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Missing SDG 5 Gender Equality for the Trees?

On the Empowerment of Female Smallholder Farmers in the Acorn Programme

Agroforestry Project Solidaridad ECA Uganda

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Abstract

Female smallholder farmers (FSFs) in the Global South are highly vulnerable to climate change. Agroforestry is a farming practice increasingly recognised for adaptation to a changing climate, which additionally contributes to climate change mitigation by sequestering carbon and storing it in trees and soils. The Acorn programme is one example of the voluntary carbon market (VCM), where sequestered carbon can be traded, benefiting the agroforestry farmer with additional income. By interviewing ten representatives from five key actor groups, this thesis explored the role of gender equality (GE) and women's empowerment (WE) in the agroforestry project *Solidaridad ECA Uganda*, located around Mount Elgon (Uganda), established by the non-governmental organisation (NGO) Solidaridad and participating in the Acorn programme. Additionally, eleven documents related to the case study project were analysed. Conceptions of GE encompassed access to social and physical resources, decision-making capacities, recognition of women's preferences and struggles, and roles, including social norms and distribution of burdens and benefits. None of the interviewed actor groups had an official definition of GE. Gendered access to resources like land-ownership, and trees being culturally associated with men excludes women in the project area from important decisions and benefits from participation. In the project, women's participation is promoted by providing resources like education and tree seedlings, ensuring female members in the project council, emphasising the common achievements to facilitate common decision-making and benefitting from carbon credit sales, and sensitising men to create awareness for GE. Gender interventions have the potential to empower women in the project, but it is too early to conclude, as they have not been implemented yet. GE plays an important role in social-environmental projects, as it creates equal opportunities and ensures that everyone benefits from similar payment for ecosystem services (PES) programmes. A lack of GE in agroforestry PES programmes and projects excludes half of the population and can have negative effects like gender violence and malnutrition of children and women.

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List of Abbreviations

CCM	Compliance Carbon Market
CRU	Carbon Removal Unit
CS	Carbon Sequestration
CSR	Corporate Social Responsibility
ESG	Environmental Social Governance
FSF	Female Smallholder Farmer
GALS	Gender Action Learning System
GE	Gender Equality
MDG	Millennium Development Goal
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organisation
PES	Payment for Ecosystem Services
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDG	Sustainable Development Goal
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market
WE	Women's Empowerment

Introduction

This introductory chapter sets the scene for the thesis, exploring the role of gender equality (GE) and women's empowerment (WE) in agroforestry projects, by zooming in on such a project (*Solidaridad ECA Uganda*) as a case study. This chapter will establish the aims and objectives of the thesis and the questions guiding it, as well as provide an overview of the subsequent chapters.

Context

The world faces increasing impacts of climate change (Pörtner et al., 2022). Some groups of people are more vulnerable to these impacts than others, among them smallholder farmers, women, and the population of so-called developing regions, especially in locations like Central-, West- and East Africa (Pörtner et al., 2022), contained in the term *Global South* (Dados & Connell, 2012). All three characteristics apply to **female smallholder farmers (FSFs) in the Global South**, entailing a high vulnerability of this particular group to climate change.

Due to shortage of nutrients and soil organic carbon, land degradation is highest in **Sub-Saharan Africa**, reducing yields and food security (Waldén et al., 2020). In the East African country **Uganda**, struggles with issues like food insecurity, landslides, and decreased productivity of the soil are especially distinct in the region around Mount Elgon (Galabuzi et al., 2021). In 2021, 68 % of women were employed in the Ugandan agricultural sector (The World Bank, n.d.) and they are a crucial part of the labour force around **Mount Elgon** (Njoki & Kiemenya, 2020), where the agroforestry project is located that is the case study of this thesis.

Agroforestry - the combination of trees and agriculture (Santiago-Freijanes et al., 2021), sometimes livestock (Jose & Dollinger, 2019), on one plot of land – is a farming practice with many benefits besides increased food security (Waldén et al., 2020) and nutrition (Bezner Kerr et al., 2021), such as mitigation and adaptation to climate change (Buttould, 2013). Although having a long tradition (Agnoletti et al., 2022), it is increasingly recognised as a “climate-smart practice” (Nyong et al., 2020, p. 702) for its potential to tackle climate change, for instance in the UNFCCC's REDD+ projects (Holmes

et al., 2017). Positive impacts on regulating and provisioning ecosystem services, inter alia tree products such as fuelwood and timber, are another benefit (Gram et al., 2018).

Furthermore, agroforestry has been linked to opportunities to address inequity disadvantaging female smallholder farmers in relation to the Millennium Development Goals (MDGs) (Garrity, 2004) and the Sustainable Development Goals (SDGs) (Agroforestry Network, 2018), in SDG5 on Gender Equality, and the Empowerment of Women and Girls (United Nations [UN], n.d.a). Access for women to natural and economic resources, as well as to ownership and use of (agricultural) land, is emphasized among the targets of SDG5 (UN, n.d.a). The 17 SDGs were adopted in 2015 by all member states of the UN as part of the 2030 Agenda for Sustainable Development (UN, n.d.b). While the SDGs have been criticised for lacking ambition and a systematic approach in terms of policies, as well as being too vague for implementation, their holistic approach broadening the understanding of development to encompass dimensions of the political and social, as well as sustainability, besides the economic guiding principle is acknowledged (Koehler, 2016). SDG5 was ascribed an important role in allowing the expression of human identities by reducing inequalities (Noordwijk, 2020), discussed as a precondition for sustainable forestry (Arora-Jonsson et al., 2019) and as a “normative guide” (Koehler, 2016, p. 54) for gender equality (GE) and the rights of women. Gender is understood as characteristics, behaviours, and roles of people that are based on societal norms, thus socially constructed and based on how a person is perceived by themselves and their social environment (World Health Organization, n.d.). The terms *gender equality* (GE) and *gender equity* relate to people of different gender, while women’s empowerment (WE) is one mean to their ends focussed on women (Pathania, 2017). Simply put in the example of opportunities, equality focuses on the provision of opportunities being independent of the gender of an individual (Pathania, 2017), while equity considers the different needs of different people to be able to make use of the same provided opportunities (Pathania, 2017). Within the scope of this thesis, the focus is on WE when looking at GE along SDG5, keeping gender equity in mind. It is however no fundamental discussion of the mentioned

concepts, but rather an exploration of their role within agroforestry projects. WE is conceptualised as an increased ability to make choices (Kabeer, 1999).

In some cases, agroforestry is part of schemes that enable payment for ecosystem services (PES) as generated offsite services (Wunder, 2015), like climate regulation through carbon sequestration (CS; Benjamin et al., 2018). This adds an extra income for the smallholder farmer to the benefits from agroforestry mentioned before.

The Acorn programme, which stands for **Agroforestry Carbon Removal Units (CRUs)** for the **Organic Restoration of Nature**, by the Dutch Rabobank (2021) provides a platform for PES, where smallholder farmers can trade (via local partner organisations of Acorn) the ecosystem service of CS with sustainability-conscious companies that strive to offset their emissions on the voluntary carbon market (VCM; Acorn, n.d.a). By doing so, Acorn aspires to support smallholder farmers (working on up to 10 hectares of land) in so-called developing countries (Acorn, n.d.b), currently in 14 projects in Africa, Latin America, and Asia (Acorn, n.d.c).

Problem Statement

While agroforestry as a practice was linked to SDG5 (Agroforestry Network, 2018), agroforestry projects participating in the Acorn programme are publicly linked to eight other SDGs (Acorn, n.d.b). Keeping in mind the high vulnerability of FSFs in the Global South to climate change and the potential of agroforestry to mitigate and adapt to climate change impacts, this discrepancy leads to the **knowledge gap**, as to what the potential of Acorn's projects is to empower women and achieve GE.

One agroforestry project taking part in the Acorn programme is located in the region of Mount Elgon, Uganda, an area combining high female involvement in agroforestry (Galabuzi et al., 2021), and high vulnerability to climate change impacts that can be abated by agroforestry, as outlined before. These characteristics, combined with GE being a chosen focus of the project (Rabobank, 2022), and

feasibility due to English being the nation's official language, led to choosing the project *Solidaridad ECA Uganda* as the case study for this thesis.

Acorn became involved in the project as a cooperation partner in 2021 (Rabobank, 2022), providing access to the VCM (Acorn, n.d.a) after the agroforestry project was set up in 2017 by the NGO Solidaridad (Rabobank, 2022). 10 % of the smallholder farmers involved are women and Solidaridad already put measures in place to empower women (Rabobank, 2022). Still, Acorn does not communicate the project as linked to SDG5 (Acorn, n.d.b).

Research Aims and Objectives

This thesis has three aims and objectives. One aim is to support the holistic integration of SDGs in agroforestry projects for CS in the Global South, with the objective of illuminating the role of GE and WE (SDG5) in such projects through key actors' conceptions in the context of *Solidaridad ECA Uganda*.

A second aim is to contribute to better livelihoods of FSFs in the Global South engaged in agroforestry projects for CS, with the objective of analysing in what way they participate in the project *Solidaridad ECA Uganda*, based on the perceptions of key actors.

A third aim is to empower FSF in the Global South engaged in agroforestry projects for CS with the objective of taking their perspective, socio-cultural context, and possibilities into account to identify important aspects of WE within the project *Solidaridad ECA Uganda*. Recommendations for key actors shall support the aims and objectives.

Research Question and Sub-Questions

To support the aims and objectives of the study, the following research question (RQ) and encompassed sub-questions (SQ) will be answered:

RQ: What is the role of gender equality and women's empowerment in the project *Solidaridad ECA Uganda* and what are the consequences for female smallholder farmers?

SQ1: What are key actors' conceptions of gender equality and women's empowerment in agroforestry projects for carbon sequestration in Uganda, especially in the project *Solidaridad ECA Uganda*?

SQ2: How do women participate in agroforestry projects for carbon sequestration in Uganda, particularly in the project *Solidaridad ECA Uganda*?

SQ3: How are female smallholder farmers empowered by participation in agroforestry projects for carbon sequestration in Uganda, such as the project *Solidaridad ECA Uganda*?

Outline of Remaining Thesis

The thesis proceeds with an overview of relevant academic literature and introduces the conceptual framework applied in this thesis, as well as identifies key actors in the case study project *Solidaridad ECA Uganda*. A chapter on research methodology follows, with an overview of the research approach and methods applied in this study, for the collection and analysis of data, as well as a reflection on the process of data-gathering. The results of the empirical research on the case study project *Solidaridad ECA Uganda* from the Acorn programme are presented subsequently and linked to the literature and knowledge gap in the following discussion chapter. The concluding chapter briefly recaps the thesis, answers the research questions and knowledge gap, reflects on the limitations of the research, and provides recommendations for both practitioners and researchers.

Theory

This chapter introduces relevant literature on agroforestry, the voluntary carbon market (VCM), and women in agroforestry projects, with a focus on sub-Saharan Africa and projects based on payment for ecosystem services (PES) to account for the case study context. It concludes by deducting key actors based on the outlined literature, that are interviewed in the context of this thesis, and designing a conceptual framework for the empowerment of women in the context of agroforestry that is applied to the case study project *Solidaridad ECA Uganda*.

Agroforestry

Agroforestry today is widely recognised as a sustainable approach to land management, while it comprises land use practices with ancient roots (Agnoletti et al., 2022). Agroforestry practices are context-specific (Moreno et al., 2018), and while they traditionally serve subsistence agriculture (Nair et al., 2017), they can also serve a commercial purpose (Cardozo et al., 2015).

While *system* and *practice* are often used interchangeably, a system refers to the local application of practice and is thus more specific (Nair et al., 2017). Agroforestry systems integrate trees either with animals (**silvopastoral**; also see Jose & Dollinger, 2019), with crops (**agrosilvicultural/silvoarable**; Eichhorn et al., 2006), or with both (**agrosilvopastoral**; García de Jalón, Burgess et al., 2018; for smallholder context see Nyong et al., 2020). A multitude of practices can be found, with different application of the same practice (e.g., Bussoni et al., 2019), and differences in characteristics of single components and their integration between systems (e.g., Cubbage et al., 2012). Practices in different geographical contexts particularly among smallholder farmers include parklands (Delgado & Canters, 2012), woodlots (Duguma, 2013), boundary plantations, homesteads, and live fences (Tadesse & Negash, 2023). Homegardens for instance are multistrata agroforestry systems around a house, which means that there are multiple levels: overstory trees providing food and shade, a fruticulture in the understory (below the trees), and domestic, small animals (Cardozo et al., 2015). As agroforestry practices sometimes intercrop other woody components with trees instead of crops, for instance, coffee plants (Sinclair, 1999) or grapes (Oliva Oller et al., 2022), Sinclair (1999) argues that instead of rigorous classification based on components, the use of trees by people is key to classifying a practice as agroforestry.

