midlands). 26

Table 3. Use of chemical fertilizer & pesticide per altitude (HL = highlands (n=6), ML = midlands (n=14)). N (total) = 20. 40

Table 4. Issues perceived by coffee farmers in Bulambuli district subdivided in three categories: environmental, financial, and social (output of FGD1). 41

Table 5. Mention of specific climate change (CC) effects by respondents of SSIs (n=20) 42

Table 6. Mention of CC interventions by respondents of SSIs (n=20) 42

Table 7. Top 3 reasons why farmers diversify. 44

Table 8. Top 3 channels through which knowledge on diversification is disseminated ... 44

Table 9. # of households with off-farm income per altitude and gender according to respondents of the SSIs (n(total)=20, w=women, m=men)..... 45

Table 10. Most important activities for income generation according to respondents of the SSIs (n (total)=20, w=women, m=men). 49

Table 11. Most important crops for food security according to respondents of the SSIs (n=20)..... 50

Table 12. Sales channels for produce from diversification strategies according to respondents of the SSIs (n(highlands)=6, n(midlands)=14, n(total)= 20)..... 50

Table 13. Diversification strategies from Mara Agribusiness' proposed list respondents of SSIs (n=20) did NOT want to engage in. 51

Table 14. Output of ranking & scoring exercise (FGD 2&3). Table shows scoring per decision making factor and diversification strategies (1 = low, 10 = high; w = women, m = men). Red numbers highlight a difference of ≥ 3 in scoring between genders. 52

Table 15. Final ranking of suggested diversification strategies from most favourable (1) to least favourable (6) by both women's and men's groups. 57

Table 16. Factors influencing decision making around diversification subdivided in three different categories: environmental, financial, and social (according to respondents of SSIs). 58

Table 17. Factors limiting engagement in new diversification strategies subdivided in three different categories: environmental, financial, and social (according to respondents of SSIs). 60

Table 18. Type of farmers group respondents of SSIs (n(total)=20) are a part of (n.n. = type of group is unknown, no group = respondents who are not part of a farmers group). 62

Table 19. Requested topics for extension services of respondents of SSIs (n=20) subdivided by altitude and gender (w=women, m=men). 63

Table 20. Future ambitions of respondents of the SSIs subdivided by altitude and gender (n(total)=20, w=women, m=men). 65

List of figures

Figure 1. Map of Uganda showing bordering countries and lakes (source: Angela King & Brad Cole (n.d.)) 15

Figure 2. Map of Uganda (left) and map of districts on Mt Elgon (right). Mt. Elgon is located in the Eastern part bordering Kenya. Source: ACCESS (2015) 18

Figure 4. Highest level of education of respondents (n=20, Pr = primary school, Sr = secondary school) 25

Figure 3. Marital status of participants of SSIs per gender (n=20). 25

Figure 5. Timeline of sampling 26

Figure 6. Accessible landholdings (ha) per respondent of SSIs. On average (households of) respondents in the highlands & midlands have access to 1,0 ha and 1,2 ha of land respectively. 37

Figure 7. Responses to land ownership per respondents of the SSIs subdivided by gender and marital status (n=20). 38

Figure 8. Household decision making as per respondents of SSIs subdivided by gender & marital status (n=20). 38

Figure 9. # of crops (including coffee) per total accessible land (ha) including standard deviations. No statistical significance could be identified ($r^2 = 0.471$). 46

Figure 10. Different crops grown by households of respondents of SSIs. Fewer than 4 mentions have not been included. 47

Figure 11. Land assigned to coffee cultivation and other crops relative to the total amount of accessible land in highland and lowland altitude (according to respondents of SSIs (n=20)). On average farmers assign 36% of their land to coffee, while for other crops the average is 57%. 47

Figure 12. # of fruit trees per total accessible land (ha). There is a statistically significant relationship at 10% interval between the accessible land (ha) and # of fruit trees ($r = 0.615$, $p = 0.009$). Two outliers ($x = 40$, $x = 500$) have been removed from the figure to prevent skewing the results. 48

Figure 13. Sketch maps of village A in the current situation (left) and the preferred future scenario (right) from women's perspective. 66

Figure 14. Sketch maps of village B in the current situation (left) and preferred future scenario (right) from men's perspective 67

Figure 15. Overview of young women and men farmers' perceptions on diversification from environmental, social, and financial perspective. At the core of diversification is food & livelihood security. Various environmental, social, and financial aspects influence the uptake and execution of diversification. Certain aspects overlap in multiple categories. CC = Climate Change. 72

Abbreviations

EU	European Union
AU	African Union
SSA	Sub-Saharan Africa
DRC	Democratic Republic of the Congo
GoU	Government of Uganda
NDP	National Development Plan
NCP	National Coffee Plan
UCDA	Ugandan Coffee Development Authority
NYAP	National Youth Action Plan
SWC	Soil and Water Conservation
FGD	Focus Group Discussion
MASL	Meters Above Sea Level
PRA	Participatory Rural Appraisal
SSI	Semi-Structured Interview
FSW	Future Scenario Workshop

1. Introduction

Over the past decades Uganda's coffee production has increased substantially. To put that into perspective a total of 375.000 tons was produced in 2021 compared to 129.000 tons in 1990 (FAOSTAT, 2023). Most of this coffee is produced by smallholder farmers, with an average farm size of less than one ha (FAO, 2018). One of Uganda's most prominent coffee growing regions is Mount Elgon located in the East on the border with Kenya. Various challenges have been identified here that negatively impact coffee production, and with that the livelihood security of coffee farmers and their families. Climate change and soil erosion, for example, are causing severe land degradation (Kogo et al., 2020). Furthermore, socio-economic factors such as volatile market prices impact income stability.

Diversifying income is often proposed as a means to improve livelihood security. Including other income generating activities, both on- and off- farm, into one's livelihood portfolio can bring a variety of benefits. Most importantly, financial stability and overall resilience of the household are enhanced since households no longer solely rely on one crop or commodity as their only source of income. Additionally, they may also contribute to improving biodiversity and combatting land degradation both at farm level and at wider community level, especially when applied by multiple farms (Pettorelli et al., 2021). However, a variety of complex reasons limit adoption, for example lack of access to knowledge, capital, land, and markets, and these are especially affecting young men and women farmers (FAO, 2014). With 80% of Uganda's population being below the age of 35 (Awiti & Scott, 2016), there is a lot of opportunity for this demographic group in the coffee sector. Furthermore, with the right support they could be front runners in making sustainable changes in farming (Giuliani et al., 2017).

This research was conducted in collaboration with Mara Agribusiness, a social coffee enterprise in Uganda working primarily with youth farmers. One of their

prospective projects with young farmers is the *"landscape and revenue diversification project"*. The project aims to help farmers become more resilient to the impacts of climate change, while simultaneously improving household resilience by assisting them with diversifying their production and income through selected crops, trees, and livestock. Understanding young farmers' perceptions on diversification and what opportunities and constraints they face could potentially improve the project design and wider policies for the adoption of diversification strategies. Furthermore, providing positive prospects for the agricultural sector may in the long term engage more youth in Uganda's coffee sector.

1.1 Study objective and research questions

The objective of this study is to explore and understand young men and women coffee famers' perceptions on livelihood diversification in rural Eastern Uganda, from environmental, social, and financial perspectives, and the opportunities and constraints that follow with both current and potential future implementation of diversification practices. From this objective the following research questions follow:

1. From environmental, social, and financial perspectives, what are young men and women coffee farmers' perceptions on livelihood diversification in rural Eastern Uganda?
2. Based on findings of the first research question, which opportunities and constraints following diversification can be identified for young men and women coffee farmers, both in current and for potential future implementation?

1.2 Structure of thesis report

This introduction and explanation of the study objectives is followed up by a chapter that outlines the theoretical framework and concepts that were used for the study. The third chapter explains the background in which the study was performed; agriculture and coffee sector in Uganda, youth in agriculture, site location, and local climatic conditions. The second part of the thesis elaborates on the methodology used, after which results are presented followed by a discussion chapter. The thesis

report ends with a concluding chapter which also includes practical recommendations and suggestions for further research.

2. Theoretical framework

This chapter explains the different concepts that were combined to establish the theoretical framework for this study. Each of the concepts were chosen because of their intricate relation to the study objective. First, agroecology was chosen as the basis for this research since it provides a holistic understanding of food systems which was helpful for relating the environmental, social, and financial to the research objectives. Second, participatory agricultural research provides the backbone of the study since the objectives are focused on understanding farmers' perceptions. As such, the logical course of action is to provide a bottom-up framework to approach the study. Furthermore, diversification, youth, and young women in agriculture are included in the theoretical framework, because they shape the focus of the research, and are integral parts for answering the research questions.

2.1 Agroecology

Agroecology has gained increased attention over the past decades. It has become evident that in order to sustain healthy food systems around the world, more holistic approaches are needed. Agroecology provides a framework for finding solutions to complex problems within our food systems. The definition(s) of agroecology, however, has/have not always been straightforward. It started out in the early 20th century as a science assessing the interconnectedness of different parts of agroecosystems (Wezel et al., 2009). It was further extended into a set of practices where ecosystems and agroecosystems were assessed as a whole, and applying these practices was presented as a means to protect natural resources (Gliessman, 2015). Later on in the 90s, social movements like La Via Campesina emerged as a response to the increasing influence of big agricultural companies and loss of food sovereignty for (indigenous) farmers, which established agroecology as a discourse

to contribute to a more equal, equitable, and just food system (Gliessman, 2015; Wezel et al., 2009).

In more recent years scientists have tried to bring these different aspects together into one coherent definition. Wezel et al. (2009), for example, explain agroecology as a science, practice, and social movement. Tittonell (2014) states that agroecology is a way of farming in which academia, practice, and a social movement are brought together to start a dialogue of wisdom in which farmers are the owners of agricultural innovation. According to Gliessman (2015) agroecology is a means to reach sustainability and resilience in all parts of the food system: ecologically, economically, and socially. What all of these definitions have in common is their holistic approach, and the inclusion of multiple disciplines to find solutions.

This research has tried to capture the holistic nature of agroecology by considering the interconnected environmental and socio-economic aspects of on- and off- farm diversification of coffee gardens.

2.2 Agricultural research and participation

How to bridge the gap between agricultural research (academia) and practice (farmers/implementors) has been a widely discussed topic over the past decades. Especially in the last 40 years, bottom-up and participatory approaches have gained wide-spread popularity. To understand this paradigm, it is important to consider how agricultural development approaches have evolved in time.

After the colonial era agricultural research and extension services were generally organized through top-down approaches and were focused on export production (Anderson et al., 2006). It was not until attention shifted towards food production that subsistence and smallholder farmers were gradually included as well (Ellis & Biggs, 2001). Farmers' own local knowledge was often not considered however, since they were not formally educated, hence their knowledge was not recognized as valid (Toness, 2001). As such, farmers mostly received extension services through technology transfers designed by scientists or educated extension staff, but as Gyekye (1994) argued, the uptake of knowledge is achieved more successfully when participants are actively involved. If that is not the case, it may result in low adoption rates (Gyekye, 1994). This idea was furthered in the 80s and 90s by

scholars like Robert Chambers. He argued that putting farmers and the rural poor 'first' rather than considering them to be receivers of information allowed for more sustainable and effective development at far greater rates than conventional development and research strategies had shown thus far (Chambers, 1987). Furthermore, putting the 'last first' meant putting farmers' needs at the center of research, which brought about a mental shift in how agricultural research was conducted. Slowly top-down and 'blueprint' approaches made way for bottom-up and holistic practices, where farmer participation had a key role (Kessler et al., 2016).

To this day however, the term 'participation' is still debated and interpreted in many ways. Levels of participation could range from manipulative participation where participation is merely a pretense, to interactive participation and self-mobilization, where farmers become stewards of their own development (Pretty, 1995). To successfully adopt presented technologies, intrinsic motivation of farmers ought to be high (Hauser et al., 2016). When people feel intrinsically motivated, they participate in activities for themselves and not for external reasons such as monetary incentives (Deci, 1975). Though studies have shown that the use of sustainable agricultural practices is influenced both by intrinsic and extrinsic motivation, intrinsic motivation is often overlooked in policy making for sustainable land use management (Bopp et al., 2019; Greiner & Gregg, 2011; Jambo et al., 2019). Hence, this research is shaped by bottom-up and participatory approaches[1] to create a well-defined understanding on farmers' perceptions and motivations for engaging in diversification.

2.3 Diversification

Diversification in agriculture may refer to different matters. It usually refers to the addition of different crops and/or cropping systems, and/or tree species, and/or animals to an individual farm, farming community, or even wider landscape (Thornton & Herrero, 2014). The underlying principle is to minimize risks associated with environmental factors, market fluctuations, and pests while

[1] When and how participation starts is also a contested issue. Unfortunately, in this research farmers could not be included in designing the research due to the scope and time limitations. Further explanation on methodology and research approaches follows in Chapter 4.

enhancing overall sustainability. By promoting diversity in both production and income sources, it not only mitigates the vulnerability of farmers but also offers the potential for increased productivity, improved soil health, and greater adaptation to the changing climate. Diversification of income sources or income generating activities is often also referred to as livelihood diversification. Off-farm income activities may refer to for example side jobs, a business, or processing farm products at farm level. Both on- and off-farm diversification add to the overall resilience of the household in the short- and long term, and are aimed at mitigating the impact of shocks/events like climate disaster, market fluctuations, and health crises (Thornton & Lipper, 2014).

This research considers both on- and off-farm diversification in relation to the research questions, though slightly more emphasis is put on on-farm diversification, and particularly on-farm diversification of individual farms.

2.4 Youth and young women in agriculture

Youth as a demographic group is not universally defined, though it is often referred to as persons transitioning from childhood into adulthood, from mandatory education to their first paid job, or from being dependent on caretakers to being an independent member of society (FAO, 2022). Age is the easiest way of defining the aforementioned group. It may, however, vary per context and on socio-demographic factors which age category is representative of youth. The European Union (EU) for example, defines youth as persons between the ages of 15 and 29 (European Commission, 2011), while the African Union's (AU) definition is those between 15 and 35 (AUC, 2006). Uganda specifically defines youth as persons between 18 and 30 (MiGLSD, 2016). For this thesis, however, youth have been defined as people between the ages of 18 and 35, since this is the age group that Mara Agribusiness works with.

The impact of youth on agricultural development has received increased attention in the past decade, especially in the context of Sub-Saharan Arica (SSA) where 50% of the population is below the age of 25 (World Bank, 2014). Since youth comprise such a substantial portion of the overall population, and agriculture is the dominant sector in the majority of SSA countries, they could become leading

forces not only for sustainable development of the agricultural sector, but also for overall economic development in these regions. There are many challenges however, in engaging youth in agriculture. Foremost a trend has developed of young people leaving rural areas trying to find jobs and livelihood opportunities elsewhere, often in urban areas (Mueller et al., 2019; Sumberg et al., 2012). This is related to certain barriers, but also a negative perception and perceived status that comes with engaging in agricultural activities (Anyidoho et al., 2012; Mwaura, 2017). Barriers for youth to remain in rural areas are often attributed to a lack of access to resources, knowledge, capital, land, market, and green jobs (FAO, 2014). Access to government support and inclusion in decision-making processes is creating another gap between youth and their potential to flourish in the agricultural sector (Giuliani et al., 2017).

Youth are not a homogeneous group, and interests and aspirations vary in different socio-economic contexts. One of the intersections of the "youth in agriculture"- debate is gender. What may be limiting to young men, is often even more limiting to young women (Pyburn et al., 2015). For example, patrilineal inheritance structures limit women from being land owners (Wekesah et al., 2019). Furthermore, though women are involved with most of the on-farm labor, they may have limited influence on household decision making, because of cultural customs and beliefs (FAO, 2014; Farnworth et al., 2016). Pregnancy and marriage at a young age may also be limiting in obtaining a higher education (World Bank, 2014), and women's responsibility in the household was found to be a barrier for them to receive extension services when services are provided during times that are usually allocated to household work (Farnworth et al., 2016). Another important aspect to consider, is how rural outmigration of men is affecting women's position in agriculture, also referred to as the feminization of agriculture. Though the global trend is that (young) people are leaving agriculture, women often do not have the same opportunities as men regarding labor migration or migration to realize dreams and aspirations elsewhere. It is sometimes believed that women are "left behind" as passive actors or victims. However, this is often not the case as women become crucial for crop production and take on new leadership roles within farm production (Kawarazuka et al., 2022). As such, addressing the unique challenges that young

women face in agriculture will be essential for sustainable development in the sector, and could have a significant impact on global food security.

This research focusses on youth as the target group. However, a differentiation has been made between young men and women during the research and in analyzing the results to provide more insight on gender differences and similarities and how certain barriers or opportunities affect men and women, in both similar and diverse ways.

3. Background

This chapter elaborates on the background the study was performed in, including Uganda, Uganda's coffee sector, and youth and gender policy. Furthermore, the site location and local environment are discussed. Lastly, it elaborates on Mara Agribusiness, the company with which this research was conducted.

3.1 Uganda

3.1.1 General country overview

The Republic of Uganda is a country in Eastern Africa landlocked by Tanzania and Rwanda in the South and South-East, the Democratic Republic of the Congo (DRC) in the East, South Sudan in the North, and Kenya in the West (Figure 1). It also borders Lake Victoria in the south and south-west, which provides important livelihood opportunities for nearby living communities. As in many countries in SSA, the agricultural sector, which includes both crop production and livestock keeping, is the main driving force for the country's economy, though the majority of farmers are smallholder subsistence farmers. The Government of Uganda (GoU) wants to decrease the number of subsistence farmers as described in their National Development Plan (NDP, current version III). However, recent decrease in land productivity

Figure 1. Map of Uganda showing bordering countries and lakes (source: Angela King & Brad Cole (n.d.))

and rapid population growth are increasing pressure on land which is causing the number of subsistence farmers to grow (World Bank, 2021). Currently Uganda counts a population of approximately 45 million (FAOSTAT, 2023).

Though GDP seemed to be rising, environmental shocks, such as the drought of 2016/2017, and Covid-19, have decelerated growth, and poverty remains a pressing problem in today's society with 30% of the population living below the poverty line (World Bank, 2021). Poverty is most persistent for those living and working in rural areas, especially in agriculture. According to the World Bank (2022) 80% of Uganda's poor live in rural areas.

3.1.2 Coffee sector and national policy

Two different varieties of coffee beans are grown in Uganda; robusta (*Coffea canephora var. Robusta*) which grows in mid- and lowland areas across the country, and arabica (*Coffea Arabica)* which grows primarily in highland areas such as Mt. Elgon in Eastern Uganda, and Mt. Rwenzori in the West. Robusta accounts for 80% of total production, though Arabica production has been increasing.

