DISSERTATION

EVALUATING SOCIAL EQUITY AND CONSERVATION ATTITUDES IN COMMUNITY BASED CONSERVATION:
A CASE STUDY OF THE CONTROLLED HUNTING AREA PROGRAM IN THE BALE MOUNTAINS OF ETHIOPIA

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ABSTRACT

EVALUATING SOCIAL EQUITY AND CONSERVATION ATTITUDES IN COMMUNITY BASED CONSERVATION:
A CASE STUDY OF THE CONTROLLED HUNTING AREA PROGRAM IN THE BALE MOUNTAINS OF ETHIOPIA

This dissertation research examines perceptions of social equity and conservation attitudes in community-based conservation (CBC) programs in the Bale Mountains, Ethiopia. While there has been an increasing shift towards inclusive and participatory approaches in conservation over the past 40 years, the social and environmental outcomes of CBC programs remain limited. One reason for this is the failure to recognize the diversity of local actors involved in CBC programs, the different costs and benefits they face, and how embedded power relations shape participation and empowerment in CBC programs. Devising effective and fair CBC programs requires putting social equity concerns at the core of conservation, which should in turn improve both social and conservation outcomes. This dissertation makes conceptual, methodological, and empirical contributions to the fields of social equity and CBC by implementing a mixed methods assessment of perceptions of social equity and conservation attitudes, as indicators of long-term conservation outcomes, and the factors that influence these perceptions and attitudes.

Specifically, Chapter 1 provides an overview of the dissertation starting with a background of the underlying premises and implementation challenges of CBC programs globally and in Ethiopia. The chapter introduces social equity and conservation attitudes as central themes of the dissertation, gives a backdrop of the community-based controlled hunting area program in the Bale Mountains, and highlights the key research questions. In Chapter 2, this dissertation draws from a

multi-dimensional social equity framework to generate a nuanced understanding of different groups' perceptions of equity in the distribution of benefits and costs, the processes of engagement and participation, and the recognition of needs and priorities in a CBC program. I conducted 15 focus group discussions in different communities and apply grounded theory to elicit locals' nuanced perceptions of social equity. The chapter underscores the need to evaluate local actors' diverse and contextualized relationships with other actors and the natural world and give recognition to how perceptions of equity interplay with broader social and environmental processes, in designing and implementing CBC programs. For Chapter 3, I conducted household surveys in four communities. This chapter builds on the previous qualitative analysis by assessing the effects of socio-economic and institutional factors in shaping perceptions of equity across different communities and CBC program models. I integrate the Sustainable Livelihoods Framework (SLF) to assess how access to various capital assets influences equity perceptions. The results signify the need to address the heterogeneity among local actors affected by conservation programs in equity design and assessment. These findings further highlight the need to strengthen weak institutional ties with external organizations, facilitate intra-community organization, and design programs that emphasize transparency to facilitate more equitable conservation outcomes. Finally, in Chapter 4, I use household survey responses to assess how conservation attitudes vary across different communities based on different social, economic, and/ or institutional characteristics. I also examine the role of social equity in mediating how social capital affects conservation attitudes. To foster positive conservation attitudes, results suggest CBC programs need to build on and strengthen internal communal institutions and external links with conservation organizations. The findings also emphasize the need for adopting equity conscious designs that recognize the needs and priorities of marginalized groups.

Overall, this dissertation contributes to the science and practice of CBC in Ethiopia and beyond. Empirically, the dissertation advances the contribution of mixed methods in assessing the complex construct of social equity. The focus group discussions with different community members and the use of grounded theory helped elicit local people's nuanced and contextualized perceptions of social equity. Informed by these qualitative findings, I developed locally relevant indicators to quantitatively measure equity perceptions across communities and program models. This contributes to the literature on social equity by adopting and refining existing frameworks in ways that are pertinent to specific contextual realities. From a policy perspective, the findings suggest that CBC programs in Ethiopia need to critically address differences in access to resources and decision-making power and to reframe notions of benefits to encapsulate multiple dimensions of equity. Additionally, the findings from this dissertation suggest that CBC programs more broadly will benefit from building internal social capital and strengthening links with external conservation organizations and resource management agencies, as social capital is key in crafting more equitable CBC programs and influencing positive conservation outcomes.

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1.CHAPTER ONE: INTRODUCTION

Conservation is inherently a matter of justice; for the planet and its various life supporting systems as well as the well-being of its people both today and in the future. There is growing consensus in the field of biodiversity conservation on the importance of ensuring conservation goals are not achieved at the expense of local people's well-being (Lele et al., 2010; Naidoo et al., 2019; Woodhouse et al., 2015). Globally and increasingly so in Africa, there are increasing attempts to ensure lasting and mutually reinforcing conservation and rural development outcomes (Brown, 2012; Gockel, 2009; Jacobsohn & Owen-Smith, 2003). Consideration and understanding of the social impacts of conservation interventions matters for both ethical reasons of not undermining the rights of local communities as well as practical reasons of enhancing the acceptability and long-term success of conservation outcomes (Halpern et al., 2013; Martin e al., 2016; Schreckenberg et al., 2016).

This attention to human well-being in conservation has led to calls for integrated approaches that build on local knowledge, resources, capacity and meaningful relations across scales and sectors. This has led to the burgeoning rise in collaborative, co-management and/or community-based conservation approaches that consider the complex linkages between humans, their well-being, and the environment (Borrini-Feyerabend et al., 2007; Child & Barnes, 2010; Liu et al*.,* 2007). Community based conservation (CBC) in particular has emerged as a reaction to the complex social and environmental dilemmas linked to exclusionary, state-centric governance models premised on the ideas of 'fortress conservation' (Gibson & Marks, 1995; Hulme & Murphree, 1999). Some of the adverse outcomes of exclusionary conservation approaches include displacement, dispossession of community groups living in and around protected areas, conflict

and uncurbed encroachment, and degradation of resources (Brockington & Igoe, 2006, Jones, 2006).

There has been a growing recognition that environmental problems and their solutions need to increasingly engage with a wide array of actors, processes, and social structures beyond the traditional roles of management and conservation organizations (Ansell & Gash, 2008). CBC programs include a combination of arrangements such as financial incentives, education, and training opportunities, and community development initiatives, and involve diverse groups of actors such as local community groups, government, and non-government agencies (Lele et al., 2010). The rationale behind CBC programs is that more inclusive and socially just strategies will lead to more effective and efficient conservation outcomes (Hulme & Murphee 2001; Nilsson et al., 2016). Despite its promising prospects, outcomes of CBC efforts have remained mixed, challenged by complex questions of power, access, formal/informal use rights as well as differences in perceptions and values among different groups of people affected by conservation actions (Calfucura, 2018; Galvin et al., 2018). A growing number of studies on CBC programs underscore the importance of recognizing and critically engaging with the power dynamics between different groups of people affected by conservation interventions to ensure they are socially just (Adams & Hutton, 2007; Gibbes & Keys, 2010).

The notion of social equity integrates the issue of conservation costs and benefits with issues of governance and holistic well-being (Schreckenberg et al., 2016). Social equity is used as an approach to recognize and address differences in power between different actors in order to achieve long term social stability and development as well as to enhance sustainable protection of natural resources (Friedman et al., 2018; Guy & Mccandless 2012; Schreckenberg et al., 2016). In the context of CBC programs that offer the promise of people-centered, inclusive, and participatory

approaches to conservation, the need for greater appreciation of the different dimensions of equity is widely underscored (Curtis et al., 2014; Nkhata & Breen, 2010; Robinson & Berkes, 2011). In addition to providing equitable benefit sharing, CBC programs have seen rising calls to address broader linkages with well-being, ensure the devolution of decision-making power through meaningful participation and to acknowledge the differences in wealth, power, interests and priorities among different groups and individuals (Campbell & Vainio-Mattila, 2003; Shackleton et al., 2002; Thoms, 2008). Studies also show a need to address the disconnect between localized notions of fairness and narrowly defined, generic concepts of equity (Martin et al., 2014). Recently, there have been an increasing number of studies in the conservation and development literature that examine social equity as a multi-dimensional concept and focus on people's perceptions of equity within conservation programs (Dawson et al., 2018; McDermott et al., 2013; Schreckenberg et al. 2016; Zafra-Calvo et al., 2017).

The underlying premise in CBC is that fostering positive attitudes among local people about the program and conservation goals more broadly across community stakeholders will contribute to its long-term success. CBC programs implement different strategies and mechanisms to garner local support, which may include providing direct monetary/material incentives, offering employment opportunities, integrating conservation and livelihood objectives through rural development programs, sharing decision-making rights, and creating educational programs (Cooney et al., 2017; Nilsson et al., 2016). These interventions are often expected to shift attitudes and behaviors positively toward conservation. For example, the distribution of economic incentives as part of CBC programs seeks to offset some of the costs locals accrue as a result of conservation including loss/restrictions on access to resources or wildlife damage on crops and livestock (Gibson & Marks, 1995; Larson et al., 2016; Newmark & Hough, 2000; Ochieng et al.,

2020). Other programs devolve decision-making rights to local actors with the assertion that enhancing access, ownership and control to resources and management will promote positive attitudes and stewardship towards natural resources (Adhikari et al., 2007; Bajracharya et al., 2005; Solomon et al., 2012). Hence understanding attitudes can serve as an indicator of future adoption of conservation behaviors (Hazzah et al., 2017). Additionally, understanding attitudes can help assess the effectiveness of conservation interventions by gauging their perceived legitimacy, acceptability, and impact among different groups (Sirivongs & Tsuchiya, 2012; Snyman, 2014).

Studies underscore a myriad of individual and institutional factors that shape perceptions and attitudes and hence affect CBC outcomes. These include pre-existing power dynamics and inequities between different groups and individuals (Agrawal & Gibson, 1999; Calfucura, 2018; Gibbes & Keys, 2010). Literature also shows the role of individual characteristics such as gender, age, education, size of land, size of household, wealth, and ethnicity as important factors in shaping perceptions and attitudes toward nature conservation (Kideghesho et al., 2007; Mukherjee & Bhattacharya, 2017; Mutanga et al., 2015; Tessema et al., 2010). Fostering positive perceptions and attitudes in CBC thus requires critically examining individual and community characteristics, past and present relationships between individuals and groups, as well as the socio-cultural, economic, and political context (Brooks et al., 2012, 2013; Infield, 1988).

1.1 Research setting

The dissertation is located in the Bale Mountains, found in the Oromia region of Southeast Ethiopia. The Bale Mountains is home of the Bale Mountains National Park (BMNP). The national park was established with the goal of safeguarding critical habitats for a number of Ethiopia's endangered and threatened species, most notably the Ethiopian Wolf (*Canis simensis*), the rarest canid in the world, and two-thirds of the remaining global population of mountain nyala

(*Tragelaphus buxtoni*) (EWCA, 2017). The Bale Mountains harbor 26% of the country's total endemic species, that includes 77 mammals (26% endemic), 170 species of birds (57% endemic) and over 1,300 species of flowering plants of which 63 are endemic to Ethiopia (EWCA, 2017; Evangelista et al., 2012; Kidane et al., 2012). The conservation significance of the Bale Mountains is further heightened by the critical role the massifs play in climate control and water flow regulation of five major rivers on which downstream users depend (EWCA, 2017). Despite its ecological, economic, and socio-cultural significance, this area exemplifies many of the common conservation challenges facing Ethiopia. These include increasing human population pressure and impacts on natural resources, contested land use and resource ownership rights and settlement encroachment around protected areas.

As a reaction to the incongruity between livelihood practices and the park's 'preservationist' conservation approach, different alternative natural resource governance models have been proposed and implemented around the national park. These include the Participatory Forest Management (PFM) and the Controlled Hunting Areas (CHAs). Both involve the surrounding local communities by granting controlled access to natural resources, benefit sharing arrangements and/or participation in decision-making processes. The idea is to devolve natural resource management rights and benefits to organized local groups also known as Community Based Organizations (CBOs) which take collective responsibilities for sustainable management of natural resources. Several prior studies have looked at the PFM approach in the Bale Mountains and the effectiveness in terms of conservation and livelihood goals (Amente, 2006; Tesfaye, 2011; Tesfaye et al., 2012), but no known studies have assessed the social and environmental outcomes of the CHA programs.

Currently, there are six designated CHAs in the Bale Mountains co-managed under

Ethiopian Wildlife Conservation Authority (EWCA) and its regional unit Oromia Forest and Wildlife Enterprise (OFWE). These are: Hanto, Abbasheba Demero, Udubulu, Shedam Berbere, Gasera Wabe and Adaba-Dodola. Despite the promises of controlled hunting in the region as a wildlife management tool and as a means to support local economies, there has been growing contention between its conservation objectives and surging livelihood demands propelled by population pressure, land scarcity, political unrest, and land degradation in and around the CHAs.

Starting in 2014, EWCA and OFWE, together with non-government organizations including Frankfurt Zoological Society (FZS), devised CBC programs that would include surrounding communities in benefit sharing from trophy hunting fees and devolve decision-making power. In this arrangement EWCA releases 85% of the total annual revenue earned from trophy hunting fees to the regional OFWE office. In turn, OFWE dispenses 60% of the received trophy fees to each *kebele* (the smallest administrative unit in Ethiopia) located within each designated CHA (Abebe et al., 2020). There are two slightly different models, the 'new CBC' involves organized community-based organizations (CBOs) that are responsible for joint resource management, monitoring, and decisions about benefit distribution across multiple *kebeles*, and an 'original CBC' model that involves sharing of incentives from hunting with individual *kebeles* based exclusively on the size of land located within the CHA. Only two of the six CHAs have implemented the new model. The underlying assumption with these CBC program models is that providing community benefits in the form of hunting revenues and sharing of decision-making rights with the community will result in more positive conservation attitudes and behaviors.

1.2 Research questions

While the shift toward more participatory CBC programs in the Bale Mountains is encouraging, it will not be a panacea. These programs are still in the early phases of

implementation and there are important questions on if and under what conditions these programs can attain social and ecological outcomes. More specifically, there are increasing equity questions in this region which have both ethical and instrumental implications for conservation. From an ethical stance, equity is critical given the historical and ongoing political strife in the region fueled by demands of economic and political equity in many sectors including conservation. From an instrumental perspective, implementing conservation organizations seek to demonstrate more positive conservation attitudes as a result of these CBC programs. This dissertation addresses these gaps by generating bottom-up evidence on equity perceptions and locals' attitudes towards natural resource conservation and the CBC programs. We selected two CHAs, Abbasheba Demero and Besmena Udubulu, which employ the new and original CBC models, respectively. We then selected two *kebeles* from each CHA on the basis of socio-demographic characteristics, different history of interaction with OFWE, and accessibility. The specific research questions asked in this dissertation were:

1. How do different groups (i.e., age, gender, role in community) conceptualize social equity in the CBC program?
2. How do perceptions of distributive, procedural and recognition social equity dimensions vary across households and CBC program models?
3. What factors explain local people's attitudes toward conservation of natural resources and attitudes toward rules and benefits in the CBC program?

Answering these three research questions contributes empirically to the CBC literature. Specifically, the first two questions contribute to the growing body of literature that measures locals' multiple notions of equity including the inclusiveness and participatory nature of decision-making processes as well as respecting different values and priorities in the design and

implementation of conservation programs (Roe et al., 2018; Zafra-Calvo et al., 2017). The third research question generates a grounded understanding of the varied socio-economic and institutional factors shaping individuals' conservation attitudes, contributing to the human dimensions literature on understanding conservation attitudes.

1.3 Dissertation structure

The dissertation is structured in the form of three main chapters, with an introduction and conclusion to frame the research. The three main chapters follow manuscript format where each chapter is intended to be a stand-alone peer reviewed journal article.

Chapter 2 of this dissertation generates a nuanced understanding of different groups' perceptions of equity in a CBC program in the Bale Mountains of Ethiopia. I draw from a multi-dimensional social equity framework that includes a: 1) distributive dimension, focused on perception of allocation of benefits and costs among different groups; 2) procedural dimension, that looks at the transparency, accountability and access to information in the decision-making processes; 3) recognition dimension focused on the respect and acknowledgement given to the rights, needs and priorities of various groups and identities; and 4) contextual dimension of equity which considers pre-existing political, economic, and social conditions that affect how and to what extent different actors engage in and benefit from resource distribution in CBC programs. Theoretically, this chapter contributes to the literature on social equity in CBC programs by applying a grounded qualitative approach and a multi-dimensional equity framework across different community groups. From a policy implication perspective, this chapter contributes to the design of more equitable CBC programs. It underscores how economic benefits are not sufficient in leading to just outcomes in CBC programs without addressing whether more marginalized groups have access to these resources, and whether these incentives compensate for the losses felt

by these groups. Furthermore, equity considerations need to promote accountability and transparency in the processes of decision making. The chapter reiterates the needs for CBC program design and assessment to consider how perceptions interplay with broader social and environmental processes such as population growth and land scarcity, legacy of land use interactions, lack of community infrastructure, and political movements.

In Chapter 3, I address the second research question which assesses the effects of socio-economic and institutional factors in shaping perceptions of equity across different households and program models. I use the Sustainable Livelihoods Framework (SLF) in conjunction with an equity framework to assess how natural, financial, physical, human, and social capital affect the perception of equity in the CBC programs. The results signify the need to address the heterogeneity among individuals affected by conservation programs in equity design and assessment. These findings further highlight the need to strengthen weak institutional ties with external organizations, facilitate intra-community organization, and design programs that emphasize transparency, to facilitate more equitable conservation programs.

In Chapter 4, I assess how conservation attitudes vary across different households based on different social, economic, and/ or institutional characteristics. I also examine the role of social equity in mediating how social capital affects conservation attitudes. To foster positive conservation attitudes, results suggest CBC programs need to build on and strengthen internal communal institutions and external links with conservation organizations while adopting equity conscious designs that recognize the needs and priorities of marginalized groups on natural resources. In Chapter 5, I reflect on the key objectives, research processes and overall contributions of this dissertation and point to future research directions.