Agroforestry contributes to climate change mitigation benefiting the global community by taking up (Martinelli et al., 2019) and storing carbon, as well as impacting the microclimate locally (Agnoletti et al., 2022), making it an adaptation strategy in contexts like coffee plantations (Gidey et al., 2020). This potential of agroforestry as a mitigation strategy is also recognised among crop farmers

(Okunlola et al., 2019) and smallholder farmers (De Giusti et al., 2019; Quandt et al., 2017). The increased recognition can also be witnessed for instance in agroforestry being a strategy within the UNFCCC's REDD+ approach to climate change (Holmes et al., 2017), along with additional benefits to rural development (De Giusti et al., 2019). Mitigation success can be threatened though by (short-term) needs, for instance for fuelwood (De Giusti et al., 2019).

Ecosystem services of agroforestry, the “benefits people obtain” from this ecosystem (Hassan et al., 2005, p. 27), encompass regulating and maintaining (e.g., of physical conditions), provisioning (e.g., materials, nutrition), and cultural (e.g., spiritual interaction with landscapes) services, and exclude supporting services like cycling of nutrients, as they are intermediate processes (Moreno et al., 2018). Within agroforestry systems, trade-offs between or within different ecosystem service types can occur, for instance between improved shade leading to increased growth but also increased need for disease and pest management (Mortimer et al., 2018). In the context of cocoa farming agroforestry systems, Scudder et al. (2022) show that pest and disease management systems can increase yield but are connected to high labour and financial inputs, which are not justified by returns in income as it is now.

People benefit directly from agroforestry, by protection of streets and buildings (e.g., from wind, Jose, 2009) or heat stress relief around the house by regulated microclimate (Martinelli et al., 2019). More income-related motivations for agroforestry uptake are increased yields and lowered labour costs (Oliva Oller et al., 2022), fewer requirements of external inputs like pesticides or fertilisers (Cardozo et al., 2015; Fahmi et al., 2018), while income increases (Duguma, 2013). Regarding smallholder farmers, Cechin et al. (2021) find agroforestry systems to bear financial risks, due to low market accessibility and thus uncertainty of sales, and limited finance accessibility. Even models considering risks from variation in yield and price exclude these factors while assuming market stability and thus overestimate the price and quantity of sold produce (Cechin et al., 2021). Additionally, agroforestry has rather long-term economic benefits and only pays off after continued investment, while its complexity makes for a challenging adoption (Cechin et al., 2021).

Compared to monocultures or forestry, agroforestry systems were more profitable when accounting for other ecosystem services (dos Santos et al., 2020), environmental externalities and looking at overall well-being benefits to society (García de Jalón, Graves et al., 2018). Alavalapati et al. (2004) encourage the internalisation of benefits from ecosystem services and non-marketable goods stemming from agroforestry, so more landowners or producers are motivated to apply the practice, for instance through payments for carbon sequestration (CS). The income from CS could prove to be incentivising for smallholders in East Africa to change to agroforestry, provided the carbon price is high enough, and efficient management and institutions are in place (Waldén et al., 2020).

Carbon Sequestration and the Voluntary Carbon Market

Carbon sequestration (CS) is defined as carbon removed from the atmosphere and stored in carbon sinks, which relates within agroforestry to storage above- and below ground in biomass and soils (Jose, 2009) and contributes to climate change mitigation (Van den Berge et al., 2021).

The CS potential of trees depends on their use (e.g., firewood or timber; De Giusti et al., 2019), and geographical factors like elevation gradients linked to human exploitation of trees and other factors like temperature contributing to a changed organic carbon stock in the soil (Birhane, 2020). Soils are the biggest carbon pool of the terrestrial ecosystem and the third largest of the earth, after the ocean, and geological pools of oil, coal, and natural gas (Siqueira et al., 2020).

The management of land use for carbon uptake is called *carbon farming* and includes agroforestry as one strategy (Sharma et al., 2021). Sequestered carbon can be expressed in carbon credits, which can be traded, for instance on the *voluntary carbon market* (VCM; Kreibich & Hermwille, 2021), of which Acorn is part through certifying carbon credits (carbon removal units [CRUs]) and providing a platform for their trade. The VCM facilitates the trade of carbon credits from schemes based on privately organised certification, to organisations or individuals who want to reduce their carbon footprint through voluntary emission offsets (Kreibich & Hermwille, 2021).

Carbon banking is an alternative approach in carbon trading: instead of remunerating CS in trees by a one-time payment, the idea of a carbon bank is applied, where sequestered carbon creates

a deposit, from which buyers “borrow” through annual payments (Bigsby, 2009, p. 382). Bigsby (2009) proposes carbon banking as an alternative that reduces uncertainty and risks to tree owners, for instance, related to liabilities after tree loss due to a fire. Being based annually on current amounts of sequestered carbon and current carbon prices, carbon banking facilitates participation in the VCM for owners of smaller pieces of land as well, who were previously excluded due to inflexibility of the scheme (Bigsby, 2009).

While there is an acknowledged potential of the VCM as a strategy for transition to a “low-carbon future” (Streck, 2021, p. 374), to drive climate change mitigation, compensate for lacking governmental ambition to tackle climate change, and to especially benefit investments in so-called developing countries, there are also multiple challenges.

One challenge for the VCM arose from the Paris Agreement’s legal architecture introducing Nationally Determined Contributions (NDCs) of countries to climate neutrality, including those that host carbon offsetting schemes, pitting two goals against each other (Kreibich & Hermwille, 2021). Other challenges include the comparability of carbon credits from different programmes (Oldfield et al., 2022), leakage, additionality (offset credits are necessary for the agroforestry project, and the project is necessary for emission reduction), co-benefits, and permanence (in the capacity for carbon sequestration and storage), costs of opportunity, social, and transactional nature, also unpredictable and fluctuating carbon prices, challenges of implementation within verification, reporting, monitoring (Pan et al., 2022), and measuring, as well as a risk of double-counting and lack of shared information and communication (Shrestha et al., 2022).

One observation that sets the VCM apart from the compliance carbon market (CCM), is that forest-based carbon credit projects perform better regarding transactions and competitiveness on the VCM when they include co-benefits based on payment for ecosystem services (PES), while on the CCM carbon standards and emission reduction are in focus (Lee et al., 2018). Co-benefits can be environmental, economic, or social, for instance creating career or educational opportunities for women (Lee et al., 2018).

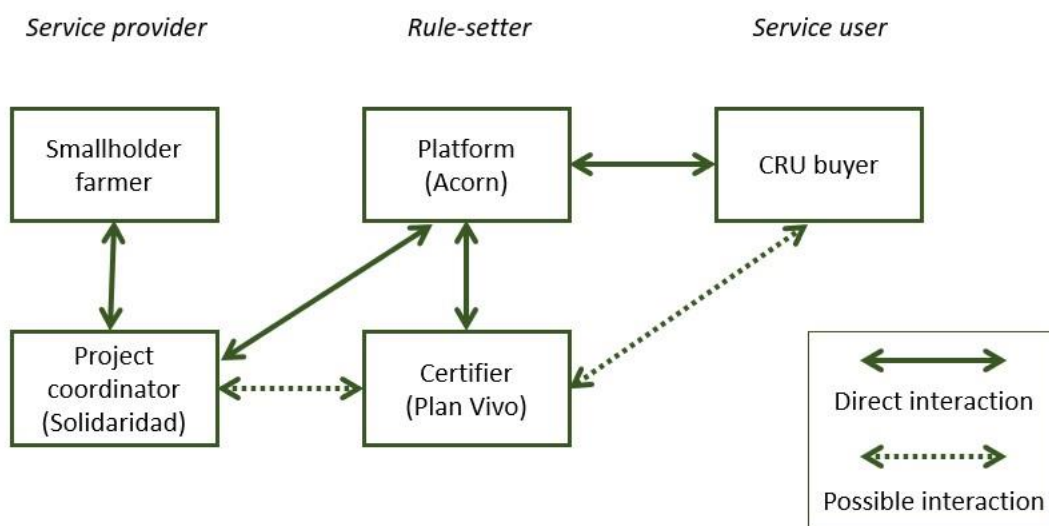
Payment for Ecosystem Services, and Key Actors

Wunder (2015) understands co-benefits or ecosystem services synonymously with generated offsite services. He defines payment for ecosystem services (PES) to have a voluntary basis and agreed rules concerning the management of natural resources, based on which the service user pays the service provider for the service (Wunder, 2015). Climate regulation through CS in agroforestry can be identified as such a service (Benjamin et al., 2018).

Linking Wunder’s (2015) definition of PES to Acorn’s business model (Acorn, n.d.a) in *Figure 1*, assuming voluntary participation of all actors: smallholder farmers and project coordinators can be understood as service providers, providing CS through agroforestry; buyers of carbon removal units (CRUs) correspond to the service user; and the platform Acorn linking service providers with service users, along with the certifier Plan Vivo, sets the rules on natural resource management, in the case of Acorn comprised in a certified framework and methodology (Plan Vivo, n.d.).

Figure 1

Key Actor’s Relations in Payment for the Ecosystem Service Climate Regulation Through Carbon Sequestration in the Project Solidaridad ECA Uganda



Note. Bi-directional arrows represent the continuous flow of offsite services towards the service user, measured in carbon removal units (CRUs), and the monetary compensation for the service

towards the service provider. The dotted lines represent certification services provided once or irregularly. Based on Wunder (2015).

Wunder's (2015) definition of PES serves as a starting point to identify key actors that are to be included and interviewed in the study: smallholder farmers, and representative people from Solidaridad, Acorn, Plan Vivo, and from a CRU buyer (Acorn, n.d.b).

Women in Agroforestry Projects

The role of women in agroforestry was already investigated in 1985 (Fortmann & Rocheleau), but gender issues remained understudied (Montambault & Alavalapati, 2005), and are still no main topic in agroforestry research (Quandt et al., 2023; Westholm & Ostwald, 2020).

Gendered social roles are interwoven with agroforestry and affect (economic) opportunities for women. Forestry is often connotated with masculinity (Fortmann & Rocheleau, 1985), and despite female labour, trees can be believed to be men's work and exclusively their property (De Giusti et al., 2019). Contrariwise, women are often the sole farmer in homegardens, which provides the household with security and holds possibilities for gender equality promotion (Kumar & Nair, 2004). In some cases, knowledge of tree produce is gendered and related tasks are only performed by women (Carney & Elias, 2006). In multiple African contexts, ownership, access, and use rights regarding agroforestry practices and parts of trees are gendered, including benefits from harvest and sale, with the product being the decisive factor, even within a space belonging to another gender (e.g., timber in women's homegardens belonging to men; Kiptot, 2015). Rights of women to products from trees are often limited to those with little to no value in economic regards like fruits, vegetables, herbs, spices (Kiptot, 2015), or fuelwood (De Giusti et al., 2019), and are confined to shrubs for producing fodder and firewood (Bourne, 2015). Non-timber forest products are relatively accessible for women and thus often turned to (Westholm & Ostwald, 2020). Whenever the financial benefits of a practice managed by women increased sufficiently, men would take over (Bose, 2015). The distance to markets of

products owned by women leads to women lacking decision-making leverage and impact on policymaking (Westholm & Ostwald, 2020).