Uganda is Africa's second largest exporter of coffee, exporting mostly to Europe and North America. Coffee has accounted for approximately 20% of Uganda's foreign exchange earnings in the past decade, and with that it is one of the country's leading export products (UCDA, 2021). According to the Uganda Coffee Development Authorities (UCDA), there are currently 1.7 million households in Uganda that engage in coffee cultivation, most of them being smallholder farmers who depend on rain-fed agriculture. The GoU has set out to further develop the country's coffee sector. These ambitions are reflected by the National Coffee Policy (NCP), which was put into effect in 2013. The NCP aims at promoting coffee production and increased productivity at farm level, research, farmers' organizations, value addition at various stages of the value chain, quality enhancement, and national consumption. Furthermore, it also focuses on improving the livelihoods of coffee farmers and enhancing the competitiveness of Ugandan coffee in the international market. There is no published literature on the effectiveness of the NCP so far, but poverty amongst rural households remains a large scale issue (World Bank, 2022).

3.1.3 Youth, gender, and policy

Currently 22% of Uganda's population fall into the youth category and this percentage is likely to increase in the coming years (UBOS, 2021). This demographic group also experiences the highest unemployment and poverty rates of the overall population (World Bank, 2021). According to UBOS (2021), the proportion of youth not in education, employment or training is currently 41%, and for young women this is even as high as 52%. Youth that do work are often engaged in informal, and insecure jobs.

The GoU addresses issues concerning youth and gender through various policies and programs. The National Youth Action Plan (NYAP) for example was put into effect in 2001 with the main objective to promote youth participation in national development and decision making, empower youth through education and opportunities, address challenges and barriers such as unemployment, and promote gender equality to ensure young women and men have equal opportunities (MiGLSD, 2016). One of the priority areas of the NYAP is to improve youth employment in the agricultural sector by involving youth actively in activities along the agricultural value chain and improving access to affordable agro-inputs and extension services. Another example is the National Strategy for Youth Employment in Agriculture (effective since 2017) which aims at overcoming barriers that limit youth participation in agriculture. It suggests interventions such as supporting youth-oriented agricultural extension, improving youth education and learning, promoting youth entrepreneurship, and addressing agribusiness risks (MAAIF, 2017). Other policies such as the National Agricultural Policy (2013) and the National Employment Policy (2011) also recognize agriculture's potential for young men and women. Both policies are committed to gender equity and emphasize gender sensitivity in operational guidelines (MAAIF, 2013; MiGLSD, 2011).

Despite efforts, youth participation in agriculture continues to decline (Nabyonga et al., 2022). The majority of youth live in rural areas currently, but rural-urban migration is increasing at a rapid rate (World Bank, 2022). This is partly caused by the fact that farming is often not aspired as the primary livelihood strategy by young people, and it remains challenging especially for young women

to engage in commercial farming activities due to social norms (Rietveld et al., 2020). Furthermore, limitations for youth and women in agriculture as discussed in Chapter 2.4., such as limited access to resources, knowledge, capital, and land, also contribute to the declining interest of Ugandan youth in agriculture (Mdege et al., 2022).

3.2 Site Location

This study was carried out on the slopes of Mt. Elgon in Eastern Uganda. Mt. Elgon is the largest and oldest dormant volcano in Africa with a peak elevation of 4321 masl. Communities of people live across the altitudinal gradient of the mountain, starting from the lower slopes (1000 masl) to the border of the national park Mt. Elgon (2200 masl).

The sample area of the study covers two districts, Bulambuli and Sironko (Figure 2**Error! Reference source not found.**). These districts were chosen since most of the farmers Mara Agribusiness[2] works with are located in this area. Furthermore, it is a well-known area for coffee production and one of few areas in Uganda that predominantly produces Arabica coffee beans. Next to coffee other crops such as

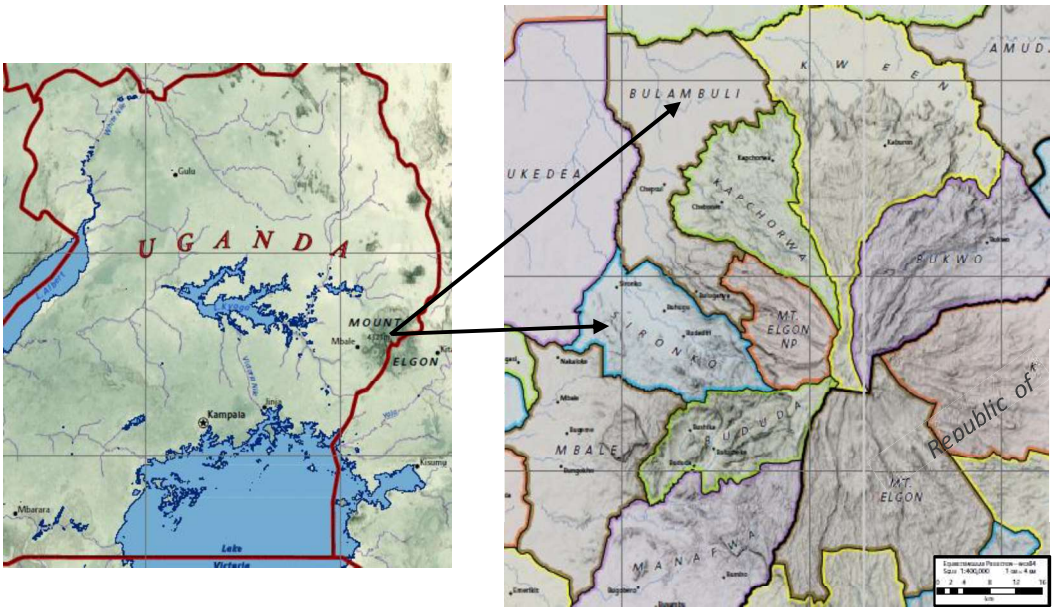


Figure 2. Map of Uganda (left) and map of districts on Mt Elgon (right). Mt. Elgon is located in the Eastern part bordering Kenya. Source: ACCESS (2015)

[2] For further information on Mara Agribusiness and how this collaboration influenced the research design, see chapter 3.4. and chapter 4.2.

maize, potato, banana, cassava, rice, and beans are also commonly grown (UBOS, 2022).

3.3 Local environment

The Elgon region primarily has a humid tropical climate. Depending on altitude, the average minimum temperature is approximately 15 °C and the average maximum temperature approximately 30 °C. There are two rainy seasons, one from March to May, and one from September to December. On average this area receives between 1400 – 1800 mm of rain annually. With climate change however, the rainy season is changing; the duration is decreasing, and rain patterns are becoming more variable (IPCC, 2023). Due to population pressure in recent decades land has been increasingly converted into agricultural land at the cost of natural tree cover (Opedes et al., 2022). Even though Opedes et al. (2022) also reported an increase in replanted forest, the lack of tree cover combined with severe rains regularly causes heavy floods and landslides with damage to and loss of crops, infrastructure, houses, and in worst cases death of people as a result (Mugagga et al., 2012). Heavy rains, landslides, deforestation, and limited uptake of soil and water conservation (SWC) measures have all contributed to an increase in soil erosion and subsequently soil infertility has become a pressing issue (Jiang et al., 2014).

3.4 Mara agribusiness

This study was conducted in collaboration with Mara Agribusiness. Mara is a social enterprise located in Kampala, Uganda, with the mission to *"supply genuine, accessible and affordable agro-inputs to coffee farmers, trade in high quality sustainable and traceable coffee, and create 2500 decent jobs for rural youth by 2025*" (https://www.maraagribusiness.com/). Alongside the supply of subsidized agro-inputs, they assist farmers with extension services, and train youth in jobs along the coffee value chain. Furthermore, they offer a 5% higher market price for coffee beans compared to the official coffee market price with the aim of increasing

this to 10%. The coffee beans are processed and roasted locally and sold domestically and to the world market through their coffee brand *Aramah Coffee*.

This research was carried out as part of one of their prospective projects *"The landscape and Diversification project"*. The project proposal was used as a guideline for designing the research.[3] Furthermore, Mara Agribusiness used their network to find farmer participants and sensitize them. One of their officers also assisted in data collection (for example organization, transport, and translation). Mara Agribusiness did not take part in the analysis of data, nor drafting the report.

[3] How the project was used as guideline is further explained in chapter 4.2.

4. Methodology

Because of the explorative nature of the research questions, qualitative data collection was performed to conduct this study. This chapter discusses the methodology and tools including their limitations, which were used during the study. Furthermore, it elaborates on the philosophical worldview, ethical considerations, the researcher's reflexivity, data analysis tools, and study credibility.

4.1 Philosophical worldview: constructivist approach

How we formulate problems and research questions is shaped by our philosophical beliefs and interpretations. Defining one's philosophical worldview is therefore important, especially when conducting qualitative research (Huff, 2008). This study departs from a constructivist worldview. Constructivism is an approach used commonly in qualitative research which seeks to understand the interpretation others have of the world around us (Creswell, 2013; Creswell & Creswell, 2018). It builds upon the assumptions that humans create meaning as they interact with the world which they make sense of based on their personal history and socio-economic perspectives, and that meaning is always generated in a social context through interactions with other people (Crotty, 1998). As such constructivists focus their research on the participants' views of the studied matter to understand their specific context. Researchers also recognize that their personal experiences and historical and socio-economic background influences how their interpretation is shaped (Creswell, 2013; Creswell & Creswell, 2018).

A constructivist worldview was beneficial for this study, because it is explorative by nature, and therefore seeks to understand other peoples' perceptions and perspectives on the research question, in this case young farmers' perceptions

on diversifying their production. How the author's own socio-economic background and personal experiences influenced the study and its outcomes, is further discussed in sub-section 4.5 and 4.6 of this chapter.

4.2 The landscape and revenue diversification project

This research project was designed as a pre-study to Mara Agribusiness' prospective project: *"The landscape and revenue diversification project"*. The aim of the Mara project is to promote environmental, social, and economic sustainability by harnessing agroforestry technologies with a focus on the end market for diversified products that come from the coffee farm. Other objectives are to empower communities to sustainably implement landscape management practices and reduce land degradation, diversify, and increase revenue of coffee farmers throughout the year, and promote sustainable production and productivity of coffee by increasing smallholder farmers' resilience to climate change. Farmers will be assisted with specifically selected crops and trees which currently are avocado, jack fruit, banana, and pumpkin. Furthermore, beekeeping and cow rearing will be promoted as well. In the initial phase (starting in 2024), 150 farmers in the Elgon region will be supported with the aim of increasing this number to 600 by the end of 2025. The proposed diversification strategies have been included in this research project so as to provide relevant information for Mara Agribusiness that can guide them when taking the landscape and revenue diversification project forward. This is further explained in section 4.3.3.

The definitive version of the research design was run by Mara Agribusiness and accepted before starting data collection. As mentioned before, Mara Agribusiness was also responsible for finding participants and sensitizing them. Furthermore, one of their field officers assisted data collection and provided translation when necessary.

4.3 Research design

A variety of tools from the Participatory Rural Appraisal (PRA) catalogue were used for conducting this research such as semi-structured interviews (SSIs), focus group discussions (FGD), and field observations. PRA, sampling, as well as the specific tools used for data collection are further elaborated on in the next sections.

4.3.1 Participatory Rural Appraisal (PRA)

PRA's objective is to empower local people by appealing to their analytical capabilities (Chambers, 1994c). PRA is built on three principles (Chambers, 1994b). Foremost, participatory methods are used to facilitate analysis by participants. For example, semi-structured interviewing methods and visualization workshops are used to identify problems farmers are encountering (Chambers, 1994a). Problem visualization is used to tackle the issue of illiteracy amongst rural people. Important in this process is the second principle, namely the outsider behaviour of researchers and extension officers. Researchers and extension officers have been put in place to support and facilitate instead of investigate. Good rapport should be established between the outsider and farmer participants, which is achieved by showing respect and openness to learn toward participating farmers (Chambers, 1994a). Lastly, a culture of sharing should be established, between participants, from participants to outsiders, and from outsiders to participants. This establishes open access to information for all parties involved, and avoids information being owned and possessed by outsiders (Chambers, 1994b).

Other important features of PRA are optimising trade-offs and sequencing activities. PRA is meant for quick appraisal while avoiding unnecessary detail, but without losing sight of the essence of a problem (Mikkelsen, 1995; Narayanasamy, 2009). Sequencing is used to understand the different dimensions of a problem by using different methods in a systematic manner to collect data. Furthermore, it can be used to cross-check collected data.

4.3.2 Sampling and participants' profile

Data sampling consisted of 20 individual interviews and 5 focus group discussions (FGDs). The target group of this study was youth. As such farmer

participants across the study had to be in the age-category of 18 to 35 (for further explanation see chapter 2.4). Participants for both the individual interviews and the FGDs were sensitized and chosen randomly by the field officer appointed by Mara Agribusiness to assist during field work. Furthermore, the field officer was present during interviews and focus groups to assist as a translator as most farmers did not speak English.

The individual interviews were completed with farmers across nine villages in Sironko and Bulambuli district, Eastern Uganda. These districts were chosen because this is where Mara Agribusiness is already active and has access to a network of farmers. Interviews were conducted with farmers individually to prevent side parties from influencing participants' answers. A distinction was made between midland (1000 - 1500 masl) and highland (>1500 masl) areas upon start of data collection, because it was quickly discovered that there are differences in (micro-)climate, slope gradient and socio-economic circumstances at different altitudes that influence farming and living conditions which may influence farmers' perceptions. Furthermore, to highlight potential differences between genders, approximately half of the interviews were conducted with men, the other half with women (Table 1). Of the women respondents, 6 were married and 2 separated (Figure 3). Among the men interviewees 8 were married, while 4 were single. Married and separated respondents had between 1 and 6 children (mean = 3,4), though single men were currently childless. Levels of education varied (Figure 4); from obtaining only primary education to 17% of men that went on to study for a degree. On average men had been able to attain higher levels of education than women. All interviews were recorded and transcribed to prevent losing valuable information. The majority of women did not receive education beyond the lower levels of high school (up to Sr. 3).

Table 1. # of participants of SSIs and their profile (HL = highlands, ML = midlands).

	Women		**Men**		
	HL	ML	HL	ML	**Total**
Bulambuli	2	2	4	2	**10**
Sironko	-	4	-	6	**10**
Total	**2**	**6**	**4**	**8**	**20**

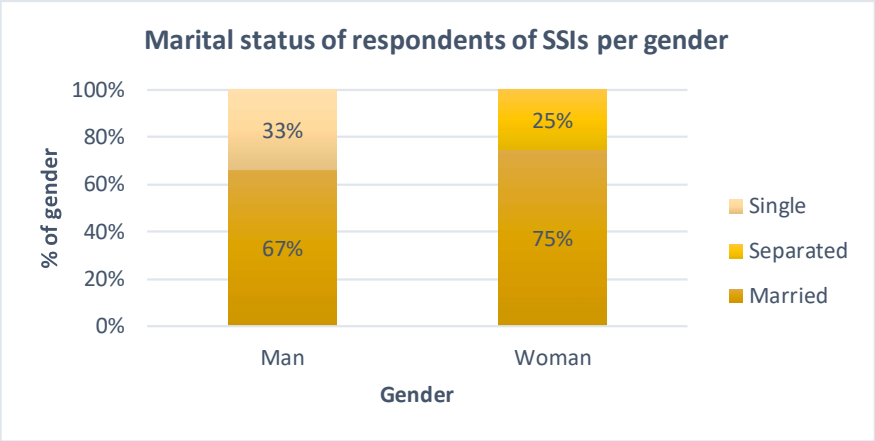


Figure 3. Marital status of participants of SSIs per gender (n=20).

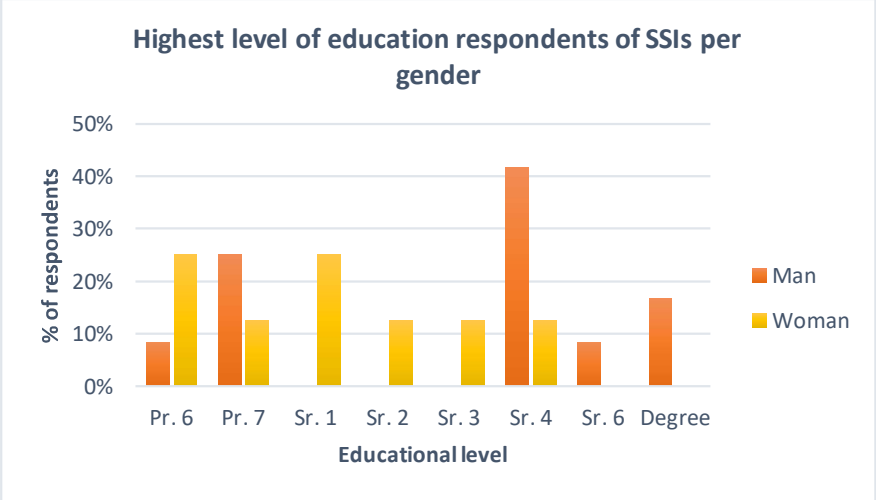


Figure 4. Highest level of education of respondents (n=20, Pr = primary school, Sr = secondary school)

Additionally, five FGDs were conducted. FGDs often spark discussions on topics that may not be highlighted in individual interviews. Therefore, it is a good method to cross-check data and include different perspectives in the analysis. Three different types of FGDs were organized, namely a problem analysis workshop, matrix ranking and scoring, and future scenario workshops. Only the first type was done with a mixed-gendered group. The other two were conducted separately with men and women to highlight differences between genders. Table 2 shows an overview of the profile and number of participants for each FGD.

Table 2. # of participants and their profile for different FGDs (HL = highlands, ML = midlands).

	District	Altitude	Women	Men
FGD 1 (problem analysis)	Bulambuli	HL	4	5
FGD 2 (ranking & scoring)	Bulambuli	HL	12	-
FGD 3 (ranking & scoring)	Bulambuli	HL	-	10
FGD 4 (future scenario workshop)	Sironko	ML	10	-
FGD 5 (future scenario workshop)	Sironko	ML	-	7

All data was collected between March 2023 and June 2023 (Figure 5). A specific order of collecting data was used to provide progression in understanding different perceptions. The individual interviews provided a red thread throughout the data collection period. FGD 1 was conducted at the beginning of sampling together with the start of the individual interviews to set the scene for the context and understand current problems in the region. After having conducted approximately half of the individual interviews, more group perspectives were added through FGD 2 and 3 (ranking and scoring). The FGDs provided additional data on which factors are currently most important regarding decision making, and how this affects farmers' choices for diversification. These results furthered the understanding of the previously held interviews and the ones yet to be carried out. FGD 4 and 5 (future scenario workshops) were done at the end, because they focused on farmers' future ambitions, and how they would like to see their environments develop providing a future outlook for the study.