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2. CHAPTER TWO: EXAMINING SOCIAL EQUITY IN COMMUNITY-BASED CONSERVATION PROGRAMS: A CASE STUDY OF CONTROLLED HUNTING PROGRAMS IN THE BALE MOUNTAINS, ETHIOPIA[1]

2.1. Introduction

There are increasing attempts to attain the triple bottom line in biodiversity conservation, where success is measured not only in terms of effectiveness and efficiency, but also on the attainment of social equity goals and broader human well-being (Dawson et al., 2018; Franks et al., 2018; Halpern et al., 2013; Klein et al., 2015). Historically, assessments of conservation programs have placed greater emphasis on analyzing the economic costs and benefits (Damania & Hatch, 2005; Gutman, 2002; Naidoo & Adamowicz, 2005; Ramirez et al., 2002). While accurately accounting for the distribution of monetary and/or material costs and benefits is essential, there is an increasing recognition of the need to address the inclusiveness and participatory nature of decision-making processes, while respecting different values and knowledge systems in the design and implementation of conservation programs (Roe et al., 2013; Zafra-Calvo et al., 2017).

The need for more explicit emphasis on social equity in conservation is associated with both ethical and instrumental reasonings. The moral argument follows the shift in global and national debates on the nexus between conservation and development where the "right to development" is increasingly recognized as an essential human right (Schreckenberg et al., 2016). In the context of conservation, this has been accompanied by a shift in narrative from a narrowly

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framed “do no harm” approach focused on minimizing negative impacts and providing economic benefits to a new normative argument focusing on recognizing and fulfilling a broader set of rights on human well-being and dignity (Campese, 2009; Schreckenberg et al., 2016).

From an instrumental standpoint, the newer argument recognizes that simply providing more income opportunities to the “local community” does not by itself bring about improved performance in conservation effectiveness (Berkes, 2004; Halpern et al., 2013). This had led to more critical engagement with the power dynamics between different groups of people affected by conservation interventions (Adams & Hutton, 2007). Furthermore, by unpacking multiple dimensions of equity, other salient aspects were found to shape people’s perception of equity. Parallel studies on holistic approaches to measuring conservation impact on well-being similarly underscore the importance of place-based, culturally grounded indicators that give due recognition to local people’s values, world views, and knowledge systems (Biedenweg & Gross-Camp, 2018; Sterling et al., 2017). Consequently, the perceived legitimacy and long-term successfulness of conservation is not merely an outcome of providing alternative economic and material incentives. Perceptions of equity are also affected by the processes of engagement and the recognition given to multiple identities (Dawson et al., 2018; Martin et al., 2016).

The notion of equity integrates the issues of conservation costs and benefits with those of governance and holistic well-being (Schreckenberg et al., 2016). Social equity is used as an approach or framework for explicitly recognizing and addressing differences in power between different actors to achieve long-term social stability and development while enhancing sustainable protection of natural resources (Friedman et al., 2018; Guy & Mccandless 2012; Schreckenberg et al., 2016). A growing number of frameworks in the conservation literature examine social equity as a multi-dimensional concept. One of the most common multi-dimensional equity frameworks

includes: examining the distribution, procedure, and recognition dimensions of equity (Dawson et al., 2018; Franks et al., 2018; Schreckenberg et al., 2016; Zafra-Calvo et al., 2017).

Distributive equity refers to how costs, responsibilities, rights, and benefits are allocated among different actors which determines who has access to benefits and who suffers from restrictions on access to benefits (Dawson et al., 2018; Krause & Loft, 2013; Sommerville et al., 2010). It involves examining tradeoffs in costs and benefits across communities, places, and generations. Procedural equity examines the processes of how decisions are made and who has a voice, and whether decision-making involves formal rules or informal interactions (Dawson et al., 2018; Law et al., 2018; Schreckenberg et al., 2016). It requires clear communication, free and informed consent for engagement and participation at different stages, accountability, and transparency of the process, and ensures marginalized groups have opportunities to have a say in matters that are important to them (Gustavsson et al., 2014; Zafra-Calvo et al., 2017). Recognition dimensions of equity consider acknowledgement of and respect for distinct identities, histories, values and interests, knowledge diversity, as well as inclusion of statutory and customary rights (Friedman et al., 2018; Martin et al., 2016; Schlosberg & Carruthers, 2010; Schreckenberg et al., 2016; Sikor et al., 2014; Zafra-Calvo et al., 2017).

In addition to these three types of equity, contextual equity or "equity in access" considers pre-existing political, economic, and social conditions that affect how and to what extent different actors engage in and benefit from resource distribution (McDermott, 2013). Contextual dimensions of equity could be impacted by social relations and institutions that include power relations that determine access to information, capital, labor, or markets. Contextual equity is often discussed as influencing both individuals' and groups' capability to gain recognition and participate in benefit

and decision-making in resource arrangements (Sikor et al., 2014), and is sometimes considered as a fourth dimension of equity (McDermott, 2013; Pascual et al., 2014).

In the context of community-based conservation (CBC) that emphasizes people-centered, inclusive, and participatory approaches to conservation, the need for greater appreciation of different dimensions of equity is widely underscored (Curtis et al., 2014; Nkhata & Breen, 2010; Robinson & Berkes, 2011). In general, CBC programs are increasingly addressing broader linkages with well-being, encouraging the devolution of decision-making power through meaningful participation of diverse groups, and examining the institutional and structural factors that shape success (Campbell & Vainio-Mattila, 2003; Hayes & Murtinho, 2018; Shackleton et al., 2002; Thoms, 2008). Existing studies on social equity highlight the lack of clarity in the design of conservation programs and what is meant by equitable and for whom, suggesting that power dynamics between groups and individuals is not thoroughly examined (Friedman et al., 2018; Schreckenberg et al., 2016). Studies also show gaps between localized notions of fairness and externally defined concepts of equity (Martin et al., 2014). Additionally, most existing studies of equity focus on the distribution dimension with less attention paid to the procedural and recognition dimensions of equity (Friedman et al., 2018). The findings from these studies underscore the need to examine equity as a multi-scalar and multi-dimensional concept with attention to the interrelationship between its different dimensions.

This paper contributes to the literature assessing social equity in CBC programs by examining multiple communities' conceptualization of equity in a complex community-based wildlife conservation program in the Bale Mountains, Ethiopia. Addressing equity considerations in the Bale Mountains matters for both ethical and instrumental reasons. From an ethical stance, there is increasing demand for acknowledging the rights of diverse community groups reliant on

natural resources for livelihoods in Ethiopia (Tsegaye et al., 2017). This call for recognizing rights of local groups is critical given the historical and ongoing political strife in the region and most parts of Ethiopia fueled by demands of economic and political equity in many sectors including conservation. From the instrumental goal of ensuring effective biodiversity protection, "exclusionary" and "preservationist" conservation approaches that are common in the region are being increasingly challenged by complex social and environmental issues, such as increasing settlement and agricultural expansion, and encroachment of livelihood practices in and around protected areas, anthropogenic fire, wildlife revenge killings, and conflict between community groups and conservation organizations, tourists, and hunters (Hillman,1988; Stephens et al., 2001; Yosef, 2015).

To generate a nuanced qualitative understanding of how different groups (i.e., age, gender, role in community) conceptualize equity, we conducted 15 focus group interviews that explore perceptions of multi-dimensional social equity concepts across four communities involved in CBC programs. We have three objectives. First, we examine the broader contextual dimensions, such as historical, political, and demographic factors, that affect perceptions of equity across the four communities. Second, we assess how individual characteristics such as gender, age, and power affect perceptions of equity. Third, we examine if and how different levels of community "organization" or CBC "governance-models" affect perceptions of equity by exploiting differences across our communities in institutional support for managing the CBC programs.

2.2. CBC programs in the Bale Mountains, Ethiopia

The Bale Mountains is composed of distinct mountain ecosystems displaying a continuous sequence of high-altitude vegetation belts within the Oromia Region of Ethiopia (Uhlig and Uhlig, 1991). The mountains are vital centers for ecological processes that provide water and support an

estimated 12 to 20 million people in south-eastern Ethiopia, central Somalia, and parts of northern Kenya (EWCA, 2017; OFWE, 2014). The Bale Mountains are also important hubs for floral and faunal diversity and endemicity (Hillman, 1988). It is home to Bale Mountains National Park (BMNP) which was established in 1974 to protect the endangered and endemic mountain nyala (*Tragelaphus buxtoni*) and Ethiopian wolf (*Canis simensis*). Despite its ecological, economic, and socio-cultural significance, this area exemplifies many of the common conservation challenges facing Ethiopia.

To address the increasing contention between the pressing livelihood demands and the protection of natural resources, there have been different alternative, inclusive, and participatory management models implemented across Ethiopia. One of the earliest forms of community conservation strategies in this region was the Participatory Forest Management (PFM) approach. The PFM approach was widely implemented in the Oromia region since the 1990's as an approach to devolve forest management rights to recognized members of Forest Dwellers Associations which translates to *Waldayaa Jiraatoota Bosonaa* (WAJIB) in local Oromiffa language (Abdurahiman et al., 2003). In the PFM model, the forest area is sub-divided into forest blocks and managed by organized local users.

Another more recent alternative conservation model is the community-based Controlled Hunting Area (CHA) program. While licensed hunting dates back to the early 20th century in Ethiopia, it was not until the establishment of the Ethiopian Wildlife Conservation Organization (now Ethiopian Wildlife Conservation Authority [EWCA]) in 1970 that trophy hunting was formally used as a conservation tool (Fischer et al., 2015). Today EWCA is responsible for the oversight of hunting activities and issues annual hunting permits in collaboration with regional government (Fischer et al., 2015). The primary species of interest is the mountain nyala

(*Tragelaphus buxotni*), a spiral-horned antelope that is endemic to Ethiopia's southern highlands. The species is known to be elusive, preferring dense montane forest and Afro-alpine habitats away from people and livestock (Evangelista et al., 2012). Because of the species rarity and limited number of licenses issued, the mountain nyala is a highly coveted species for trophy hunters (Lindsay et al., 2007).

Hunting takes place in designated CHAs, where a hunting concession holder (outfitter) can obtain a five-year lease that can be renewed if they maintain the agreement with the federal and regional governments (Fischer et al*.,* 2015). In Ethiopia, the government formally owns all the land, however, the boundaries of CHAs were drawn next to, and often overlap with, lands that were traditionally used by local communities. Designated CHA lands are set aside for wildlife and forest conservation and humans and livelihood practices are not allowed within them, except for some limited regulated access to resource collection. In the Bale Mountains, there are six CHAs: Hanto, Abbasheba Demero, Besmena-Udubulu, Shedam Berbere, Gasera Wabe, and Adaba-Dodola, operated under three hunting concession holders. These CHAs are set up mainly for the trophy hunting of mountain nyala, Menelik bushbuck (*Tragelaphus scriptus meneliki*), and Bohor reedbuck (*Redunca redunca*), while in Gasera Wabe CHA, lesser kudu (*Tragelaphus imberbis)* and greater kudu (*Tragelaphus strepsiceros*) are the main species for trophy hunting (OFWE Report, 2014). While trophy hunting has been used as a strategy to manage wildlife populations and conserve critical habitats for some time, growing human population pressure and demand for land and forest resources has prompted calls for increased sharing in the benefit opportunities and decision-making rights for the surrounding communities.

In response to these calls, EWCA and its regional unit, the Oromia Forest and Wildlife Enterprise (OFWE), have worked with non-government organizations such as Farm Africa and

Frankfurt Zoological Society (FZS), to modify the distribution of benefits and ways of engaging communities in CHA management. Since 2014, OFWE has negotiated and implemented a benefit sharing mechanism with each individual community/*kebele* (the smallest administrative unit in the country) located within a designated CHA. This arrangement (hence forth "original CBC") was implemented through *kebele* administrators or with existing PFM leaders (for *kebeles* that had an existing PFM). According to the original agreement, OFWE would share 30% of the annual trophy hunting revenue of each CHA, and each eligible *kebele* would get its share of benefit solely based on the area of their respective *kebele* that is located under CHA management (see Figure 2.1). Since 2017, that share of CHA benefit has been increased to 60%. In the original CBC model, there are no arrangements between different *kebeles* in the CHA on joint management and benefit sharing. There is also no formally binding agreement between OFWE and each *kebele* governing benefit sharing, management, and monitoring of the resource. The benefit is deposited in each *kebele*'s account run by *kebele* administrators and it is up to the discretion of each *kebele* how benefits are distributed. There is no clear mechanism linking benefits made with expected conservation behavior from the community. Five of the seven CHAs are currently under this original CBC model.

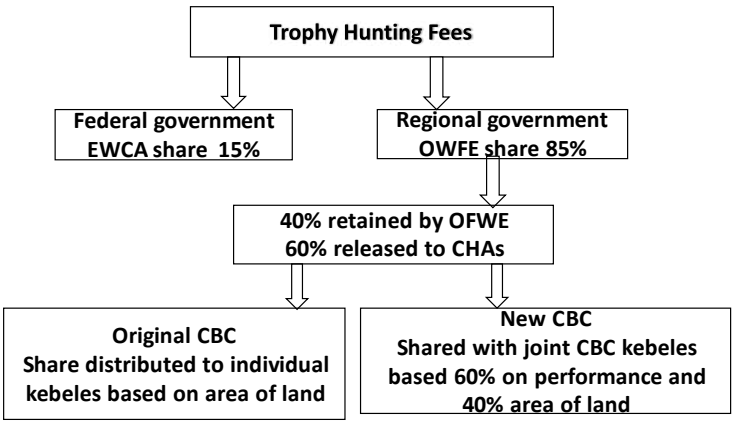

Figure 2.1: Benefit distribution of trophy hunting fee in the Bale Mountains

As of 2017, OFWE and the FZS mobilized to roll out a slightly different version of the original CBC program, referred to here as "new CBC". In this new CBC model, multiple *kebeles* located within a designated CHA were organized to jointly manage and share benefits from the trophy hunting program. This new arrangement was based on the understanding that wildlife habitat range covers broader areas than the politically defined boundaries of a single *kebele*. The model also involves performance-based benefit and power sharing mechanisms through organized user groups in each *kebele* called Community Based Organizations (CBOs). Each CBO has several sub-units called block committees responsible for monitoring and reporting on the protection of wildlife resources under their respective jurisdictions to the overseeing joint CBO committee. The joint committees are in turn responsible for reporting to OFWE that oversees the benefit sharing and resource monitoring of all CHAs. In terms of benefit sharing, of the total annual trophy fees generated, EWCA retains 15% and releases 85% to OFWE. OFWE dispenses 60% of this share to *kebeles* participating in the new CHA model (Figure 2.1). The new CBCs have a joint agreement between their constituent CBOs to share 60% of the CHA benefits based on their conservation performance, which is measured by a set of indicators including measures of forest protection, monitoring, and reporting of illegal activities. The other 40% is distributed based on the area of their *kebele* land that falls within the CHA. Membership in the CBOs for individual households in each *kebele* is voluntary but requires a membership fee of 30 birr/household (equivalent to about one U.S. dollar) per year. If a household chooses not to become a member, they are not involved in decision-making or benefit sharing from the trophy hunting program.

2.3. Methods

2.3.1 Study area

The Bale Mountains span the south-central and south-eastern highlands of Ethiopia, forming the largest contiguous area of Afro-alpine habitat in Africa (Friis, 1986; Stephens et al., 2001). The vegetation of the Bale Mountains falls within a group of distinct mountain ecosystems and displays ecological zonation ranging from 1,500 – 4,377m (Uhlig & Uglig, 1991). Climatically, the Bale Mountains has a short, four-month dry season from November to February; and a long, temperate wet season with rainfall and high moisture from March to October (Kidane et al., 2012; Stephens et al., 2001). Rainfall is bimodal or short unimodal with a five-month wet season away from the mountains at lower elevation (Hillman,1988).

The local people are predominantly Muslim and from the Oromo ethnic group. People rely on cultivating subsistence and cash crops such as wheat and barley while keeping cattle, goats, and sheep (Amente et al., 2006; Luizza et al., 2014). Livelihood strategies in the Bale Mountains differ based on area of cultivable land, age, distance from markets, and elevation (Tesfaye et al., 2011). Broadly based on the resources used, livelihood strategies can be classified as forest-based, crop-based, livestock-based, business-based, and diversified livelihood-strategies (Tesfaye et al., 2011). Access to agricultural land and livestock size determine a household's societal status (Amente, 2006; Tesfaye et al., 2011). For poorer households without sufficient fertile cropland, access to forest-based resources provides an important livelihood diversifying option (Tesfaye et al., 2011). The society is largely male-dominated when it comes to household level decision-making with clearly defined age and gender-based divisions of labor in livelihood activities (Amente, 2006).