Land ownership and ownership of other resources add barriers to women in agroforestry, such as incomplete rights for land use, which is applicable to multiple areas of sub-Saharan Africa (Benjamin et al., 2018). Around Mount Elgon, Uganda, decision-making powers, knowledge of agroforestry practices, financial and labour resources, and tree products are differently accessible to women than to men, as land and trees are only inherited by men or passed on to widows (Bourne et al., 2015). Land ownership status can affect the implementation of agroforestry practices (Ndayambaje et al., 2013). Next to access to land, membership in groups was found to be important for the empowerment of women, especially when support of family was lacking (Mulyoutami et al., 2015), linking them to external stakeholders and facilitating knowledge acquisition (Bourne et al., 2015). Gendered resource accessibility is linked to the gender of contact people and technical personnel (Fortmann & Rocheleau, 1985), and often includes ownership of farming and transportation equipment (e.g., bicycle) (Assé & Lassoie, 2011).

Differences between women and men in the perceived and preferred benefits of agroforestry, and their use thereof are often observed, although not in a study in Uganda (Bourne et al., 2015). Women value firewood, benefits to the household (e.g. health; Akpabio & Ibok, 2009), food security (Bourne et al., 2015), and shade for its cooling effect (Assé & Lassoie, 2011) higher than men, who prefer commercial over subsistence use (Kiptot, 2015; Mulyoutami et al., 2015; Sari et al., 2020). Female farmers are also more aware of the risks of agroforestry, such as additional work and financial requirements (Akpabio & Ibok, 2009; Bourne et al., 2015). Women around Mount Elgon also perceived agroforestry (long-term) benefits sooner than men, and agroforestry was preferred to crop by female household-heads, contrary to male household-heads (Bourne et al., 2015).

Agroforestry PES has been attributed the objective to balance gender, and projects increasingly acknowledge gender equity and include female smallholder farmers in sub-Saharan Africa (Benjamin et al., 2018). Equitable sharing of benefits through community-based payments,

introducing shrubs, improving accessibility to agroforestry information regarding labour, technology, and finance, facilitating collaboration between women and men, and mixed groups for information access and decision-making are recommendations to PES schemes to include women in Uganda (Bourne et al., 2015). Mixed discussion groups hold the risk of women being silent, even on issues concerning them primarily (Fortmann & Rocheleau, 1985). Priorities for tree species should be assessed in a gender-responsive manner and those selected that combine benefits for men and women, based on local and scientific knowledge, as well as promotion of practices that benefit all regardless of gender, and solutions to the accessibility of capital linked to land titles (Kiptot, 2015).

Women increasingly head households, hold knowledge valuable to projects, as well as special (economic) interests that need to be considered, and are an integral part of community life and decision-making as public and private participants (Fortmann & Rocheleau, 1985). Thus, Fortmann and Rocheleau argued already in 1985 that women's inclusion is not only of normative or moral value but benefits agroforestry projects. Agroforestry PES were found to empower female participants through social and human capital that make up the basis of female smallholder farmers' knowledge (Benjamin et al., 2018). At the same time, PES schemes should be assessed critically, as they have the potential to enforce social differences already existing within the project context (Rodríguez de Francisco et al., 2013). Another possible outcome of empowerment to keep in mind is the potential for conflicts between empowered, trained women and men holding land rights or other assets necessary for adoption of agroforestry (Bourne et al., 2015).

Through social policies or processes, agroforestry holds the potential of changing gender roles, next to external changes (Westholm & Ostwald, 2020). For instance, younger couples in Mali were found to conform less likely to traditional norms regarding decision-making on natural resources (Assé & Lassoie, 2011), and gendered roles in rubber agroforestry in Sumatra changed over time (Villamor et al., 2015).

Applied Conceptual Framework

Next to women's empowerment (WE), two characteristics of the project *Solidaridad ECA Uganda* were considered in the deduction of the conceptual framework: the context of a) payment for ecosystem services (PES) schemes, and b) forest management, to account for the trees which are added to agriculture in agroforestry, as well as the additional revenue from sold CRUs. Although the respective conceptualisations are not focussed on agroforestry solely but encompass it as one activity among others within forestry, they add to this thesis by accounting for the specific context of the project used as a case study.

Empowerment understood along Kabeer (1999) entails a *change to a more powerful position with increased choosing ability*, the existence of alternatives being implied in choice. As (dis)empowerment is tied to the *ability to make important choices*, three dimensions are relevant to the ability of choice-making, encompassing pre-conditions, process, and outcomes (Kabeer, 1999). The dimension of **resources** includes material, social and human resources, and access and (future) claims to them. The dimension of **agency** encompasses among others decision-making, negotiation and reflection. And the dimension of **achievements**, which are essentially outcomes related to well-being, includes outcomes with varying complexities such as life-expectancy or political representation.

Four dimensions make up *social equity*, as Pascual et al. (2014) apply it to PES schemes: The dimension of **procedure** encompasses rule- and decision-making, respectively inclusivity and involvement. **Distribution** comprises rights, and benefits, as well as burdens and costs. **Recognition** relates to the inclusion of stakeholders' rights in designing and implementing a program, as well as their knowledge, values, and social norms. The social conditions surrounding these three dimensions make up the fourth, (social and political) **context**, which influences equal access to procedure, distribution, and recognition. Gender is given as one example of such a social condition. Pascual et al. (2014) warn against trade-offs regarding social equity in PES schemes which tend to focus on conservation and economic efficiency.

Important components of analysing gender roles in forest management are **labour**, as well as **control, power, access, and decision-making**, and how they are distributed between men and women, which determines the component of **forest benefits** (Colfer, 2013). The framework created by Colfer (2013) contains three scales (macro, meso, micro), with continuous, blurry boundaries and interactions between each layer. The macro scale contains formal principles (e.g., from law, policy) as well as less formalised conceptions (e.g., from culture or religion). Encompassing the state and formal units nested within, just as areas demarcated by inhabitants sharing a characteristic such as ethnicity or religion, the meso scale includes matters such as resource accessibility and land tenure, gender norms, opportunities for education, and economic changes from subsistence to cash. Factors on the micro scale are clustered into five groups, 1) economic and 2) domestic roles, 3) power dynamics within a household, 4) opportunities to improve livelihood through changes, and 5) demographics of the local context.

The conceptual framework applied to this research combines components of the introduced works by Kabeer (1999), Pascual et al. (2014) and Colfer (2013), see *Appendix A* for a detailed breakdown. It includes two dimensions (resources, agency) of empowerment defined by Kabeer (1999), three dimensions (procedure, distribution, recognition) of social equity in PES schemes (Pascual et al., 2014), and factors from the meso and micro scales of Colfer's (2013) gender roles in the context of forest management. These components are chosen as they seem influenceable within PES programmes and are further informed by the considered literature.

Research Methodology

This chapter outlines the chosen research approach, introduces the case study, elaborates on the methods used for data-collection and -analysis, and concludes by reflecting on data-gathering.

Research Approach

To answer the research questions, a multimethod approach was chosen, consisting of document analysis and qualitative interviews with key actors. The nature of the research questions, being rather explorative, open, and provoking accounts of individual perceptions and experiences (Patten & Newhart, 2018a), just as the inductive component calls for a qualitative approach (Bowen, 2009; Patten & Newhart, 2018b). Applying two qualitative methods allows for triangulation of the data and increases the trustworthiness of the findings (Bowen, 2009; Morgan, 2022). The research is designed in a way that it builds on relevant theory to explore the topic of interest, the role of gender equality (GE) and women's empowerment (WE) in agroforestry projects for carbon sequestration (CS) and the consequences thereof for female smallholder farmers (FSF), in the context of a single-case study, an agroforestry project of the NGO Solidaridad in Uganda (*Solidaridad ECA Uganda*), participating in the Acorn programme for the trade of carbon removal units (CRUs) from the project (Rabobank, 2022).

Table 1

Four Dimensions of WE in PES Agroforestry Schemes with Example Questions

FRAMEWORK DIMENSION	EXAMPLE QUESTION
Resources (physical, social)	How accessible are resources (e.g., social, capital, educational) within the project <i>Solidaridad ECA Uganda</i> for female and male participants?
Decision-making (agency, procedure)	How do female and male smallholder farmers participate in decision-making in the project <i>Solidaridad ECA Uganda</i> ?
Recognition (preferences, knowledge, interests, conflicts)	How are the knowledge, and preferences of female and male smallholder farmers included in the project <i>Solidaridad ECA Uganda</i> , how are conflicts handled?
Roles (roles, distribution of benefits, burdens)	How are benefits and burdens from the project <i>Solidaridad ECA Uganda</i> distributed between female and male participants?

Before any data was collected, relevant literature was considered, which resulted from a directed search in several databases (SCOPUS, Web of Science, JSTOR, and GreenFile) and the international journal *Agroforestry Systems*. The search was based on accessibility and two combinations of keywords (see *Table 2* for the example of SCOPUS) adapted to the databases' requirements for keywords, regarding whole phrases, wildcards, and so forth, and requiring words directly related to agroforestry to be in the title if possible. After a screening of titles and abstracts to exclude obviously irrelevant literature, 181 papers remained for further examination (see *Appendix B* for an overview). Through reference list checking (Horsley et al., 2011) of articles that the initial search brought up, additional literature that seemed relevant was also included. Furthermore, literature already known to the author as relevant was considered as well, even if it did not come up in the directed search. Although extensive, the literature considered does not claim to be exhaustive.

Table 2

Keywords Used in Two Literature Searches on the Example of the Database SCOPUS

FIRST LITERATURE SEARCH KEYWORDS
agr?forest*
AND
smallholder* OR farmer*
AND
gender* OR "Gender equality" OR *m?n OR *male
AND
carbon OR "Carbon sequestration" OR "Carbon storage" OR "Carbon project*" OR "Carbon market*"
SECOND LITERATURE SEARCH KEYWORDS
agr?forest*
AND
smallholder* OR farmer*
AND
gender* OR "Gender equality" OR *m?n OR *male
AND
uganda* OR "Global South" OR "Sub-Saharan Africa*" OR "South-East* Africa*" OR rabobank OR acorn

Study Area and Case Study Project: *Solidaridad ECA Uganda*

On the border between Uganda and Kenya (East Africa), a highland area called Mount Elgon is located, with the elevated, forestry mountains being part of the Mt Elgon National Park (Bourne et al., 2015). On the Ugandan side, agroforestry around Mount Elgon has been supported by the local government and organisations based in communities (Bourne et al., 2015). Agroforestry potentially reduces dependence on the protected national park area for fruit, wood, and timber, while environmental services also contribute to landscape multifunctionality, such as carbon storage (Bourne et al., 2015).

According to Acorn (n.d.d), the agroforestry project *Solidaridad ECA Uganda*, set up in the Mount Elgon region (*Figure 2*) in 2017 by Solidaridad (Rabobank, 2022), covers 21,003 hectares of land, captured 8,418 tonnes of CO₂, based on which 8,418 CRUs were issued, and helped 36,989 farmers so far, contributing to eight SDGs (not including SDG5). The collaboration with Acorn started in 2021 (Rabobank, 2022). In the area, women do the majority of work on the farm, and women make up 10 % of the smallholder farmers involved in the project (Rabobank, 2022).