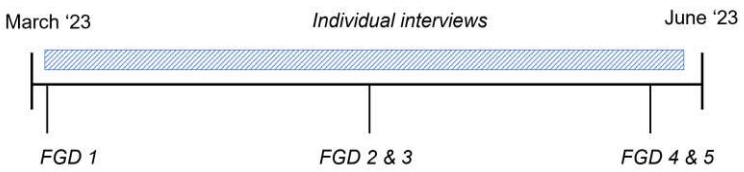


Figure 5. Timeline of sampling

4.3.3 Data collection methods

In the following sections the different types of data collection methods are described. Using several tools allowed for data triangulation. Doing the interviews provided information from an individual point of view, while the focus groups

provided group perspectives. Collecting these different perspectives was important to prevent bias towards either one. Furthermore, field observations were important for providing a framework through which to analyze the data. Without physical presence in the study area, the results may have been interpreted substantially different.

Semi-structured interviews (SSI)

SSIs were used for conducting the individual interviews. They allow interviewees to express their ideas and opinions freely while simultaneously the researcher is able to obtain necessary information as opposed to close ended surveys or completely unstructured interviews (Mikkelsen, 1995). For this research, an interview guide was used to structure the interview. The interview guide contained questions about occupation, coffee cultivation, diversification, extension services, land tenure, decision making and future aspirations (Annex I). These categories allowed for the different dimensions (environmental, financial, social) of the research questions to be covered. Mikkelsen (1995) highlighted two weaknesses of using SSIs in combination with the interview guide approach. First, important topics may be excluded because conversation is pushed in a certain direction. To prevent such exclusion, participants were always given the opportunity to add any comments or ask questions at the end of the interview. Most interviewees used this moment to highlight their biggest struggles and needs, which proved to be crucial information during data analysis. Second, flexibility in wording of questions could lead to different interpretations by interviewees, which may result in answers that are not comparable. This issue was mitigated however, by asking follow-up questions if it was clear that interviewees interpreted questions differently than originally intended.

Focus Group Discussions (FGDs)

Three different types of FGDs were organized. Participants of the FGDs were chosen randomly, though participants of each FGD all came from the same area/altitude. The main focus of the first FGD with both women and men was to get a better understanding of the local context and current problems young coffee farmers face. During the discussions, all input was written down on a flipchart,

which was later reorganized into a problem analysis. Furthermore, time was spent discussing the ranking and scoring exercise, where women and men would be interviewed separately. Men and women were separated to make gender differences more pronounced. Furthermore, they may influence each others' responses due to psychological phenomena. Especially women in male-dominated societies could alter their answers due to fear of expressing their own opinions (Stewart & Shamdasani, 2015).

Ranking and scoring exercises are often used to assess people's opinions, beliefs, and preferences (Mikkelsen, 1995). In this case the exercise was meant to assess what farmers thought of the different diversification strategies that Mara Agribusiness is proposing through their "*landscape and revenue diversification*"-project. These are avocado, jack fruit, bananas, pumpkin, honey, and zero-grazing cows. During the first problem analysis FGD participants were asked which factors play a role in deciding whether they will engage in a new type of diversification. Participants determined these as: food security, profit, initial investment, time to harvest, labor requirements, access to market, current knowledge, reduction in soil erosion, improvement in soil fertility, and pest management.[4] During the ranking and scoring workshops these factors were then tested against the different diversification strategies and put together in a matrix. Participants could score each diversification strategy against each factor from one to ten. One was always considered most negative, and ten most positive, meaning that for example if labor requirements were considered as high (which is perceived as negative) a low score would be assigned. This was made clear to the participants to avoid confusion. The reason behind each scoring was probed and noted down. Initially participants were supposed to rank and score individually. However, quickly emerging group discussions and time constraints led to collective voting, thus this was continued in both FGDs. At the end participants were asked to give a final ranking for the different diversification strategies. During the men's-only ranking and scoring FGD a top three was also put together for which factors are most important in the decision

[4] Though this is a result from the first FGD, it is also part of the methodology for FGD 2 & 3 which is why they are mentioned here.

making process. Unfortunately, this was left out during the women's-only focus group.

Lastly, two future scenario workshops were conducted with men and women separately. This type of tool allows for participants to visualize their future ambitions and aspirations on individual level as well as community level (Mikkelsen, 1995). Furthermore, it is especially useful when working in illiterate communities (Chambers, 1994a). Most farmers in the communities had gone to school, but their levels of English were low, and the local language is usually not written. The workshops started with a small discussion around sustainability as well as diversification, and what this meant to the participants. Participants were then asked to visualize what their village currently looks like. After completing the first drawing, a second drawing was put together to visualize what they would like their village to look like in the future. Furthermore, strategies were discussed to reach this future scenario. After the workshops both current and future drawings were digitalized to make them suitable to put in the thesis report.

Field observations

A multitude of field visits were done during the period of data collection. These also included visiting district offices and offices of local village leaders. The field visits provided a more in-depth understanding of the context of the study.

4.3.4 Limitations to research design

Though the research design and methodology provided a good framework for data collection and analysis, limitations were present. The first is linked to the collaboration with Mara Agribusiness. Their involvement gave a good starting point for designing the research, but it also shifted focus in a certain direction. It would have been interesting, for example, to define diversification and related strategies with study participants instead of using a pre-made list provided by Mara Agribusiness. This would have enhanced the level of participation of farmers throughout the study which may have led to results which could have been used to align the landscape and diversification project even stronger to their needs. Furthermore, it would have impacted the progression of the research. In the current design, the first FGD was focused on creating a problem analysis, and the first half

of the interviews were key in shaping an understanding of the context. If participants had been included in the research design phase, the interview guide and focus groups could have been tailored towards farmers' own set objectives, which may have been more useful for them in the short term as well.

Though useful for quick analysis, the rapid in PRA also provides its limitations. Due to time pressure and limited time available for data collection, certain information may have been overlooked. Furthermore, the field officer requested interviews not to be longer than 30 minutes, since he did not want to keep participants from their daily tasks. The interview guide (Annex I) had become rather lengthy, which made it difficult to manage within a 30-minute time frame. The study would have benefited from a more concise and focused interview guide to leave more room for spontaneous discussion. Shorter and more concise interviews may also have given room to increase the number of conducted interviews. Though a level of data saturation had been reached after 20 interviews, there were still some distinguishable differences between farmers making it difficult to draw general conclusions. Furthermore, a differentiation was made between men and women, and midlands and highlands in data analysis. All these categories contained an even smaller sample size. It would have been interesting to assess more households per category, and in a wider geographical area. Unfortunately, time and money constraints did not allow for more extensive data collection.

Another issue that the individual interviews did not consider, was polygamy. It is common in the study area for men to have multiple wives. In case a man has another wife, she and potential children live in a different house, i.e., they form a separate household. The study did not consider how resources might be pooled or kept separate from each individual household under the same husband.

Further limitations in the research design were related to the focus groups. First, the focus groups were confined to a maximum of 1,5 hours each, putting pressure on reaching their intended objectives. Second, the selection of participants for the focus groups was random. To produce reliable and valid data group participants ought to be socially homogeneous to prevent them from feeling pressurized to conform to their (dominant) peers (Campbell, 2001). This may have been invisible

in the different focus groups since they relied on group conversation and exercise. Though this issue was partly mitigated by separating men and women in the ranking and scoring exercise and future scenario workshops, social relations between participants of the same gender had not been considered when choosing participants for the focus groups. Furthermore, this could have been a reason for a sometimes lack of active participation of all farmers during focus groups. The goal of PRA is for farmers to be in charge of their own appraisal, but it was not always easy to actively engage participants. This called for clearer directions during FGDs and made it harder to host the group discussion as a facilitator. Besides, it may have biased results to the opinions of the few active participants. A lack of active engagement could, however, also be noted in some of the individual interviews. As such, it is unclear whether group dynamics and interpersonal relationships were the main driver behind a lack of active engagement in group discussions. Furthermore, Campbell (2001) critiques PRA for often not replicating FGDs which generalize information obtained from one source. By using different tools from the PRA catalogue data triangulation was ensured. Nonetheless, it would have strengthened data obtained from the focus group had they been replicated.

Specifically for the future scenario workshops, there were two limitations. As explained previously, visualization can be an empowering tool, because it does not require any alphabetical literacy (Chambers, 1994a). In this study, drawing was chosen as the visualization technique. However, this was not chosen in agreement with the participants, and it may not have been their preferred visualization tool. Second, interpretation of visual output may differ between participants and facilitator, but even between participants themselves. This may have altered conclusions drawn from the future scenario workshops. Both issues could have been mitigated by spending more time in the field and with the participants, but time and money did not allow for that.

A continuous challenge throughout the research was the language barrier. Many farmers did not speak English and the author did not speak the local language which meant that (almost) all interactions had to be supported by a translator, in this case the field officer. Though he possessed a good command of English, certain things may have gotten lost in translation. This could especially be the case with words

and sentences that have implicit meaning which are difficult to translate to their full extent. Finally, a potential limitation was the fact that the same field officer was also present during interviews with women and the FSW with women which may have influenced their answers. It is difficult to conclude whether the outcomes of the study would have been different if a female translator had been present during those moments, but studies suggest the interviewer's gender has an effect on participant's responses (Benstead, 2013; Liu & Wang, 2016).

4.3.5 Data analysis

Data was analyzed both simultaneously during data collection as well as after finishing data collection by using various MS Office tools. Interviews were transcribed by listening back to audio recordings and cross checked with written notes. It was a conscious decision not to use any transcription software so as not to lose any valuable information. Data was compared by highlighting key words in answers. This resulted in one big table comprising all interview answers. Focus groups were not recorded, so data was preliminary analyzed as quickly as possible after they took place. By organizing data in tables and writing a summary shortly after they were conducted, loss of data was prevented. The drawings from the future scenario planning workshops were digitalized using Adobe Illustrator after return back to Sweden.

4.4 Ethical considerations

Anticipating ethical issues during a study is important, especially when it involves collecting (personal) data from people (Creswell & Creswell, 2018). In conducting this study these have been considered firstly by asking permission from the district offices of Bulambuli and Sironko to conduct the study. Both offices were visited prior to data collection. Written letters from the University's supervisor and the owner of Mara Agribusiness were presented after which permission was granted by both offices. Second, written consent was asked of all approached participants. Before starting any data collection procedure, participants were asked for consent through a consent form which explained how their personal data would

be processed as per SLU guidelines (for the full consent form see (Annes II). A paragraph was included to ask permission from participants to use the results of the study, including their views, for improving future project designs of Mara Agribusiness. Furthermore, participants of individual interviews were asked for permission to audio record the interview. Participants were made aware that they could withdraw their consent at any time if they no longer wished to participate or did not want to be included in the study anymore. It was also stressed that they always had the right to refrain from answering any specific question. Moreover, participants were made aware during sensitization that participation was voluntary, and that no economical compensation could be provided, though a small bag of sugar or salt was provided to thank each participant for their time and contributions.

For the interviews and focus groups with women a female translator would be arranged, as sometimes women are more open in the absence of men. Unfortunately, the field officer (who was a man) had not always arranged for a female translator. In the end only one women's focus group was conducted without him. Since he grew up in the area himself, he argued farmers in the area, whether men or women, trusted him. Women farmers were indeed quite open, but it cannot be known how they would have responded otherwise.

For analysis, the drawings made during the future scenario workshops were taken home to Sweden. The aim is to return the drawings to the respective villages through the field supervisor, since there is no possibility within the thesis framework to return the drawings to the villages personally.

All collected personal data and recorded audio was stored in a computer vault. In the report pseudonyms have been used to describe farmers and villages. No personal data has been included that can be linked back to specific participants or their villages to ensure participants' anonymity.

4.5 Researchers' reflexivity

During data collection and analysis it is important to recognize the influence and bias the researcher may have on the process and outcomes of the study (Creswell,

2013). Since this is highly subjective, for this section the *"I"* preposition will be used to further elaborate.

I am conscious of the bias, values, and experiences I bring to the study which may influence the outcomes. There are three matters I consider to be most important in recognizing my own reflexivity. First, I have had the privilege of being able to pursue higher education at two of the world's leading agricultural universities which influences the way I perceive and assess problems related to this field. Second, I had not been to Uganda nor any other country in Sub-Saharan Africa prior to conducting this study. I tried to overcome this issue by spending a full four months in Uganda, making an active effort to learn about the Bagisu[5] culture and way of living. Furthermore, I was assisted by a field officer who had grown up in the studied areas which established an immediate rapport with most[6] of the farmers I met in the field. Last, and most importantly, I recognize that my European upbringing influences the way I perceive the world. Even though I consider myself to be a well-read person, my view of the world is shaped by Eurocentric thought. This in itself does not have to be problematic, but it becomes problematic when Western based assumptions are put on other non-western cultures which can easily result in power imbalances or in the case of Africa the idea that "*Africa lags behind*" (Boogaard, 2019). To overcome this, I have followed Kimmerle's work on intercultural dialogue. Some of the important features of intercultural dialogue are (Kimmerle, 2004):

- *Methodology of listening;* seeing the other as an equal fellow human being and taking their views seriously, leaving behind any differences in socio-economic status or wealth.
- *Openness to learn from others;* an open attitude is required with the expectation that someone will tell the other, in this case me, the researcher, something they could not have known beforehand.
- *Openness with regard to expected results;* dialogues should be open to discuss intended outcomes, how to get there and possible failure. It also

[5] The Bagisu, or Bamasaba, is the original tribe inhabiting the slopes of Mt. Elgon, Eastern Uganda.
[6] Though farmers were open to receiving me, not all of them were interested in participating in possible future projects with Mara Agribusiness (or other extension services).

means that none of the involved use their power to steer the conversation towards a certain result. This does not mean however, that there cannot be expectations about the outcome, but rather that by combining different perspectives and worldviews, a special knowledge increase can evolve (Boogaard, 2019).

4.6 Credibility of study

Creswell (2013) discusses several strategies for enhancing the credibility and trustworthiness of a qualitative study. In this study the most apparent ones that have been used are data triangulation (i.e. using different sources of data collection), clarifying the researcher's bias (see section 4.5), and spending prolonged time in the field. Furthermore, negative/discrepant information has not been left out of the report and findings. Results, whether "positive" or "negative" have been compared to existing literature.

5. Results

This chapter describes the results obtained during field work. Sections 5.1. to 5.3. discuss land ownership, household practices, farming practices regarding coffee and other crops, and current issues for farmers. Section 5.4. focuses more in depth on diversification; farmers' perceptions, decision making, and challenges. The chapter continues with results regarding knowledge sharing and extension services in section 5.5. Lastly, section 5.6. discusses farmers' future ambitions and visions.

5.1 Land ownership & household practices

In midland areas the average amount of land respondents' households had access to was 1,2 ha, while in highland areas this was slightly lower (1,0 ha; Figure 6). The overall average in the study area was 1,2 ha. Women reported having access to 1,4 ha on average, while for men this was 1,1 ha on average. The two female-headed households (separated, with children) owned more, or a similar amount of land compared to the average, 2,8 and 1,2 ha respectively. This is surprising because usually literature reports that women have less access to landholdings (Chigbu, 2019; Lambrecht, 2016; Lastarria-Cornhiel et al., 2014; Mwesigye et al., 2020).

It could be the case that in this area specifically women have improved access to land. That would also explain how the average land holding in the midlands is reported higher, since most interviewed women lived in the midlands. On the other hand, a more plausible explanation is probably that land is more easily accessible in the midlands compared to the highlands. As more women including those who were separated resided in the midlands, it is not surprising that women reported accessing larger landholdings on average than men did. It should be noted however, that when comparing the data sets, results came back as statistically insignificant,

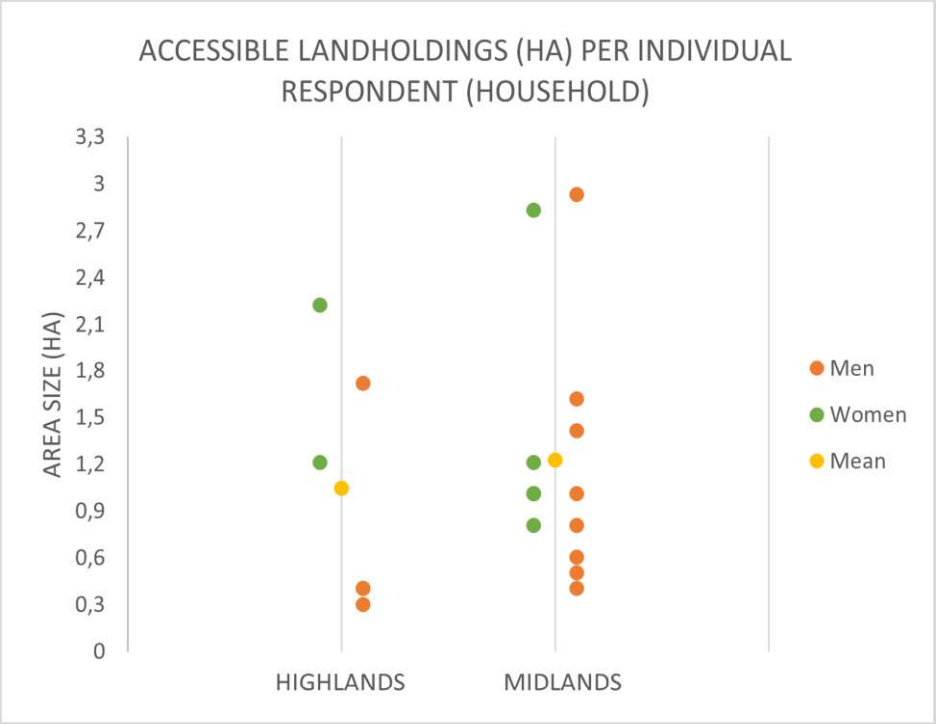


Figure 6. Accessible landholdings (ha) per respondent of SSIs. On average (households of) respondents in the highlands & midlands have access to 1,0 ha and 1,2 ha of land respectively.

which means a more extensive data collection needs to be performed to verify the results statistically.

In 58% of cases respondents (and their household) gained access to their land solely through inheritance. Others inherited their land partially but had purchased plots as well (16%). A similar amount (11%) also mentioned they rented part of their land. One farmer mentioned specifically that they only rent if they have the funds for it that year so it may vary from year to year. In another case, a single man farmer rented a plot for himself, while also helping out on his father's land when needed. He explained that income earned through his rental plot was his to spend, while income from his father's land went to the family as a whole. For women, inheritance was more often the only pathway to land access (71%, n=7) than for men (50%, n=12), and for female-headed households it was the only one. There was also a slight difference between midlands and highlands; 67% of respondents in the highlands (n=6) access land solely through inheritance, while the corresponding figure for farmers in the midlands was 54% (n=13), suggesting that it is easier for farmers in the midlands to access land in other ways, for example through buying or renting additional plots. This would also explain why average

land holdings are bigger in midland areas. At the same time, interestingly enough women seem to have a more difficult time accessing land holdings through other means than inheritance, while they also had bigger land holdings on average.