We selected two CHAs, Abasheba Demero and Besmena Udubulu which employ the new and original CBC mechanisms respectively and operate with the same concession holder (Table

1.1). We selected two *kebeles* from each on the basis of socio-demographic characteristics, different history of interaction with OFWE, and accessibility. (Figure 2.2)

Table 2.1: Controlled hunting areas in the study area

Name of CHA	Total number of *kebeles* in CHA	Total size of CHA in hectares	*Kebeles* sampled	Number of households/*kebele* 2018	Size of sample *kebele* in hectares
Abasheba Demro	9	19,514	Gulba Duma Bole	449	2,499
			Wayo Hora	630	2,563
Besmena Udubulu	8	243,087	Besmena	649	2,595
			Walta'ii Wachoo	460	6,345

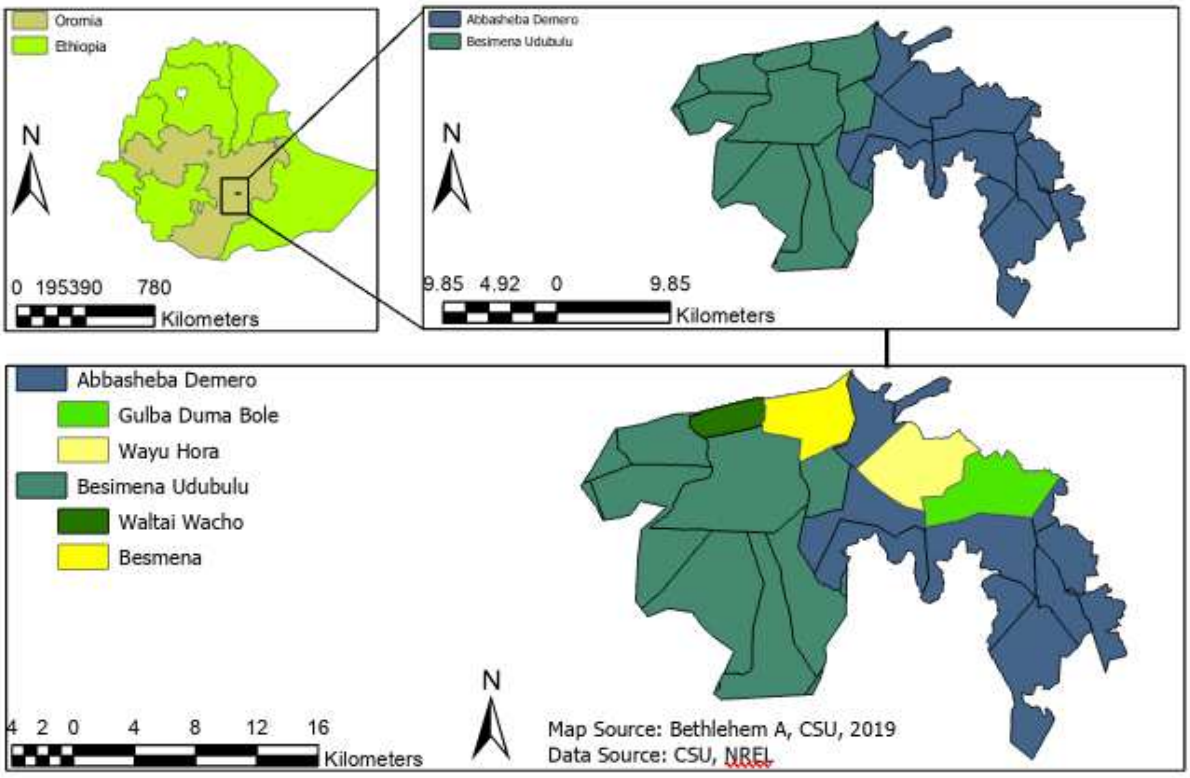

Figure 2.2: Study areas kebeles in the controlled hunting areas

2.3.2 Data collection

Background information on the CHA program was obtained from a scoping trip to the Bale Mountains in May 2018. We conducted informal interviews with organizations and individuals

that were instrumental in better understanding the complex research setting, identifying, and building relationships, and informing the design of our research questions and appropriate methods. We decided to use focus group interviews to collect our data as the topic of locals' perception of the CHA program in the Bale Mountains has not been explored in prior research and the use of focus group discussions allows generating an in-depth understanding of the complex context from locals' lived and shared experiences. Focus group interviews provide a grounded perspective of locals' conceptualization of the multiple dimensions of social equity, while allowing for shared perspectives to emerge across different groups (Dilshad & Latif, 2013; Nyumba et al., 2018). Consistent with focus group research focused on understanding consensus around complex concepts, our unit of analysis was the group level versus individuals within groups (Cyr, 2016).

Between December 2018 and February 2019, we conducted a total of 15 focus group interviews. In each of our four *kebeles*, we aimed to conduct four separate interviews to respect differences in perceptions of equity that might emerge across gender, age, and power dynamics. We developed categories based on age, gender, and leadership role in consultation with community key informants. In these preliminary discussions, we learnt the need to distinguish between the youth (*queerro*) and elder men given the current youth-led social and political movement in the region. The *queerro*, younger men roughly 18-32 years of age, represent the group behind the massive wave of demands for economic, political, and social equity and recognition across the Oromia region. In addition to the contemporary significance for age-based groupings, our grouping of male respondents follows the Oromo *Gadaa* system which is an age-based indigenous institution that has historically served as a political and socio-cultural organizing system among the Oromo for several centuries (Aliye, 2019). Although the *Gadda* age grade system is not presently used as a governing socio-political system, it remains an important cultural symbol

among the Oromo signifying different social roles between elders and the youth. In our consultation meetings with key informants, we learnt that a similar age-based grouping for the women was not relevant given the shared experiences across ages among women. Thus, we merged elder and younger women in our focus groups. We found it important to separate women from men in focus groups given the differences in lived experiences and prevalent cultural norms for women to not speak freely in the presence of men (Cherinet & Mulugeta, 2003). The last grouping was the *kebele* or CBO administrators which represent a group with a unique social leadership role. We found it important to examine these as a separate group given concerns over local elites dominating decision-making and benefits in the implementation of CBC initiatives (Lund & Saito-Jensen, 2013). Administrators were predominately men but in one *kebele* there was one woman CBO leader.

Our discussions with community key informants guided our data collection process. We asked key informants from each *kebele* what days and times men/women would most likely be available. To ensure maximum participation, we avoided scheduling meetings during local market days, prayer hours, and other days with scheduled events. Meetings with the *kebele* leaders and elder men were conducted at the end of the workday where they would be more likely to be free from office and agriculture related responsibilities. We met with women's groups during late mornings when household chores were reduced. However, despite these efforts, for one *kebele* we were unable to interview women due to community leaders cancelling the meeting claiming the women had household responsibilities and could not be present for the focus group interview. Our attempt to reschedule failed when our second meeting was also cancelled. This brought our total number of focus groups to 15.

Participants for each focus group in the respective *kebele* were recruited and selected based on the four groups outlined above with the help of *kebele* leaders and community key informants. Recognizing the potential for bias coming from *kebele* leaders, we carefully explained the importance of recruiting diverse community members during our initial meeting. This included targeting a mix of CBO members and non-CBO members in the new CBC model. While we made intentional efforts to have representative focus groups, which would include minorities such as other ethnic groups or migrants, since we did not record the names or ethnicity of participants, we cannot ensure that all of these group were adequately represented. However, discussions with key informants suggested the attendees represented the most salient groups in the study area.

We used a multi-dimensional equity framework to guide the interviews, while allowing flexibility for respondents to offer their nuanced understanding of equity. We based equity dimensions and questions on the literature, particularly Schreckenberg et al. (2016) and Zafra-Calvo et al. (2017). Semi-structured guiding questions (Appendix A.1.1) were presented around the themes of: 1) distribution equity, including awareness of benefits, perception of costs and benefits, perceptions on access and restrictions to natural resources in the CHA, and how the CHA affected their livelihood; 2) procedural equity, including who is/is not participating, why they are/not participating, perception of the decision-making processes, and perceptions of the outcomes of decisions; 3) recognition equity, including perceptions of the inclusions of specific identities, values, knowledge systems and needs of different groups; and 4) contextual dimensions, covering livelihoods and changes, threats affecting livelihoods, community capital, and the role of natural resources in livelihoods.

The focus group interview guide was translated to the local language Afaan Oromo, pre-tested, and revised prior to conducting the focus groups. We selected facilitators by identifying

individuals who met the following qualifications: 1) minimum of a bachelor's degree; 2) social science training; 3) field research experience in the region; and 4) fluent in Afaan Oromo. Additionally, the first author who had received professional training in facilitation of focus groups, trained facilitators in best practices of focus group facilitation. The training involved an interactive three-day classroom session and five-day field exercise during the pre-testing. The pre-testing was an iterative process where the first author was able to clarify questions for the facilitators on site. The focus group guide was modified based on questions raised during the pre-testing that needed clarification. The training was based on standard IRB ethical guidelines such as prior informed consent, avoiding personal identifiers, and recommended interview facilitation techniques (Morgan, 2002; Nyumba et al., 2018). The latter involved building rapport to foster open and honest dialogue, probing and reframing questions differently to keep discussions focused on the broad guiding questions without influencing the responses, and flexibility to adapt to flow of communication (Nyumba et al., 2018). Facilitators directed questions to less-vocal respondents when discussions were dominated by a few vocal respondents in the groups (Bernard et al., 2017; Dilshad & Latif, 2013). Additionally, we adhered to ethical research norms and issues relevant to the study area based on the experiences of our facilitators working on conservation research in the region. We ensured use of terms, concepts, and expressions that were relevant to local culture and sensitivities in the region. To avoid possible respondent bias, we avoided using financial incentives and offered refreshments for our participants in line with the standard research practice in the region. Interviews were audio-recorded with permission from the participants. We used one facilitator and one assistant per focus group interview, to ensure that all topics were fully covered, and follow-up questions could be asked during the interview (Krueger, 1994; Nyumba et al*.,* 2018). On average, focus group interviews took two and a half hours and had eight participants.

2.3.3 Data analysis

To analyze the data, a Grounded Theory (GT) approach was used that allows generating an overall explanation or theory from analyzing the emergent interrelationship among different lines of text, concepts, themes, and sub-themes (Bernard et al., 2017; Charmaz & Belgrave, 2007; O'Connor et al., 2008). All interviews were recorded and transcribed verbatim in the local language. The data were then translated from Afaan Oromo to English and systematically organized for analysis and interpretation by the first author.

Nvivo software was used to reduce and organize data by creating relevant themes and categories around each of our semi-structured guiding questions. The first step of the coding process called initial coding involved naming, splitting, and sorting important phrases and ideas into several sensible and manageable units (Charmaz, 2006). The second step called focused coding, involved reassembling the data, and carefully examining emerging and existing relationships among categories and searching for associations and patterns (Bernard et al., 2017). The process of constant comparison (O'Connor et al., 2008) involved repeated zooming in and out of the emerging corpse of textual data to consolidate links and explain relationships across lines of text and paragraphs. This led to the development of ‘axial codes’ which are labels that summarize relevant and meaningful set of codes (Boeije, 2009). Appendix A.1.2 shows the axial codes that inductively emerged from the data and were organized into 15 relevant categories. The process of constant comparison proceeded to the final stage where we reconnected our emerging categories to theoretical constructs of equity. An example of how we coded the categories into contextual, procedural, distributive, and recognition dimensions of equity can be found in Appendix A.1.3. To summarize the results, we first compared responses across our four focus

group types, i.e., youth, elder men, women, and *kebele/*CBO leaders, and second, across the new and original CBC models as presented in Appendix A.1.3.

We recognize the potential for unintended bias stemming from the interpretation of the results coming mainly from the first author, the language translation processes, and positionalities of researchers involved. Given the complexity of the social equity constructs examined in this study, we also recognize it would be highly valuable to validate our results by various community groups from which our results come. Unfortunately, we were unable to go back to these communities to conduct follow up interviews due to financial constraints. We acknowledge the limitations this has on the interpretation of our results.

2.4. Results

2.4.1 Setting the scene: contextual dimensions underlying equity

2.4.1.1 Legacy of interactions

Perceptions of equity of the CBC programs are shaped by the *kebele's* previous relationships with the private hunting concessionaire. Prior to the establishment of the new CBC model, the private concessionaire in both of the study areas had rolled out different community benefit programs. In the *kebeles* under the new CBC model, the concessionaire had contributed money to building or repairing roads, health centers, schools, grain mills, and employment opportunities in hunting camps as guides, porters, or guards. In addition to the community benefits, the private concessionaire had permitted regulated access to resources in the forest in most *kebeles* where the new CBC model is currently established. On the other hand, *kebeles* that are currently under the original CBC program perceived the hunting concessionaire as having historically denied them access rights from the resources with little or no economic benefit opportunities. As a result, the histories of interaction between concessionaires and communities, prior to EWCA's

CBC programs, varied. It is not clear if this relationship is coincidental or not, but in the new CBC model, the concessionaire was viewed more favorably, while in the original CBC model, relationships between the concessionaire and communities have remained very informal, and in some cases the *kebele* perceived a negative relationship.

Oromia Forest and Wildlife Enterprise is the key government organization that has been working on the ground to establish both CBC models. Due to limitations in financial and human resources, OFWE and partnering NGOs such as FZS have pulled their efforts together on setting up the new CBC model in only two of the seven CHAs. The establishment process of the new CBC model required long negotiation processes lasting about two years that resulted in trust building between OFWE and the communities in the new CBC. Most members in the new CBC we interviewed recognized OFWE from the initial community mobilization process. On the contrary, most of the *kebeles* in the original CBC model felt left out in the establishment of the new CBC model. Despite the earlier efforts of setting up the original CBC model, respondents in these communities expressed that their relationship with OFWE has diminished over time. A respondent in the original CBC stated, "*We have no contact with OFWE, we don't see them once a year except when there is an emergency situation such as when they heard people moved into the forest*".

2.4.1.2 Population pressure and land scarcity

In all four *kebeles*, land scarcity emerged as one of the most important contextual factors determining perceptions of equitability of the CHA program. Respondents repeatedly noted there was intense demand for agricultural land and forest resources due to unprecedented population growth in the area. They expressed how the land per household has been sub-divided to the maximum and there is no longer agricultural or settlement land left to pass down to the youth. In

the face of this critical land scarcity, they expressed how the presence of the CHA severely restricted their ability to expand their land further into the forest. Increasing population pressure and more demand for agricultural land by the landless and jobless youth was also leading to the continuous erosion of traditional land use practices. An elder noted *"As you can see all of this land is farmed, there is nothing left of it so what can we do with all of the people we have; we have to go into the forest."*

2.4.1.3 Underdeveloped community infrastructure

Closely tied to the increasing pressure on forest and natural resources is the lack or very limited access to basic community infrastructure. Respondents' across the four *kebeles* commonly expressed limitation in community services such as roads, market, health centers, education facilities, water, and electricity across communities. Most *kebeles* in our study area only had one elementary school that was understaffed with poor facilities. High schools were located in bigger towns and cities on average two or three hours away. Most parents interviewed noted they could not afford to send children off to other cities or towns for further education. This exacerbated the issues of unemployed and landless youth with limited opportunities after completing elementary school.

Lack of electricity or alternative sources of energy was also a factor closely linked to people's reliance on fuel wood collection for basic household energy use such as cooking and light. The respondents we interviewed lamented that roads were one of their biggest needs, severely impacting their mobility to nearby markets, heath centers, or schools. Most respondents felt their repeated request for durable and accessible roads had been neglected by government officers as well as the hunting concessionaire. Respondents expressed that the underlying factor for lacking adequate community infrastructure is administrative failures including misallocation

of funds, lack of skilled manpower, land, and resource exploitation by administrators, and/or elite capture in the community. For disadvantaged groups such as landless youth, women, or poor households, forest and other natural resources provided safety nets or alternative means of sustenance. However, most respondents also complained that it is often the wealthier or more powerful groups that are benefiting from unfair use or allocation of lands. In either case, these interdependencies on natural resources heavily shaped people's perceptions of conservation programs that affected their access to natural resources.

2.4.1.4 Broader political climate

Underpinning the increased claim for rights and benefits from natural resources is the ongoing broader political movement led by the youth (*queerro*) in the Oromia region and other parts of the country. One of the central issues at the heart of the widespread protests was the perceived inequitable land administration in parts of the Oromia region. This movement has also galvanized ongoing protests by disenfranchised youth in the study region. There was strong resistance by the youth in the study region against conservation efforts including the CHAs. The youth claim they have not benefited from these conservation efforts while bearing the costs on restrictions to land use. As one youth respondent said, "*What has the CHA done for us (youth)…many have fled this region ……because there is nothing left for us here, no jobs and no land".* The youth groups demanded immediate action to address the problems of the landless and jobless youth. *"…. this is the 'Renaissance time', it's time for them (OFWE) to listen to our (youth) problems and give us our rights from the resource…. they cannot ignore us anymore*". Leaders and other community members also added that the current political climate has emboldened and intensified the surging claims of the youth for use rights from the land.

2.4.2 Individual characteristics that affect perceptions of equity

2.4.2.1 Distributive equity

Individual characteristics such as gender, age, and power/role within the community also shaped perceptions of equity of the CHA program. CBO/*kebele* leaders and elder men were most likely to report positive benefits from cash incentives while women and youth were the least likely to report receiving cash benefits. A respondent in a women's group noted "*we only hear rumors that money from hunting has been received by kebele leaders, but no one has told us how much or what is planned with it".* Another respondent claimed, "*we have not received any cash…we hear rumors that the funds have gone to individuals' accounts".*

The youth and women were also the most likely to report insufficient compensation for the losses incurred. These groups stated they were the most reliant on the natural resources in the CHA and had the most to lose from restrictions on land and forest use in the CHA. A respondent in a youth group noted "*What does the CHA do for us (youth)? we don't have land from our fathers to inherit and we can't farm in the forest. What is left for us? we can only collect wood twice a week…that's not enough, our daily life is dependent on this forest"*. In another youth group interview a respondent stated "*The cash is nothing for us, they say it comes once a year, we don't even see anything. How are we (youth) going to survive the whole year? We cannot depend on it (cash incentive) to support us".*

2.4.2.2 Procedural equity

CHA community meetings were most commonly attended by household heads, which are mostly men. Women were the least likely to participate in CHA meetings or to become a part of the CBO management committees under the new CBC model. The largely limited participation of women in the CHA was evident in terms of the number of women in CBO committees—only one

woman out of the 24 women we interviewed in our three focus groups was a member of the CBO management committee. More than half of the women groups we interviewed had not even heard about the CHA program's rules and only knew of the existence of the private hunting concessionaire. Asked about the rules of the new CHA a woman noted "*we do not know what has changed, we have always been told by the private concessionaire not to go into the forest and that is still what we are told*". Asked about participation another woman noted "*we have a lot of work to do, when do we have time to sit for meeting*s?".

The youth also reported feeling excluded from representation in CHA management and decision making. A youth respondent stated *"how did they decide where forest boundary is and where we can and cannot collect fuel wood…have they consulted us? do we agree? We are at a disadvantage here".* According to these respondents, only the household heads are informed about the outcome of CHA decisions thus there is a lack of transparency on the benefits received from the CHA. As one youth claimed, "*we are very suspicious of administration and use of funds including conservation funds for personal ends*".

2.4.2.3 Recognition equity

In light of population pressures and land scarcity in these *kebeles*, responses regarding traditional rules being included in the CHA program varied between the elder and younger men in all communities. The younger men perceived the traditional rules of resource protection as not applicable anymore due to demand for resources surpassing available means to support their livelihoods. A youth stated, *"the forest is our only option, maybe the traditional rules had worked for them (the older generation) when there were less people and more land, but not anymore, how are we (the youth) supposed to live without land?".* On the other hand, the elder men saw the CHA rules as being important to preserve traditional land use norms and save the meagre resources. An

elder stated "*In the Oromo culture, we have huge reverence for the tree. Whoever sets foot in the forest with an axe on hand was considered a traitor by the society and everyone listened to the Abba Gadda. But nowadays the youth do not listen to elders anymore. They think about today's benefits only and the forest is getting cleared off…. we need the rules of the CHA together with our traditional rules to save these forests*."