Methods for Data-Collection

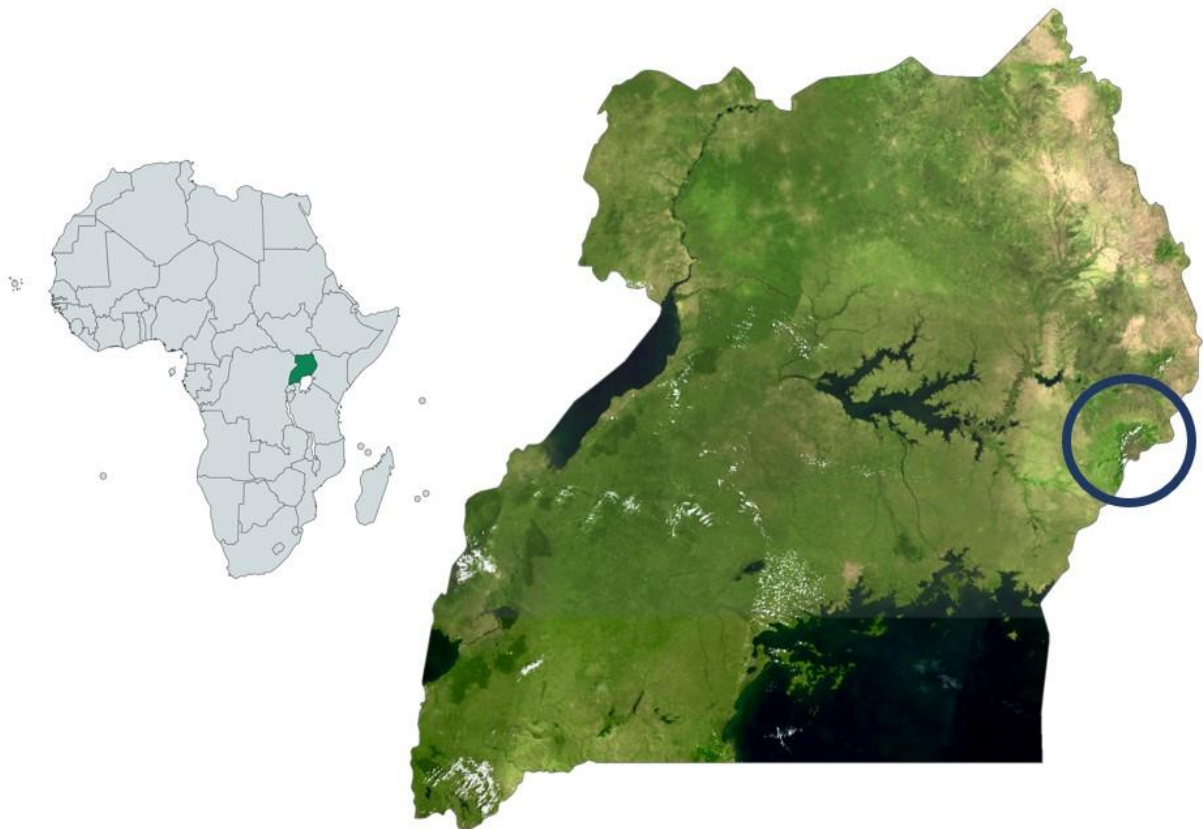
The research approach in this thesis is based on two sources of data: documents and interviews, thus pre-existing data and data that was created with the author of this thesis playing an active role (Morgan, 2022).

The eleven documents included in the corpus were determined by four characteristics elaborated on by Flick (2018, p. 379): *authenticity* (being primary documents), *credibility* (no cause to doubt the reliability of the authors or document accuracy), *representativeness* (typicality given as documents were provided by key actors) and *meaning* (a source of information for the reader; documentation, encompassing accountability, insurance, potential to upscale, and consistency for author and projects). The documents sourced share the following characteristics: accessibility online, a link to at least one of the key actors and relevance to the thesis topic, as they are in one way or the

other linked to the project *Solidaridad ECA Uganda* (see *Appendix C* for an overview of included documents). Thus, the documents were *sampled purposively*, the point of reference being the identified key actors in the case study project, selecting *critical cases* including documents produced by or thematically including those actors with high importance for the functioning of the project (Flick, 2018).

Figure 2

Two Maps Showing the Location of Uganda on the African Continent, and the Case Study Project's Location Around Mount Elgon, Uganda



Note. Colouring in Uganda on the African continent was done with MapChart (2023). The case study project's location was delineated on a map of Uganda by GISGeography (2022).

The key actors to be interviewed in online interviews were deduced from Wunder's (2015) definition of payment for ecosystem services (PES, see *p. 18*). Interviewees were reached by snowballing from contacts of the Fair & Smart Data research project at Maastricht University, who

previously cooperated with key actors in this study in different research settings. Hence, sampling built on existing networks and the referral from initial contacts to possible participants, as is typical for **snowball sampling** (Parker et al., 2019), including who key actors found to be representative spokespeople in the matter.

Ten people covering all key actor groups were interviewed (*Appendix D*). The interviews were conducted online via Zoom (nine) and on the phone (one) in the months of May and June 2023 and lasted between half an hour and one hour. They were based on a semi-structured interview guide with open-ended questions (*Appendix E*), which was conceived based on the proceeding of Helfferich (2011), which starts with collecting interview questions, which are then examined, sorted, and subsumed in separate steps, leading to the elimination, or rephrasing of some questions. Underlying this process was the conceptual framework (see *p. 24*), and the questions were further informed and contextualised (Bowen, 2009) by the results of preliminary document analysis. Formulating questions beforehand structured the interviews, assured that all areas of interest were covered and allowed for comparison between interviews, while the possibility to ask follow-up questions besides the script remained (Mayring, 2002).

Ethical considerations are always important when working with people (for a discussion see Kiegelmann, 2020). The geographical, historical, and cultural context of the case study added points for reflection regarding data collection: next to the language barrier, conducting research on a project located in the Global South, while being based in the Global North outside the context of the people directly involved and impacted by the project brought about reflections on colonialism and existing power dynamics. To tackle these challenges, informed consent was ensured through a written interview consent document and time for questions before each interview, including the affirmation that interviews could be stopped without justification at any time. While an organisational hierarchy leading to participation cannot be ruled out, this approach sought to ensure voluntary participation in the research. Within the limited scope of the thesis, a critical personal reflection of the role of a researcher as well as on potential pre-conceptions and assumptions, combined with a focus on the

statements of interviewees from the case study area were relied upon to approximate the geographical and cultural context. To avoid any harm to interviewees, their contributions were anonymised to only include their organisation, role, and gender, where this degree of anonymity was consented to.

Methods for Data-Analysis

To answer the research questions, documents and interview transcripts were analysed with a combined approach using the software Atlas.Ti (*Figure 3*). Adopting a combined, multi-stage approach (Kuckartz & Rädiker, 2022), all documents and transcripts were scanned and coded two times regarding relevant categories. Categories simplify complex issues, as they are codes that represent the essence of a unit of data (Saldaña, 2009). The approach encompassed the development of deductive categories based on the literature and framework *before the analysis*, which were continuously supplemented during the coding process, by categories and subcategories developed *along the material* inductively, following **structuring qualitative content analysis** (Kuckartz & Rädiker, 2022). Hence, the chosen framework was included by using the pre-defined categories while allowing for exploration through inductively developing additional categories. This process was *iterative* and open to revision in feedback loops during the analysis. To ensure consistency throughout the coding process, categories were defined and supplemented with examples in a codebook (*Appendix F*).

Reflection on Data-Gathering

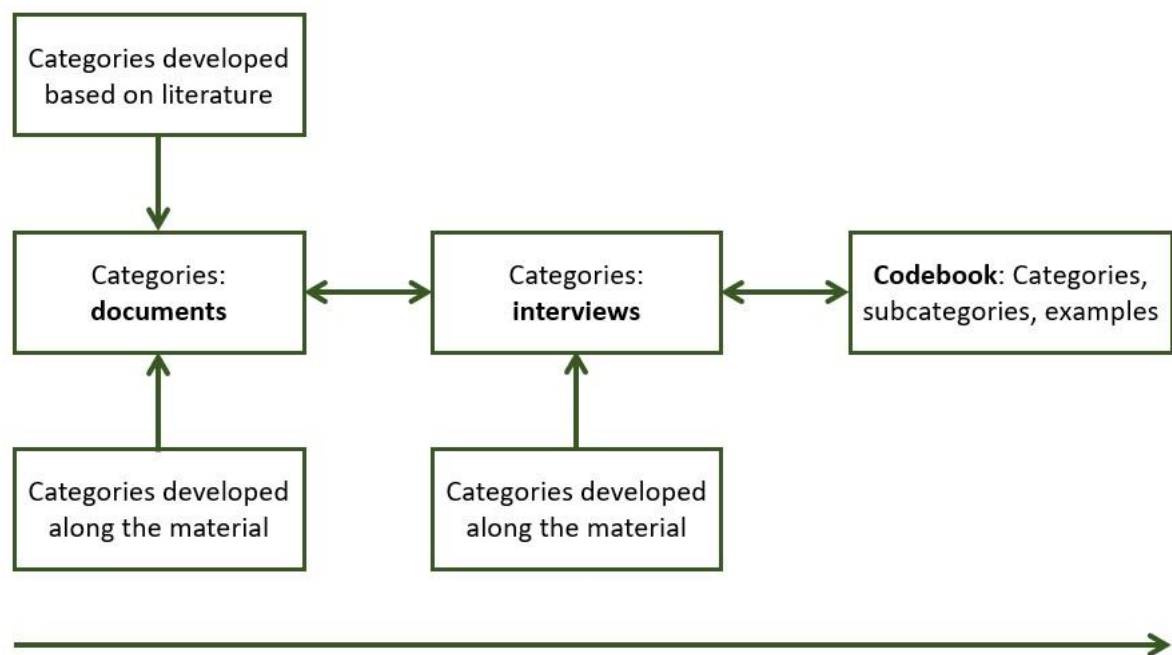
While the aim was to conduct as many interviews as needed to reach a point of saturation where information becomes redundant (Patten & Newhart, 2018b), the number of interviews eventually was contingent on the possibilities within this study.

Eighteen people were involved in the snowball sampling, excluding two experts on agroforestry and gender equality based in Uganda, which were contacted based on an internet search. Lastly, since the referral to smallholder farmers from interview partners did not seem possible, a

Ugandan female smallholder farmer (FSF) was contacted through a journalist based on a newspaper interview on agroforestry.

Figure 3

Iterative Approach to Data-Analysis of Relevant Documents and Transcribed Interviews with Key Actors



Eleven people agreed to be interviewed. Due to one person repeatedly not showing up to the interview, ten interviews took place until data-gathering had to be concluded due to time limitations. Despite being a small sample and thus not representative, the interviews conducted include all actor groups identified prior, which allows to get some insight into the issue. Interestingly, albeit not allowing conclusions due to the sample size, nine interviewees are female. Six interviewees are based in Uganda, while the remaining interviewees are based in the United States, the Netherlands, and the United Kingdom.

Due to technological infrastructure and financial constraints, the interview with the FSF was conducted on the phone and shorter than other interviews. The way that this relates to the third aim of this thesis to take the perspective of FSFs into account will be discussed in the limitations section

of this thesis. The expert interviews added valuable insights to the results, including accounts of the situation of FSFs in agroforestry based on work experience and research.

Because of an unforeseen loss of data (theft of the phone containing interview recordings), four interviews could not be transcribed but summaries based on notes and memory had to be compiled, which were then revised by the interviewees. Based on the interviews, six documents were added to the original corpus for the document analysis.

Results

The results chapter presents the outcomes of analysing eleven documents (*Appendix C*) and interviewing ten people (*Appendix D*), eight representatives from the identified key actor groups and two experts respectively. The results are structured along the three sub-questions of this study and the five key actor groups, plus the experts. Corresponding to the focus on the case study, the results are organised according to proximity to the project *Solidaridad ECA Uganda*, starting with the female smallholder farmer (FSF), then Solidaridad, Acorn, Plan Vivo, and carbon removal unit (CRU) buyer, ending with the experts to provide more context.

SQ1: Key Actors' Conceptions of Gender Equality and the Empowerment of Women

Female Smallholder Farmer

Asked about her definition of gender equality (GE), the FSF spoke about agroforestry benefits for coffee plants and yield.

Solidaridad

In Solidaridad's documents, GE is understood as including interests of women and men equally, and one factor contributing to social justice. Gender and social norms are identified as key drivers of poverty and marginalisation, of which the current situation of women is one example. Empowerment is linked to planning in life and enterprise, to identification and negotiation of needs and interests. Solidaridad applies the Gender Action Learning System (GALS) methodology, rooted in

a commitment to SDG5 and three indicators related to women's empowerment (WE): economic empowerment, voice and decision-making (and influence), equitable workloads (and benefits). Gender roles are limiting farmers' adoption of agroforestry, according to the project report.

Impacting farmers' livelihood, WE was chosen additionally to three mandatory indicators for the project *Solidaridad ECA Uganda*. Linked to decision-making on tree planting and CRU revenue, measurement examples are employment numbers or percentages of women in the project council. GE is expected to increase through the agroforestry intervention, due to promotion of female involvement in management of agroforestry systems through Solidaridad, such as taking part in trainings, or receiving tree seedlings.