Among the married women farmers all responded they own their land together with their partner (Figure 7), while the separated ones owned their land themselves. Among married men farmers answers varied. Some own the land together with their partner, while some replied they were the sole owners of the land. The single men farmers either owned their land themselves or cultivated their parents'/fathers' land.

Figure 7. Responses to land ownership per respondents of the SSIs subdivided by gender and marital status (n=20).

Most men and women who were married reported taking household decisions together with their partners (Figure 8). One third of married women farmers responded their husbands made all the household decisions, and 13% of married men respondents said they did too, bringing the total of households with men as the sole decision maker to 21% (married respondents, n=14). A quarter of single men farmers said in their household the whole family was involved in decision making.

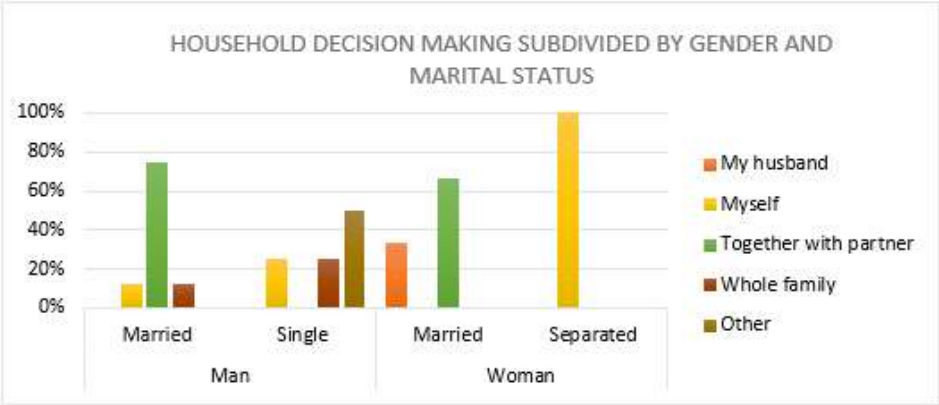


Figure 8. Household decision making as per respondents of SSIs subdivided by gender & marital status (n=20).

5.2 Coffee management & general farming practices

100% of the respondents of the SSIs responded they started farming through their parents or other family, i.e. their family members were already farmers who had passed on their knowledge to them. In 40% of cases farming was not their full-time occupation. Other occupations related to for example tailoring, building, and extension work. One respondent was still finishing school and was planning to go to university after finishing his last year of high school.

Among the reasons for cultivating coffee, it was mentioned most frequently (80%) that it is an important cash crop in the region. One respondent even went on to say:

> *"It's the only cash crop we can grow here"* - married man in highlands (ID_VII)

Some also mentioned that they learned coffee cultivation from their parents, which was mentioned by 20%. One respondent mentioned the environmental conditions as their primary reason for growing coffee. There was no notable difference between men or women, or the highlands or midlands in this regard.

Management practices for coffee cultivation (though not all are limited to coffee cultivation only) were generally the same among respondents of the individual interviews and the FGD. These were amongst others:

- Digging of trenches and/or terraces to prevent soil erosion
- Application of manure from cows for soil fertility and plant nutrition
- Application of chemical fertilizer for supply of nutrients (Table 3)
- Application of pesticides to control pests (Table 3)
- Mulching to retain soil moisture and improve soil fertility
- Weeding to prevent nutrient and growth competition
- Pruning to improve plant growth
- Stamping to stimulate fresh growth

All respondents of the SSIs reported having issues with soil health and fertility. 85% of respondents reported using chemical fertilizer and pesticides (Table 3), though 10% said it depended on whether they had capital at the moment application would be needed. The main reason for using chemicals was to improve yield, i.e.,

dealing with the issue of low soil fertility and pests. When asked if growing organically was something they would be interested in, the usual answer was:

> *"Here I can't do without fertilizer*" – married woman in midlands (ID_XIX)

Another farmer (married woman in highlands (ID_IX)) said she would be open to the idea if they would receive proper training. Ten percent of farmers grew their coffee completely organic of which all were men residing in high land areas. Their main reasons were to save money and to improve soil fertility. Though the differences between high- and midland farmers are minimal, it is interesting that the organic farmers both reside in highland areas. A study by De Bauw et al. (2016) found that generally in high altitudes on Mt. Elgon soils are less fertile than in lower altitudes. It could be argued that there is a bigger need in that sense for soil and water conservation (SWC) measures at higher altitudes, thus adopting organic farming practices. On the other hand Magrach & Ghazoul (2015) found that with climate change good growing conditions for Arabica coffee will be pushed to higher altitudes, making high altitude areas more suitable for Arabica coffee cultivation. This means growing conditions could be more favorable in the highlands of Mt. Elgon, which makes it easier to maintain equal yields here with organic growing practices. However, one of the reasons stated for growing organically was the high price for chemical fertilizers and pesticides. This is in line with Tesfaye et al. (2014) who found that the uptake of SWC increased with farmers' wealth, though the use of chemical fertilizer and pesticides did as well. The farmer who stated improving soil fertility as his reason for growing organically did own significantly more land than others in both high- and midland areas. Unfortunately, only two organic farmers were interviewed, which makes it difficult to draw any further conclusions. There were no differences between men and women farmers in this regard.

Table 3. Use of chemical fertilizer & pesticide per altitude (HL = highlands (n=6), ML = midlands (n=14)). N (total) = 20.

Use of chemicals	**HL**	**ML**	**Total**
Yes	67%	79%	75%
Yes, if money	-	14%	10%
No; fully organic	33%	-	10%
Only pesticides	-	7%	5%
Total	**100%**	**100%**	**100%**

5.3 Current issues

In general, farmers perceived several environmental, financial, and social issues that threatened their livelihood security. Table 4 provides an overview of perceived issues as discussed during FGD1.

Table 4. Issues perceived by coffee farmers in Bulambuli district subdivided in three categories: environmental, financial, and social (output of FGD1).

Environmental	Financial	Social
Changing weather patterns: • Rainy season; shorter & more erratic -> soil erosion • Extended periods of drought & sunshine • Increase in hailstorms Declining soil fertility Pests & diseases: • Coffee wilt • Leaf rust • Coffee Berry Disease (CBD) • Black scale	High cost of inputs (seedlings, fertilizers, pesticides) Transportation costs (poor roads) Volatile market prices Lack of investment funds Access to capital Access to land + land fragmentation Lack of capital to do soil sampling & testing	Gender inequality Access to information Negative attitude of farmers

From an environmental perspective changing weather patterns, declining soil fertility, and an increase in pests and diseases were mentioned as the most pressing issues, though all of these could be attributed to climate change. All respondents of the individual interviews experienced climate change as well, though one respondent said the climate had not changed much in the past few years. For example, a change in rainfall patterns was reported by all respondents of the individual interviews (Table 5). A change in rainfall patterns could be heavier rainfall, landslides/flooding's, or a more variable and shorter rainy season. An increase in hailstorms was also emphasized by a quarter of farmers. Furthermore, too much sunshine was mentioned by 70% respondents, as well as elongated periods of drought (35%). Lastly, an increase in crop pests and diseases was also mentioned in 35% cases.

Table 5. Mention of specific climate change (CC) effects by respondents of SSIs (n=20)

CC effect	Mention by respondents of SSIs
Change in rainfall patterns	100%
Too much sunshine	70%
Elongated periods of drought	35%
Increase in pests & diseases	35%
Increase in hailstorms	25%

In terms of interventions for climate change various measures were mentioned. A widely known practice to establish good water run-off is digging contour trenches and/or terracing (Picture 2). This practice was mentioned by 80% of respondents (Table 6). In mid/low land areas terracing is not practiced usually since the slopes are not very steep, but in highland areas it is necessary to reduce soil erosion. It should be mentioned on the side that from field visits it could be observed that especially trenches were not always dug correctly. Furthermore, planting of trees was mentioned in 80% of interviews, as well as planting of grass or cover crops (10%). Trees along the boundaries and in the coffee fields could also be observed (Picture 1).

Table 6. Mention of CC interventions by respondents of SSIs (n=20)

CC intervention	Mention by respondents of SSIs
Trenches/terracing	85%
Planting trees	80%
Spraying of pesticides/herbicides	25%
Irrigation (manual)	20%
Mulching	15%
Planting of grass/cover crops	10%

Other interventions such as spraying of pesticides to deal with the increase in garden pests, manual irrigation to mitigate elongated periods of drought, and mulching to retain soil moisture and fertility were also mentioned, though by less respondents (25%, 20%, and 15% respectively).

Financially, high costs of agro-inputs, transportation costs due to poor infrastructure and volatile market prices pose the biggest threats (Table 4). Due to a lack of access to capital and lack of investment funds many farmers are trapped

Picture 2. Terracing on the slopes of Mt. Elgon (source: author)

Picture 1. Coffee field intercropped with banana and trees (source: author)

in poverty. In 70% of cases respondents of the SSIs attributed lack of capital for farm investments and school fees as the most pressing threat. A single man respondent from the midlands (ID_XXIV) had the following to say about this:

> *"The biggest challenge in this area is the investment for farming, the capital to buy seeds and inputs. Climate change is making it worse. We need more trees. In terms of the environment, we shall plant bamboo and fruit trees. For soil erosion we need to plant bamboo around the riverbanks. It helps. "*

Another married woman from the highlands (ID_X) also mentioned the difficulties of having a good source of income during the dry season:

> *"Inputs are my biggest challenge because they're expensive. Pests are also a major challenge, and we lack a good source of income during the dry season. I also lack trees, especially fruit trees to combat malnutrition.*"

Though capital is a big challenge, access to knowledge was also emphasized by 25% of respondents. A married man from the highlands (ID_I) expressed how knowledge should be prioritized over capital:

> *"We don't have enough money to save, but I'm not interested in a money hand-out. We need more knowledge."*

A lack of access to information was also mentioned by other farmers (Table 4). Especially those who live in high land areas have little access to information and/or

extension services (more about extension services in chapter 5.5). Furthermore, gender inequality was perceived as one of the major social issues. One of the women farmers mentioned how "*women do 65% of the farm work"* (woman farmer in highlands during FGD1), but still have a low status in the communities. Lastly, negative attitude of farmers was perceived to be a problem. According to the participants of FGD1 some farmers do not feel like they can change their own situation or are not interested in outside collaborations. This was further affirmed during the individual interviews when two men farmers from the midlands made it very clear that they were not interested in any type of training or extension services whether it be organized through the government or private sector (further elaboration in chapter 5.5).

5.4 On- and off-farm diversification

Diversification of income both on- and off-farm is well known among farmers in Bulambuli and Sironko. The most important reason mentioned by 85% of respondents (n=20) was increasing the household income (Table 7). However, 40% also mentioned food security as an important reason, while 15% mentioned food security as the sole reason for diversifying. One farmer assigned reduction of soil erosion too as one of their primary reasons for diversifying. There were no big differences in this regard between men and women or the highlands and midlands. Diversification of income and production is usually passed on through the parents (55%) with a similar distribution in the highlands and midlands (Table 8). Others also learned about diversification through extension services (20%), though this channel was named more often in the highlands (34%) as opposed to the midlands (14%). A quarter of men stated school as an important channel for having learnt about diversification, while only 13% of women mentioned this. The

Table 7. Top 3 reasons why farmers diversify.

Reasons for diversifying
1. Income
2. Food security
3. Soil erosion

Table 8. Top 3 channels through which knowledge on diversification is disseminated

Channels for education on diversification
1. Parents
2. Extension services
3. School

difference between men and women could be attributed to the fact that more often men had pursued education further than senior level 4 than women.

5.4.1 Off-farm income diversification

Out of the 20 respondents, 80% mentioned their household had an additional income stream aside from farm work (Table 9). Farm work in this case entails all income generated through crop and/or tree cultivation, and livestock rearing. Off-farm income streams came from amongst others, brick making, tailoring, working at the local tree nursery, or own businesses or shops. There was a slight difference between altitudes, where an off-farm income was more common in the midlands (86%) than the highlands (67%). A possible explanation could be a lack of infrastructure and longer distance from economic centres further up the mountain, which was found to be limiting by other studies (Adem & Tesafa, 2020; Fassil & Elias, 2016). Marital status did not show any differences in responses, though women farmers more often than men responded their household did not have an off-farm income stream. It is difficult to draw any conclusions on why that would be the case, but a study by Van den Broeck & Kilic (2019) found that women in rural Uganda were almost 1,5 times less likely to engage in off-farm income activities than men.

Table 9. # of households with off-farm income per altitude and gender according to respondents of the SSIs (n(total)=20, w=women, m=men).

	Highlands (n=6)			**Midlands (n=14)**			***Total***
		w (n=2)	m (n=4)		w (n=6)	m (n=8)	
Yes	67%	50%	75%	86%	67%	100%	***80%***
No	33%	50%	25%	14%	33%	-	***20%***
Total	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

5.4.2 On-farm diversification strategies

Crops

Including coffee, farmers grow between 3 and 10 different types of crops. A positive relationship can be identified between the number of crops and amount of land that a farmer has access to, meaning that in general the more land farmers (and

their households) have access to the more diversified are their crop portfolios (Figure 9). The values came back as non-significant for the whole data set, as well as the highlands and midlands separately, indicating that a more extensive data collection is needed to verify the results statistically.

Figure 11 shows the crops most commonly grown by households of the

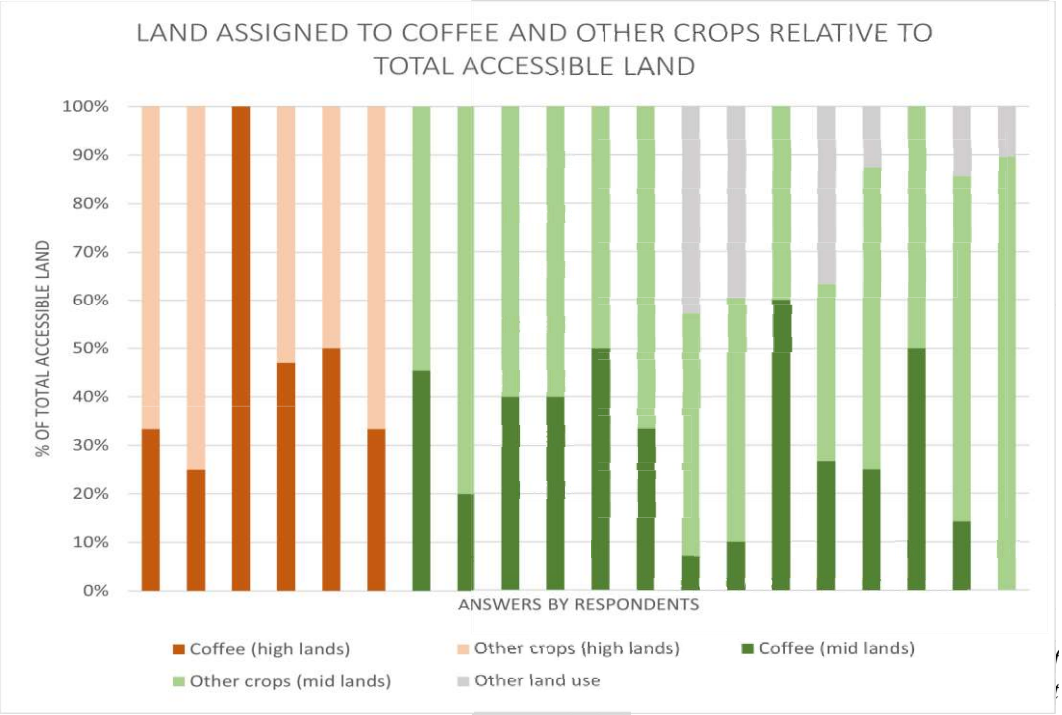
Figure 9. # of crops (including coffee) per total accessible land (ha) including standard deviations. No statistical significance could be identified ($r^2 = 0.471$).

respondents of the SSIs. These are beans, matoke (food banana) and maize. There was no difference between men and women, nor in altitude in this regard.

It is common in the area to intercrop bananas with coffee to provide shade as coffee trees perform better when not exposed to direct sunlight (Bote & Struik, 2011). Beans are also often intercropped with coffee though one farmer observed a negative impact on the coffee trees after growing beans:

> *"I don't intercrop beans with coffee anymore because there is competition for nutrients if you mix matoke, beans, and coffee at the same time. It's not a serious effect, but after harvesting beans you see the coffee leaves yellowing. After growing beans, the yield is always decreased. That is at least my experience as a farmer."* - single man in midlands (ID_XXI)

More often beans are intercropped with maize. Maize as well as tomato, cabbage, eggplant, and onions are usually grown in a different field than coffee. Figure 10 shows the amount of land that is assigned to coffee versus other crops, as well as other land use types. On average farmers assign 36% of their land to coffee



been included.

Figure 10. Land assigned to coffee cultivation and other crops relative to the total amount of accessible land in highland and lowland altitude (according to respondents of SSIs (n=20)). On average farmers assign 36% of their land to coffee, while for other crops the average is 57%.

while 57% is used for other crops). A difference can be observed between highland and midland areas, where in highland areas on average more land is assigned to coffee. This may be explained due to the fact that not all crops grow as well in highland areas as in midland areas. 30% of respondents who farm in midland area assigned some land to other use. This could be for example fallow land to let soil fertility restore or grazing for livestock. One respondent had assigned a small plot to growing eucalyptus trees.

Crop rotation is well practiced in the region, and more than half of the participants mentioned practicing crop rotations as a common farming practice. Furthermore, positive effects on soil fertility and/or reduction in soil erosion were attributed to diversification of crops by 15% respondents.

Trees

Aside from agricultural crops, trees also make up an important part of the diversification strategies. All respondents reported having trees growing on their plots. Especially fruit trees are important in the region since they not only contribute to a reduction in soil erosion and provide shade for crops such as coffee, but they

also provide an extra source of nutrition and income for households. Most commonly grown fruit trees are avocado, passion fruit, and mango. A statistically significant relationship at 10% interval was identified between the amount of accessible land (ha) and the number of fruit trees on each farm (Figure 12). The correlation value between the number of crops and accessible land was higher in high-land areas ($r^2 = 0,79$) than midland areas ($r^2 = 0,63$), though both came back as non-significant. The farmers who grew fully organic are not included in the figure as they grew a substantial higher amount of fruit trees than other respondents.