2.4.3 How do CBC governance models shape perceptions of equity dimensions?

2.4.3.1 Distributive equity

The average annual cash incentive received by the CBO in the two new CBC *kebeles* was USD 3500. CBO leaders reported that they had deposited this money in communal savings for investment in community development services. Most respondents were aware of community services that were developed or repaired through the cash from the CHA in their respective communities. The reported costs due to the CHA program included loss of access to, or restrictions on, the use of natural resources including agricultural land, grazing pasture, fuel wood, wood for construction material, and bee keeping inside the CHA boundary.

Awareness about the CHA program and perception of distributive equity in the new CBC *kebeles* differed among respondents based on CBO membership status and location of the household. CBO members and residents that live closer to the *kebele* center were the most likely to report awareness of the CHA and its benefits compared to non-CBO members and residents that live further away from the center. In both *kebeles* we sampled, about one third of the total households were not CBO members. When asked about membership, they noted *"We have not even heard about the program or what is required to become a member, we live far off from the kebele"*. In relation to community development benefits, respondents felt these benefits were concentrated in villages that are closer to the *kebele* center while more remote villages did not get

the attention of the CBO leaders. One respondent noted "*Our village has not received any development benefit from the CHA so far, even though we have no roads or school, it is only the villages that are near the kebele center that get the most benefit*".

In terms of the regulated access to resources and community development services, perception of inequity was reflected by CBO members in the new CBC model. Interviewed CBO members lamented that while they abide by the rules, non-member residents were still able to access these resources illegally since regular and fair monitoring was not enforced across the *kebeles*. One respondent stated, "*The non-members feel they have little to gain from the protection of the resource and not much to lose if they are caught*." Some members felt this arrangement was not equitable adding there was no particular benefits they were getting from their CBO membership. A respondent added "*We pay the membership fee and have to abide by the rules but what is our benefit? The non-members are benefiting the same, they still go to the forest to graze or collect fuel wood illegally and can get away without punishment*".

In the original CBC model, average annual cash incentive received at the *kebele* level was USD 9365 and USD 3745; the difference is due to the area of the respective *kebeles*. Leaders in one of the two *kebeles* reported making cash payments to household heads. Respondents in this *kebele* reported receiving benefits of USD 26 per household per year. In the other *kebele*, respondents did not receive direct cash payments. Leaders claim the funds from hunting were deposited in communal savings and invested in community development projects. However, most respondents in these *kebeles* claimed they did not see CHA benefits being appropriately invested in community development projects such as roads and health care services. Most respondents expressed suspicion of embezzlement and corruption on the use of funds by administrators.

Leaders in the original CBC communities disagreed on their share of benefits. A leader noted "*The annual cash we are given at the community level is not even comparable to the money the private concessionaire is making…we have so many people that when the cash is sub-divided it is so insignificant to the household*s". This perception of inequity expressed by the leaders was also reflected by the other respondents who expressed perceptions of insufficient compensation to losses under the original CBC model. They claimed that they have lost most of their valuable land to the CHA and expressed negative reactions on restrictions to access to fuel wood, grazing land, and bee keeping from the hunting area. Those that have received the direct cash stated, *"The yearly cash we get is close to nothing compared to the loss of access to resources that we depend on to support our daily lives"*. Another respondent claimed, *"We were moved out of the forest with many promises of compensation, that our benefits would be much higher than if we stayed in the forest, but we have been left and forgotten once we have moved out of our land"*.

2.4.3.2 Procedural equity

In assessing perceptions of procedural equity in the new CBC model, most CBO members expressed that since the setup of the new model, they have started electing CBO committee leaders and felt the committee was making decisions that benefit the community. Most CBO members recognized OFWE, the CBO management team, and reported being involved in the initial boundary demarcation and community consultation process as the joint CBOs were established. Responses regarding the transparency of decision-making processes varied between the CBO leaders and other CBO members. Leaders noted they hold annual general CBO meetings to inform the members about the rules of living in the CHA, the money earned each year, and collectively decide how to invest the money. The CBO leaders stated, "*We inform the community about the rules and what is expected of them. We collectively decided what is better…to save the money in*

the communal savings or to distribute it to individual households". However, most members interviewed noted that they were only informed about decisions already made by leaders and felt they did not have power to influence the outcomes of those decisions: *"We are only told what they have decided, sometimes there are new rules about the activities and boundaries we have not agreed to previously*".

Most respondents who were CBO members positively perceived the monitoring done by the CBO block committees. The presence of community representatives in the CBO management and monitoring committee was associated with greater sense of trust and responsibility among the community. There was a pervasive acceptance and social norm that protecting the resource or complying with the rules of the CBO is in the best interest of the community members. However, some respondents perceived the monitoring was not carried out regularly and not equitably enforced on all residents of a *kebele*. A respondent noted "*They claim to control illegal cutting, but they turn a blind eye when the rich or their relatives are expanding land or cutting trees because they are also among the beneficiaries. But if the poor like me pick a single fallen tree, they are fine[d]*". This gap in regular and equitable monitoring was leading to a sense of lack of accountability among the members. As a respondent noted "*There are people that illegally expand into the forest because no one will come after them".*

When assessing procedural equity in the original CBC model, respondents in both *kebeles* expressed lack of awareness or representation in CBC management, lack of transparency in benefit distribution, and felt they were not consulted in CBC boundary demarcation. Most respondents felt there was no mechanism in place to allow active or meaningful participation in meetings and decision-making in CHA matters. All respondents except the elder men and *kebele* leaders claimed they have not attended any CHA meetings.

There was a general lack of transparency expressed about the distribution of benefits between OFWE and *kebele* leaders as well as between the *kebele* leaders and residents in the community. The transfer of CHA cash directly to the *kebele'*s account is an added source of mistrust on the use of these funds. One person reported *"We are merely informed that the cash is not enough, but we are not told when they received money and how much we are getting at the kebele level and how it is distributed to the rest of the community.*" Respondents in the *kebele* with individual cash payments expressed the most dissatisfaction and perception of lack of transparent process in cash distribution. Additionally, there was pervasive disconnect among the residents regarding benefits received from the CHA and expected conservation behavior.

Due to the lack of legally binding agreements between OFWE and *kebeles* on enforcing restrictions in the original CBC model, there is no accountability mechanism for the leaders to conduct resource monitoring and less pressure among the residents to comply with rules. Leaders interviewed expressed disapproval of CHA rules claiming their villages are disadvantaged by the boundary setting and benefit distribution.

2.4.3.3 Recognition equity

While population pressure and land scarcity were evident in both CBC models, the new CBC *kebeles* appear to have established greater understanding of the positive role of the CHA for the upkeep of traditional livelihood practices. A respondent noted "*The CHA is helping keep our traditions of protecting the land, these young ones are only thinking about today, about getting land and cash. Had it not been for the CHA, there would be no shade for our cows. It would have been all gone by now*". The community saw the importance of traditional rules being incorporated and strengthened by the legal rules of the CHA to protect the resource from increasing human pressure. A respondent noted "*What they (CHA) are doing is nothing new, it's something our*

forefathers have done, but we follow the rules by the hunting concessionaires …We still have these rules in practice for example not cutting down big trees (Odda Denbi), as there are certain trees that are meant not to be cut in the Addaa or Oromo culture designating sites for bee keeping".

Most respondents in the original CBC model felt let down by the CHA program and claimed they have the right to take back their own resources. This was evidenced by the illegal/forcible resettlement of about 50 households in the designated forest area in the advent of recent political instability in the area. They claimed their traditional norms were no longer relevant as there is more pressure for land and resources by the jobless and landless youth. A respondent added *"They (OFWE) do not care about us. It is all about nyala now. We are considered traitors of our own resource".* Another respondent added "*Who protected this resource when the settlers wanted to destroy it*? *We did…Our fathers and forefathers…. not they (the private concessionaire) but today we are the enemy*". Legitimacy and compliance to rules is threatened by perceived discord of the rules with their livelihood realities. Respondents felt they have lost access to the forest under the CHA and that is compromising their ability to meet their basic needs such as fuel wood collection and livestock grazing.

2.5. Discussion

The CBC programs in the Bale Mountains aspire to respond to the increasing call for participatory and inclusive community conservation approaches in Ethiopia (Tessema et al., 2007; Amare, 2015; Tsegaye et al., 2017). However, the socio-ecological setting of the area presents staggering complexity. There are diverse groups of resource users, with complex power dynamics that will determine who benefits from the program and how. There are also broader economic, social, and political changes in the region that will determine the perceived legitimacy and sustainability of the program across individuals and communities. Scholars have found that local

groups' concept of fairness could be divergent from abstract and externally defined notions of equitability (Corbera et al., 2007; Dawson et al., 2018; Hayes & Murtino, 2008; Pascual et al., 2014). It is thus important to ground equity assessments in the local's relationship with the natural world and their contextualized perceptions of fairness. The three most important considerations in equity assessments are to clearly define what is meant by "equitable", for whom, and why (Brown & Corbera, 2003; Howard et al., 2016; McDermott, 2013; Zafra-Calvo et al., 2017).

In this study we have engaged with equity as an evolving and pluralistic concept, that includes distribution, procedure, and recognition dimensions. We have also analyzed the contextual dimension of equity as an important underlying factor that helps make sense of the interactions between the other dimensions (Sikor et al*.,* 2014). To this end, we first show that "equity in access" or contextual equity is highly influential in setting the tone for how other dimensions of equity are perceived among different groups and individuals (McDermott, 2013). Locals' perceptions of the fairness of the CHA program is conditioned by broader prevalent social changes and processes such as the intense population pressure and the land shortage, histories of exclusion and unfulfilled promises, the lack of access to basic resources, and current political unrest in the region.

As our results show, these contextual factors underlie if and how different groups perceived the CHA program as equitable, illustrating how conservation interventions are inevitably embedded in broader social and political processes (Brechin et al., 2002; Adams & Hutton, 2007). For example, the issue of land scarcity overlapped with individual characteristics such as age, with rampant landlessness among the youth shaping their perceptions of equity. Our results support findings by Gross-Camp et al. (2019) from their studies in Tanzania and Bolivia regarding communities' negative attitudes towards hypothetical expansion of community forest. Gross-

Camp et al.'s (2019) results similarly illuminate how communities' concern over perceived opportunity costs in the form of reduction of agricultural land and access to forest products due to expansion of community forestry outweighed the increase in benefits from the proposed program.

Additionally, the different histories of land use interactions with conservation actors in the past is intertwined with how different communities perceive the CHA program. Yet, despite the varying histories of interactions across communities in the study area there are no explicit efforts by the implementing organizations to remedy or acknowledge the effects of perceived historic injustices or existing perceptions of inequity in the setup of the CBC models. McDermont et al. (2012) argue that "justice is a situated phenomenon" and it is therefore important to track and examine what factors could be affecting different people's participation and benefit from conservation interventions. Our study supports the claim by Bremer et al. (2014) that the design of a conservation program that is incognizant of the effects of pre-existing or ongoing broader factors runs the risk of not delivering the right types of benefits to the right people in the right way.

For example, despite the presence of incentive mechanisms in the original CBC model, it is none the less perceived as inequitable due to unaddressed negative histories and the current loose relationships and lack of trust with implementing organizations. This corroborates the findings of Young et al. (2016) on the importance of devoting time and resources in building and maintaining procedural trust and understanding among stakeholders. If the goal of equity as defined in the literature is beyond narrowly framed "do no harm" objectives and to address broader links with holistic well-being (Campese, 2009; Schreckenberg et al., 2016) it is important to recognize that natural resource conservation issues cannot be "siloed" from the broader contextual social factors that shape if, how, and why conservation interventions are considered fair and legitimate. As others have argued, it is important to examine, and to the extent possible address, interrelated socio-

political processes (Adams & Hutton, 2007; Musavengane & Leonard, 2019) and issues of land scarcity (Calfucura, 2018; Gross-Camp et al., 2019) in the design, evaluation, and improvement of conservation programs.

Second, our findings underscore the importance of disaggregating the simplified notion of "community" and assessing precisely which people benefit and which people are at a disadvantage, how and why, in equity assessments (McDermott & Schreckenberg, 2009; Gustavsson et al., 2014). Our results illuminate how age, gender, and role in the community shape equity perceptions. The results show women and youth are the least likely to receive benefits or perceive these benefits as fair compensations to losses they incur given their disproportionate reliance on the forest. In many cases, the perception of inequity in distribution of benefits overlaps with perceptions of inequity in decision-making processes. This is in line with previous findings by Dawson et al. (2018) where perceptions of inequity in processes negatively colored locals' perceptions of distributive equity outcomes. Accordingly, we found women and youth are the least likely to benefit from the CHA programs and the least likely to participate in the CHA meetings or management decisions. The lack of women's participation was evident in terms of the disproportionately fewer number of women present in CBO committees, lower attendance of CHA meetings, and the cultural norm where women tend to not talk or talk freely in the presence of men. These results are similar to those observed in Tanzania by Khatun et al. (2015), where they discuss the processes of cultural disempowerment that prevent women from talking in public and in particular talking before elder men, which influenced women's participation in community forestry management in Tanzania.

We also find discord between the marginalized youth and the elders and CBO/*kebele* leaders on their perception of recognition equity. While the youth prioritized the inclusion of their

present livelihood demands, the elders valued the protection of traditional land protection practices in the CHA program. The youth and their perception of inequity is particularly important given how it intersects with broader contextual issues such as population pressure, land scarcity, and the youth-led political unrest. Our results are in line with a study that illuminates the intra-community tensions between the elders and youth in Bolivia regarding land use benefits and decision-making in community conservation programs (Gross-Camp et al., 2019).

The issue of gender is more commonly considered in assessments of fairness of resource governance outcomes and equity participatory processes (Kameri-Mbote, 2007; Leisher et al., 2016; Mwangi et al., 2011). There has been less attention in the literature to the youth, who in many biodiverse areas are becoming disenfranchised with the lack of tangible opportunities (Holden & Tilahun, 2016; Nkurunziza, 2006). Overall, our results corroborate the points made by McDermott and Schreckenberg (2009) on the need to critically engage with who benefits from community conservation and tailor benefit programs accordingly. Unless the design of conservation programs explicitly targets the most marginalized, benefits from these programs often only improve conditions on average, while the poor and marginalized are not left better off. What is worse, the introduction of conservation programs that do not adequately consider the disproportional reliance of the least advantaged could be exacerbating existing inequalities and cause further disenfranchisement (Andersson et al., 2018).

While a new CBC model is being introduced to the area, with the hope that it will create a more equitable and participatory decision-making space through the formation of community management and monitoring committees, our results suggest that these mechanisms are not yet effectively and regularly implemented across all communities. There remains a large number of non-CBO members, many of which do not have access to information about the program and live

father away from *kebele* centers and hunting camp sites. This highlights the importance of paying attention to the effects of spatial configuration and settlement patterns on access to information, benefits, and participation in CBC programs (Khatun et al., 2015).

That said, there are some positive outcomes of the new CBC model. First, there are promising efforts to devolve part of the management responsibilities to the community at different scales. One is through the creation of a community management committee, which is an encouraging step in strengthening bottom-up approaches. Second, the presence of community members in the resource monitoring block committees was perceived as legitimate and inclusive among the community. Third, the presence of legally enforceable guidelines and rules governing resource use and protection and benefit sharing between the *kebeles* with the oversight of OFWE has created a sense of accountability by the CHA leaders on the use of funds from hunting for community development ends. Additionally, the creation of a joint management and monitoring system between neighboring *kebeles* combined with a performance-based approach, has created a degree of responsibility and transparency across communities.

While the new CBC is making commendable efforts in devolving decision-making power and promoting benefits among groups, we urge future program design and monitoring endeavors to explicitly account for equity considerations in order to ensure fairness and long-term legitimacy. One suggestion is to recognize and approach the community as a complex, diverse, and evolving unit and account for discrepancies in access to resources, information, benefits, and participation. This could be done through an adaptive co-management approach which is premised on sharing management power and responsibility through multiple institutional linkages, feedback learning, and mutual trust among partners (Berkes, 2004). While an adaptive co-management approach itself is not a panacea, it is better suited in grappling with complexities and uncertainties of socio-

ecological systems (Holling, 2001). It enables a deliberative process that encourages continual observation, reflection, and communication (Stern, 2005). The benefits include recognition of different needs, efforts to build on locally meaningful rules and norms, formation of linkages and networks, knowledge sharing and co-production, and building capacity to respond proactively to uncertainty (Armitage et al., 2009). Related to this, it is important to carry out regular, transparent, and fair monitoring at multiple scales, including between OFWE and the CHAs, between different *kebeles* in the new CBC, and between block committees within each *kebele*.

It is also important to recognize that setting up CBC programs in such complex settings is not a one-off step or check off list. OFWE and related organizations need to mobilize efforts and resources to continue follow up with the communities to devise/revise rules, address inequities perceived by marginalized groups, and continually evaluate and improve the program. To this end, the principle of free, prior, and informed consent (FPIC) can help serve as a mechanism that enables local groups to proactively shape the process and outcomes of resource interventions (Baez, 2011; Mahanty & McDermott, 2013). FPIC's guiding principles, such as the absence of coercion, provision of adequate prior time for decision making, access to adequate information, and the right to consent or withhold consent in resource decision making, can augment the equity framework (Mahanty & McDermott, 2013). However, this needs to be coupled with sufficient understanding and emphasis on the continually evolving socio-cultural, political, and economic contextual dimensions shaping equity as well as explicitly recognizing the rights and priorities of the most vulnerable groups such as women and youth. To this end, biocultural approaches that emphasize place-based and culturally grounded understanding and development of locally relevant indicators could be valuable (Sterling et al., 2017). In the case of women and youth, socio-culturally mediated barriers to their equal participation need to be recognized and intentional

efforts geared towards increasing their participation, such as requiring a minimum number of female and youth representatives in CBO committees and empowering role models who understand the unique challenges facing them (Khatun et al., 2015).

While the new CBC model has a long way to go in terms of extending equity across all members of the community, it has established the principles, laid down the structures, and is taking the first steps in linking distribution of costs and benefits with community inclusive management and monitoring in decision-making processes. This is an improvement over the original CBC model which has not been able to establish a transparent and inclusive procedure of decision making.