The difference between equity and equality was mentioned in the interviews with Solidaridad's representatives. Solidaridad answers a "global call for gender equity" (I4) and strives for inclusive leadership and fair value distribution. GE has been a focus of Solidaridad since its origins because half of the population and an important part of the agricultural workforce are women, which would be left behind without measures for GE. The aim is to empower the household by empowering women, as Solidaridad is "not training women to run away from their husbands" (I3). Instead, the aim is collective decision-making, on where to plant a tree, which plant species to use, which trees to remove, and how to invest the revenue from CRUs. Men realise that empowered women and GE benefit the community and economic productivity and it is the community members that identify issues related to GE and bring those forward to Solidaridad.

Acorn

In Acorn's documents, the ambition to contribute to the SDGs, also called co-benefits, is highlighted. The SDG targets applicable to Acorn include targets from the SDGs 1, 2, 6, 8, 9, 13, 15, and 17. Among responsibilities of local partners regarding smallholder farmers is not to exclude participants based on gender. Projects also "should strive not [to] harm or negatively influence local

communities (e.g. reinforce gender inequalities)” (D1, p. 13). Within the project, the local partner should also work on equal employment opportunities for women.

Next to three fixed indicators (farmer income from carbon finance, nutritional variety, agricultural biodiversity), one out of eight discretionary indicators is to be chosen by the participants themselves, one being women’s empowerment (WE, local livelihood); Examples are employment numbers and percentage of female council members.

GE was mentioned in the interviews with Acorn representatives as being important to Acorn, who would like to see more female participants in their programmes. GE is not an indicator focussed by Acorn since the focus is on other indicators already and cannot be broader, but also due to pushback from some project regions to making GE a mandatory indicator. CRU buyers “want it all” (I5), including GE in carbon removal units (CRUs). When the topic of GE was raised among participants in Uganda, a present interviewee noticed recognition and consensus: “you see [men] nodding heads and (...) nobody objecting that it's none of their business” (I6).

Unsure of a common definition of GE within Acorn, one interviewee defined it for herself as equal treatment of women and men, “it shouldn't matter if you're a man or a woman” (I6). Examples included inheritance, education, and job applications. She mentioned struggling with the idea of money going “into the account of the man, while the woman really does the work” (I6). A reason for Acorn to be wary of the rights of women is that often the male in a household owns the land. Acorn acknowledges this as a problem and the need to address it. Acorn thus focuses on the whole household, including the children, for example regarding education about the programme and decision-making on additional income.

Plan Vivo

Documents from Plan Vivo show that data in agroforestry projects is to be disaggregated by gender (e.g., livelihood indicators), and potential negative impacts and risks on GE need to be

assessed, such as exacerbation of gender-related inequalities, contribution to gender-based violence, and restrictions to access environmental goods and services due to roles and positions of girls or women, stressing a risk to their situation, livelihoods, and rights. Stakeholder engagement and understanding local decision-making processes and governance structures explicitly include the involvement of women. Social exclusion risks based on factors like gender, age, or land ownership are recognised for participant engagement, decision-making, discussions, and access to benefits. The attractiveness of projects considering impacts beyond carbon to funders and buyers is highlighted.

Plan Vivo prescribes a gender-sensitive approach to projects, entailing considerations for women's needs and capacities, and including socio-cultural context while avoiding a gender-blind approach, where men act as decision-makers and spokespersons for women. The approach emphasises women-headed households, elderly widows, girl school pupils, and LGBTQIA women as examples of particularly disadvantaged groups, next to more articulate, better-educated middle-class women eager to participate.

Plan Vivo projects averagely contribute to 11 SDGs, with proxies to SDG indicators. Five indicators of SDG5 are included, covering a) land ownership, b) knowledge and decision-making, c) reproductive rights, d) positions in project management and e) project governance, f) community participation, and g) sex-based discrimination. Projects are either community-group or smallholder projects. Community-group projects contribute significantly more to SDG5 proxies facilitated by their financial setup, whereas in smallholder projects the (male) landowner is most involved.

Plan Vivo's representative explained that women's empowerment in carbon projects was linked to management roles, representation, participation in training and knowledge-sharing in groups, and access to financing (e.g., community fund microfinancing women entrepreneurs). GE is one indicator, strictly required not to impact the project region negatively at least, at best to improve it. Included in measurements for risk management, it relates strongly to SDG targets, such as household income, women's literacy, women's participation in project meetings, and decision-making

structures. WE indicators and direct ties to the SDGs can increase price premiums for carbon credits above average and add to the corporate social responsibility (CSR) or environmental social governance (ESG) agenda of buyers. Plan Vivo historically has the highest prices on the voluntary carbon market (VCM) due to co-benefits, making their carbon credits high-quality and sought after. Plan Vivo does not need a justification for promoting GE as the SDGs are best practice. Empowerment is motivated by women gaining “agency in terms of making decisions when it comes to climate projects because most of the unpaid or unrecognized agricultural work is done by women” (17).

CRU Buyer

The sustainability statement of the CRU Buyer includes monitoring client’s respect and encouragement for equal opportunities and diversity at work, including gender diversity. The SDGs are supported, with specific mention of energy and food transitions, circular economy and financial wellbeing, and the SDGs 2, 7, 8, 11, 12, 13, 15, and 17. The aim to achieve inclusive and strong communities is underpinned by the notion of equality and human rights covering gender. Grievance mechanisms for labour rights violations explicitly include gender-based violence and harassment.

Asked about the role that GE or WE might have played in choosing the CRU’s programme, the CRU buyer’s representative replied: “[t]o be honest, that was not a question” (18). She elaborated that transparency, methodology and quality of the carbon credits were considered. Later she added, “I’m embarrassed by the fact that it hadn’t been a criteria of ours” (18) and that “knowing that they prioritize gender equality would definitely be a strong selling point” for her, that she would be even happier to support.

Experts

According to an expert, GE was defined by looking at responsibility, opportunities, roles, and rights of women and if they differ from men’s. She emphasised that GE cannot be looked at without talking about gender equity, corresponding to fairness. Because even if opportunities, responsibilities, and rights are the same, other obstacles could hinder someone from the full potential to utilise

opportunities in place. If actors in agroforestry are interested in GE depends on many factors, such as their gender. Most decision-makers in the field are men, among whom some are interested, while others “may be interested, but they have this unconscious bias” (I9). Also, if they received training on gender “they're able to appreciate what it is and why they need to promote it” (I9). Additionally, there now are mandatory guidelines for all sectors to mainstream gender equality, gender equity, and gender in their interventions to receive funding from the Ministry of Finance, forcing compliance.

The other expert defined GE as equal opportunities for everyone, “men, women, youth, people with disabilities” (I10), to access information and resources to achieve aspirations. For instance, woody biomass, and land with alternative livelihood options. He described the problem underlying gender mainstreaming efforts as “[w]omen are marginalized. Women don't even know that they have a voice that should be heard” (I10). While including women in resource management brings about improvements, when women’s needs are marginalised, cascading problems like gender violence or malnutrition of children and women can be observed. To avoid these issues, women need to be considered in natural resource management, what they consider important, which trees they want and why. “They have these answers (...) but because they are maybe not given the opportunity, they are not on these decision-making bodies, that information is missed” (I10). He concluded that gender mainstreaming in natural resource management “ensures that communities can coexist, that peace can be maintained, where men don't abuse their women, their wives” (I10), and that understanding the gender component would result in “everyone [knowing] that they can't do it alone, but rather working together” (I10).

SQ2: Women’s Participation in Agroforestry Projects for Carbon Sequestration in Uganda

Female Smallholder Farmer

According to the FSF, agroforestry is the same for women and men. She stated, “[i]t’s easier when you’re alone” (I1), as men “tend to dictate over women” (I1) at times, which sometimes includes men just cutting trees. The interviewee is alone and thus controlling the farm, which entails that

“nobody can dictate over me, I say this tree is not old enough to be trimmed, or it is not old enough to be sold” (I1). She added that “African men (...) they say the wife belongs to them” (I1), which means that the woman is a “helper” (I1) without rights over certain things.

Solidaridad

The project report states that culturally, female-headed households are not accepted in the project area. Thus, men are in charge of the household and take all decisions, including how the revenue from carbon finance is spent, although women do most of the work in maintaining the farm. Solidaridad ensures that up to 40% of the participants in agroforestry and climate-smart trainings and recipients of tree seedlings are women, and at least one-third of project council members are female (currently 38 % of women) with the aim that women have capacity to play a key role in the agroforestry transition. Payments are made to farmers directly, for traceability and as it allows farmers to decide what to spend the carbon income on. Within the project *Solidaridad ECA Uganda*, 10% of farmers and 50% of local partner employees are women. The project employs predominantly women in the collection of baseline surveys and onboarding data, female team members are involved in all trainings within the project, and two women are especially involved in considering gender in planning and executing activities (gender thematic lead and gender officer).

Solidaridad’s representatives highlighted that community members bring issues related to gender equality to Solidaridad, and up to 40 % of participants informing the baseline in the pilot project were women. Women’s preferences in decisions are represented by other female farmers in the project council. They also mentioned that within the project women work paid jobs onboarding farmers and collecting data. Most women do not own land but are given land to farm for some time by male relatives or husbands. Gender informs participants’ roles within agroforestry projects due to cultural and social norms.

Acorn

Acorn's documents prescribe that carbon benefit payments to participants are to be made annually and to be traceable, constituting at least 80 % of proceeds from sold CRUs in cash or individual in-kind contributions (e.g., seedling costs). They are not applicable to a community, because they need to be traceable to individuals. Carbon rights are linked to land ownership or long-term user rights. Building on local culture and traditions is one proposed measure for the start of a project. Local customs, as well as the inclusion of marginalised groups, are factors participants should consider when contributing to selecting and designing activities.

According to Acorn's representatives, land is often owned by men, hence most participants in programmes are male, "caused by the fact that we need to check who owns the land and that often is by tradition the men of the household" (I6). One interviewee assumed the only way a woman could own land would be by becoming a widow with underaged children and no brothers. This impacts who receives income from carbon credit sales, linked to land titles for traceability. Acorn has witnessed a lot of the farmers investing the money in their farm or in the education of their children, "[b]ut there will always be (...) a few men, (...) who have additional income stream and think, let's have a nice night out in the pub or something" (I6). Female farmers in the project were perceived by one interviewee as approaching investments and the farm as a business, while men were not always perceived as spending the extra money wisely. Elaborating on her experience: "I feel that women are more long-term thinkers, and they think more of their whole family and the future of their family" (I6).

She added, "I think we have to work with how it works in a country" (I6), so Acorn tries to include the whole family in the programme, to make tree planting and farming the responsibility of both women and men, entailing shared carbon money and decision-making. Acorn wants to see women included in the project council (50/50 or one-third balance), to consider grievances and worries of women. Within the project council, GE was discussed, which "obviously was raised by one of the women" (I6). A third up to 50 percent of members are female, and as one interviewee emphasised also *young* women. She recalled, "I think that they raised the topic and the awareness

also for the other men in the council” (16), which refers to the topic that participation in the programme “should be seen as a collective effort and a collective ways of distributing the money” (16). Participants in the project *Solidaridad ECA Uganda* are coffee farmers, where usually both women and men work on the farm.

Plan Vivo

Plan Vivo’s documents recognise frequent differences in needs, aspirations and voices of women and men. Men are typically the main decision-makers while women carry out many activities relating to forest products or smallholder agriculture.

As explained in their documents, Plan Vivo applies a gender-sensitive approach, specifically focusing on local women, making sure participation is balanced in mixed groups, and project meetings are set up considering women’s domestic responsibilities and literacy. Local rules or customs preventing the participation of women and the potential for social exclusion due to land-based projects benefiting individuals with more land are recognised. One condition for participating in a project by Plan Vivo is the ability of a group or individual smallholder to demonstrate their long-term (user) rights to the land. Within Plan Vivo’s approach, participants are supposed to be designing activities and setting objectives, deciding on livelihood indicators and their monitoring.

Plan Vivo’s representative argued that women often do not have enough collateral or are faced with too high-interest rates to access microfinance as “most of the unpaid or unrecognized agricultural work is done by women” (17). Carbon projects can channel livelihood benefits to women, directly including women as leaders in improving the project, for instance through community funds. There are requirements around participatory community involvement in the design phase of projects “because we don't want a company in the global north, who is usually a developer, to prepare all the documentation as they have the technical capacity to do so” (17).