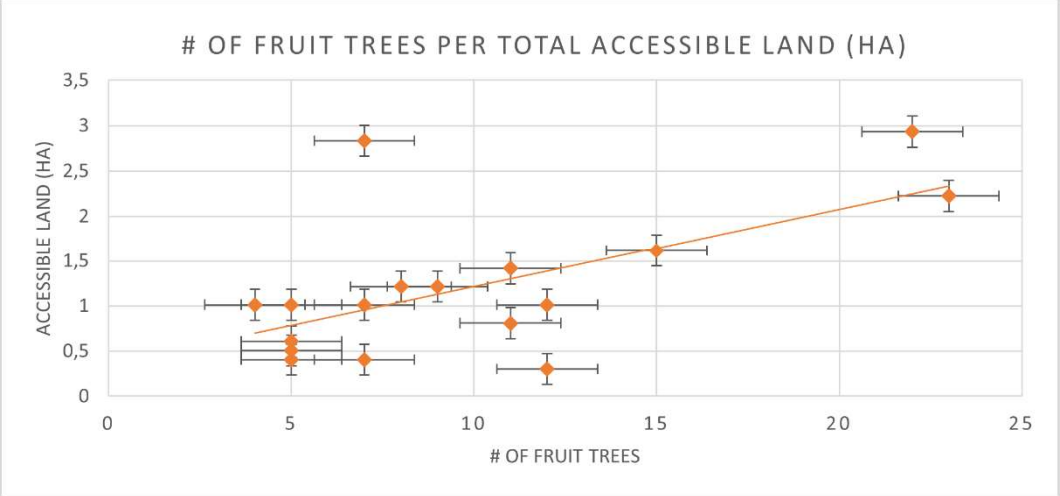


Figure 12. # of fruit trees per total accessible land (ha). There is a statistically significant relationship at 10% interval between the accessible land (ha) and # of fruit trees (r = 0.615, p = 0.009). Two outliers (x = 40, x = 500) have been removed from the figure to prevent skewing the results.

Respondents did not only grow fruit producing trees. Other tree species such as musizi (*Maesopsis eminii*), codia (*Cunoniaceae*), and grevillea (*Grevillea robusta)* were also present across the study area. Musizi, for example is important for firewood, while grevillea provides nutritious feed for livestock (in particular goats). In general, trees are perceived as an important addition to the physical farm environment, as mentioned by half the respondents. According to respondents planting trees is important for maintaining soil fertility and reducing effects of wind and rain/hailstorms on the coffee plants. There was no difference between the highlands and midlands, but women mentioned the importance of trees (63%) more often than men (33%).

Livestock

Livestock keeping was common in the study sites. Only 10% of respondents mentioned not having any livestock at all. Not all respondents were asked specifically what type of livestock they owned, but based on those who were asked and field observations the most common livestock were chickens, goats, and non-grazing/stall fed cows (i.e. cows that are kept in paddocks around the house to collect manure and prevent over-grazing). Manure is collected to fertilize coffee and other crops and/or trees.

Income generation & food security

Coffee was identified as the most important crop for income generation by half of the respondents (Table 10). Relatively more respondents from the highlands attributed coffee as their most important source of income. This was expected since farmers in the highlands also assign relatively more land to coffee cultivation than farmers in the midlands. No women farmers in the midlands named coffee as their households most important income generating activity. They mentioned other on-farm income streams such as beans, maize, and other crops (onion, cabbage, soybean, and ground nut) as more important. 20% of respondents mentioned off-farm income generating activities as the main source of their household's income. These were mostly men.

Table 10. Most important activities for income generation according to respondents of the SSIs (n (total)=20, w=women, m=men).

		Coffee	**Beans**	**Maize**	**Other crop**	**Off-farm activity**	**Matoke**	**Livestock**
High-lands	w (n=2)	50%			50%			
	m (n=4)	100%			25%	25%		25%
Mid-lands	w (n=6)		83%	83%	33%	17%	17%	
	m (n=8)	63%	13%			25%	13%	
Total		***50%***	***30%***	***25%***	***20%***	***20%***	***10%***	***5%***

For food security, maize and beans were by far the most important crops (Table 11). All women across the study area reported maize as the most important crop for their household's food security. Matoke was deemed important by 40%

respondents, most of them men farmers residing in the highlands. Other crops in this case refers to cabbage, cassava, and potato.

Table 11. Most important crops for food security according to respondents of the SSIs (n=20).

		Maize	Beans	Matoke	Other
High-lands	w (n=2)	100%			50%
	m (n=4)	75%	100%	75%	25%
Mid-lands	w (n=6)	100%	83%	33%	33%
	m (n=8)	75%	75%	38%	
Total		***85%***	***75%***	***40%***	***20%***

5.4.3 Sales channels

Different sales channels are used for selling both coffee and other produce (Table 12). Usually, farmers make use of different sales channels simultaneously trying to get the best prices for their produce. For example, selling produce at the market to individuals and/or middlemen while also having middlemen coming to the farm is a normal practice. In one case a respondent mentioned selling produce privately, i.e. selling to individuals outside of a market structure (for example a neighbour). The market as sales channel was less important for farmers in the highlands than for farmers in the midlands (1/3 and 2/3 respectively). In the midlands it was most common for middlemen to come to the individual farms to pick up produce (64%). A possible explanation could be better infrastructure (quality of roads) further down the mountain, i.e. farms in the midlands are more easily accessible compared to the highlands. However, whether farmers trade with middlemen also relies on their own decision to trade or not trade with middlemen. For example ethnic and religious

Table 12. Sales channels for produce from diversification strategies according to respondents of the SSIs (n(highlands)=6, n(midlands)=14, n(total)= 20).

	Middlemen (at farm)	Market	Middlemen	Private sales
Highlands	50%	33%	50%	17%
Midlands	64%	57%	36%	-
Total	***60%***	***50%***	***40%***	***5%***

factors could play an important role in shaping the relationship between farmers and middle men (Abebe et al., 2016). There was no notable difference between men and women respondents.

5.4.4 Engaging in new diversification strategies

For their project on landscape and revenue diversification, Mara Agribusiness wants to provide farmers with knowledge and tools on diversifying through the following strategies: avocado, jack fruit, banana, pumpkin, beekeeping, and rearing of cows. More than half of the respondents of the SSIs (60%) were interested in all these strategies. Strategies that were of less interest were jack fruit, pumpkin, and beekeeping (Table 13). Jack fruit was not of interest in high land areas, because this tree does not grow well at that altitude. Farmers who were not interested in beekeeping resided in mid-land areas. Other reasons for not wanting to engage in a certain strategy were a lack of knowledge, lack of capital, and particularly for beekeeping not having a suitable place for beehives:

Table 13. Diversification strategies from Mara Agribusiness' proposed list respondents of SSIs (n=20) did NOT want to engage in.

		Beekeeping	**Jack fruit**	**Pumpkin**
Highlands	w (n=2)		50%	50%
	m (n=4)		50%	
Midlands	w (n=6)	33%		
	m (n=8)	38%		
Total		***25%***	***15%***	***5%***

> *"All of them are good, apart from honey. I don't have space for beehives."* – married man in midlands (ID_XVI).

Challenges in engaging in new diversification strategies will be further discussed in section 5.4.6.

In two of the focus groups with farmers (one men's, one women's), participants were asked to rank and score the different diversification strategies recommended through the landscape and revenue diversification project on specific factors. Table 14 shows the results of these FGDs. Below an extensive elaboration per diversification strategy follows.

Table 14. Output of ranking & scoring exercise (FGD 2&3). Table shows scoring per decision making factor and diversification strategies (1 = low, 10 = high; w = women, m = men). Red numbers highlight a difference of ≥ 3 in scoring between genders.

	Avocado		**Jack fruit**		**Banana**		**Pumpkin**		**Honey**		**Milk (cows)**	
	w	*m*	*w*	*m*	*w*	*m*	*w*	*m*	*w*	*m*	*w*	*m*
1. Food security	10	5	2	-	10	8	8	5	3	10	10	10
2. Initial investment	1	1	1	-	1	1	1	1	10	9	10	9
3. Income/profit	3	4	1	-	10	10	1	2-3	10	10	10	10
4. Time to harvest	2	1	1	-	8	4	8	8	8	2	1	3
5. Labor requirements	1	1	1-3	-	9	6	3	1	9	3	10	9
6. Access to market	10	1	10	-	10	8	1	2	10	7	10	10
7. Current knowledge	10	10	10	-	10	7	2-4	10	2	4	10	7
8. Reduces soil erosion	1	8	1	-	10	8	10	10	1	1	8	1
9. Improves soil fertility	10	1	10	-	10	10	10	10	1	1	6	10
10. Pest management	1	1	1	-	1	1	1	1	1	1	1	10

Avocado (Persea americana)

The importance of avocado (*Persea americana*) for food security was scored very high by the women while the men did not perceive this the same way. According to the men avocados were mainly grown for selling because the fruits are perishable, but the women deemed it an important part of the diet. Both groups agreed initial investment costs were low, because seeds can be sourced locally, obtained for free from the tree nursery, or even gifted by neighbours. Furthermore, profit from avocado is not very high. It takes about 5-6 years before an avocado tree starts producing fruits, so this category was scored low as well. In terms of labour requirements, they all agreed it was very little work. After planting there is little labour going into maintenance. Interestingly enough, the women perceived access to market as very good, while the men found access to market very poor. This is mainly due to the fact that they have to bring the produce to the market

themselves, and market prices are not good. Both groups scored their current knowledge on the crop a 10, because they felt they had all knowledge needed to grow avocado trees. No reduction in soil erosion occurs from having avocado trees according to the women. The men on the other hand, perceived having avocado trees as a big reducer of soil erosion since the roots are good at keeping soil particles together. There was also a difference in perception of soil fertility. The women perceived avocado trees as a contributor to soil fertility, because the leaves can be used for mulching, and peel from the avocado fruits can be used for composting. The men, however, felt avocado trees had a negative impact on soil fertility because the trees are heavy feeders. Both groups did not perceive any benefits for managing garden pests.

Jack fruit (Artocarpus heterophyllus)

Jack fruit is perceived to be more suitable for mid- and lowland areas because it does not grow well in highland areas. Since the ranking and scoring focus groups were held in highland area, both farmer groups did not show a lot of interest in cultivating this tree species. The women considered it for scoring, but the men did not want to give it a scoring for this reason. A few interesting differences did pop up. For example, women voted access to the market for jack fruit as very good (10/10), as well as their current knowledge for growing the tree, and its positive impact on improving soil fertility.

Banana (Musa spp.)

Banana, or matoke, is one of the main staple crops in the region and is very important for food security. Since banana plants multiply by themselves, investment costs are very low. If needed it is possible to ask a neighbour for a new cut. Demand is always high, so profit was considered good by both groups. Time to harvest was perceived differently between groups. According to the women, bananas are fast growing with continuous harvesting from 6 months after planting, hence a scoring of 8. The men scored this category a 4, because it takes up to 12 months before a banana plant starts producing, though after that, harvesting is continuous. In terms of labour requirements, however, there was quite a difference in scoring. According to the women cultivating banana plants is almost as labour

intensive as coffee. The men, however, perceived this very differently, and stated there are some key jobs that need to be done in order for the plants to grow well, such as sticking, applying manure, and weeding, but overall, it is not very labour intensive.

Accessibility to market was deemed very good by both the men and women, because bananas can be sold almost anywhere. Either middlemen come to the farm or harvest is brought to the market by farmers themselves. In terms of knowledge there was a divide. The women felt like they had all the necessary knowledge there is to know in order to grow banana plants, while the men felt their current knowledge could be improved (7/10). They requested more training especially on disease management. Diseases such as banana wilt for example, are threatening production in the area.

Both groups saw a reduction in soil erosion and improvement in soil fertility from growing banana due to the fact that all plant materials can be composted and spread out on the land. By mulching the leaves and stems the soil is provided with nutrients while soil moisture is retained as well. Both groups did not perceive any benefits for managing garden pests.

Pumpkin (Cucurbita pepo)

According to the women pumpkin is important for food security (8/10) because you can eat both the fruit and the plant leaves, though in the overall diet it is not as important as banana and avocado. The men scored it significantly lower on this factor (5/10). They perceived pumpkin as fairly important but did not like the fact that it cannot be kept for a long time. Initial investment was perceived low by both groups (1/10), because seeds are cheap and easily obtainable. They may even be given out by neighbours who have leftovers.

Both groups perceived profit as low, because pumpkin is mainly grown for food security and not for selling. Time to harvest is similar to bananas (approximately 6 months), which led to a scoring of 8 out of 10 for both groups. Labor requirements were considered low by both groups though the women added that some manure and pesticides should be applied, which explains why they scored it an 8 out of 10. Access to market was also considered poor by both groups, mainly because the interest in buying pumpkin on the market is low. However, the women did mention

later on that when pumpkins are sold on the market, they do get a good price for it. Current knowledge was perceived quite differently. The women scored it 2-4 out of 10, because current knowledge among the group varied. For example, manure application was debated. They agreed however, that they all needed more knowledge on pumpkin cultivation. The men on the other hand, felt like they owned all the knowledge needed for growing this crop (10/10). In terms of soil erosion reduction and soil fertility, pumpkin was considered to have a positive effect. Both groups scored 10 out of 10 on both of these factors. Pumpkin is grown as a cover crop, and the leaves can be used for mulching. Furthermore, all plant parts can be given back to the soil for decomposition.

Though both groups scored benefits to pest management a 1 out of 10, the women did so because they did not perceive positive nor negative effects on garden pests, while the men perceived pumpkin as a difficult crop in this regard, because it attracts a lot of pests.

Honey (beekeeping)

The women saw honey as a minor addition to overall food security (3/10), while the men thought of it as very important (10/10) due to its medicinal traits. Initial investment was considered high by both the men and the women (9 and 10 out of 10 respectively) due to all the materials (e.g. iron sheets, beehives, tin bags) that need to be purchased to establish a healthy beehive. Honey is a high value product, as such profit was perceived as very high (10/10) by both groups. Time to harvest on the other hand was perceived differently. The women gave this factor a high score (8/10), because a harvest can be done every 6 months. According to the men, however, colonization of beehives could take long and from their experience it may take up to 2 years before the first harvest. Therefore, they scored this a 2 out of 10. Labour requirements were also perceived differently. The men scored labour requirements low (3/10). Once the beehive is established there is not much labour required. However, monitoring needs to happen in regards to pests and thieves. The women felt labour requirements were high (9/10), precisely due to the establishment period. Access to the market was deemed very easy by the women (10/10) because honey is popular, and it can be sold at farm level. The men scored it somewhat lower in this regard (7/10), because taking it to the market can give a

much better price, but it also requires more work to sell the product. Both groups felt their current knowledge was not sufficient. The women indicated to know next to nothing (2/10). The men perceived their current knowledge somewhat better (4/10), but they indicated a need for more training on the colonization process, abandonment, and learning about other profitable traits of beekeeping.

As for the effect on reduction of soil erosion, soil fertility, and pest management both groups were on the same page (1/10). Neither perceived any benefits to these issues. In fact, the men pointed out that bees can be a vector for spreading diseases. Though no scientific evidence could be found to support this claim in this specific context, a study by Pattemore et al. (2014) found that the plant pathogen *Pseudomonas syringae* (common name: bacterial blast) could survive and spread within honey beehives. A study by Parish et al. (2019) found a high probability of transmission of spores of plant pathogenic fungi through the digestive tracts of honey bees. These studies suggest that both bacterial and fungal plant pathogens could be spread by honeybees.

Cows

For food security cows were deemed very important (10/10) by both groups, since both milk and meat can be consumed. Buying a cow is expensive which is why initial investment was scored high by both groups (10 and 9 out of 10 by the women and men respectively). The men added that building shelter and maintaining the animal is also very costly. Profit is very good for the same reasons as food security received a high scoring (10/10 by both groups). Furthermore, cow dung (manure) and the cow itself can be sold, making this a high value venture. Time to harvest is not applicable to a cow of course, but since it takes quite some time before a cow starts producing milk (2,5 years from birth according to the men) and it takes long to assemble a considerable amount of manure, this factor was scored low by both the men and the women (3 and 1 out of 10 respectively). The women added that it also depends on how you feed your cow. Labor requirements for keeping a cow are perceived as high (9 and 10 out of 10 for men and women respectively), because of the initial labour for building a shelter, followed by the constant care that is needed for maintaining a healthy cow. Access to the market was perceived a 10 out of 10 by both groups as all produce can be sold easily from the farmgate.

The women felt like they knew everything there is to know about cows since all of them had grown up with cows (10/10), while the men felt their current knowledge was not sufficient yet (7/10), especially on treatment for disease and construction of the pens (i.e. shelter). On reduction of soil erosion, the women assigned a score of 8, since manure can be applied to amend the soil. The men on the other hand did not perceive any benefits from cows in this regard (1/10), but soil fertility is improved by applying manure (10/10). The women scored cows a 6 out of 10 on soil fertility since manure was the only part of the cow that was beneficial for improving soil fertility. Mixing cow urine with ash makes for a good organic pesticide according to the men (10/10). The women, however, were not aware of this. They assigned a low score (1/10) since cows bring ticks.

Overall ranking of suggested diversification strategies

Both groups were asked to put the different diversification strategies in order from most favoured to least favoured (Table 15). There were some differences in ranking, though similarities could be discovered as well. Jack fruit was chosen as least favoured by both groups since it is not commonly grown in highland areas. As their number one, the women chose pumpkin, because it would be a good addition to the diet and the market prices are good. For the men however, pumpkin was put as their #5 because it is only used for home consumption. They assigned cows as most interested in, since cows can provide an income at any time. The women put cows as their third option, because choosing strategies for food security was more important to them. Even though the men seemed more focussed on profit, similar to the women they chose banana as their second strategy, because it is such an important part of the local diet. Beekeeping was put in the top three by the men, because of the high profit, though the time until first harvest of honey and labour requirements kept them from placing it higher on the list. The women saw high labour requirements especially as a limiting factor

Table 15. Final ranking of suggested diversification strategies from most favourable (1) to least favourable (6) by both women's and men's groups.

#	Women	Men
1.	Pumpkin	Cows
2.	Banana	Banana
3.	Cows	Beekeeping
4.	Avocado	Avocado
5.	Beekeeping	Pumpkin
6.	Jack fruit	Jack fruit

which is why they put it low on the list. Since avocado trees take long before producing fruits both groups put it at a lower ranking.

5.4.5 Determinants to adopt diversification practices

Though all factors discussed in chapter 5.4.4. are considered in decision making, some factors weigh more than others. For the men profit, food security, and current knowledge were most important. The women were not asked specifically which factors were most important to them, but from their final ranking food security, profitability, and labour requirements of the new strategy seemed to play an important role in the decision making process. For respondents of the SSIs environmental factors ("*I study the environment, so that I make decision on what can grow here"* - married man in highlands (ID_XIII)), financial factors (*"I consider the demand of the crop in the market* – single man in midlands (ID_XII)), as well as food security (*"also there are some months in the year where we need food. Like in May we need some maize and beans"* - single man in midlands (ID_XXIV)) play an important role in their decision making around diversification (Table 16). Environmental factors were not reflected by the final ranking of either group in the FGDs.