2.6. Conclusion

Overall, this research provides a nuanced understanding of the multiple dimensions of equity from a grounded local perspective while disaggregating the complexities of community and examining the broader contextual processes at play. We have shown, through examining multiple dimensions of equity, that while CBC programs that provide economic benefits are needed, it is not sufficient in leading to just outcomes without addressing whether more marginalized groups have access to these resources, and whether these incentives compensate for the losses felt by these groups. Furthermore, equity cannot be achieved without recognizing the values of different individual identities and promoting fairness in the process of decision making. In all communities in our study, even though financial payments have been received, the procedural and recognition equity dimensions have not been adequately met, leading to negative perceptions of the CHA program. While the shift toward more participatory and equitable CBC programs is encouraging in Ethiopia and globally, it will not be a panacea. As our study highlights, conservation programs are a product of their context, and when trying to address a multitude of complex and historical

social issues as we found in our study site, there needs to be more honest, clear, and explicit goals in program design that define what is meant by “equitable” and for whom, to set reasonable expectations. At the same time, there is also the need to sufficiently recognize the inextricable ties of conservation to these social processes and their effects on the design, implementation, and success of CBC programs.

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3. CHAPTER THREE: UNDERSTANDING SOCIAL EQUITY OUTCOMES IN COMMUNITY BASED CONSERVATION: THE EFFECTS OF HOUSEHOLD AND INSTITUTIONAL CHARACTERISTICS ON SOCIAL EQUITY IN THE BALE MOUNTAINS, ETHIOPIA

3.1. Introduction

Natural resource governance approaches in Africa have increasingly shifted from the 'exclusionary' state-centric approaches of the 1970's towards various forms of rights based and participatory approaches since the 1980's. These people-oriented conservation approaches are commonly labelled as community-based conservation (CBC) or community-based natural resource management (CBNRM) (Berchin et al., 2002; Hulme & Murphree, 1999; Gibson & Marks, 1995; Songorwa et al., 2000). In principle, CBC programs are characterized by efforts to promote sharing of benefits and devolving decision-making rights to communities living in and around conservation areas thereby enhancing legitimacy and long-term success in conservation outcomes (Barrow & Murphree, 2001; Nelson & Agrawal, 2008). Despite such appealing premises, however, CBC programs in Africa have met complex implementation challenges over the past few decades resulting in mixed social and ecological outcomes (Balint & Mashinya, 2006; Galvin et al., 2018; Hulme & Murphree, 2001).

Failure to adequately engage with the complex and heterogenous socio-ecological context in which CBC programs operate has resulted in inequitable benefit distribution (distributive equity), exclusionary decision-making processes (procedural equity), and the lack of recognition of multiple knowledge systems, identities, and rights (recognition equity) (Nelson & Agrawal, 2008; Nelson, 2012; Nkhata & Breen, 2010). Although CBC programs might improve conditions

in general, one of the most persistent criticisms is that benefits often do not reach the most marginalized groups and programs could exacerbate existing inequalities (Agarwal, 2009; McDermott & Schreckenberg, 2009; Sunam, & McCarthy, 2010). These implementation paradoxes implicate oversimplified assumptions in CBC programs regarding distribution of benefits, participation, and the notion of 'community', demanding critical engagement with the social diversity and consequent power dynamics within and across communities along the lines of gender, class, wealth, and power (Adams & Hulme, 2001; Berkes, 2004; Blaikie, 2006). To this end, there have been increasing calls for grounded approaches that put local people at the center of conservation outcome assessments and the adoption of more holistic approaches to studying social impacts of conservation programs, especially through a focus on social equity (Gross-Camp, 2017; Haines-Young & Potschin, 2010).

Despite the increased attention to justice concerns in conservation programs (Martin et al., 2013; McDermott et al., 2013; Klein et al., 2015*;* Schreckenberg et al., 2016), there remains a gap in empirical studies that measure social equity or examine the determinants of its outcomes in CBC programs (Friedman et al., 2018, Sikor et al., 2014). The existing literature highlights that intra-community differences such as age, gender, ethnicity, education, occupation, financial status, or resource access rights could influence who is likely to receive benefits or incur costs from conservation programs, thereby resulting in different perceived equity (Bennet et al., 2020; Hayes & Murtinho, 2018; Kelin et al., 2015). Furthermore, studies highlight the impact of different levels of community organization or institutional characteristics, such as the presence of rules and enforcement mechanisms, transparency, and trust in decision-making processes among factors that can explain differences in equity outcomes in CBC programs (Hayes & Murtinho, 2018). In light of the multitude of household and institutional characteristics that might shape equity outcomes in

conservation programs, it is critical to understand which factors are most important in explaining perceptions of equity so that CBC programs can adaptively improve social outcomes.

As with most African countries, protected areas in Ethiopia are experiencing a rising need for devising collaborative, co-managed and/or CBC programs. This is heightened by the alarming increase in human settlement, land scarcity and associated livelihood impacts on natural resources that threaten both long-term conservation outcomes and sustainable well-being of communities (Mamo & Bekele, 2011; Stephens et al., 2011). Additionally, the contested issues of boundaries and land tenure, the mobile nature of wildlife spanning beyond the confines of protected areas, and the limited capacity of the state to enforce strict protection regimes, all suggest a need for alternative governance approaches in addition to the dominant 'fences and fines' approach (Young et al., 2020). In the last few decades, Ethiopia has started to design and implement CBC programs around forests and wildlife (Amare, 2015; Tesfaye, 2017); however, little is known about their outcomes or impacts on social equity.

A CBC program within Controlled Hunting Areas (CHA) near Bale Mountains National Park in Ethiopia is one of these alternative governance models. The program is administered by the Oromia Forest and Wildlife Enterprise (OFWE) and is based on sharing benefits from controlled hunting revenues and devolving decision-making power to local communities living within the designated hunting areas. The CBC program strives to restrict the expansion of human settlement and activities that negatively impact wildlife and critical habitats, such as illegal settlement expansion, timber extraction, overgrazing, and poaching (Abebe et al., 2020). There are two slightly different models of the program: a newer model that involves community-based joint management and power sharing mechanisms hereafter known as "new CBC", and an older model that only involves sharing of financial incentives without a power sharing mechanism in place,

hereafter called “original CBC”. The new CBC program has legally organized groups of users called Community Based Organizations (CBO)s in each *kebele* (the smallest administrative unit in Ethiopia) that are responsible for monitoring and reporting on the protection of resources (e.g., wildlife, forests, rangelands) under their respective jurisdictions to the overseeing CBO management committee. A joint committee made up of CBO management representatives from several *kebeles* is responsible for overseeing the distribution of benefits to each CBO and providing regular reports to the OFWE on resource protection performance. The original CBC, on the other hand, does not have a legally binding framework that joins multiple communities in benefit sharing and resource monitoring. Although a portion of revenues generated from controlled hunting are deposited to individual community accounts, there is no accountability or reporting mechanisms on the expected conservation outcomes to OFWE in the original CBC model. While the goal is to shift all communities toward the new CBC model, limitation in resources and political instability in the region have affected this transition. More detailed information on the operation of the CBC programs is found in Abebe et al. (2020).

In the Bale Mountains, previous qualitative research on the CHA program suggests that locals’ perception of the equitability is marred by the complex histories of interaction with conservation organizations, population growth and political instability in the region (Abebe et al., 2020). Using a locally grounded and multi-dimensional conceptualization of equity, Abebe et al. (2020) also found that while the new CBC model is making positive strides in sharing benefits and decision-making rights, women and youth are the least likely to perceive the program as equitable. Furthermore, access to information, transparency of decision making, and the presence of monitoring and accountability influenced equity outcomes across the two CBC program models. Building on these qualitative results, the goal of this study is to quantitatively measure perceived

equity and assess how individual and institutional characteristics explain perceptions of equity outcomes across households, communities, and governance models in the CHA program in Ethiopia. The specific objectives of this research are to: (1) examine how perceptions of distributive, procedural and recognition equity dimensions vary across communities and CBC models; (2) assess the effects of household characteristics and institutional factors on explaining equity outcomes; and (3) assess the effects of CBC models (new vs original) on perceptions of equity. This research adds to the scant literature measuring social equity and examining the factors explaining equity outcomes in CBC programs. This information is vital to developing more just conservation programs that address prevalent household and community disparities and subsequent differences in power relations not only for Ethiopia, but across Africa and the globe, given surging social, economic, and political unrest and increasing conservation threats.

3.2. Conceptual framework

3.2.1 Social equity

Social equity has been increasingly used as a framework to explicitly understand and critically engage with the power dynamics within and across different groups affected by conservation and/or development interventions (Friedman et al., 2018; Schreckenberg et al., 2016). Critical questions in equity framings in the context of conservation center around what is meant by equitable, for whom how and why (Dawson et al., 2017; Friedman et al., 2018). Equity is a multi-dimensional and multi-scalar concept that includes a: 1) distributive dimension focused on the distribution of costs, responsibilities, rights, and benefits among different groups and individuals; 2) procedural dimension concerned with the decision-making processes which determines who has access to benefits and who suffers from restrictions on access to benefits; and 3) recognition dimension that looks at the respect and recognition accorded to distinct values,

identities, histories as well as knowledge diversity in the conservation context (Dawson et al., 2018; McDermott et al,. 2012; Schreckenberg et al. 2016; Sommerville et al., 2010).

According to a systematic review on social equity by Friedman et al. (2018), the majority of existing equity assessments employ qualitative methods only or mixed methods (Dawson et al., 2017), while quantitative-only methods that measure equity are less prevalent (Bennet et al., 2020). In terms of indicators, some studies advocate for the use of standardized global indictors, such as Protected Area Management Effectiveness Tracking Tool (PAME) and social and governance tools to assess social impacts of conservation (Borrini et al., 2013; Coad et al., 2015). On the other hand, an increasing number of studies emphasize the need to elicit bottom up and diverse stakeholder understandings of multiple equity dimensions (Dawson et al., 2017; Moreaux et al., 2018). Qualitative equity studies are important for generating contextualized perceptions of equity, such as gains and losses from conservation initiatives in terms of income, land use restrictions, participation in decision making, perceived impact on socio-cultural identities, aspirations, and livelihood strategies (Abebe et al., 2020; Musavengane & Leonard, 2019). While such studies generate nuanced understanding on why different households or communities have different perceptions of equity, there is also need for quantitative assessments of these factors to develop more generalizable evidence on drivers of social equity perceptions across broader socio-demographic and bio-physical characteristics.

Existing studies that measure equity quantitatively have utilized structured questionnaires largely adopting indicators developed by Zafra Calvo et al. (2017) but tailored to capture the social dynamics of each study context (Bennet et al., 2020). Within the three dimensions of equity, the distributional aspect of equity, which focuses on the sharing of material and/or monetary costs and benefits, is the most analyzed dimension (Halpern et al., 2013; Hayes et al., 2018). While

procedural and recognition dimensions have garnered increasing attention in equity research, there are fewer studies measuring these constructs (Friedman et al., 2020; Martin et al., 2016). The three dimensions of equity need to be seen as interdependent and integral aspects of a multi-dimensional equity outcome, where addressing one dimension is expected to improve the other dimensions (McDermott et al., 2013; Sikor et al., 2014). For example, McDermott et al. (2013) show that attempts towards attaining distributive equity, while ignoring the causes and processes that are perceived as unjust, will lead to negative distributive outcomes. The interlinkages between the different dimensions of equity and the factors that explain them are often overlooked in the design or evaluation and monitoring of conservation and development interventions. It is thus important to assess not only the factors explaining distributive outcomes, but to track the processes shaping the outcomes and the recognition of identities and values in analyzing the social impact or fairness of a project or policy intervention.

3.2.2 Factors influencing social equity

The Sustainable Livelihoods Framework (SLF) posits that individuals and households have varying levels of access to capital and exposure to mediating institutions and policies which influences their livelihood choices and resulting outcomes (Carney,2003; DfID,1999; Mensah, 2011). The SLF defines capital assets as human, financial, physical, natural, and social capital (DFID, 1999). These are the building blocks for constructing livelihoods and attaining well-being. Different levels of access to these assets are likely to influence whether a household or community participates in conservation programs (Jones et al., 2020) and the types of impacts a conservation program has on the household (Hayes & Murtinho, 2018).

Human capital refers to the stock of skills, knowledge and good health that enable a household or an individual to pursue livelihood options (Cherni, & Hill, 2009). Household capital

assets in the form of household size, education, gender, and age can affect the extent to which a household has the means to pursue off-farm options, such as paid employment, or relies on natural resources for supporting livelihoods. Human capital assets could in turn influence the types of impacts a conservation program, such as the CHA program, have on social equity outcomes.

Financial capital refers to the various forms of capital base including cash, credit/debt, and savings, that are essential for the pursuit of livelihood strategies (Scoones, 1998). In terms of measuring financial capital, income indictors, such as livestock numbers, crops sold or sale of forest products, are often used as part of livelihood portfolios in rural households (Chen et al., 2013; Pica-Ciamarra et al., 2011). Physical capital is closely related to financial capital and can be measured by household items or durable assets. These possessions reflect a households' ability to afford material goods and are indicative of social status. Some household materials can also be converted to financial capital to generate income (Shinbort et al., 2019). Thus, possession of more or higher quality physical capital is postulated to correspond with less vulnerability from external interventions, such as conservation programs that could restrict access to natural resources (Morrison et al., 2011).

A household's livelihood and/or benefit from conservation programs is also conditioned by their natural capital, such as the size of land occupied, land tenure, access to land or resources in protected areas. Land rich households have a greater range of alternatives to support livelihoods compared to landless or small landholder households when faced with resource restrictions on land use (Wunder, 2008). For most poorer households, natural resources such as non-timber forest products provide important emergency nets in times of misfortune such as drought (Shackleton & Shackleton, 2004).

Social capital refers to features of social structure and organization, such as norms and social networks, that act as resources and enable or facilitate coordination and collective action for mutual benefits (Harrison et al., 2016; Putnam et al., 1993; Pretty& Smith, 2004; Woolcock, 2001). The literature discusses the role of three types of social capital that are vital in facilitating cooperation and coordination within and across groups: bonding, bridging, and linking (Woolcock, 2001; Woolcock & Narayan, 2000). Bonding social capital refers to the relations between individuals or groups of similar backgrounds, such as friends, family, and neighbors, while bridging capital refers to more inclusive networks and solidarity between people or groups of different backgrounds (Harrison et al., 2016; Titeca & Vervisch, 2008). The third form of social capital, linking capital, refers to a vertical dimension that connects households with external agencies and institutions of power that have impact on community outcomes (Harrison et al., 2016; Pretty, 2003; Pretty & Smith, 2004). We expect that social capital will facilitate more positive perceptions of equity.

3.3. Methods

3.3.1 Study area

The Bale Mountains is located in the Oromia region of Southeast Ethiopia. The mountain ecosystems display distinct altitudinal zonation that include the Afro-alpine (> 3,700 m.a.s.l.), sub-alpine and ericaceous (3,200 m to 3,700 m.a.s.l), upper Afro-montane forests (2,300-3,250 m.a.s.l.), and lower Afro-montane woodlands (1,500 -2,300 m.a.s.l.) (Evangelista et al., 2012). The mountains encompass the largest Afro-alpine habitat in Africa (Friis, 1986; Stephens et al., 2001; Young et al., 2020; Abebe et al., 2020). The Bale Mountains have global conservation significance as important reservoirs of genetic diversity (Hillman,1988; Uhlig, 1988). The Bale Mountains harbor 26% of the country's total endemic species, that includes 77 mammals (26%

endemic), 170 species of birds (57% endemic) and over 1,300 species of flowering plants of which 63 are endemic to Ethiopia (EWCA, 2017; Evangelista et al., 2012; Kidane et al., 2012). Bale Mountains National Park (BMNP) was established with the goal of safeguarding critical habitats for a number of Ethiopia's endangered and threatened species, most notably the Ethiopian wolf (*Canis simensis*) and mountain nyala (*Tragelaphus buxtoni*) (EWCA, 2017). The mountains serve as vital centers for ecological processes and provide water for an estimated 12–20 million people in south-eastern Ethiopia, central Somalia, and parts of northern Kenya (EWCA, 2017).

Livelihoods in the Bale Mountains are mixed consisting mainly of crop farming and animal rearing. While some areas are more 'livestock zones', maintaining largely semi-transhumant pastoral lifestyles, others are 'cultivation zones', which increasingly integrate livestock holdings into the expanding agricultural economy (Flintan et al., 2008). Important markers of household status include size of agricultural land and number of livestock owned (Amente, 2006; Tesfaye et al., 2011). For poorer households, forest-based resources such as fuel wood, honey, timber, and thatch, provides an important livelihood diversifying option (Tesfaye et al., 2011). The communities in the Bale Mountains are predominantly Muslim and from the Oromo ethnic group. It is largely a patriarchal society with clearly defined age and gender-based divisions of labor in livelihood activities (Amente, 2006).

Six CHAs operate in the Bale Mountains: Hanto, Abbasheba Demero, Besmena-Udubulu, Shedam Berbere, Gasera Wabe, and Adaba-Dodola (OFWE, ND). For this study we selected two CHAs operating under the same hunting concession holder that have implemented the original and new CBC model of the CHA program, respectively: Abasheba Demero and Besemena Udubulu (Figure 3.1). We then selected two highland and two lowland *kebeles* from each. Highland *kebeles* are located at higher elevations, and primarily rely on sedentary agriculture where wheat and barley

are main crops grown. Lowland *kebeles* are located at lower elevations, and livelihoods are based on pastoralism mixed with some subsistence agriculture and wild coffee harvesting. We selected Gulba Duma Bole and Ledi Chekata, from the highland and lowland *kebele*s found in Abbasheba Demaro CHA, respectively. From Besemena Udubulu CHA, we selected Wetel Wacho and Gebe Keku from the highland and lowland *kebeles*, respectively.