CRU Buyer

Within the sustainability statement's labour rights policy, accessibility to grievance mechanisms is one condition, which are supposed to be proportional, accessible, transparent and "accountable to all stakeholders" while being "communicated in a culturally appropriate and understandable way" (D11, p. 40).

The CRU buyer's representative expressed, "I guess I'm not as involved in the profile of the end user" (I8) and did not add beyond that to the participation of women in agroforestry.

Experts

One expert first pointed out that there are "different categories of women" (I9), highlighting rural women in subsistence agriculture. On governance and household levels in the agriculture sector "even though majority are women, the decision makers are still men" (I9). Tilling and informal selling of agricultural produce on markets are mostly done by women. Men are in the more lucrative and developed value chains, such as coffee, as they have access to capital to finance large-scale farming or produce businesses.

Social norms can "inhibit women from practising agroforestry" (I9), impacting access, control, and ownership of land and other productive resources. Most women do not own land. While it is legally possible, "there are those social norms that are silent" (I9). The biggest form of land ownership is customary which is passed on to male members within a family for generations, as girls are believed to move away from the family to marry. Even married women often do not own land but have access rights for food production purposes.

Since tree planting is a commercial, lucrative, and long-term activity, women cannot do it. Even when women participate in tree planting, social norms apply "[W]hen it reaches a size that is beyond your size as a woman (...) then that tree ceases to be a woman's tree. And it's now a man's tree" (I9). This results in tree plantations rarely being owned by women, but women work on them. Women need the permission of the man owning the land that they can access to plant a tree, because

“[a] woman is a visitor. So as a visitor, you cannot plant something that is going to take years before it is harvested. That one belongs to a man” (I9). Which trees to plant is gendered, in a way that women prefer fruit trees for the food, and “[i]f you plant a tree that is not a fruit tree, maybe for timber, that is straight away not your tree. It is a man's tree” (I9). This becomes an issue of resource ownership, as men might be less interested in firewood, but in timber or trees to use for lucrative charcoal.

The other expert emphasised that access to resources like woody biomass and land is important for gender equality as it creates equal opportunities. As Ugandan society is patrilineal, male relatives usually own resources and make decisions, for instance about access to land, what is planted and what resources from the land are used for, if trees are sold and how revenue is spent. Few women own resources, but usually have user rights, “because they offer an important resource of labour, especially during land cultivation, during planting crops, even tree planting and all that, women usually play a big role” (I10). Nonetheless, “it's also common to see that a woman has none of the power” (I10). Gender norms are often mentioned as limiting women. Women understand their problems and challenges, and the benefits that come from growing trees, such as the nutritional value, improved soil fertility and with that increased crop yields. They prefer fruit trees, contrary to “their male counterparts who are often eager to plant fast-growing exotic species” (I10) for timber, while women prefer diverse benefits over money.

SQ3: Empowerment of Participating Female Smallholder Farmers

Female Smallholder Farmer

The additional income helps to plan for the family and benefits women, who “most of the time (...) are busy, they don't have time to waste” (I1). It helps “to run the home” (I1), build a better house (semi-permanent houses are common in Africa), buy a better lamp, and “if the land is big enough you can even have a cow (...) which can give you manure [that] reduces expenses to buy fertiliser at a shop, to put in coffee and banana plantation” (I1). She stated, “[f]or me, it helps both of us, the men and the women” (I1). She elaborated on agroforestry benefits, such as improved soil and protection of

coffee plants, provision of firewood and timber in the garden for own use or as a backup for times of financial hardship besides the annual income from coffee.

Solidaridad

As stated in the project report, women are included in trainings and receive seedlings, to increase capacity to play a role in agroforestry. Solidaridad organises sensitisation and awareness training for men, and there are female farmers in the project council. The promotion of women's engagement in the value chain of timber and non-timber forest products is highlighted. The project has no own official policies regarding employment of women.

Solidaridad's representatives stated that women were included along with men in the baseline survey for the pilot project and the gender baseline, which is identified before the project starts, defining the situation through the community. Women can be nominated for the project council by fellow project participants, but it is harder, as more land and farming experience is expected than from a man. Women have paid jobs within the project, onboarding farmers and collecting data. Gender intervention has not yet taken place, thus it is too soon to say if women are empowered by participation in this agroforestry project, as agroforestry projects alone are not enough to empower women. The project will end in 2027 if no new investor is found to continue. This threatens the changes regarding GE following the interventions because changes to the culture and social norms need time and need to be sustained. Hence, WE in agroforestry projects also depends on project continuity.

Acorn

In Acorn's documents, consideration of local customs and inclusion of marginalised groups are emphasized when participants contribute to activities by selection and design. A local partner with understanding of local needs, societal nuances and culture is chosen for on-the-ground work. Women's empowerment is one discretionary indicator out of eight, which can be chosen by project

participants. Ambition towards equal employment opportunities is one responsibility of local partners. Projects that are eligible should emphasise agroforestry with food and/or medicinal components.

Acorn's representatives believed FSFs to be empowered by their participation in agroforestry projects, for example by firewood in the vicinity. The gender interventions go on as long as the programme does since GE was chosen as the additional indicator. By including the whole household in the programme, farming and planting a tree becomes "the couple's responsibility" (I6) which should lead to an equal share and equal decision-making on the carbon money. While there is no quota of female participants in the project, the position of women is often discussed with local partners, who should discuss the topic with participants and emphasise that the carbon money transferred to the (male) landowner is an accomplishment for the whole household that should have a say in how it is used. The additional income empowers women.

The participation of women in the project council was perceived as quite high, and when gender equality was addressed, the interviewee perceived consensus. She highlighted the project council as a way of empowerment "because there, it doesn't matter if it's a woman or female or if it's a farmer at all, (...) if he or she is somehow involved in the program or a stakeholder or whatever, they can be selected as council members" (I6). Regarding a play in the project where GE was one topic addressed, one interviewee concluded "I think that's a good way of telling the story and spreading the message that other or the household and the women should be involved" (I6) and that recognition was important.

Plan Vivo

Plan Vivo's documents consider gender in measuring the livelihood status, and general monitoring. GE is considered in risk management, just as vulnerable or disadvantaged (e.g., landless) groups. Obtaining feedback from *all* stakeholders is crucial. How benefits can be ensured to people owning little to no land is emphasised in social inclusion considerations. The Plan Vivo Standard includes a gender-sensitive approach, embracing socio-cultural context without being gender-blind,

including at least one stakeholder group focusing on local women, ensuring balanced participation of women and men in mixed groups, and considering women's responsibilities and literacy when setting up meetings. Employed and participating "women and LGBTQIA people" (D8, p. 15) must be safeguarded from gender-based violence, discrimination, and sexual harassment. Stakeholder analysis is suggested when setting up a project in heterogeneous rural communities, for identifying particularly the most vulnerable that could be excluded from activities and benefits. To improve gender sensitivity, the project team should be gender balanced and have equal employment opportunities. Separate women's groups should be held, ideally facilitated by a woman. Gender-neutral language should be used in project documents unless referring to a gendered group. In the design of activities and interventions, participation and benefits for women should be ensured. Differences in women (age, education, income, LGBTQIA, etc.) should be considered when trying to engage women in the project.

According to Plan Vivo's representative, there are strict requirements regarding the engagement of vulnerable and underrepresented groups "like women, youth, and other disadvantaged groups" (I7) and for community participation in the design stage of a project, to capture what the community wants. "[S]ocial equity and the gender equality clauses" (I7) are part of the risk management and assessments in the design phase. Gender equality is part of the monitoring and evaluation of a project, as an indicator which at least cannot perform negatively. Documentation also includes WE within livelihood benefits and other socioeconomic indicators. Direct requirements regarding GE and inclusion of women are part of an exclusion list projects must comply with. Regarding WE through agroforestry projects, she replied: "[A]t least from my experience (...) I would say that there [are] definitely no projects that are worsening the impact" (I7) such as increasing gender inequality or creating further gender divide. Community funds can benefit everyone through microfinance, but especially women who lack collateral to receive a loan, and carbon projects can channel benefits to women who do most of the unpaid work in agriculture, including them as leaders to make the project bigger and better.

CRU Buyer

The sustainability statement refers to responsibilities of clients regarding equal employment opportunities, and grievance mechanisms explicitly include gender-based violence and harassment.

The representative expressed “I have not thought of that yet” (I8) when asked what WE in agroforestry projects might look like but imagined women to be empowered.

Experts

One expert stated that WE through agricultural projects is very possible if it is deliberate and considers the wider context, such as social norms, gendered preferences in trees, ownership of resources, who makes decisions on community and household level, and deliberately targets women and men, “for purposes of complementarity, because the women can do the planting, but the men have the land” (I9). Gender transformative approaches or methodologies help to “promote a platform where men and women are able to reflect on their gender issues and [are] able to promote (...) men and women or spouses or families working together as a household” (I9) and additionally empower women financially. She acknowledged progress made through law, along the need for multisectoral enforcement and awareness trainings to challenge unconscious biases.

The other expert first defined empowerment as “the capacity to make decisions” (I10). Saying that “decision-making capacity comes from knowledge” (I10), and “knowledge is power” (I10). Subsequently, in his regard, those women are empowered, that interact with organisations, receive education, and have knowledge about the value of trees, “so they make conscious decisions” (I10).

Discussion

This chapter interprets the results along the conceptual framework’s four main components (resources, decision-making, recognition, roles; see *p.* 24) and contrasts them with relevant findings from the literature. Subsequently, the results are related back to the knowledge gap and problem

statement and used to answer the research question and sub-questions. Data is triangulated between different sources, and discrepancies as well as congruencies are discussed.

SQ1: Key Actors' Conceptions of Gender Equality and the Empowerment of Women

Resources were referred to by Solidaridad (access to trainings, tree seedlings, economic empowerment), Acorn (individual opinion: access to inheritance, education, job opportunities; participation in projects), Plan Vivo (access to trainings, group membership, education, capital, environmental goods and services, land), and the CRU buyer (access to jobs). One expert mentioned opportunities and rights but did not specify resources, while the other referred to information, woody biomass, and land as examples for resources.

Decision-making was referred to by Solidaridad (leadership, decision-making, negotiation of needs and interests, planning, management), Acorn (decision-making, percentage of female council members), and Plan Vivo (management roles, positions in decision-making structures). The CRU buyer did not mention the decision-making dimension. One expert mentioned opportunities and rights but did not specify decision-making, while the other mentioned equal opportunities for everyone and decision-making bodies.

Recognition was referred to by Solidaridad (inclusion of interests, voice), Plan Vivo (representation, participation in project meetings, gender-based violence, discussions, consideration for needs and capacities, non-male spokesperson, community participation), and the CRU buyer (grievance mechanisms in labour rights). Acorn did not mention the recognition dimension. One expert mentioned equal responsibilities, and the other said that “[w]omen don’t even know that they have a voice that should be heard” (I10), which could be considered a form of self-recognition. He also called women’s voices critical, on “what they consider important, which trees they want and why” (I10).

Roles were referred to by Solidaridad (value distribution, equitable workloads and benefits), Acorn (monetary benefit from work) and Plan Vivo (access to benefits). The CRU buyer did not mention roles. One expert mentioned roles but did not specify them.

GE definitions by the key actors included almost always all four dimensions of the framework. Components of the dimension of roles were very focused on benefits, such as revenue from work, while the distribution of burdens and social norms were addressed outside the context of gender equality conceptions. Often, components of the dimension mentioned were theoretical and not applied to the project context. Not every interviewee had a definition of GE, while most mentioned indicators, and so forth, which made it possible to approximate a definition. The actors on the furthest ends of the value chain did not give a definition for GE at all. The FSF did refer to a different subject in response, and the CRU buyer had not considered GE as a criterion, nor had she thought about what this could mean in the context of an agroforestry project since she is “not as involved in the profile of the end user” (18). Not a single time was GE defined in any of the documents. The ability to make choices, and supporting factors like access to resources and equal rights were mentioned by all interview partners but the CRU buyer, in line with Kabeer’s (1999) conceptualisation of women’s empowerment (WE). The interest in GE by the project participants was mentioned several times (Solidaridad, Acorn). While all key actors except the FSF did mention the SDGs, only Solidaridad and Plan Vivo explicitly used SDG5 in their work, while Acorn and the CRU buyer focussed on different SDGs.