In the highlands respondents of the SSIs deemed environmental, financial, and social considerations equally as important in decision making, though financial factors were not mentioned by any women. For women in the highlands environmental factors and food security were more important compared to men

Table 16. Factors influencing decision making around diversification subdivided in three different categories: environmental, financial, and social (according to respondents of SSIs).

		Environmental	**Financial**	
	n	Evaluation of land/crop/environment/season	Market	Initial investment
Highlands	**6**	**33%**	**17%**	**33%**
Women	2	50%		
Men	4	25%	25%	50%
Midlands	**14**	**43%**	**50%**	**14%**
Women	6	33%	33%	33%
Men	8	50%	63%	
Total	***20***	***40%***	***40%***	***20%***

Table 16 continued.

		Social		
	n	Food security	Knowledge	Discuss with family
Highlands	**6**	**33%**		
Women	2	50%		
Men	4	25%		
Midlands	**14**	**29%**	**7%**	**7%**
Women	6	17%	17%	
Men	8	38%		13%
Total	***20***	***30%***	***5%***	***5%***

respondents. In the midlands generally environmental and financial factors were more important than social factors. There was a higher percentage of men assigning environmental and market factors (50% and 63% respectively) as important than women (33% and 33% respectively). Though it would have been expected that women prioritize food security more than men, this was not the case in the midlands, where only 17% of women (living in the midlands) mentioned food security as a primary decision making factor.

5.4.6 Challenges for adopting diversification strategies

For respondents of the SSIs, both women and men in the whole study area, capital was by far the most limiting factor to engage in (new) diversification strategies (Table 17). Market ("*Market is a challenge, because it fluctuates.*" – single man in midlands (ID_XXI)) was the second most limiting factor followed by land. One farmer perceived the market as very difficult:

> "*There is no market. Also, another problem is inputs, like fertilizer and pesticides. They are very expensive.*" - married woman in highlands (ID_X).

Another pointed out how many farmers do not know where to find the market:

> "*We may plant, but not know where to sell, so knowing where the market is, is important.*" - married woman from midlands (ID_III).

Table 17. Factors limiting engagement in new diversification strategies subdivided in three different categories: environmental, financial, and social (according to respondents of SSIs).

		Environmental		Financial			
	n	Irrigation (dry season)	Poor seed varieties	Market	Initial investment	Land	Transport/ Infra-structure
Highlands	6			**17%**	**100%**	**50%**	
Women	2			50%	100%	50%	
Men	4				100%	50%	
Midlands	14	**7%**	**7%**	**50%**	**86%**	**29%**	**14%**
Women	6			67%	83%	50%	17%
Men	8	13%	13%	38%	88%	13%	23%
Total	***20***	***5%***	***5%***	***40%***	***90%***	***35%***	***10%***

Table 17. continued.

		Social	
	n	Knowledge	Labour
Highlands	6	**17%**	
Women	2		
Men	4	25%	
Midlands	14	**36%**	**21%**
Women	6	17%	17%
Men	8	50%	25%
Total	***20***	***30%***	***15%***

The market is perceived as more limiting by women in both highland and midland areas. This could be a result of less engagement of women farmers in cash crop sales (Njuki et al., 2011; Sell & Minot, 2018) and the limited control women may have over household productive resources (Zakaria, 2017). The altitude difference is surprising however, since access to market is expected to be better at lower altitudes. As for the issue of land, it must be noted that land is available, but rather that capital is limiting in obtaining more land (*"There is the challenge of land, I don't have more money to expand. Capital is a problem."* - married woman in highlands (ID_IX)). Land was more often a challenge in high land areas which can be attributed to the general smaller plot sizes in farmers have access to in the highlands.

Furthermore, women in the midlands (50%) deemed land a problem more often than farmer from the midlands described the limitations to diversification as follows:

"It can be a challenge because we have small plots. We also often lack money to buy seeds." - (ID_III)

Among social factors, knowledge requirements seemed to be the more limiting factor. One farmer said for example:

"I would need training to start doing something new" – married man in highlands (ID_I)

This is in line with results from FGD1 (chapter 5.3.), from which the results showed that access to knowledge was perceived to be an issue. Knowledge was mentioned more often by men than women (25% of men against no women in the highlands, and 50% against 17% in the midlands). The ranking and scoring FGDs also reflected this result. Labour was pointed out too, but only by farmers in the midlands. A possible explanation could be the smaller plots farmers have in the highlands on average. Naturally smaller plots equal less labour.

According to Table 16 environmental factors play a significant role in decision making around diversification. It is however, not perceived as limiting, especially not by women nor in the highlands. This is contradictory to the perceived issues as discussed in FGD1 (chapter 5.3.), where climate change was described as a limiting factor and threat to farmers' livelihood. In the midlands, men respondents did mention lack of irrigation in the dry season and poor seed varieties as environmentally limiting factors:

"It's very expensive, inputs, seeds. As it does not come down, the price just increases. So, capital is a challenge. Yes, and land, and access to knowledge sometimes. To consult about the seed, you're going to plant." – married man in midlands (ID_XXII)

Though certain factors seem to be more limiting than others for farmers, most farmers attributed the limitations for engaging in (new) diversification strategies to several factors. A few examples are:

"You cannot plant tomatoes in the dry season because there is no water. Irrigation is a problem. I also need more knowledge. It's also sometimes a challenge." - married man in midlands (ID_XXIII)

"Market is a problem, because sometimes for example tomatoes, they can ripen at a low price. Sometimes transporting from the garden is a problem."
- single man in midlands (ID_XIV)

5.5 Knowledge sharing & extension services

More than half of the respondents (60%) of the SSIs were part of a farmers group. Farmers that were not part of a farmers group all resided in midland areas. Most commonly respondents were part of mixed-gendered groups (Table 18). One woman responded to be part of a specific women's group, while another man was part of a youth group. Of the married farmers, 62% reported that their partners were also part of a farmers group. Approximately half of them reported that their partner was part of the same mixed group. A quarter of married men farmers responded their wives were part of women's only groups, while 17% of married women said their husband was in a mixed group. Furthermore, one single man farmer reported that his brother who he lived with, was part of a youth farmers group.

Table 18. Type of farmers group respondents of SSIs (n(total)=20) are a part of (n.n. = type of group is unknown, no group = respondents who are not part of a farmers group).

		Mixed	**Women's**	**Youth**	**n.n.**	**No group**
Highlands	w (n=2)	100%				
	m (n=4)	100%				
Midlands	w (n=6)	50%	17%		17%	17%
	m (n=8)			13%		88%
Total		***45%***	***5%***	***5%***	***5%***	***40%***

Aside from farmer groups, there are extension services active in both districts. Extension services are not only provided by extension officers meeting with farmers in person but may also occur through radio. It is usually the sub-county that provides extension services, though private companies also play an important role, especially in high land areas. Some also reported having received extension from a specific officer, i.e. an extension officer who was also a local farmer. This farmer was also among the interviewed. It was not uncommon that farmers had not (yet) received any extension at all. Of the respondents who had received trainings through extension services all found the services useful:

"They help us, they sensitize us to know to grow more, modern crops. Even to getting seedlings, new way of seedlings." - married man in highlands (ID_VI)

"It has made me to what I am, that is why I like it so much." - separated woman in midlands (ID_XX)

"Especially the private has helped me a lot. They taught me how to plant beans and how to space them." – married man in midlands (ID_XXII)

A few respondents pointed pointed out that they lack adequate trainings from the sub-county:

"Sometimes in subcounty, they cannot help you in good way." - married man in midlands (ID_VIII)

"I'm missing district representation. I would need more training on pest management." – single man in midlands (ID_XXIV)

Table 19 shows an overview of themes respondents of the SSIs would like to receive more extension on. These themes were address in an open-ended question, i.e. respondents were not given a pre-made list to choose from. Beekeeping and pest management were mentioned most frequently. Beekeeping was especially requested by women in the midlands (83%). No farmers in the highlands requested

Table 19. Requested topics for extension services of respondents of SSIs (n=20) subdivided by altitude and gender (w=women, m=men).

	Highlands (n=6)			**Midlands (n=14)**			***Grand total***
	w (n=2)	m (n=4)	*Total*	w (n=6)	m (n=8)	*Total*	
Beekeeping				83%	13%	*43%*	***30%***
Pest management	50%	25%	*33%*	17%	13%	*14%*	***20%***
Fruit tree cultivation				33%		*14%*	***10%***
Livestock rearing	50%		*17%*		13%	*7%*	***10%***
Nothing					25%	*14%*	***10%***
Other		50%	*33%*	33%	38%	*36%*	***35%***

for beekeeping. Pest management on the other hand was requested by one third of farmers living in the highlands, especially women. Furthermore, fruit tree cultivation and livestock rearing were reported, though the first only by women in the midlands. Fourteen percent of farmers in the midlands were not interested in any types of extension service, not at the current moment nor in the future ("*For me I don't need any* – married man in midlands (ID_XV)). Topics that were only mentioned once are put in the other category. Among the topics are tree intercropping, coffee management, crop insurance, and gender equality.

Informal knowledge sharing was also a common practice among farmers. Out of 20 respondents, 95% engaged in some type of knowledge sharing outside of their farmer groups or extension services. Two of the respondents were model farmers for others in the area. One reported how the model farms are used to share knowledge:

> *"I have become a model farm, so farmers visit me, and I also visit other farmers around to get knowledge."* - married man in highlands (ID_VII)

Besides the model farms family, friends, and neighbours were mentioned as ways to share knowledge.

5.6 Future ambitions and scenarios

Respondents were asked if they were satisfied with their current life, to which 70% (n=20) answered yes. It was mostly single men farmers who responded they were not satisfied (75%, n=4), though of the married farmers (n=14) 14% and 7% of men and women respectively responded *no* as well. Dissatisfaction was mostly attributed to the lack of income and means to sustain the household.

All respondents saw themselves being farmers in the future. 20% of all respondents (n=20) saw themselves moving elsewhere, but they would still keep their land and continue to farm or hire people to farm there (Table 20). Other future ambitions were described as improving the house structure, improving, and expanding farm production, buying more land, opening a business, and educating children and/or themselves. Answers of women seemed to be more spread out, while men seemed to focus more on farm production/expansion and increasing land

size. Future aspirations were further discussed during the future scenario workshops where one group of women and one group of men drew their current situation and preferred future scenario.

Table 20. Future ambitions of respondents of the SSIs subdivided by altitude and gender (n(total)=20, w=women, m=men).

	Highlands (n=6)			***Midlands (n=14)***			***Grand Total***
	w (n=2)	m (n=4)	*Total*	w (n=6)	m (n=8)	*Total*	
Improving/expanding farm production		50%	*33%*	17%	63%	*43%*	***40%***
Opening a business				67%	25%	*43%*	***30%***
Buying more land		25%	*17%*		38%	*21%*	***20%***
Education				50%	13%	*29%*	***20%***
Second house	100%		*33%*		25%	*14%*	***20%***
Improving house		50%	*33%*	33%		*14%*	***20%***
Job elsewhere	50%	25%	*33%*	17%		*7%*	***15%***
Increasing income		25%	*17%*		13%	*7%*	***10%***
Constructing local school		50%	*33%*				***10%***

Current situation and future scenario – women's perspective

Figure 13 shows the current situation (left) and preferred future scenario (right) of village A as perceived by a group of women farmers from that village. Around the main road is where most of the settlements are. This is also where people keep their livestock (there is a zero-grazing policy). Coffee plantations are intercropped with banana and surrounding fields are sown with crops such as maize and beans. Furthermore, tomatoes are grown alongside the river. The river can be a source of problems for the inhabitants when there is too much rainfall. It causes the river and fields to flood and may take both crops and soil causing severe soil erosion. Even though they dug trenches and planted grass as cover, the issue is still pressing.

Currently, the biggest farm related issues are pests. They use pesticides, but problems persist. They use chemical fertilizers too, because without:

"We don't have any yield" - woman farmer during FGD 4

SKETCH MAPS OF VILLAGE A

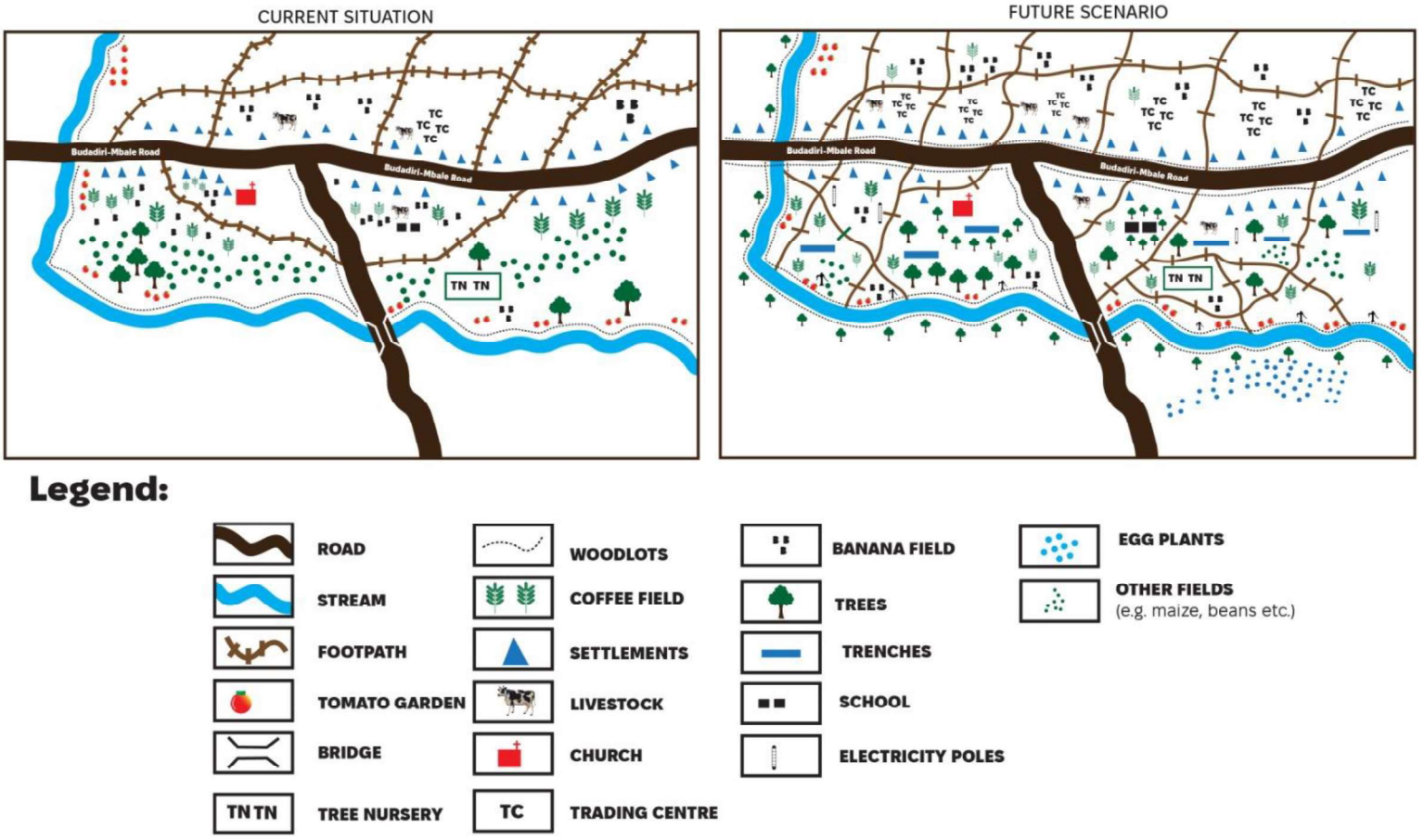


Figure 13. Sketch maps of village A in the current situation (left) and the preferred future scenario (right) from women's perspective.

In the future they envision increasing coffee production in the plain lands to increase their income. Another way of increasing income could be achieved through crop production in the dry season, which is why they want to install water pumps alongside the river so crops can be irrigated even in the dry season. For example, tomatoes can now only be grown during rainy season. Another crop they would like to cultivate in the future is egg plant which will be planted on the other side of the river. Growing a bigger variety of vegetables and being able to grow in the dry season would also improve food security.

Furthermore, they want to plant more trees, because they perceive trees to be good for providing shade for coffee. It is also good for improving air quality, and a source of firewood which could be an income stream. They are not necessarily

interested in fruit trees, but rather would like to focus on firewood trees. Trees would also be planted alongside the river to prevent erosion.

Lastly, they would like to improve infrastructure (electricity for every household and more walking paths) and trading. Trading centres will be built along the main road towards Mbale to increase business opportunities in the area.