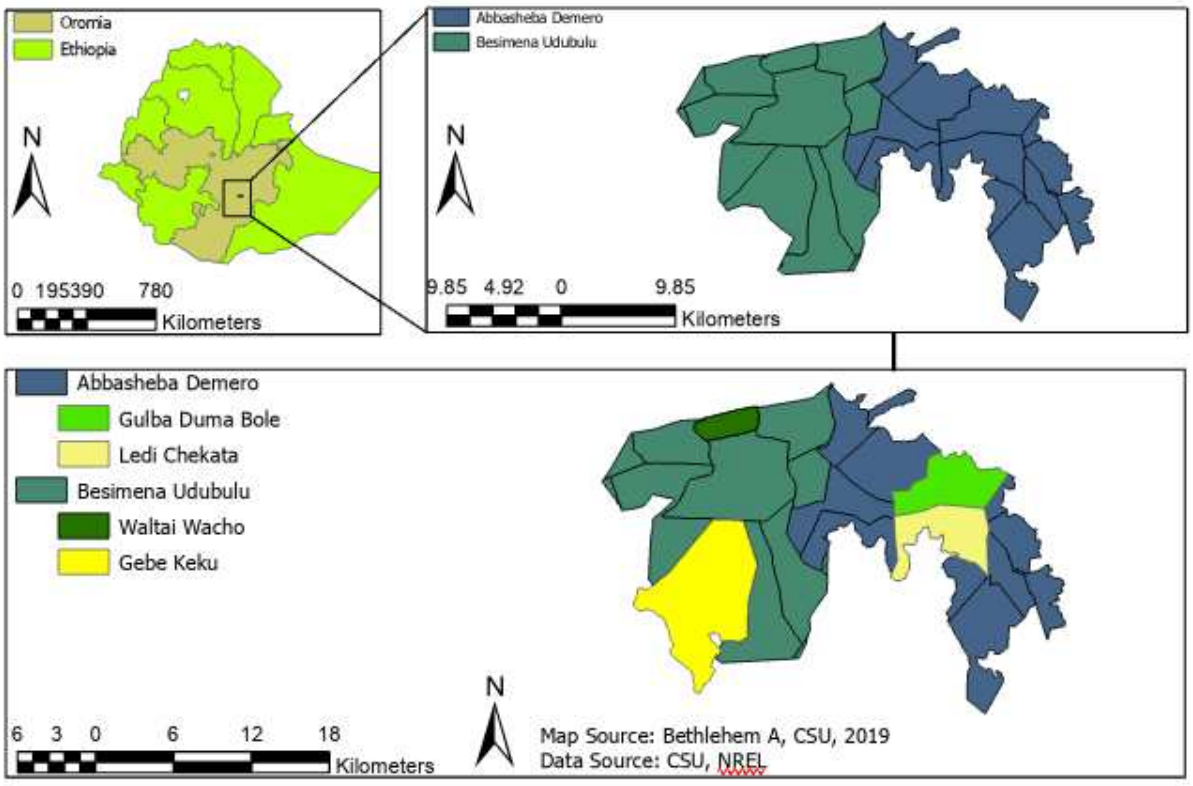

Figure 3.1: Map of the study area *kebeles*

3.3.2 Data collection

3.3.2.1 Household survey sampling design

In each of the four *kebeles*, we sampled 50 households for a total of 200 survey responses. For the purpose of this research, we defined households as a unit whose members (who may or may not be related by blood) live, cook, and eat together and primarily depend on the household head to provide means for livelihoods. For a sampling frame, we used a list of total households

which we obtained from the *kebele* administration office. We numbered the households on the lists and used a random number generator to select households for inclusion in the survey. This method gave all households equal chances on being included in the survey. Although systematic random sampling would have been favorable, we opted for simple random sampling since the location of households in the study is not systematically organized in each street as in most urban settings (Mbaiwa & Stronza, 2011). Since the majority of registered household heads in our study area are older males, we made intentional efforts to include the participation of women and younger men in our sample as appropriate. We thus surveyed any household member above the age of 18 and aimed to have 15% of our total sample to include men and women 18-35 years.

3.3.2.2 Data collection process

Data collection was undertaken from December 2019 to January 2020 and involved: (1) an initial consultation period where we held informal discussions with community leaders; (2) translation of survey instrument, training of enumerators and pre-testing of survey; and (3) revising the surveys and conducting face-to-face household surveys.

We had conducted a scoping trip to the area in 2017 and 2018 which enabled us to meet with different stakeholders and community groups, develop trust, build rapport, and understand the socio-demographic and bio-physical context. Furthermore, we conducted an initial stakeholder consultation in 2019 before the survey was carried out which helped us to identify our final sample *kebeles* and facilitate implementation of the survey. The survey was translated and conducted in the local language Afaan Oromo. The translation of the survey was an iterative process involving a number of feedbacks and revisions to the original survey. To ensure relevance and accuracy, we used multiple skilled Afaan Oromo translators working on conservation who also had familiarity with terms and expressions specific to the study area as well as the conservation field, for

translation. We hired six local enumerators who had training and experience in social science field research. One author on this study led a week-long training with the enumerators where they went through the research objectives and each survey question, making sure enumerators became sufficiently versed with the concepts and terms used in the questionnaire. The workshop also covered standard IRB guidelines, such as informed prior consent and confidentiality of personal identifiers, as well as appropriate ethical research norms in the study area.

We pre-tested the translated questionnaire on 15 randomly selected respondents in one of our four sample *kebeles*. Based on the comments and feedbacks from the pre-testing, we adjusted the language of questions in the final surveys to ensure clarity. Furthermore, enumerators used neutral probing techniques such as repeating the question or presenting scripted definitions for selected concepts in questions when respondents requested clarification (Schober & Conard, 1997; West et al., 2018). Known as Conversational Interviewing, this involves incorporating flexible interviewing techniques with varying degrees of departure from standardization to provide clarity for concepts (Schober & Conard, 1997). To minimize possible interviewer bias, we ensured that enumerators did not have direct previous working exposure in the *kebeles* where they collected data from. Enumerators presented themselves as independent researchers collecting data for a study on community perceptions of the CHA program. The questionnaire took on average 90 minutes (Appendix 2.6). One author from this study participated in data collection by monitoring the enumerators and was available to answer questions that arose in the field.

3.3.2.3 Survey instrument

The survey was informed by prior, in-depth qualitative research conducted in the area which was instrumental in eliciting locally relevant indicators of capital assets and social equity (Abebe et al., 2000). The survey only included close-ended questions (Appendix 2.6). Each of the

three dimensions of equity was measured using 5-scale Likert statements, where "1 = strongly disagree" and "5 = strongly agree" (Chyung et al., 2017). To measure distributive equity, we used eight Likert questions focused on the perceived gains and/or losses of benefits among different groups such as monetary incentives, community development projects, access rights to land and natural resource use, and compensation for restrictions or losses in access to resources. We measured procedural equity using 10 Likert questions focused on the kinds and levels of participation in management and monitoring of forest and wildlife resources, transparency of decision-making processes, presence of mechanisms for accountability and conflict resolution in the CHA programs. Finally, we measured recognition equity using five Likert questions focused on the values, rights, and identities of different groups in relation to resource use and access.

There are challenges with using standardized Likert scale statements in data collection that can be more pronounced in non-Western cultural contexts (Browne-Nuñez & Jonker, 2008). Some of these limitations include multiple interpretations of concepts measured, central tendency bias where participants avoid extreme response categories, social desirability bias where respondents report what they perceive to be socially desirable answers versus giving honest responses, and interviewer bias where responses may be influenced by the appearance, behavior, and/or organization the interviewer is perceived to represent (Bertram, 2007; Browne-Nuñez & Jonker, 2008). There are a number of suggested approaches to overcome these limitations such as the use of multiple methods including participatory focus groups to develop culturally relevant indicators and intensive pre-testing (Browne- Nuñez & Jonker, 2008), both of which we used in this study to reduce potential bias. The CI technique was also used to provide clarity of Likert scales while in the field in the form of neutral probing techniques and using scripted definitions of concepts that were pre-defined based on the inputs during the pre-testing. (Schober & Conard, 1997).

We use the SLF (Carney, 2003; Chambers & Conway, 1992; DfID, 1999; Scoones, 1998) to examine how household characteristics and institutional arrangements affect perceptions of equity outcomes. We measured human capital with questions related to gender, age, education, household size and composition, and length of residence in the *kebele*. To measure physical capital, we asked questions related to household material assets and house construction material. Financial capital was measured using questions on the amount of crops and livestock sold in local markets. We measured natural capital using questions on use and frequency of extraction of timber and non-timber products, size of personal land and access to public lands. We measured two forms of social capital. Bonding social capital was measured using five 5-scale Likert questions focused on communities' internal connections such as presence of active cooperation and functional support system in the community, presence of clear rules and sanction mechanisms, and fair access for decision-making rights within the community. To measure linking social capital, we used five 5-scale Likert questions focused on perceptions of relationships with external conservation organizations, including the presence and quality of communication, presence of active relationships with the conservation organizations in the form of addressing community concerns, giving technical and financial support, trainings, and capacity building or other opportunities.

A final set of seven independent variables were selected based on theory and exploratory analysis described in Section 3.4 (Table 3.1). These seven variables span the five capital asset categories. From human capital, we use gender and age, where gender is measured as a binary variable with "1" coded as women and "2" coded as men. We expected that women would score lower on their perceptions of equity. Age was measured as a continuous variable and we expected as age increases, perception of equity scores would increase (Abebe et al., 2020). We measured physical capital with household roofing material measured as a binary variable and coded as "1"

for lower quality roofing and "2" coded for higher quality roofing. The expected relationship with social equity was that households with higher quality roofing would score higher on their perceptions of equity. For financial capital, we use sale of crops measured as a binary variable that was coded as "1" for low crop sales (less than half of their total crops) and "2" for high crop sales (more than half of their total crops). For natural capital we use perception of land access measured as a binary variable with "1" for negative perception on land accessibility and "2" for positive perception. Perceptions on land access asked respondents if they perceived they will continue to have access rights to the land they currently use in the foreseeable future. We expected that households that had positive perceptions on land access would score higher on their perceptions of equity. Additionally, to capture the different CBC models we created a binary variable where "1" was equal to the new CBC model and "2" was equal to the original CBC model. Bonding social capital, was measured using five Likert questions focused on presence of shared norms and strong internal ties across households within the same *kebele* such as neighbors, members of support groups, sub-village associations. Linking social capital, measured using five Likert questions focused on presence and quality of relationships, including communication and support with external conservation organizations. We expected that households living in communities with stronger internal ties and external linkages would score higher on their perceptions of equity.

3.3.4 Data analysis

To analyze the survey data, we used Statistical Package for the Social Sciences (IBM SPSS statistics 26). We created composite scores for each social equity category using the individual 5-scale Likert scale questions. Since composite scores could not be computed for a given questionnaire when one of the composing items was a missing value using the listwise deletion, we used the delete items solution where we specified the number of questions a respondent must

answer to be included in the summated index (Vaske, 2008). Individual responses to each equity dimension were graded and summed, resulting in an overall score for each respondent on a scale. The internal consistency of the items on the scales was measured by the reliability coefficient, Cronbach's alpha, which ranges from 0 to 1; the larger the value, the greater the reliability of the scale (Vaske, 2008). All of the items had a Chronbach's alpha coefficient >0.7, which was considered sufficient (Taber, 2018). We followed a similar process to create composite indices for the measures of bonding social capital and linking social capital with each social capital dimension having a Chronbach's alpha coefficient >0.75.

Following variable creation, we ran basic descriptive statistics on all independent and dependent variables for each *kebele*. Then we tested for univariate associations between each independent variable (IV) and the dependent variable (DV) using the following statistical tests: (1) independent samples t-test using the F test (Levene's) for variables coded as one binary IV and one DV; (2) analysis of variance (ANOVA) using Tueky HSD for Post Hoc comparison tests for variables that were coded as one or more binary/categorical IV and one continuous DV; and (3) correlations measured using the Pearson Correlation (r) for variables that were coded as continuous IV and continuous DV (Garson, 2012; Vaske, 2008).

We used multiple linear regression analysis to develop descriptive models on the effects of capital assets on each of the three dimensions of social equity. In developing the regression models, we checked that the assumptions for linear regression had been met. We used multicollinearity diagnostics tests of Variance Inflation Factor (VIF) >4 and Tolerance < 0.2 as cut off points for deciding if there was too much intercorrelation between independent variables (Garson, 2012; Vaske, 2008). We used tests of homoscedasticity to ensure the relationship investigated is the same for the entire range of the dependent variable (Garson, 2012). We used scatter plots for the

standardized predicted value against the standardized residual value to check that the variance of error terms was similar across the values of the independent variables (Garson, 2012; Osborne & Waters 2022). Additionally, we ensured there were no significant outliers using the Cook's Distance with a cutoff of 1 (Garson, 2012).

For the full regression model, we included all seven capital asset predictors that we expected would capture salient variables relevant to the study area as predictors of social equity (Table 2). We also present a parsimonious model, which was determined independently for each social equity construct by using backward stepwise regression, which is a stepwise regression approach that starts with a full model using all seven variables and gradually eliminates variables from the regression to find a reduced model that best explains the data (Oshima & Dell-Ross, 2016). To test the role of the CBC model on equity outcomes, we introduce the CBC dummy-coded variable in the full model and parsimonious model for each equity outcome. Finally, to help control for potential omitted variables at the *kebele* level, and provide additional confidence in our results, we ran all four models above with *kebele* dummies. For all regression models, we used standard errors as a measure the accuracy of predictions.

3.4. Results

3.4.1 Household and livelihood characteristics

Of the 200 households surveyed, 73% of respondents were male and 27% female, and the average age was 37 years with 56% of the sample less than the age of 36 years (Table 2). The average household size was seven persons and ranged between three and 22 family members. The average number of dependents (under 15 years of age) per household was four. About 65% of our sample respondents reported they could read and write. Of the total respondents, about 33% reported having some type of leadership role in the *kebele*. The majority of the respondents had

lived in the area most of their lives and average length of residence was 33 years. Households were located on average 16 minutes walking distance from the *kebele* center and an hour from the protected area boundary (Appendix 2.1).

In terms of livelihood activity, 97% of our sample population practiced traditional agriculture mixed with livestock keeping as their primary livelihood activity. Each household had an average of five cattle with a maximum of 21 cattle per household. In the highlands, the most commonly produced crops reported were wheat (74%), barley (52%) and beans (42%). Of the top produced crop (wheat), 55% of those surveyed in the highlands reported selling more than half of their harvest. In the lowlands, maize (87%), teff (68%) and coffee (49%) were the most common crops grown. Only 28% of the sample households in the lowlands reported selling more than half of their top produced crop (maize).

About 96% of the respondents reported extracting fuelwood from the forest, of which 66% reported extracting at least two times a week. Other forest uses included timber extraction (52%) and honey production (27%). Households on average owned between 1.6 hectares of land in the lowlands to 2.25 hectares of land in the highlands. About 78% of those surveyed consisted of households that had lower quality roofing construction material, which included thatch, wood or mud roofing, the majority of which are found in the lowlands. About 90% of households reported that they would have access to land in the foreseeable future and this was generally consistent across *kebeles*, except in *kebele* 2 where close to 20% reported they did not think they would have access to land in the near future. The average community decision-making index (bonding social capital) was generally high, at around 4 out of 5. External relations with conservation organizations (linking social capital) was evaluated lower across all *kebeles*, with a mean value around 3.

Table 3.1: Summary Statistics of independent variables across the four kebeles in the study area. N=200. Kebele 1(Gulba Duma Bole) and Kebele 4(Chekata) are under new CBC model from the highland and lowland *kebeles,* respectively. Kebele 2(Weletel Wacho) and Kebele 3 (Gabi Keku) are original CBC mode from the highland and lowland kebele, respectively.

Variable	Measurement	Count and Percentages									
		Kebele1		Kebele 2		Kebele 3		Kebele 4		Full Sample	
Gender	Women	76	38%	36	18%	44	22%	56	28%	54	26.6%
	Men	124	62%	164	82%	156	78%	144	72%	146	73.4%
Roof type	Lower quality	60	30%	88	44%	16	8%	16	8%	46	22.5%
	Higher quality	40	70%	112	56%	184	92%	184	92%	154	77.5%
Crops sold	Low sale	84	42%	96	48%	168	84%	120	60%	118	58.5%
	High sale	116	58%	104	52%	32	16%	80	40%	82	41.5%
Land accessibility	No	12	6%	36	18%	20	10%	8	4%	20	9.5%
	Yes	188	94%	164	82%	180	90%	192	96%	180	90.5%
Variable	Measurement	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	Number of years	37	16.7	36	14.1	35	14.2	40	14.3	37	14.9
Community decision-making (bonding social capital)	Continuous scale 1 through 5. 1 being the poorest and 5 being highest	3.7	0.76	3.3	0.71	3.5	0.7	4.03	0.83	3.8	0.78
External relations (linking social capital)	Continuous scale 1 through 5. 1 being the poorest and 5 being highest	2.5	0.78	2.65	0.93	2.32	0.77	3.63	0.94	2.8	0.98

3.4.2 Social equity perceptions across kebeles and CHAs

Households gave a lower average score for the composite index measuring distributive equity than for procedural or recognition equity (Table 3.2). For distributive equity, the mean value

was 1.9, with *kebele* 3 (original CBC) having the most negative perception of distributive equity. For procedural equity, the mean value was 3.4, with *kebele* 3 having the most negative perception of procedural equity. The mean value for recognition equity was 2.2, with *kebele* 3 again having the most negative perception of recognition equity.

Table 3.2: Summary Statistics on equity dimensions across the study area kebeles.
Kebele 1(Gulba Duma Bole) and Kebele 4 (Chekata) are under new CBC model from the highland and lowland Kebeles, respectively. Kebele 2 (Wetel Wacho) and Kebele3 (Gabi Keku) are under the original CBC model from the highland and lowland Kebeles respectively.

Variable	Average (Mean, Standard deviation)				
Dependent Variable Composite Index	Kebele 1	Kebele 2	Kebele 3	Kebele 4	Full Sample
Distributive equity	2.0 0.7	2.01 0.66	1.46 0.55	2.2 0.66	1.95 0.7
Count	49	49	43	47	185
Percentage	24%	24%	21.5%	23.55	92.5%
Procedural equity	3.4 0.77	3.4 0.8	2.7 0.95	4.1 0.8	3.4 0.96
Count	46	49	43	46	184
Percentage	23%	24.4%	21.5%	23%	92%
Recognition equity Count	2.9 0.96 46	2.8 1.06 49	2.2 0.97 42	3.7 0.98 46	2.9 1.1 181
Percentage	23%	24.%	21%	23%	90.5%

3.2 Univariate analysis

The univariate statistical analysis on individual equity dimensions showed gender to have a statistically significant relationship with equity composite scores, where men were found to have more positive perceptions of procedural and recognition equity than women. Physical capital measured in terms of household roofing construction material was found to have a statistically

significant relationship with distributive equity. Financial capital measured in terms of crops sold was found to have a statistically significant relationship with distributive equity. In both cases, poorer households, with lower crop sales and cheaper roofing construction material, had more negative perceptions of distributive equity. The univariate tests showed strong positive statistical relationships between community decision-making and all three dimensions of equity. Similarly, perceptions of relationships with conservation organizations were also found to have strong positive statistical relationships with the three dimensions of equity (Appendix 2.2).