SQ2: Women’s Participation in Agroforestry Projects for Carbon Sequestration in Uganda

The participation of women was related to **resources** by the FSF (rights over certain things), Solidaridad (land ownership, paid jobs with project, revenue linked to land, participation in trainings, tree seedlings, female gender thematic lead and gender officer, 10 % female farmers, 50 % female project employees), Acorn (land ownership, revenue linked to land), and Plan Vivo (lack of collateral

for microfinance). The CRU buyer did not mention resources. Both experts mentioned land ownership issues limiting women's participation.

Participation was linked to **decision-making** by the FSF (decisions on cutting, trimming or selling trees), Solidaridad (project council, male decision-makers, decision on revenue), Acorn (decision over income linked to land ownership, project council) and Plan Vivo (male decision-makers). The CRU buyer did not mention decision-making. Both experts mentioned men being the decision-makers.

Participation was related to **recognition** by the FSF (men "dictating" over women), Solidaridad (informing baseline), Acorn (grievances represented by women in the project council), Plan Vivo (participatory community involvement, different needs/aspirations/voices, mixed groups, project set-up, literacy in meetings) and the CRU buyer (grievance mechanism in labour rights accountable to all stakeholders). Both experts mentioned women's preference for fruit trees and other benefits from agroforestry while men prefer lucrative trees for timber or charcoal.

Roles were linked to participation by the FSF (woman as a helper), Solidaridad (cultural/social norms informing agroforestry roles, female headed-households culturally not accepted, women do most of the farm work), Acorn (both women and men work on the farm in coffee, women as long-term thinkers, consideration for family, business approach to investments in farm) and Plan Vivo (unpaid agricultural work, smallholder agriculture, financial benefits linked to land-ownership). The CRU buyer did not mention resources. One expert elaborated on women tilling and selling informal produce on markets, while men are in lucrative value chains like coffee, and on social norms impacting women's opportunities in tree planting, which is linked to the women's height, profitability of the tree produce (timber > fruit), and the duration of the activity, as women are seen as visitors on the land they do not own. The other expert mentioned gender norms as limiting women, whom he called an important labour resource and attributed very good understanding of benefits from agroforestry.

Participation of women includes all framework dimensions. Some important aspects mentioned by most of the key actors are a) land-ownership, impacting the empowerment dimensions resources, decision-making, and roles, b) different preferences of women and men in agroforestry, and c) the project council as a forum for decision-making and recognition. Trees being connotated as men's work was also found in the literature (De Giusti et al., 2019), being tied to the tree produce (Kiptot, 2015), such as timber (Westholm & Ostwald, 2020), and its profitability (Bose, 2015). Women's preference for subsistence benefits such as food (Bourne et al., 2015), and consideration for the whole household (Akpabio & Ibok, 2009) also coincide with the literature. Gendered land ownership limiting participation of women in agroforestry was found to be the case for Sub-Saharan Africa (Benjamin et al., 2018) and Uganda (Bourne et al., 2015) before.

SQ3: Empowerment of Participating Female Smallholder Farmers

Empowerment of FSFs was interrelated with **resources** by the FSF (additional income), Solidaridad (paid jobs within project, trainings, seedlings), Acorn (firewood, additional income, equal employment opportunities), Plan Vivo (community funds, microfinance, channelled benefits, gender balanced team, equal employment opportunities, facilitation of discussion by women, participation and benefits ensured in design), and the CRU buyer (equal employment opportunities). One expert mentioned resource ownership needed to be considered to empower women, and financial empowerment was a possible alley. The other mentioned education and knowledge as empowering women in agroforestry.

Solidaridad and Acorn linked empowerment to **decision-making** through the project council. The FSF, Plan Vivo, and the CRU buyer did not mention decision-making, while both experts did.

Recognition in empowerment was observed by Solidaridad (baseline surveys), Acorn (play, discretionary indicator, emphasis on food/ medicinal components), Plan Vivo (strict engagement requirements, community participation in design stage, risk management, monitoring & evaluation indicator, exclusion list, feedback, gender-sensitive approach, safeguards for employees and

participants, stakeholder analysis, gender-neutral language in documents, differences in women), and the CRU buyer (grievance mechanisms). The FSF did not mention recognition, and only one expert mentioned gendered tree preferences to be considered.

Roles were linked to empowerment by Acorn (couple's responsibility, household's achievement, local customs, understanding of societal nuances and culture) and Plan Vivo (benefits linked to land considered). The FSF, Solidaridad, and the CRU buyer did not mention roles, and only one expert emphasised deliberately targeting women and men.

The assessment of empowerment of FSF varied between "yes" (FSF, Acorn, CRU buyer), "possible under specific circumstances" (Solidaridad: interventions, project continuity; experts: if deliberate, through education), and "at least no negative effects" (Plan Vivo).

There are some interesting contradictions, such as the barriers connected with the nomination of a woman to the project council (high or low), and the continuity of gender interventions being linked to the programme, or investors. The estimation that agroforestry projects do not have a negative impact needs to be critically assessed as payment for ecosystem services (PES) has the potential to enforce existing social differences (Rodríguez de Francisco et al., 2013) and men were observed to take over from women when a practice became lucrative (Bose, 2015), as could be the case for a carbon farming programme. Considering the differentiating preferences of women and men (Sari et al., 2020), this could have a negative impact on women's access to resources in the programme area.

RQ: The Role of Gender Equality and Women's Empowerment in the Project *Solidaridad ECA Uganda* and Consequences for Female Smallholder Farmers

Although no interviewed actor group had an official definition of GE, either personal definitions or indicators for GE were mentioned, encompassing access to social and physical resources, decision-making capacities, recognition of women's preferences and struggles, and roles, including social norms and how burdens and benefits are distributed. Interest in GE was motivated by different factors

like education, avoiding negative consequences by excluding half of the population or contributing to the quality of carbon credits and price premiums, and some key actors use SDG5. Due to multiple factors like trees being culturally associated with men and lacking GE in land ownership, women's participation in agroforestry is limited and they are often excluded from important decisions and benefits from PES programmes. The addressed knowledge gap referred to the potential of Acorn's agroforestry projects to empower women and achieve GE, since contrary to other agroforestry projects (Agroforestry Network, 2018) Acorn does not link their projects to SDG5 Gender Equality. Concluding from interviews and document analysis there are several reasons for this disparity. One is a narrow focus on other SDGs by Acorn, while participants in the project *Solidaridad ECA Uganda* chose the discretionary indicator *women's empowerment* (WE) next to three mandatory indicators, explaining the discrepancy between the project's focus and the communicated SDGs on Acorn's website. An underlying cause is the pushback from some project regions to making GE a mandatory indicator itself. An additional factor is the difference in financial setup between community-group and smallholder projects like this case study, rendering the contribution of the latter to SDG5 less feasible.

Through resources like additional income, trainings and tree seedlings, the promotion of women's participation in decision-making spaces like the project council, recognition of the preference of women for fruit trees for project eligibility, and interventions to social norms by emphasising a household's common achievement, the project *Solidaridad ECA Uganda* holds great potential to contribute to GE and consequentially empower FSFs, if empowerment is understood as an increased capability to make choices (Kabeer, 1999). The role of GE in agroforestry projects is to create equal opportunities and ensure that everyone benefits from PES programmes like Acorn and projects such as *Solidaridad ECA Uganda*.

Out of the additional findings of this thesis, three shall be highlighted as food for thought. 1) Next to gender equality (GE), the concept of gender equity was emphasised repeatedly. 2) Discussing interventions, interviewees raised the question, "how far do you want to go and take it?" (I6), as telling

smallholder farmers what to do with their money would be “very Western” (16), and stressed the importance of participatory community involvement instead of “a company in the global north” (17) developing the project alone. 3) Another point alluded to multiple times was the reality of different groups of women, including widows, the elderly, young women, school pupils, rural women and LGBTQIA women, next to more articulate, better-educated middle-class women eager to participate.

Conclusion

Female smallholder farmers (FSFs) in the Global South are highly vulnerable to climate change (Pörtner et al., 2022). They are also a crucial part of the labour force around Mount Elgon, Uganda (Njoki & Kiemenya, 2020), a country in East Africa with very high employment of women in the agricultural sector (The World Bank, n.d.). Agroforestry, a farming practice integrating trees into agriculture (Santiago-Freijanes et al., 2021), has many benefits including climate change mitigation (Nyong et al., 2020) by sequestering carbon and storing it in soils and vegetation (Waldén et al., 2020). On the voluntary carbon market (VCM), sequestered carbon can be traded as carbon credits (Kreibich & Hermwille, 2021), for example within the Acorn programme as carbon removal units (CRUs; Acorn, n.d.a). One agroforestry project participating in the Acorn programme is located in the Ugandan Mount Elgon area. While agroforestry as a practice was linked to the United Nation’s Sustainable Development Goal (SDG) 5 on Gender Equality, and the Empowerment of Women and Girls (Agroforestry Network, 2018), Acorn links projects participating in the programme to eight other SDGs (Acorn, n.d.b). This thesis aims to support the holistic integration of SDGs in agroforestry projects for carbon sequestration (CS) in the Global South, to contribute to better livelihoods of participating FSFs and to empower them. Considering the high vulnerability of FSFs in the project area, this raises the main question, what the role of gender equality (GE) and women’s empowerment (WE) in the project *Solidaridad ECA Uganda* is, and what the consequences for FSFs are. This question is supported by three sub-questions, on key actor groups’ conceptions of GE, the participation of women in the project, and how FSFs are empowered by participation.

Conceptions of GE encompassed access to social and physical resources, decision-making capacities, recognition of women's preferences and struggles, and roles, including social norms and how burdens and benefits are distributed. None of the interviewed key actor groups had an official definition of GE. Gendered access to resources like land-ownership, and trees being culturally associated with men excludes women in the project area from important decisions and benefits from participation. Within the project, women's participation is promoted by providing resources like education and tree seedlings, ensuring female members in the project council, emphasising the common achievements to facilitate common decision-making and benefitting from carbon credit sales and sensitising men to create awareness for GE. Gender interventions have the potential to empower women in the project, but it is too early to conclude, as they have not been implemented yet. GE plays an important role in social-environmental projects, as it creates equal opportunities and ensures that everyone benefits from similar payment for ecosystem services (PES) programmes. A lack of GE in agroforestry PES programmes and projects excludes half of the population, and can have negative effects like gender violence and malnutrition of children and women.

Recommendations

Five **recommendations for practitioners** follow from this research, accompanied with the notions of gender equity, intersectionality, and self-determination:

- 1) Coming to a **shared understanding of gender equality** (GE) can facilitate work on the topic and on its importance for different actor groups. Empowerment of women needs a deliberate approach, and interest in the topic is manifold, as well as benefits to involved key actors, such as smallholder farmers, the Acorn programme, and service users.
- 2) Gender interventions need a **household approach**, empowering the household along with the women, including the men and children in changing norms around gender. Interviewees emphasised the complementarity of women and men needed for GE in agroforestry projects and the recognition of the topic by the whole community.

- 3) If women can only be participants in the programme as **landowners**, possible alleys to increase their number need to be explored, such as microfinancing arrangements for women, who can be role models to others. Be informed and clear on ways that women can purchase, own, and control land.
- 4) As the **project council** was recognised as a great way to empower women, is expected to include women's grievances, and was used by women to bring up the topic of GE regarding issues like equal sharing of CRU revenue, barriers to the nomination of women need to be removed.
- 5) Due to the link between land tenure and **CRU revenue**, women are often excluded from decisions on the additional income, and potentially not benefitting from it. Ways of payment that ensure traceability but benefit the community instead of the individual smallholder owning the land linked to a CRU should be devised and presented to the project council along with downsides and benefits, so participating smallholder farmers can decide on the payment method(s) used in their project.

Limitations

This thesis research has several limitations owing to its scope and feasibility. While one aim was to take the perspective of FSFs in the Global South into account to empower them, the inclusion of FSFs in the data collection process proved challenging, also regarding the theoreticality of some questions like the definition of GE. Including interviews with people based in Uganda generally contained some challenges, due to WIFI connections, and data loss after the interviews were recorded. As only one person (the researcher) coded the data, reliability cannot be ensured. The results can only be taken as inspiration and not be generalised, due to the low number of interview partners from five different key actor groups. The research also only covered a few aspects of GE, focusing on WE, and neglected interconnected forms of exclusion due to its scope and time limitations.