Current situation and future scenario – men's perspective

Figure 14 (left) shows the current situation of village B as perceived by a group of men from village B. Here, coffee/banana intercropping is combined with other trees for shading. Maize and beans are intercropped as well. Separate fields are assigned to tomato and cabbage production. Furthermore, alongside the river, woodlots are maintained. Weather patterns have changed during the past few years and climate change is impacting production increasingly each year. There is too

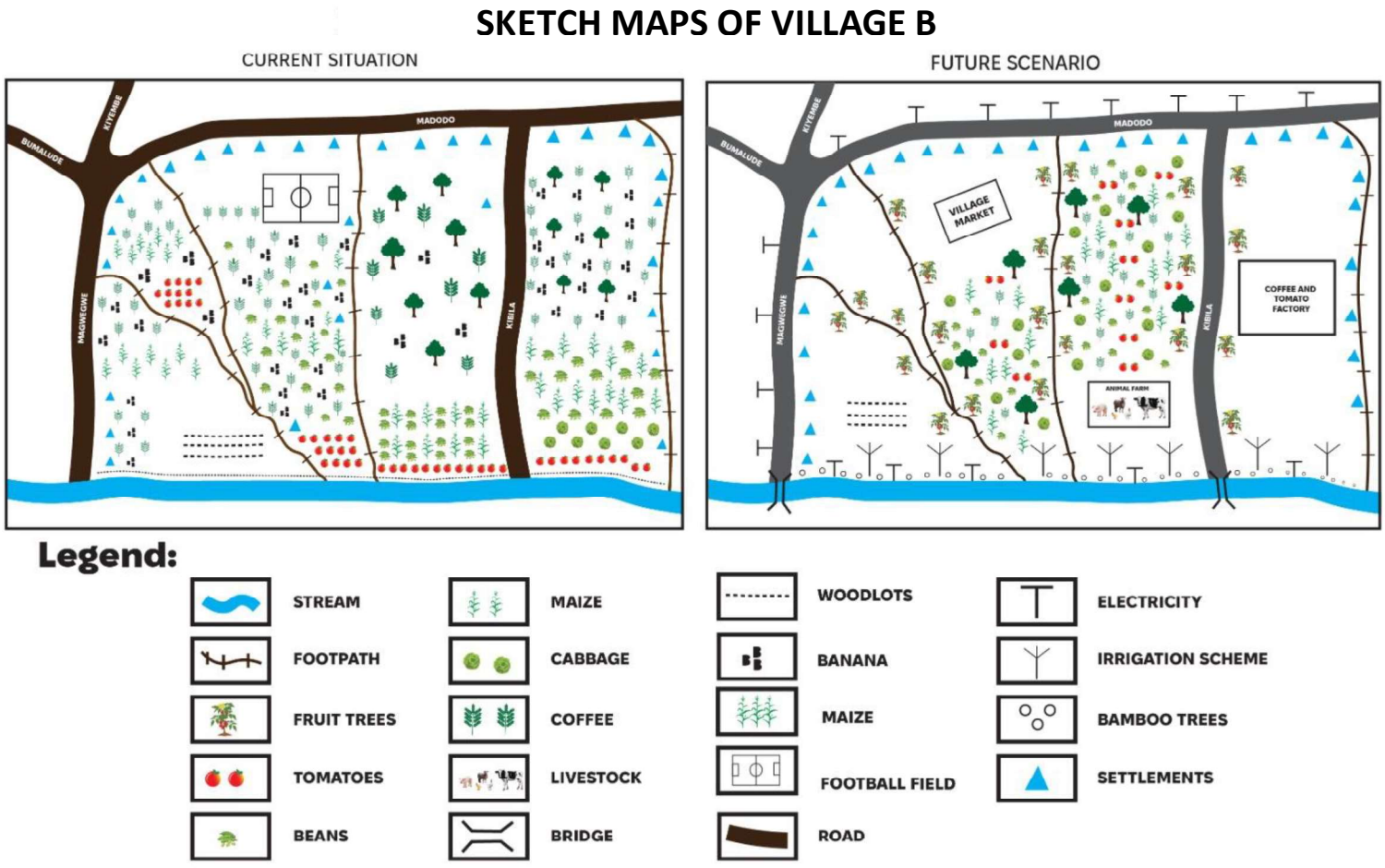


Figure 14. Sketch maps of village B in the current situation (left) and preferred future scenario (right) from men's perspective

much sunshine during the dry season and rainfall has become heavier and more unpredictable. Furthermore, the rains start much later than before. Currently, most problems concentrate around the river during the rainy season. Heavy rainfall causes flooding with landslides and erosion as a consequence. Furthermore, pests are a big problem, especially in coffee and tomato production.

Inputs are generally expensive, withholding farmers from reaching their potential production. They are further impacted by volatile market prices. The biggest change they would like to see is regarding land fragmentation. Instead of every household having their own small plots, they would like to unite themselves. This means that all resources will be shared and used by the whole community. They suggested to have one designated area for farmland which will be farmed on by the whole community, while another area will be used to have an animal farm where livestock such as cows, pigs, goats, and poultry will be reared together. Furthermore, in the future they would like to plant more bamboo alongside the stream to restore the riverbanks. Along the roadsides they would like to invest in fruit trees. During the dry season farmers struggle with water availability for their crops, which is why irrigation is needed. They would like to invest in sprinkle irrigation specifically.

Making sure that natural resources are used sustainably is perceived as very important. In that regard they are already doing a number of things, including planting of trees, digging of trenches, ban of plastic bottles and bags, and recycling of plastic and natural waste. As for the ban on plastics and recycling they are one of the first villages to have put these regulations in place.

To add more value to their produce, they would like to build their own processing facility. This facility will mainly focus on processing of coffee and tomatoes. Most preferably produce and processed goods will be sold at their local village market which they will be hosting in the future. To make themselves resilient in the market they would like to start their own cooperative union. This will ensure that each farmer gets a fair price for their produce and improves their overall resilience in the market.

Lastly, they would like to establish improvements in infrastructure needs. This means more footpaths, bridges around the stream, and paved main roads, and they

would like to be self-sufficient in power supply. To ensure access to electricity for all household electricity poles will be installed along the main road. However, solar panels will be the main source of power to avoid having to rely on regional electricity networks.

The biggest challenge they see for reaching their goals is investment funds. Besides, knowledge is needed on how to for example build and maintain irrigation systems.

Future Scenarios – comparison of men's and women's perceptions

There were many similarities between the men and the women. Both groups reported experiencing problems around the river where heavy rains cause the riverbanks to erode and flood the land. To prevent this, they would like to plant more trees along the riverbanks to prevent erosion in the future. The women were more interested in trees for firewood purposes while the men wanted to plant bamboo specifically to restore the riverbanks. The men also wanted to add more fruit trees to their growing portfolio, while the women were not very interested in growing more fruit trees.

Both groups wanted to expand their farming productions both for food security and income stability. How they wanted to achieve this, however, was quite different. The women wanted to expand through their individual farms, while the men had a collective vision. Cultivating the communities land collectively would allow them to grow more while sharing the output equally. Furthermore, the men envisioned increasing livestock production, while the women did not want to expand livestock production due to a lack of space. Though the women wanted to have more trading centres to improve business opportunities in their village, the men took things one step further by adding local processing facilities for coffee and tomato to their future village and wanting to start their own cooperative union to ensure fair prices for their produce. Throughout this process environmental and social sustainability, as well as enhancing independence from outside institutions seemed to be central to the men's vision. This was not reflected as strongly by the women though elements of environmental sustainability were included, for example growing more trees to prevent soil erosion and improve air quality.

Active involvement in the creation process was different between the two groups. It was evident the men had been thinking and discussing some of their ideas before the workshop, while it was difficult to engage the women. The difference in marital/household status of both groups should be recognized as well. All women were already married and had children, while the majority of men were single without children, and most of them were still in school. Understanding the full extent of these factors on the outcome of the workshops would require a research on its own, but existing literature shows that cultural norms and beliefs, for example expected early marriage and larger responsibility for household chores (Ahaibwe et al., 2018), are often found to be a hinder for women's empowerment and engagement decision making and agricultural research (Mulema et al., 2019).

6. Discussion

This chapter discusses the results described in the previous chapter. A detailed discussion follows addressing the perceptions of young men and women coffee farmers on diversification from financial, social, and environmental, followed by a discussion on the constraints and opportunities that follow with diversification.

6.1 Young men and women's perceptions on diversification

Figure 15 provides an overview of young men and women's perceptions on diversification divided into environmental, social, and financial categories. Overlapping all three categories and at the core of diversification are food and livelihood security, i.e. the main reasons for farmers to diversify. Numerous factors across these categories influence the uptake and execution of diversification, with several overlapping categories.

It is important to recognize that it is already common practice on the slopes of Mt. Elgon to intercrop coffee with banana and maintain multi-cropping systems (Rahn et al., 2018; van Asten et al., 2011). Aside from the fact that this has been maintained throughout generations, coffee harvest alone is not enough for farmers livelihood security, which forces them to engage in diversification for food and livelihood security.

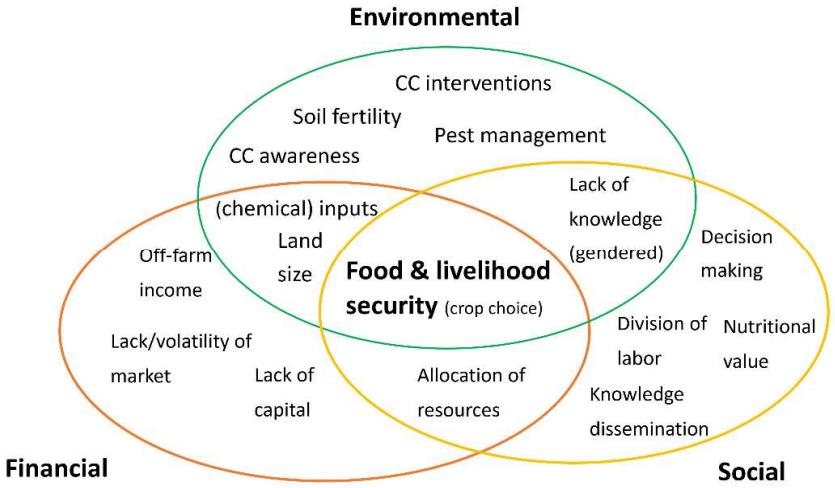


Figure 15. Overview of young women and men farmers' perceptions on diversification from environmental, social, and financial perspective. At the core of diversification is food & livelihood security. Various environmental, social, and financial aspects influence the uptake and execution of diversification. Certain aspects overlap in multiple categories. CC = Climate Change.

6.1.1 Financial perceptions

Securing income was deemed as the most important reason for engaging in diversification, though food security follows shortly after. The individual interviews did not show a difference between men and women, but the ranking and scoring exercise showed that men prioritize profitability. This does not mean however, that women are not concerned with profit at all. High costs of inputs and lack of capital were mentioned frequently as limitations to farming and diversification equally by men and women. Furthermore, the ranking and scoring workshop showed that women and men had similar perceptions on initial investment and profitability, and future goals of women in the SSIs were more often related to exploring business off-farm, which is in line with the future scenario workshop where creating a business environment around the village was an important part of their future plan.

Market perceptions varied across the study area. The volatility of market prices as well as access to the market were perceived as a problem. Men deemed market a determining factor in deciding whether to engage in a new diversification strategy, while women mentioned the market more often as a limiting factor. Interestingly enough though, the ranking and scoring workshop showed that women in the highlands often perceived the market more positive than men. Their explanation

was usually based on the fact that certain products can be sold easily to neighbors, i.e. selling through informal channels. It has been reported by other studies that women in smallholder farming often engage more in informal markets than their male counterparts (Njuki et al., 2011) which may explain their more positive outlook on local sales channels.

The sales of on-farm produce made up the most important income strategies. Coffee is important for securing the households' income, but other crops make up a big part of the income portfolio as well. For farmers in the highlands, coffee was more important in this regard than for farmers in the midlands, where other crops such as beans and maize were more important. Furthermore, off-farm income was reported more often by farmers in the midlands than highlands. Income streams other than coffee are likely to continue getting more relevant here in the future as climate change shifts suitable growing conditions for coffee further up the mountain (Magrach & Ghazoul, 2015). Whether farmers had off-farm income streams did not only show a difference in altitude, but also in gender. Predominantly men engage in off-farm income generating activities while women are more involved with on-farm work, which has also been reported by other studies (Van den Broeck & Kilic, 2019; Yeboah & Jayne, 2016).

6.1.2 Social perceptions

The second most important reason for diversifying is providing enough food and nutrition for each household member. The individual interviews did not show any differences between men and women in their motivations for diversifying nor in their current crop portfolios, but the ranking and scoring exercise showed that women were more interested in cultivating new crops to improve their food and nutritional security while men prioritized profitability. Thus, differences are there but they are less pronounced than expected. The future scenario workshops for example, showed that both men and women were interested in expanding their farm production in order to improve food security and livelihood resilience, though men had more extensive visions on how to develop their village. Why women may be more concerned with crop production for food security may be linked to social norms and cultural beliefs, but lack of access to inputs and markets, as well as lack

of control of high-value cash crops, have been reported as limiting factors for women to engage in market-oriented crops (Njuki et al., 2011; wa Gĩthĩnji et al., 2014). Given that women mentioned the market as a limiting factor more often than men, this could be a plausible explanation.

Interest in new diversification strategies was higher for crops for which farmers felt their current knowledge was sufficient. Though only a few farmers mentioned knowledge as an important decision making factor for diversification, a quarter mentioned access to information to be a key limitation to their farm production. Women perceived their knowledge to be less on average, and they felt this was a limiting factor. Furthermore, women requested extension services on specific topics more often. A possible explanation could be that girls and women in Uganda tend to drop out of school, marry and start conceiving children at a younger age than men (Wodon et al., 2016). From the future scenario workshop with men however, knowledge came forward as a limiting factor to reaching the envisioned goals. This study did not compare farmers' perception on their current knowledge and their actual knowledge, but there seems to be differences in current knowledge between men and women, for example when it comes to pest management. During the ranking and scoring workshop, men mentioned various pest problems related to banana, pumpkin, and bees, as well as pest management methods such as mixing cow urine with ashes to make an organic pesticide. At the same time, pest problems were pointed out by women during the future scenario workshop as currently very problematic, and overall women requested training on pest management more often than men, supporting the assumption that women in the study area are more constrained in their knowledge on pests management than their male counterparts (Ochago et al., 2016).

Labor was mentioned by only a few farmers during the SSIs as a limiting factor to engage in new diversification strategies with a limited difference between men and women. The ranking and scoring exercise however, clearly showed a difference in perception of labor requirements between men and women. Women deemed labor requirements often higher than men, especially in the case of banana cultivation and beekeeping. High labor was also the reason for them to put beekeeping low on their final ranking of strategies. Women are often more involved

in on-farm labor than men (Bryceson, 2019), which explains why they would be more concerned with the amount of labor that goes into a new diversification strategy. Besides, they are often more time constrained in general due to their traditionally assigned domestic responsibilities and possibly community responsibilities, which might make them reluctant to adding labor intensive crops to their crop portfolios (Vercillo, 2020). This argument was further reflected through the first FGD, where it was mentioned that women do more farm work than men, but do not have equal decision making powers. The majority of married farmers, however, said to take household decisions together with their partner. However, decision making may be interpreted differently between spouses. As Sell & Minot (2018) found in their study on women's involvement in decision making, most women are involved in various aspects (if not all) household decision making, but it does not necessarily mean men and women have equal power in all parts of decision making. Husbands may claim household decisions are a joint venture, while their spouses may not agree with that statement (Anderson et al. 2017). Alternatively, other studies found that women may be more likely to say they have equal decision making powers than men while in reality this may not be the case (Acosta et al., 2020; Ambler et al., 2021).

Similarly, the majority of married farmers (both men and women) perceived themselves as joint owners of their land. However, women are less likely to be listed as owners on official documents which has a negative impact on women's tenure security (Doss et al., 2014).

6.1.3 Environmental perceptions

The results showed a positive relationship with land size available to households and number of crops and trees grown by each household, arguably meaning that farmers expand their crop and tree portfolio's as they obtain access to more land whether it be through ownership or rent. Similar results were found by Asante et al. (2018) and Dessie et al. (2019) in Ethiopia and Ghana respectively. It also means, however, that farmers with limited access to land diversify less (Galabuzi et al., 2021). Hence, this group of farmers is at greater risk of insecure livelihoods. On the other hand, there are also studies who found different results. For example Sebatta

et al. (2019) found that in the Elgon region those with bigger land size tend to intensify conventionally, while small land owners are forced to diversify more due to a lack of income and food security.

Though the results show that financial and social motivations are more important in engaging with diversification, environmental factors also play a distinct role. Almost half of the interviewed farmers mentioned environmental factors as important for deciding whether to engage in new types of diversification, for example by (re-)evaluating their crop choices in light of climate change. Farmers are well aware of the changing climate which is mainly perceived through shorter and more erratic rainy seasons, and prolonged periods of drought (Assan et al., 2020; Bomuhangi et al., 2016). The more long-term effects such as soil erosion and subsequent loss of soil fertility were also perceived as challenges throughout the study area, but soil fertility was only mentioned as a limiting factor to engage in new types of diversification by a few farmers in the midlands. This is interesting since both in the focus groups and during interviews soil fertility was pointed out as problematic. Furthermore, the use of chemical inputs was deemed necessary, arguably because soil fertility was too low to resort to organic farming practices solely (though some organic farmers were around as well). It could be argued that farmers do perceive soil quality as a problem, but it does not prevent them from engaging in (new) farming practices. This is supported by Bamutaze et al. (2021) who found similar results on farmers' perception on the effect of soil erosion on soil health.

Pests were perceived as an issue by farmers in the study area, but diversification was generally not perceived as a strategy to manage and control garden pests. Diversification of crops and trees can contribute to natural pest control, for example by creating habitat for natural enemies (Pumariño et al., 2015). It must be considered though that pest problems and solutions may be very contextual. For example, in the case of Mt. Elgon, Jonsson et al. (2015) found that Coffee Berry Borer (CBB) was less common in tree shaded coffee plots with a more distinct difference at lower altitudes, while the white stem borer was more common in tree shaded plots. This calls for interventions tailored to local pest problems and climatic conditions (such as altitude).

Land tenure security has been found an important factor for the adoption of sustainable agricultural and conservation practices (Lovo, 2016; Mango et al., 2017; Nkomoki et al., 2018). This implicates especially women, since they usually experience higher levels of land tenure insecurity (Farnworth et al., 2016; Tsige et al., 2020; Wekesah et al., 2019). In this study however, women reported having higher land holdings on average and joint household decision making was reported by the majority of married farmers. Though different results were expected, it would explain the similarities between men and women in how they deal with climate change. Planting trees was even pointed out more often by women than men as a strategy to combat climate change, and to improve the farms' physical environment (for example air quality). An important factor in this may be women's heightened concern with changes in their environment that may impact their ability to perform their more traditional roles in cultivating and preparing food (Bomuhangi et al., 2016). On the other hand, in the midlands, both men and women envisioned planting more trees as part of their future village plan, though women emphasized production of firewood trees.

6.2 Constraints and opportunities of diversification

As the years go by, climate change is likely to make growing conditions for farming increasingly difficult on the slopes of Mt. Elgon. Communities living at lower to mid altitudes will be more impacted by rising temperatures, but communities at higher altitudes may experience more difficulties with soil erosion due to faster erosion rates on steeper slopes (Bamutaze et al., 2021). Furthermore, as confirmed by this study socio-economic conditions make it difficult for young farmers to reach their full potential and secure their livelihoods. Thus, the need for agroecological interventions is of significant importance for the survival and sustainability of communities living in this area. Diversification of crops, trees (agroforestry), and other on- and off-farm income streams are all strategies that could provide farmers with the right tools for improving their livelihoods in an ecologically, socially, and economically sustainable way.

Young farmers in this region feel a strong bond to their location and most see themselves continuing living and farming in the same area in the future. This is contrary to previously published literature (Mueller et al., 2019; Sumberg et al., 2012; Tadele & Gella, 2012), though Giuliani et al. (2017) found similar results in the Moroccan highlands. However, it is important that farmers' livelihoods are secured to prevent further outmigration (Giuliani et al., 2017). Both men and women that participated in the FSW had future visions that include collective action for sustainable development of the region. Thus, motivation and willingness for agroecological development is there, but farmers are currently limited by socio-economic factors.