3.4.3 Regression models with household predictors of social equity

3.4.3.1 Full model

For distributive equity, the results from the full model containing the seven predictors indicated that the model explained 29.5% of the variance and was a significant predictor of distributive equity, $F(7, 173) = 10.27$, $p < 0.01$. Out of the seven predictors entered in this model (Table 3.3), gender, roof type, crops sold, perception of land access and perception of relationship with conservation organizations were statistically significant predictors. Specifically, the model shows that, on average women reported 0.2 points lower in perception of distributive equity than men. For physical capital, on average households with higher quality roofing scored 0.14 points more in perception of distributive equity than households with lower quality roofing. For financial capital, on average households with higher crop sales scored 1.27 points more on perceptions of distributive equity than households with lower crop sales. For natural capital, on average, households that had negative perceptions on land access scored 0.1 points less on their perception of distributive equity than households with more positive perception on land accessibility. For linking social capital, as perception of relationships with other organizations increased by one standard deviation, perception of distributive equity increased by 0.42 standard deviation.

For procedural equity, the results from the full model indicated that the model explained 38.7% of the variance and was a significant predictor of procedural equity, F (7, 173) = 15.18, p <0.01. Out of the seven variables entered in this model, perceptions of land access, community decision making, and perception of relationships with external organizations were statistically significant predictors. Specifically, the model predicts that on average households that had negative perception on land access scored 0.14 points less in procedural equity than households with more positive perception of land access. For bonding social capital, a one standard deviation increase in community decision-making led to a 0.24 standard deviation increase in perception of procedural equity. For linking social capital, a one standard deviation increase in perception of relationships with other organizations led to a 0.44 standard deviation increase in procedural equity.

For recognition equity, the results indicated that the model explained 29.9% of the variance and was a significant predictor of recognition equity, F (7, 170) = 10.25, p <0 .01. Out of the seven variables entered in this model, community decision-making and perception of relationships with conservation organization were statistically significant predictors of recognition equity. More specifically, a one standard deviation increase in community decision making, recognition equity increased by 0.16 standard deviation. For every one standard deviation increase in perceived relationships with other organizations, recognition equity increased by 0.41 standard deviation.

Table 3.3: Full model with all seven key predictors of equity dimensions entered in the equation simultaneously. *p<0.1: **p<0.05: ***p<0.01

Variables	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.205** *0.109*	-0.095 *0.136*	-0.100 *0.175*
Age	0.006	0.015	0.051

	0.003	*0.004*	*0.005*
Roof type	-0.145**	-0.037	0.002
	0.110	*0.141*	*0.176*
Crops sold	1.27*	0.039	0.102
	0.094	0.119	0.149
Land accessibility	0.107*	0.142**	0.066
	0.277	*0.354*	*0.438*
Community decision making	-0.001	0.246***	0.168**
	0.064	*0.080*	*0.102*
External relations	0.421***	0.447***	0.415***
	0.048	*0.061*	*0.077*
R^2	29.5%	38.7%	29.9%
Observations	185	184	181

When *kebele* dummy variables were added to the full model there were some minor changes in which independent variables were statistically significant (Appendix 2.3). For distribution equity, gender, roof type and perception of relationships with external organizations remained statistically significant while crops sold and perception of land access were no longer statistically significant predictors of distributive equity. For procedural equity, all three predictors in Table 3.3 remained statistically significant. For recognition equity, both relationships with other organizations and community decision-making remained statistically significant predictors when the *kebele* dummy variables were added.

3.4.3.2 Parsimonious model

For distributive equity, the parsimonious model predicted 29.5% of the variation in the outcome variable and was statistically significant with $F(5,175) = 14.6$ $p<0.01$ (Table 3.4). The same five variables as in the full model—gender, roof type, crops sold, land access and perception of relationships—remained statistically significant predictors in the parsimonious model. For procedural equity, the parsimonious model predicted 36.4% of the variation in the outcome variable and was statistically significant at $F(3,177) = 35.3$, $p<0.01$. This model found perception of land access, community decision-making and perception of relationships with other

organizations statistically significant predictors of procedural equity. Similarly, for recognition equity, perception of relationships with other organizations and community decision-making were statistically significant predictors in the parsimonious, and full, models. This model predicted 26.5% of the variation in the outcome variable and was statistically significant with F (2, 175) = 32.9, p<0.01.

Table 3.4: Parsimonious model with least explanatory predictors of equity dimensions sequentially removed from the equation. *p<0.1: **p<0.05: ***p<0.01

Variables	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.204** *0.108*		
Roof type	-0.145** *0.108*		
Crops sold	0.126* *0.092*		
Land accessibility	0.107* *0.275*	0.149** *0.351*	0.066 *0.438*
Community decision making	-.001 *0.064*	0.248*** *.079*	0.189* *0.101*
External relations	0.421*** *0.048*	0.458*** *0.061*	0.423*** *0.076*
R^2	29.5%	36.4%	26.5%
Observations	185	184	181

Similar to the addition of *kebele* dummy variables in the full model, including *kebele* dummy variables only changed the independent variables in the model for distributive equity. Specifically, crops sold and land access were no longer statistically significant with the *kebele* dummy variables included (Appendix 2.4).

3.4.4 Regression models testing impact of CBC program models

The CBC model type had a statistically significant influence on each dimension of social equity (Table 3.5). For distributive equity, CBC model types were significantly different from each

other with the original CBC scoring on average 0.14 less in perception of distributive equity than the new CBC model. Gender, roof type, and perception of relationships remained significant predictors in the model. For procedural equity, the original CHA scored on average 0.2 points less than the new CBC in perception of procedural equity. When the CBC variable was included, gender also became a statistically significant predictor in this regression model. For recognition equity, the CBC models were again significantly different from each other where the original CBC scored on average 0.15 points less than the new CBC in perception of recognition equity. There was no change in other independent predictors.

Table 3.5: Full regression model with the CBC dummy coded variable. *p<0.1: **p<0.05: ***p<0.01

Variables	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.208** *0.108*	-0.102* *0.133*	-0.104 *0.173*
Age	0.002 *0.003*	0.006 *0.004*	0.046 *0.005*
Roof type	-0.141** *0.109*	-0.027 *0.137*	0.010 *0.174*
Crops sold	0.116* *0.093*	0.026 *0.116*	0.091 *0.147*
Land accessibility	0.099 *0.275*	0.130** *0.346*	0.056 *0.433*
Community decision making	0.009 *0.064*	.267*** *0.078*	.189** *0.101*
External relations	0.366*** *0.051*	0.372*** *0.064*	0.356*** *0.081*
CBC	-0.141** *0.097*	-0.203** *0.121*	-0.154** *0.153*
R^2	29.5%	38.7%	29.9%
Observations	185	184	181

In the parsimonious model for distributive equity, the CBC dummy variable remained statistically significant (Appendix 2.5). On average, the original CBC model scored 0.14 less in

perception of distributive equity than the new CBC model. For procedural equity, original CBC scored 0.2 less in perception of procedural equity than the new CBC model in the parsimonious model. In this model, gender was no longer a significant predictor. For recognition equity, on average, the original CBC scored 0.16 less in perception of recognition equity than the new CBC model. Because we only have four *kebeles* and two *kebeles* are in each CBC model, it was not possible to implement a regression model with both *kebele* dummy variables and the CBC dummy variable due to collinearity.

3.5. Discussion

The CHA program in the Bale Mountains seeks to offer an alternative governance approach from top-down strategies by devolving decision-making rights and benefit opportunities to the local community. While the program is making commendable strides as an inclusive and bottom-up approach to conservation in the area, there remain equity concerns about the benefit sharing, decision-making processes and recognition of different identities and priorities (Abebe et al., 2020). In this study, we quantitatively assess the effects of household and institutional characteristics on perceptions of equity and consider how two different governance models of the CHA program influence social equity outcomes. While we found that equity perceptions for all *kebeles* were relatively low, our results point to the important role that bonding and linking social capital can play in improving perceptions of equity and suggest that marginalized populations continue to be left out of CBC benefits (distributive equity) and decision-making processes (procedural equity). We discuss these results in more detail below.

3.5.1 Effects of household characteristics on perceptions of equity

In our analysis of household capital assets, we found that gender was an important characteristic in explaining perceptions of distributive equity. This supports qualitative findings in

the region (Abebe et al., 2020) that women are less likely to receive benefits or deem these benefits as sufficient compensations to losses incurred. In the CHAs, while restrictions on access to forest products such as fuelwood strongly affect women's daily livelihood activities, the benefits from the CHA in terms of annual cash incentives are made to the household heads which are mostly men. This likely explains the more negative perception of distribution equity by women. This finding corroborates the literature on gender equity in Africa where women usually represent a marginalized and disadvantaged group, gaining a meagre benefit from conservation efforts while bearing disproportional costs from restrictions or loss of access to resources (Agrawal, 2007). For most women from poor households in sub-Saharan Africa, various forest products such as fuel wood, medicinal plants, and animal fodder serve as major sources of subsistence income (Brown, 2011; Timko et al., 2010). Thus, measures that restrict or prevent access to these products will disproportionately affect women than men. For example, a study of the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe showed how women were disproportionately disadvantaged by restrictions on access to forest resources such as rope and thatch as a result of the conservation program (Nabane & Matzke,1997). Other studies similarly assert that gender is one of the most important dimensions that defines and mediates access to and benefits from decisions related to natural resources in most developing countries (Leisher et al., 2015; Mwangi et al., 2011). The equitability of conservation programs for women is marred by complex socio-cultural, economic, and institutional structural barriers such as resource access and control rights, discrimination, and male bias in the provision of services including credits, lack of networks and exclusion of women from the decision-making space at household, community, and national levels (Mwangi et al., 2011; Torri, 2010). While we expected age to be an important human capital factor in predicting equity outcomes based on previous work

(Abebe et al. 2020), the results from this study did not find a statistically significant effect of age in explaining equity outcomes.

Our results also show that crops sold and roofing material, as indicators of wealth, were statistically related to distributive equity perceptions. The negative perceptions of distributive equity reported by poorer households is related to perceptions of greater costs/losses from restrictions on resource use in CHA land, such as grazing pasture, agricultural land, and forest products. This supports the assertion in the literature that poorer households are more reliant on 'open access' natural resources on average for up to 40% of their household incomes (Cavendish, 2000; Mamo et al., 2017, Thondhlana et al., 2012).

We also found that perceptions of land access were statistically related to distributive equity and also to procedural equity. The link between negative perceptions of land access and distributive equity is closely tied to poorer households' greater reliance on open access resources livelihoods discussed above. We found that the size of the plot land allocated to each household was correlated with income status, where poorer households had smaller plots of land compared to wealthier households. Land is argued as a critical resource in rural communities with increasingly high population density, land shortage and competing valuable alternative uses such as agricultural value (Calfucura, 2018). Land poor households without access to land or having small plots of land depended heavily on natural resources for sustenance, and thus find it more taxing to restrict land use practices as a result of conservation programs. This finding reaffirms previous studies where wealthier households tend to benefit more from community conservation programs given their secure land tenure and capacity to sustain and support their lives employing an array of natural resources which poorer households do not have the access to (Larson & Ribot, 2007; Shrestha & Alavalapati, 2006). The link between negative perceptions of land access and

procedural equity is tied to access to information on decision-making on natural resources. Households that had negative perceptions on their land access were likely to report that the decision-making processes of the CHA program are not inclusive and considerate of the needs of the most vulnerable in the community. This ties to discussions on procedural justice that questions whose voices are represented when decisions are made on natural resources and how reflective those decisions are of the needs of marginalized groups. Our results corroborate findings Gustavsson et al. (2014) where a Marine Protected Area (MPA) program that failed to consider inequalities between villages (e.g. varying resource use access rights) and incorporate meaningful participation of all actors affected failed to attain both procedural and distributive justice. Interestingly, we did not find any household characteristics related to human, financial, physical, or natural capital to be correlated with perceptions of recognition equity.

3.5.2 Effects of institutional characteristics on perceptions of equity

Our analysis also illuminated the role of social capital in shaping perceptions of equity outcomes. We found that bonding social capital had a strong positive effect on procedural equity. Procedural equity emphasizes the need for justice in the processes by which decisions are made and not only the final outcomes of decisions. We found that the presence of strong ties, trust, and networks among households within each *kebele* serves as a catalyst in shaping positive perceptions towards transparency in decision making, access to information, and accountability in the CHA program. This corroborates the social capital literature on how strong relationships across members within a given environmental collaborative facilitates trust, cooperation, and collective action (Chowdhury et al., 2013). For example, Dahal & Adhikari (2008) show that the presence of high levels of cohesion and traditional norms among the local people within a community conservation program in the Philippines resulted in a forest management planning and implementation process

being perceived as fair and legitimate among the participants. Similarly, a study of communal governance systems in a Payment for Ecosystem services (PES) program in Ecuador finds that households in more organized communities were more likely to engage in inclusive and transparent decision-making processes that would lead to more acceptable outcomes in distribution of benefits (Hayes & Murtinho, 2018). In another study, Diedrich et al. (2017) show how social capital in the form of trust for leaders in a marine protected area program in Siquijor, Philippines had positive impact on perceptions of equity.

We also find that presence of bonding social capital positively affects perceptions of recognition equity. Recognition equity is associated with the respect and acknowledgement given to different actors, values, histories, and knowledge systems in conservation discourse and practice (Friedman et al, 2018; Martin et al., 2016). In the context of the study area this has to do with how the priorities, needs and beliefs of different groups such as women, youth and poorer households are addressed in the CHA program. Recognition equity has an inter-subjective aspect in that freedom is achieved through the perception of meaning acquired in a relational context (Martin et al., 2016). Our results support this assertion where presence of internal cohesion within a community, such as active support groups and networks, led to positive perceptions on the recognition of these groups' priorities in the CHA program. For example, qualitative data from a study of equity in the region (Abebe et al., 2020) shows in the *kebeles* with strong bonding capital, women reported relying on "*Afosha*", a rotating saving and credit association that also serves as means to support each other in times of need. Such networks, particularly among marginalized groups, serves as an informal source of information and a means of empowerment and assertion of their particular needs and priorities. Similarly, the presence of "*Gote*" (a nucleus of smaller community units) were reported as vital in creating cohesion among community members and

leaders. Households with stronger sense of belongingness to their respective *Gotes*, where they received information about the programs and had a close relationship with the *kebele* leaders. Communities with less active *Gotes* and poor relations with their *kebele* leaders were also more likely to have negative perception towards the CHA program leaders and CHA program This is valid concern given the majority of the *kebele* and CHA leaders are older men and belong to similar social networks. Thus, existing bonding capital across units such as *Gote*s, *kebele* administration, and self-support groups is key in facilitating or deterring perceptions of inclusion and acknowledgement in the CHA program. It was surprising our results did not show bonding capital to have a statistically significant effect on perceptions of distributive equity.

Linking social capital was evaluated in this study in terms of perceptions of relationships with conservation organizations that have presence and influence in the communities. The results showed that linking capital positively shaped perceptions of all three forms of equity. There are different organizations involved with the communities in various conservation and livelihood programs in the area. The private hunting concessionaire that leases land from the government has been working with different communities in providing community services such as roads, water wells and employment opportunities. OFWE is the key government organization that has been mobilizing communities in the creation of the community-based organizations. Farm Africa, primarily active in the lowlands has been providing training and material support related to forest conservation efforts. Across all households in the four *kebeles*, the private hunting concessionaire was rated as the top organization that has the most presence and active relationship with the communities. Households that reported that their communities had an active and positive relationship with the private concessionaire reported positive perceptions of all three dimensions of equity. This is in line with a previous study in the area (Abebe et al., 2020), where we found

that perceptions of previous or current relationships with the private hunting concessionaire, shaped the extent to which people perceived the benefits of the program as equitable or felt like the program recognized their rights and priorities.

This finding is particularly important considering that in principle, the CHA program is clearly distinct from the private hunting concessionaire in terms of the expected responsibilities towards the community. The OFWE oversees the CHA program, and CBOs and *kebeles* administer their respective communities in the sharing of benefits and monitoring. While the private hunting concessionaire brings in hunting revenues and pays concession fees, it is not directly involved with or responsible for the distribution of these benefits to the local community. The official responsibility of distributing benefits from trophy hunting fees to the respective CHAs is entrusted to EWCA and OFWE. Some community infrastructure, such as roads and schools, that the concessionaire has provided in *kebeles* most adjacent to hunting campgrounds are not part of the CHA program, but the concessionaire's own initiatives of establishing good rapport with the neighboring community. However, the local community does not have a clear understanding of the separate mandates of these external organizations. Underpinning their perceptions of equity of the CHA program are their past and present relationship, support and direct benefits received from the hunting concessionaire, who they identify as a key stakeholder when they discuss the CHA program. However, the hunting concessionaire does not have the capacity or mandate to extend its support or maintain active relationships with all adjoining *kebeles* in the CHA program further fueling resentments and suspicion of favoritism for certain *kebeles*.

3.5.3 Effects of CBC programs on perceptions of equity

We found that the CBC models were a significant determinant of each of the three equity dimensions. A household was found more likely to report having received benefits from the CHA

program and to rate these as fair if they lived in *kebeles* found in the new CBC program. Furthermore, households that lived in the new CBC *kebeles* were more likely to positively report on the decision-making processes and the recognition of their needs and priorities in the new CBC than households involved in the original CBC program. This result is aligned with some of the ways in which the new CBC program is attempting to facilitate an organized mechanism for distributing benefits across *kebeles*, putting in place designated CBOs, which include management and monitoring committees and an accountability framework where CBOs report to OFWE, the overseeing external organization.