Further Research

One interesting research avenue following from this thesis lies within the WE dimension of roles in the context of agroforestry programmes for CS, including topics like self-recognition and the role of men in changing gendered social norms. Reconcilability of traceability and landownership with community benefits would be another potential alley, just as assessing the risk of displacing FSF by adding a financial component to tree planting and maintenance through PES programmes.

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Appendix A

Conceptual Framework on Women's Empowerment

The conceptual framework on women's empowerment combines components of works by Kabeer (1999), Pascual et al. (2014) and Colfer (2013). The table below breaks down how they compose the applied framework.

FRAMEWORK DIMENSION	COMPONENT SOURCE
Resources (physical, social)	Resources (Colfer, 2013; Kabeer, 1999), Education (Colfer, 2013), Capital (Colfer, 2013)
Decision-making (agency, procedure)	Agency (Kabeer, 1999); Procedure (Pascual et al., 2014)
Recognition (preferences, knowledge, interests, conflicts)	Recognition (Pascual et al., 2014), Interests (Colfer, 2013)
Roles (roles, distribution of benefits, burdens)	Distribution (Pascual et al., 2014), Roles (Colfer, 2013)

Appendix B

Directed Literature Searches

Both directed literature searches include papers published up to and including the 1st of February 2023.

The first directed literature search covered agroforestry, smallholder farmers, gender, and carbon sequestration through multiple keywords. The second directed literature search covered agroforestry, smallholder farmers, gender, and the project scope through multiple keywords.

<i>Medium</i>	SCOPUS
Search	(TITLE (agr?forest*) AND TITLE-ABS-KEY (smallholder* OR farmer*) AND TITLE-ABS-KEY (gender* OR "Gender equality" OR *m?n OR *male) AND TITLE-ABS-KEY (*carbon* OR "Carbon sequestration" OR "Carbon storage" OR "Carbon project*" OR "Carbon market*"))
Results	39 initial results, 16 articles were chosen based on titles and abstracts, as well as accessibility
<i>Medium</i>	Web of Science
Search	agr?forest* (Title) AND smallholder* OR farmer* (Topic) AND gender* OR "Gender equality" OR wom?n OR *male OR m?n (Topic) AND *carbon* OR "Carbon sequestration" OR "Carbon storage" OR "Carbon project*" OR "Carbon market*" (Topic)
Results	10 initial results, 3 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	JSTOR
Search	agr?forest* (title) AND smallholder* OR farmer* AND gender* OR "Gender equality" OR wom?n OR female OR male OR men OR man AND *carbon* OR "Carbon sequestration" OR "Carbon storage" OR "Carbon project*" OR "Carbon market*"
Results	42 initial results, 13 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	GreenFile (EBSCO)
Search	T1 agr?forest* AND (smallholder* OR farmer*) AND (gender* OR "Gender equality" OR *m?n OR *male) AND (*carbon* OR "Carbon sequestration" OR "Carbon storage" OR "Carbon project*" OR "Carbon market*")
Results	2 initial results, 0 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	Agroforestry Systems - An International Journal incorporating Agroforestry Forum
Search	agr?forest* AND smallholder* OR farmer* AND gender* OR "Gender equality" OR wom?n OR *male OR men OR man AND *carbon* OR "Carbon sequestration" OR "Carbon storage" OR "Carbon project*" OR "Carbon market*"
Results	707 initial results, 99 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches

<i>Medium</i>	SCOPUS
Search	(TITLE (agr?forest*) AND TITLE-ABS-KEY (smallholder* OR farmer*) AND TITLE-ABS-KEY (gender* OR "Gender equality" OR *m?n OR *male) AND TITLE-ABS-KEY (uganda* OR "Global South" OR "Sub-Saharan Africa*" OR "South-East* Africa*" OR rabobank OR acorn))
Results	21 initial results; 15 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	Web of Science
Search	agr?forest* (Title) AND smallholder* OR farmer* (Topic) AND gender* OR "Gender equality" OR wom?n OR *male OR m?n (Topic) AND uganda* OR "Global South" OR "Sub-Saharan Africa*" OR "South-East* Africa*" OR rabobank OR acorn (Topic)
Results	8 initial results; 1 article was chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	JSTOR
Search	agr?forest* (title) AND smallholder* OR farmer* AND gender* OR "Gender equality" OR wom?n OR female OR male OR men OR man AND uganda* OR "Global South" OR "Sub-Saharan Africa*" OR "South-East* Africa*" OR rabobank OR acorn
Results	34 initial results; 11 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	GreenFile (EBSCO)
Search	Tl agr?forest* AND (smallholder* OR farmer*) AND (gender* OR "Gender equality" OR *m?n OR *male) AND (uganda* OR "Global South" OR "Sub-Saharan Africa*" OR "South-East* Africa*" OR rabobank OR acorn)
Results	1 initial result; 0 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches
<i>Medium</i>	Agroforestry Systems - An International Journal incorporating Agroforestry Forum
Search	agr?forest* AND smallholder* OR farmer* AND gender* OR "Gender equality" OR wom?n OR *male OR men OR man AND uganda* OR "Global South" OR "Sub-Saharan Africa*" OR "South-East* Africa*" OR rabobank OR acorn
Results	536 initial results; 23 articles were chosen based on titles and abstracts, as well as accessibility and overlap with previous searches

Appendix C

Documents Included in the Document Analysis

NR	DOCUMENT TITLE	KEY ACTOR GROUP
D1	The Acorn Framework, Version 1.0 - 2021	Acorn
D2	Methodology for Quantifying Carbon Benefits from Small-Scale Agroforestry, Version 1.0 - 2021	Acorn
D3	How to integrate the Gender Action Learning System (GALS) in IFAD Operations - 2022	Solidaridad
D4	Project Report: Solidaridad ECA Uganda (summary) - 2022	Solidaridad
D5	Project Report: Solidaridad ECA Uganda (full project documentation) - 2023	Solidaridad
D6	Project Design Document – n.d.	Plan Vivo
D7	Environmental and Social Screening Report – n.d.	Plan Vivo
D8	Project Design Guidance (Plan Vivo Standard v5.0), Version 1.1 - 2022	Plan Vivo
D9	Impact Report Plan Vivo Projects and the Sustainable Development Goals - 2022	Plan Vivo
D10	Plan Vivo Standard Project Requirements Version 5.0 – n.d.	Plan Vivo
D11	Sustainability Statement – n.d.	CRU Buyer

Appendix D

Interview Partners

NR	INTERVIEWEE	KEY ACTOR GROUP
I1	Ugandan Female Smallholder Farmer	Smallholder Farmer
I2	Gender Inclusivity Project Officer Uganda	Solidaridad
I3	Regional Gender Inclusivity Advisor East and Central Africa	Solidaridad
I4	Monitoring, Evaluation & Learning Officer Uganda	Solidaridad
I5	Head of Certification	Acorn
I6	Account Manager for Solidaridad East- and Central Africa	Acorn
I7	Project Officer	Plan Vivo
I8	Global Sustainability Consultant	CRU Buyer
I9	Expert in Agroforestry in Uganda	<i>Expert</i>
I10	Expert in Gender Equality in Agriculture in Uganda	<i>Expert</i>

Appendix E

Interview Guide

Introduction

- Introduction of researcher and topic:
 - **Name** of researcher
 - **Thesis topic** and **aim** of the interview.
 - Ask if there are questions about the **consent form** or any other **questions**.
 - Ask for **consent to record** the interview.
- Introduction of interviewee:
 - Brief introduction of the interviewee's **role**, and **relation to the research topic**.

Section 1: Gender Equality in Agroforestry (linked to SQ1)

- What is your **understanding/ definition of gender equality**?
- What does **gender equality** look like in agroforestry projects in Uganda/ the project *Solidaridad ECA Uganda*?
- How do you perceive the **interest** in gender equality **of other actors** in Ugandan agroforestry/ the project *Solidaridad ECA Uganda*?

Section 2: Involvement of Female Smallholder Farmers in the Project *Solidaridad ECA Uganda*

(linked to SQ2)

- How do women/ female smallholder farmers **participate** in agroforestry projects in Uganda?
or:
- How are female smallholder farmers involved in the project *Solidaridad ECA Uganda* (involvement in the past, involvement in the present, planned involvement in the future)?
If applicable, otherwise more general:
- How are **benefits and burdens** from the project *Solidaridad ECA Uganda* distributed between female and male participants?
- How accessible are **resources** (e.g., social, capital, educational) within the project *Solidaridad ECA Uganda* for female and male participants?
- How do female and male smallholder farmers participate in **decision-making** in the project *Solidaridad ECA Uganda*?

- How are the **knowledge and preferences** of female and male smallholder farmers included in the project *Solidaridad ECA Uganda*, how are **conflicts** handled?

Section 3: Empowerment of Female Participants in the Project *Solidaridad ECA Uganda*
(linked to SQ3)

- According to you, **are female smallholder farmers empowered** by participation in (projects like) the project *Solidaridad ECA Uganda*? Why or why not?
- **What can be done** through (projects like) the project *Solidaridad ECA Uganda* to further empower female smallholder farmers, and by whom?

Closing

- Would you like to **add something** to the topic?
- Communicate the possibility of **contact via e-mail** (as used to set up the interview) for future questions or follow-up thoughts.
- **Thank you** for your time and openness!

Appendix F

Codebook

Categories are bold and sub-categories are bold, italicised, and indented.

Gender Equality Conception (GEC)

Conceptions of gender equality/ women empowerment in the context of the agroforestry project
Solidaridad ECA Uganda

Examples: shared decision-making, equal access to resources like education

Interest

Interest in Gender Equality by different actors, in the context of agroforestry projects, motivation for interventions

Examples: interest of buyers in projects including gender equality, interest of smallholder farmers in gender equality interventions

Intersectionality

Vulnerability of a person involved in agroforestry projects due to multiple characteristics connected to oppression

Example: LGBTQIA women

SDGs (Sustainable Development Goals)

Mention of SDG5 or other SDGs or the term “sustainability” in in the context of agroforestry projects

Example: a project contributes to eleven out of the 17 SDGs

Definition

Definition and/or conceptualisation of gender equality and terminology used in the context of agroforestry projects

Example: a project contributes to gender equality and gender justice

Female Participation (FP)

Involvement of female smallholder farmers in the design, implementation, monitoring, and evaluation of agroforestry projects

Examples: percentage of women informing the baseline survey, female members of the project council

Decision-Making

Mentions of female participation (or absence) in agroforestry projects regarding decision-making, relating to agency and procedure

Example: Do decision-making processes hold equal participation opportunities for women and men?

Recognition

Mentions of female participation in agroforestry projects regarding recognition of knowledge, preferences, and interests of women and how conflicts involving women are handled

Example: How is knowledge from women included in the design and implementation of agroforestry projects?

Resources

Mentions of female participation in agroforestry projects regarding access to physical and social resources

Examples: access to education, female extension workers, access to capital, land-ownership

Roles

Mentions of female participation in agroforestry projects regarding social roles related to agroforestry, and distribution of benefits and burdens from agroforestry schemes

Examples: cultural role of women in forestry, distribution of revenue from CRUs between women and men

Women's Empowerment (WE)

Empowerment of female smallholder farmers through participation in agroforestry projects

Examples: additional income, decision-making capacity

Assessment

Assessment of empowerment of female smallholder farmers through participation in agroforestry projects

Example: women are empowered by availability of fuelwood in close proximity

Means

Means needed to empower women in agroforestry projects and own means to contribute

Examples: sufficient time is needed for social change, a baseline needs assessment was conducted

Design phase

Women's empowerment in the design phase of an agroforestry project

Example: women informed the baseline assessment

Implementation phase

Women's empowerment in the implementation phase of an agroforestry project

Example: women receive tree seedlings

Monitoring/ Evaluation phase

Women's empowerment in the monitoring and evaluation phase of an agroforestry project

Example: women participate in a survey assessing women empowerment indicators