6.2.1 Financial constraints

Lack of capital for inputs and other investments such as land is perceived as the most challenging factor for engaging in diversification, and there seems to be limited structures to access loans. However, the challenges to engage in diversification seem to be more complex. One of those challenges is the trade-off between diversifying for improving eco-system services and return on investment. Though the majority of farmers understand the importance of on-farm diversification for example for mitigating the effects of climate change or planting trees to combat land degradation, without proper financial support it is not economically feasible in the short term. Growing fodder, firewood and fruit trees may make it more feasible, but the time until first harvest can take several years, making it more unlikely for farmers to invest in diversification strategies that have a long return on investment such as trees, especially those that are barely coping (Kuyah et al., 2020). On the other hand, agroforestry (maintaining an integrated tree/crop cultivation system) has been found to positively impact food security (Kiptot et al., 2014; Kuyah et al., 2020; Mbow et al., 2014), which is an important driver for farmers to engage in diversification strategies.

6.2.2 Matching farmers' needs

As the previous section emphasizes, it is important to consider farmers' needs when suggesting interventions. These may vary at different altitudes and between

genders. Results showed, for example, that it is unlikely that farmers in the highlands will grow jack fruit trees as the local climate is unsuitable. This is further underlined by Bukomeko et al. (2019) who reported that the diversity in tree species that farmers on Mt. Elgon had on their plots did not match their needs, thus to enhance agroforestry practices it is important that tree species advertised through extension services match farmers' needs in terms of ecosystem services, as well as socio-economic needs. Another key point is land size. In the midlands, farmers had access to larger land holdings than farmers in the highlands, which also resulted in a higher diversity of crops and trees on their plots. This implies that diversification interventions should be tailored accordingly to land size. Furthermore, men and women expressed different interests for future livelihood strategies, underscoring the importance of gender inclusive approaches to match all farmers' needs.

6.2.3 Supporting women

The study did not only show differences between genders in terms of needs, but also in terms of wishes and aspirations for the future. Currently, annual crops such as maize, beans, and banana are key crops for the local diet. Enhancing fruit (and perhaps nut), and milk intake would improve food and dietary diversity. Since women showed a higher interest in diversifying for food security, they could have a leading role in this process. However, women seem to be constrained in their ability to engage in new farming practices, for example by lack of knowledge and access to market. Similar results were highlighted by Kiptot et al. (2014) who found this to be true for women wanting to engage in agroforestry practices. Supporting women's engagement and access to resources would contribute to the adoption of agroforestry and subsequent improvement of food security and ecosystem services (Kiptot et al., 2014). Generally, promoting educational equality has a positive impact on women's empowerment (Sell & Minot, 2018). Besides improving women's abilities to realize their own aspirations, improving women's empowerment has been associated with improved farm productivity by multiple other studies (Anderson et al., 2021; Diiro et al., 2018; Kehinde et al., 2021). As such, promoting educational equality and providing equal access to information, resources, and markets could have a profound impact on improving on-farm

production. Furthermore, households where women are more involved in decision making are found to be more food secure (Adem & Tesafa, 2020; Sharaunga et al., 2016).

However, support should not be focused on women independently, but rather involve both men and women equally to prevent reverse effects. Supporting women's access to resources, knowledge and market may challenge existing power hierarchies creating ground for conflict at household (Alemu et al., 2018; Alesina et al., 2021) or community level (Schmook et al., 2014). When addressed collectively, structural changes regarding gender inequality are more likely to occur (Manlosa et al., 2019).

6.2.4 Access to knowledge, information, and market

Fostering and enhancing social capital has been found to improve resilience among smallholder farmers (Niles et al., 2021). In the case of Mt. Elgon, access to knowledge has been identified as another key challenge to social capital. Aside from a few farmers, most value extension services however, and would like to receive more extension in the future, which is illustrated by the following quote by a man farmer (ID_I) in the highlands: "*I'm not interested in a money hand-out. We need more knowledge.*"

Extension services both from the state and private companies play an important role for farmers in adopting new farming practices, though there were also farmers who had not received any extension at all. Furthermore, in the highlands support from state extension services is lacking. As such, private companies could have a considerable impact in these parts. For most farmers however, informal community engagements and local farmer groups seem even more important in disseminating knowledge and information, which was found similarly in other studies (Pretty, 2003; Saint Ville et al., 2016).

Based on these findings, this study argues for strengthening and making use of already existing information dissemination infrastructure to enhance social capital, which could improve extension service delivery and uptake of proposed technologies. Participatory agroecology is for example, such an approach that has shown to improve uptake of agroecological interventions by fostering social

cohesion among smallholders and improving production networks while using participatory farmer-to-farmer learning tools (Kansanga et al., 2020). The power of peer influence has also been stressed by multiple other studies (Buyinza et al., 2020; Kalanzi et al., 2021; Meijer et al., 2015). According to Misanya et al. (2023) the Integrated Farm Planning (PIP) approach for example, made farmers who initially participated to increase their income, more aware of their role in protecting environmental resources, hence improving their sense of stewardship. The PIP approach is built on making integrated farm plans, first at household level, later at village level, and eventually at landscape level, with learning and integration of activities as key elements and promoting stewardship at its core (Kessler et al., 2016). Furthermore, gender inequality is addressed by involving the whole household in the planning phase and promoting vision sharing of each individual household member. The strength of both mentioned approaches is the focus on collective action, which is necessary to address, for example climate change. However, it can also be pivotal in addressing other issues such as access to market. Organization through cooperatives, farmer groups, or producer/marketing organizations has been shown to improve farmer's position in the market and with that increase household income (Gyau et al., 2014; Markelova et al., 2009). In other words, supporting self-organization of farmers will be key in enhancing smallholder farmers' resilience, and promoting the uptake of agroecological interventions.

7. Conclusions and recommendations

This study explored and sought to understand the perception of young men and women coffee farmers on livelihood diversification in the Elgon region, Eastern Uganda, from environmental, social, and financial perspectives, and the opportunities and constraints that follow with diversification. The first part of this chapter will synthesize the key findings of the study and provide practical recommendations. The second part discusses suggestions for further research.

7.1 Key findings and practical recommendations

There is a variety of reasons for young coffee farmers to engage in livelihood diversification. Findings show that young farmers cannot rely on coffee alone to support themselves and/or their families throughout the year. Diversification of crops and trees, and other income generating activities are important strategies for them to ensure both food and livelihood security. These practices are passed down through generations and inheritance as young farmers in the region usually grow up in farmer families. As such maintaining intercropping and multi-cropping systems are commonly practiced. Furthermore, the study showed a positive relationship between land size and crop/tree diversification, indicating that farmers expand their crop/tree portfolios with increased access to land.

Income security is a primary motivator for young farmers to engage in diversification. Food security follows shortly after as the second most important reason. Gender differences were less pronounced than expected in this regard. Nonetheless, men showed a preference for prioritizing profitability in decision making around how and when to diversify, while women displayed a greater interest in cultivating new crops to improve food and nutritional security. Furthermore, financial perceptions reflected the difficulties caused by market

volatility and limited access to markets, especially for women. The study also highlighted the importance of livestock and off-farm income.

Though the results show that financial and social motivations are more important in engaging with diversification, environmental factors also play a distinct role. Farmers recognize that the climate is changing unfavourably to their production systems, which forces them to adapt their management practices. Especially growing trees is emphasized as a tool for mitigating soil fertility issues and soil erosion. However, different climatic and geographical conditions on Mt. Elgon call for locally tailored solutions, for example in light of pest management where differences in knowledge levels between genders have to be considered.

Opportunities and constraints were identified, and lack of capital emerged as a key barrier to the uptake of diversification strategies. The trade-off between improving eco-system services and return on investment are hindering farmers from engaging in diversification practices. Furthermore, a lack of social capital emerged as a challenging factor, with women more often expressing a perceived lack of knowledge and need for extension services. Moreover, women perceived labour requirements often as higher. As men and women tend to have different perceptions and priorities, the study emphasizes the necessity for gender-inclusive approaches, as well as strengthening and making use of already existing information dissemination infrastructure to enhance social capital, which could improve extension service delivery and uptake of proposed technologies.

In conclusion, as climate change is likely to become more problematic in years to come and other challenges may persist, such as capital and market fluctuations, young men and women farmers on Mt. Elgon are faced with the increasingly difficult task to maintain their livelihood security. Agroecological interventions including crop diversification, agroforestry, and establishing different on- and off-farm income streams may all be effective solutions to mitigate the aforementioned problems. Furthermore, both men and women farmers felt a strong bond to their geographical location and had distinct ideas about the future development of their communities, which shows the high potential for agroecological development in the region. For that to effectively happen however, environmental, and socio-economic barriers must be overcome. As such, the study underlines the importance

of fostering social capital, access to knowledge, access to capital, and gender-inclusive approaches with farmer participation at the core in order to support the sustainable development of farming communities on the slopes of Mt. Elgon.

7.1.1 Practical recommendations for Mara Agribusiness

Based on the findings recommendations can be made for companies providing extension services such as Mara Agribusiness. A starting point could be to gather the farmers again and make use of participatory action tools to tailor the design of the project to local conditions, farmers' needs, and Mara Agribusiness' objectives. As proposed in chapter 6.2.4 possible approaches could be participatory agroecology or the Integrated Farm Planning approach (PIP). The PIP approach calls upon the more innovative farmers in the community who are willing to try something new for the first phase. In follow-up phases these farmers could then be used for strengthening social networks in and outside the farmer communities. As a trickle down effect, those networks could become the basis for supporting community saving groups or other cooperatives.

Bottlenecks in participatory projects often relate to objectives not supporting the needs of all farmers. For example, strong participation of farmers who are already better-off in the community might result in exclusion of those with less capital. Besides, exclusion of women might be a result of societal pressure. To prevent both these issues from happening it is important to monitor activities closely. Creating equal responsibility for all throughout the project will be an important mitigation strategy. Furthermore, organizing activities outside of parts of the day that are usually allocated to household work (as this is often the responsibility of women), and possibly using quota's could prevent this from happening.

7.2 Suggestions for further research

To complement findings of the current study, some suggestions are made for follow-up research:

- Conducting a more extensive study with larger sample sizes of men and women, and farmers at different altitudes using mixed

quantitative/qualitative methods, including for example a comparison of perceived and actual knowledge.

- Analyzing the relationship between state and non-state actors in providing extension services, and how they can complement each other.
- Analyzing value chains of products from diversification strategies, including product to market linkages.
- Analyzing intra-household and community decision making processes and labor divisions to get a better understanding of gender relations at household and community level (keeping polygamy in mind).
- Researching the possibilities of organic farming, and how to minimize farmers' dependency on chemical inputs.
- Analyzing the impact of social capital and collective action initiatives on agroecological development.

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Popular science summary

Uganda's coffee production has grown significantly from 129,000 tons in 1990 to a remarkable 375,000 tons in 2021, with Mt. Elgon emerging as a key coffee-growing region. Agriculture here is characterized by smallholder farmers who farm on less than one hectare on average. These farmers face various challenges like soil degradation and economic uncertainties, which is made worse by an aging workforce as young people seek better opportunities elsewhere.

In a collaborative effort with Mara Agribusiness, a social coffee enterprise in Uganda dedicated to working primarily with youth coffee farmers, this study explores young coffee farmers' perceptions on livelihood diversification and where limitations and opportunities lie for them. Diversification of production and income is a way to improve household resilience as it creates more financial stability by not relying on one crop only, while also improving biodiversity and combatting land degradation, especially when embraced collectively by multiple farms.

Results show that those with access to larger landholdings also diversify more, implying that land size is an important enabler for engaging in diversification. Securing income is a primary driver for diversification, with food security following shortly after as the second most important reason, and to a lesser extent environmental concerns like climate change.

However, the journey towards livelihood security is not without challenges. Lack of capital is the number one key barrier for young farmers. Social capital, or the lack thereof, also plays a significant role, particularly for women who expressed a perceived lack of knowledge and a need for knowledge services. Furthermore, different climatic and geographical conditions on Mt. Elgon call for locally tailored solutions, for example in light of pest management.

Gender differences in decision making highlight the importance of tailoring approaches to individual needs. Though the results were less pronounced than

expected, men seem to prioritize profitability, while women tend to choose new crops that have added value for their household's food and nutritional security.

In light of climate change and ongoing challenges, young farmers on Mt. Elgon are faced with the increasingly difficult task to secure their livelihoods. Agroecological interventions, including crop diversification, are seen as potential solutions. As young farmers have distinct ideas about the future development of their communities, the potential for agroecological development is high. However, overcoming barriers like lack of capital, market fluctuations, and gender disparities is crucial to ensure this development. Encouraging social capital, knowledge access, and inclusive participation can support the region's farming communities effectively.

Appendix 1 – Interview guide

Introduction

Thank you for participating in this interview session today. By agreeing, you are contributing to a study I am conducting to complete my master's degree in Agroecology at the Swedish University of Agricultural Sciences, located in Sweden. I'm doing this research together with Mara Agribusiness, as a pre-study to their future project "*The landscape and revenue diversification project*". The overall aim of the study is to explore and understand young coffee famers' perceptions on livelihood diversification in the Elgon region, from environmental, social, and financial perspectives, and the opportunities and constraints that follow with diversification. Today, I am looking forward to hearing from you in particular how you perceive different aspects of diversification. We will talk about your agricultural operations, as well as side operations (non-farm income), extension services that you may use, and future aspirations.

I would like to remind you that this interview is voluntary and will remain confidential. There is nothing identifying you such as your name, picture, contact info, signature, etc. that will be published together with the information that you share today. If you agree to this interview, I need you to sign a consent form for legal reasons so I can process the answers you share with me today. I hope that you will feel free to talk about your own perceptions and views. However, you are not obliged to answer any of my questions, and if you want to end this interview pre-maturely you can. Also, if you don't feel comfortable with particular questions, we can skip those particular ones. Nonetheless, I am looking forward to conducting this interview in its entirety, because your views and experiences on livelihood diversification in coffee farming are very important to this study. The interview will take approximately 30 to 45 minutes.

For better analysis I will take notes and I would like to record the interview. Do I have your consent to record the interview? Do you have any other questions? If not, let's get started.

Questions

= optional/if time allows

- Base information
    i. Name
    ii. Living district
    iii. Age
    iv. Gender
    v. Marital status
    vi. Children
    vii. Highest level of education

- General questions
    1. How did you get into farming?
    2. Is farming your full-time occupation?
        - If not, what is?

- Coffee & farming
    3. Why did you choose to get into the coffee business?
    4. Do you have specific management practices that you use for growing coffee? *Please explain.*
    5. Do you use chemical pesticides and/or fertilizers? – *if not already answered*
    6. What is your motivation for growing coffee this way? *(organically or conventionally)*
    7. Do you experience effects of climate change on your production? And if so, how?
        - If yes, what interventions do you use to tackle these issues?
    8. Does this play a role in the way you produce coffee *(organically or conventionally)*?
    9. Do you experience difficulties with soil health/depletion/erosion?
    10. Have you thought about organic production and certification? *Please explain.*

- Diversification
    11. Does your household have other sources of income (on- and off-farm)?
    12. Which type of crops do you grow on your farm besides coffee?
    13. Do you practice mixed or mono cropping?
    14. Where or how did you learn about farm diversification (whether it be mono or mixed)?
    15. Please fill in the following table for all crops that you grow on your farm:

Crop	Measure	Harvested	Sold	Consumed	Land allocated (acres)

16. Why (or why not) is diversification important to you?
17. How do you make decisions around diversification?
18. What factors decide whether you engage in a new type of diversification? For example, access to land, capital, knowledge, market, etc.
19. Which activities are most important for income generation?
20. Which crops are most important for food security?
21. How does this diversification affect your economic status? *Income through coffee vs. other revenue streams ranking which most income*
22. Through which channels are diversified products sold?
    - What stakeholders are involved, any middlemen/mara agribusiness?
23. Did Mara already speak to you about their Landscape & revenue diversification project?
24. Mara is launching a project on diversification in which they want to support famers with diversifying through the following products: *Avocado, jack fruit, banana, pumpkin, honey, milk*
    - What are your thoughts on these diversification strategies?
25. What are your thoughts on the environmental aspect of diversifying?
26. Is there any type of value addition happening at farm level, like processing at home?

- Extension services
  27. Are you part of any type of farmers group (informal/formal)?
      - *Women's group?*
      - *Youth group?*
      - *Wife/husband part of women's/farmers group?*
  28. Which extension services or training on farming do you have access to?
  29. How useful do you find these extension services?
  30. Outside of extension services (for example model farms), is there any type of knowledge sharing?
      - If yes, what does this look like? *For example, Internet, social media (IG, tiktok)?*
      - If not, would you like this to be there? What are the barriers?

31. Do you speak with neighbors about diversification/farm productivity/knowledge sharing?

- Land & decision making
  32. How much land do you farm on (acres)?
  33. Do you own this land yourself or together with your wife/husband (if applicable)?
      - If none of the above, how did you get access to this land?
        1. Bought it
        2. Through parents --> if yes, what motivates you to continue farming on this land?
        3. Rental
        4. Assigned by village leader
  34. Who makes decisions in the household, for example what crops are grown?
  35. Which decisions are made by the man of the household? Which by the woman?
  36. How is work divided in your household, who is responsible for executing what part of the household's activities?

- Future ambitions/aspirations
  37. What are your ambitions/aspirations for the future, say 10/15 years?
  38. Is farming your future or more like an in-between/temporary venture?
      - If not, will you keep the land in your family or sell the land?
  39. Do you see yourself living in this area in the future?

Is there anything you'd like to add?

Appendix 2 – Consent form

Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Department of Urban and Rural Development
Marie Ingrid Svedhem, Student

SLU ID: SLU.202100-2817
01/03/2023

Processing of personal data in independent projects

When you take part in the independent project of Marie Ingrid Svedhem, SLU will process your personal data. Consenting to this is voluntary, but if you do not consent to the processing of your personal data, the research cannot be conducted. The purpose of this form is to give you the information you need to decide whether or not to consent.

You can withdraw your consent at any time, and you do not have to justify this. SLU is responsible for the processing of your personal data. The SLU data protection officer can be contacted at dataskydd@slu.se or by phone, +46 18 67 20 90. Your contact for this project is: Ingrid Svedhem, mdem0003@stud.slu.se, +256 76 33 04 617 / +46 79 33 29 621.

We will collect the following data about you: name (will not be published), living district, age, gender, marital status, highest level of education, occupation and views on different aspects of your agricultural production and livelihood.

The purpose of processing of your personal data is for the SLU student to carry out their independent project using a scientifically correct method, thereby contributing to research within the field of coffee farming in Uganda. Furthermore, the results of this study will be used by Mara Agribusiness to improve future project designs.

You will find more information on how SLU processes personal data and about your rights as a data subject at www.slu.se/personal-data.

☐ I consent to SLU processing my personal data in the way described in this document. This includes any sensitive personal data, if such data is provided.

☐ I consent to Mara Agribusiness using the results of this study, including my data, for improving future project designs.

_____

Signature Place and date

_____

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