Contrasting the two models, the new CBC program involves an explicit framework to devolve resource monitoring, management of incentives and decision-making rights to designated CBOs in each community, whereas in the original CBC where *kebele* leaders are the *de facto* administrators of the financial benefits from the CBC program. Since *kebele* officials are political appointees, perceptions toward them are clouded with bureaucratic bottle necks, administrative failures, and misallocation of resources. The perceptions of equity are invariably associated with these negative connotations. The finding of more positive perceptions for distributive equity in the new CBC can thus be linked with the presence of an accountability mechanism that increases trust and transparency for households in this arrangement. Furthermore, the presence of joint CBO committees, which are community management units adjoining multiple *kebeles* with a performance-based benefit sharing mechanism, appears to facilitate an understanding that the share of benefits is reasonably administered among *kebeles*. While this approach is imperfect in that not all community members in the new CBC program *kebeles* were aware of the distributive processes, there was a common understanding in these *kebeles* that the benefits from hunting were not arbitrarily disbursed across *kebeles*. This can be attributed to the presence of better procedural

trust in these communities as a result of the establishment of the CBOs. The contrary was true in the original CBC *kebeles* where despite the presence of the incentive mechanisms (each *kebele* received revenues solely based on its respective size), there was no framework that serves to connect the community with OFWE or a committee specifically designated for managing finances. As a result, there was a pervasive distrust on the allocation of funds among these communities. The lack of procedural trust is tied to unfounded rumors that the land has been sold off and the incentive is the government's way of silencing unrest from the community. Thus, the presence of procedural and distributive inequity is tied to recognition equity in which the incentive-based arrangement alone, in the absence of trust and accountability ensuring mechanisms, was seen by the community as depriving them of their land rights.

3.5.4 Policy implications

Addressing equity concerns in conservation is becoming an increasingly sought-after goal both as an ethical obligation towards people affected by conservation programs and for practical reasons of enhancing effective biodiversity conservation. In CBC programs, despite the professed quest to attain positive social outcomes, intra communal differences in access to resources and decision-making power shape who benefits from such conservation efforts. Furthermore, the internal institutional arrangements of each community, the presence and strength of relations with external organizations, and the fit between design of conservation programs and the complex implementation context all have bearing on shaping equity outcomes.

Based on the findings from this research, we assert that addressing heterogeneity among community groups affected by the conservation program is critical in equity design and assessment. By disaggregating the often-simplified notion of community, we argue for the need to address the interplay of individual attributes, namely gender and wealth, as important factors in

shaping perceptions of distributive equity. Second, our results showed the effects of bonding and linking capital in shaping procedural and recognition dimensions of equity. Existing community networks and units lay down foundations of trust that can be harnessed to develop equitable conservation programs We reiterate the strong need to build on internal capacity of a community which will facilitate trust in the decision-making processes when involved in conservation interventions such as the CHA program.

Beyond merely dispensing conservation incentives, we also stress the need to strengthen meaningful external linkages with conservation organizations as key to building rapport and shaping more positive equity perceptions. We have shown the interrelationships between the different dimensions of equity where strong perceptions of procedural equity were associated with strong/positive perceptions of recognition and distributive dimension. This underscores the need for conservation organizations and hunting concessionaries to give due emphasis to building trust, emphasizing respect and recognition to different actors when striving for more equitable conservation outcomes.

Finally, we argue that designing a conservation program which incorporates a power sharing mechanism, can facilitate more positive equity perceptions. As evidenced with our results showing the new CBC model being linked with more positive equity perceptions, we suggest that institutional design of conservation programs that incorporates community driven management, monitoring and reporting mechanisms can play a large role in facilitating transparency, trust, and legitimacy. This in turn can lead to recognition of identities and positive perceptions of distribution outcomes. Hence, we suggest the CBC program in our study area continue to build on organizational arrangements like in the new CBC model that strengthens a community's capacity to promote equitable distribution of benefits and costs, decision-making process, and recognition

of rights, while recognizing the need to address vulnerable groups and their disproportional reliance on natural resources.

3.6. Conclusion

Despite the recent burgeoning rise in literature on social equity in conservation, there is paucity of evidence on factors explaining social equity outcomes in community conservation. Our study provides important understanding on the household and institutional characteristics that predict equity outcomes in CBC programs. In line with previous studies (McDermott et al., 2013; Zafra-calvo et al., 2017), we engaged with social equity as a multi-dimensional concept that includes distributive, procedural and recognition dimensions. We disaggregate the notion of 'community' (Berkes, 2007) to develop a nuanced understanding of how household and institutional characteristics explain equity perceptions using the SLF's five capital assets. The SLF posits that households have differing degrees of capabilities which is conditioned by various social and individual contexts including gender, age, status, access to resources, institutional and policy arrangements. Using this approach, we developed explanatory models that show the roles of physical, financial, natural, human, and social capital assets in shaping equity perceptions.

We found slightly negative perceptions of all three dimensions of equity across the four communities. Gender, wealth, and access to land were important household determinants of distributive equity, with women and poorer households having more negative perceptions. Access to land was also associated with perceptions of procedural equity. Social capital, both internal community cohesion and strong relationships with external organizations, positively affected all three dimensions of equity but had the largest impact on procedural and recognition equity. Finally, we explored how the two conservation models affected equity and found that communities

involved in a CBC model that emphasized joint management, monitoring, and transparency had higher perceived equity than communities involved in a model without these features.

Overall, our results provide important advances in quantitatively measuring equity dimensions and understanding how household and institutional factors influenced perceived equity. Empirical evidence on factors explaining equity outcomes can help to develop more just conservation programs that address prevalent household and community disparities and subsequent differences in power relations. Addressing these equity concerns is critical and timely not only for Ethiopia, but across Africa and the globe, given surging social, economic, and political unrest and increasing conservation threats.

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4. CHAPTER FOUR: UNDERSTANDING ATTITUDES TOWARD NATURAL RESOURCE CONSERVATION AND COMMUNITY BASED CONSERVATION PROGRAMS IN THE BALE MOUNTAINS, ETHIOPIA

4.1. Introduction

Global biodiversity loss is taking place at an alarming rate with one million species facing extinction (Díaz et al., 2019). The International Union for the Conservation of Nature (IUCN) reports 41% of amphibians, 25% of mammals, 34% of conifers, 13% of birds and 33% of reef-building corals are threatened with extinction (IUCN, 2018). Habitat destruction and fragmentation is the prime driver of species extinction, with 75% of terrestrial and 66% of marine systems being 'severely altered' by human actions (United Nations, 2019). To try and curb biodiversity loss and habitat destruction, the global coverage of protected areas has been increasing, with close to 15% of terrestrial and inland waters falling under formal protection (UNEP-WCMC et al., 2019). Protected area coverage is growing most rapidly in developing countries where biodiversity is the greatest (Naughton-Treves et al., 2005). Yet protected areas in developing regions that are biodiversity-rich face increasing pressures from population growth and growing demand for natural resources, leading to habitat encroachment, fragmentation, and continued biodiversity loss (Liu et al., 2001; Naughton-Treves et al., 2005; Schulze et al., 2018). Thus, while protected areas remain a critical cornerstone of biodiversity conservation, there have been mixed social and ecological outcomes associated with these exclusionary governance approaches in developing countries (Hayes, 2006; Lele et al., 2010; Pfeifer et al., 2012).

There is now widespread recognition that effective biodiversity conservation depends on sufficiently integrating the human dimensions of conservation, including institutional arrangements, socio-economic and political realities, and the needs and aspirations of local communities (Armitage, 2005; Bennett et al., 2017a,b; Brechin et al., 2002). Community-based

conservation (CBC) embodies the idea that conservation and people are mutually interdependent and must be linked in conservation planning (Galvin et al., 2018; Gibson & Marks 1995; Newmark & Hough, 2000; Western, 1994). CBC programs implement different strategies and mechanisms to garner local support which include providing direct monetary/material incentives, offering employment opportunities, integrating conservation and livelihood objectives through rural development programs, sharing decision-making rights, and creating educational programs (Cooney et al., 2017; Nilsson et al., 2016). The underlying assumptions in these approaches are that enlisting locals' support is key to achieving success in conservation outcomes (Brooks et al., 2012; Mehta & Kellert, 1998; Rampheri & Dube, 2020) and that locals will support conservation if they perceive they have a legitimate stake in conservation goals, participate in decision-making processes, and are fairly compensated (Hulme & Murphee 2001; Snyman, 2014; Störmer et al., 2019).

While the premises of CBC programs are appealing, their practical effectiveness in attaining desired conservation and social outcomes remain challenged by complex social factors (Galvin et al., 2018; Hackel, 1999; Newmark & Hough, 2000). Studies show the negative effects of overly simplistic and flawed assumptions in CBC program design and implementation regarding communities and the impact conservation interventions will have on them (Berkes, 2004; Blaikie, 2006; Stone & Nyaupane, 2014). For example, a major assumption in many CBC programs is that a 'local community' is a homogenous and unified group. In line with this thinking, communities are often perceived as having either overall hostile attitudes toward conservation or as being trusted 'guardians of nature' (Forsyth & Walker, 2008; Moore, 2010). However, individuals display an array of attitudes toward nature and respond differently toward conservation interventions based on important social characteristics such as gender, age, role in the community, and social ties with

other actors in/outside the community (Costa et al., 2017; Diedrich et al., 2017; Garekae et al., 2016). CBC interventions are often expected to shift attitudes and behaviors positively toward conservation, but with mixed evidence. For example, the distribution of economic incentives as part of CBC programs do not always lead to desired conservation attitudes and behaviors (Larson et al., 2016; Gibson & Marks, 1995; Newmark & Hough, 2000; Ochieng et al., 2020). Additionally, CBC programs that devolve power and decision-making rights have not always led to positive conservation attitudes, as these rights are conditioned on pre-existing power dynamics and inequities between different groups and individuals (Agrawal & Gibson, 1999; Calfucura, 2018; Gibbes & Keys, 2010).

In the face of these complex challenges, devising and implementing effective and equitable CBC programs requires a grounded understanding of the varied factors shaping groups' and individuals' conservation attitudes and behaviors (DeCaro & Stokes, 2008). Attitudes have been extensively studied in human dimensions of conservation research as a way to understand and measure individuals' and groups' preferences, perceptions, or opinions on a specific topic (Dewu & Røskaft, 2018; Donnelly & Vaske, 1995; Infield & Namara, 2001; Manfredo et al., 2013; Sharma et al., 2019; Snyman, 2014). Attitudes are defined as the organization of beliefs about an object that influence one's evaluation of that object (Rokeach, 1968). Studies measuring attitudes in human dimensions employ a series of belief statements focused on respondents' evaluations of a specific conservation issue (Manfredo, 2008; Larson et al., 2016). One of the main reasons for the prevalence of attitudinal studies in human dimensions research is the assertion that attitudes can help explain complex cognitive processes that influence human behavior (Manfredo et al., 2004). According to the Theory of Planned Behavior, and its later variant the Theory of Reasoned Action, attitudes are the proximate cause of behavioral intentions which in turn cause behavior

(Ajzen & Fishbein, 2000, 2005; Fishbein & Ajzen, 1975). Thus, understanding attitudes can serve as an indicator of future adoption of conservation behaviors. Additionally, understanding attitudes can help assess the effectiveness of conservation interventions by gauging their perceived legitimacy, acceptability, and impact among different groups (Sirivongs & Tsuchiya, 2012; Snyman, 2014).

It is important to understand the factors shaping individual attitudes toward natural resources if conservation programs hope to achieve their goals. This requires critically examining individual and community characteristics, past and present relationships between individuals and groups, as well as the socio-cultural, economic, and political context (Brooks et al., 2012, 2013; Infield, 1988). Attitudinal studies in CBC show that individual characteristics such as gender, age, education, size of land, size of household, wealth, and ethnicity are important factors in shaping attitudes toward nature conservation (Kideghesho et al., 2007; Mukherjee & Bhattacharya, 2017; Mutanga et al., 2015; Tessema et al., 2010). For example, women have sometimes been found to have less favorable attitudes toward conservation given their greater reliance on forest and natural resources, inadequate compensation to losses and less representation in decision-making processes (Costa et al., 2017; Kaeser et al., 2018; Kamat, 2018). However, other studies show women to have more positive attitudes toward nature conservation stemming from their deeper relationship with, dependence on and knowledge of the environment as well as their caring and nurturing nature (Agarwal, 2009; Low & Tremayne, 2001; Ray et al., 2017). Some studies find that more educated groups report more positive attitudes toward conservation (Kideghesho et al., 2007; Tomićević et al., 2010). Better-off households have also been found to express less negative attitudes toward conservation than poorer ones, as they have a greater range of alternative means to support their livelihoods compared to poorer households that are more heavily dependent on natural resources

(Hariohay et al., 2018; Tessema et al., 2010). Other factors influencing locals' attitudes is their livelihoods and their proximity to conservation areas. In general, crop raiding, conflict with wildlife, and exclusion from natural resources have been shown to result in negative attitudes toward conservation (Lepp et al., 2006; Snyman, 2014).

At the group level, social capital, in the form of trust, reciprocity and exchange, common rules, norms and sanctions, and connectedness in/across groups, has been shown to enhance positive conservation outcomes (Pretty & Smith, 2004; Pretty & Ward, 2001). It is also likely that social capital influences attitudes toward natural resources and conservation programs (Diedrich et al., 2017). There is increasing evidence showing that the social equity of CBC programs, in terms of fairness in distribution of costs and benefits, decision-making processes and the recognition of different identities, is instrumental in enhancing positive conservation outcomes (Dawson et al., 2018; Pascual et al., 2014). Ensuring social equity in the form of local empowerment and inclusion in decision-making is expected to result in positive equity feedbacks such as increased legitimacy, local buy-in and compliance, which should manifest itself as positive conservation attitudes and outcomes (Pascual et al., 2014).

In this paper, we contribute to the literature on attitudes toward natural resource conservation and CBC programs by examining the individual and group factors that shape attitudes in the Bale Mountains, Ethiopia. The Bale Mountains share the conservation dilemma facing many biodiversity-rich conservation areas in developing countries: rapid population pressure, land scarcity, agricultural and settlement expansion, overgrazing, and deforestation. These anthropogenic factors pose significant threats to biodiversity conservation efforts in and around Bale Mountains National Park (BMNP). The introduction of CBC has occurred around BMNP in the form of Controlled Hunting Areas (CHAs), which are centered around trophy hunting. The

CBC programs in the CHAs are an alternative governance model in the region seeking to reconcile conservation objectives with pressing livelihood demands on natural resources. The CBC model works based on the assumption that sharing of benefits and decision-making rights with the local community will promote positive attitudes about the CBC program and the protection of wildlife and natural resources more broadly. However, there is no current research that examines what factors explain locals' attitudes toward conservation of natural resources and attitudes toward the CBC program. Thus, the specific objectives of this research are to: 1) identify the factors and characteristics explaining locals' attitudes toward conservation of natural resources; 2) examine what factors and characteristics explain locals' attitudes toward the CBC program; and 3) explore the role of social equity in explaining locals' attitudes toward the CBC program. Understanding what factors influence individuals' attitudes toward natural resource conservation and the CBC program helps inform the ongoing efforts of implementing organizations in evaluating the early outcomes of the program and toward devising more effective CBC programs in the long run. This research also contributes to the human dimensions literature more broadly, by disaggregating and critically analyzing socio-economic and institutional factors that shape attitudes toward natural resource conservation and CBC programs.

4.2. Background

4.2.1 Trophy hunting as a conservation tool

Controlled hunting (also called 'trophy', 'sport' or 'safari' hunting) is a specialized form of tourism that involves paying for an authorized hunting of selected individual species with exceptional trophy characteristics (e.g., large horns, tusks, body size) (Fischer et al., 2015; Lindsey et al., 2007). Controlled hunting is considered a market-based conservation approach that not only creates an incentive for conservation of wildlife and their habitat but also contributes to rural livelihoods (Baldus et al., 2008; Muposhi et al., 2016). As a niche market of specialized and high

paying tourism, trophy hunting generates high revenues from lower volumes of tourists and hence minimizes damage on the natural environment (Mayaka et al., 2005). This is beneficial for developing countries as it allows for a small scale yet profitable form of tourism. Trophy hunting does not require the extensive infrastructural investment or alterations to the natural environment as is often the case with most other forms of tourism development (Lindsey et al., 2007). Hunters in search of unique trophies travel to less known destinations with lower aesthetic appeal to mass photography tourists, or during less popular tourist seasons, including during periods of political unrest (Gressier, 2014; Lindsey et al., 2007). As a result, remote, less developed areas with few other tourist attractions can still benefit from trophy hunting.

One of the strongest arguments in favor of trophy hunting is its role in incentivizing and supporting conversation of wildlife and their habitat. The revenue from trophy hunting can be reinvested in the management and protection of wildlife, as well as reintroductions or rehabilitation of wildlife areas (Lindsey et al., 2006, 2007). In the context of developing countries, wildlife conservation goals must compete with environmentally unsustainable livelihood/economic alternatives on the use of nature such as conversion to agricultural land and livestock grazing (Fischer et al., 2015; Tadie & Fischer, 2013). Trophy hunting can provide the much-needed economic justification and means for conservation of endangered and endemic species (Leader-Williams et al., 2005). Trophy hunting areas can promote landscape connectivity and protection of species' habitat ranges in private and communal lands beyond the restricted confines of strict state-run protected areas (Lindsey et al, 2007). This is particularly important in the context of biodiverse regions where protected areas are becoming increasingly engulfed by accelerating population pressure, land scarcity and habitat fragmentation. From a species composition standpoint, controlled hunting is considered important in supporting viable and healthy population

productivity rates. When effectively implemented, the quota system in controlled hunting promotes sustainable off-takes by removing a fraction of natural population growth rates (Evangelista et al., 2015; Muposhi et al., 2016).

However, the use of controlled hunting as a conservation/development tool is highly polarized and contested; it is riddled by ethical, ecological, and social concerns associated with its principles and practices. From a sustainable biodiversity conservation standpoint, if not effectively monitored and regulated, trophy hunting can have detrimental impacts on population dynamics and reproduction of wildlife species (Festa-Bianchet, 2003; Loveridge et al., 2007; Snijders, 2012). In the context of Africa, for example, most wildlife departments lack the resources to carry out reliable and regular wildlife census. Quotas are often based on guesswork, resulting in inappropriate and excessive quotas being set on wildlife populations (Lindsey et al., 2007). Another concern is related to the long-term impacts of the selective nature of trophy hunting on the hunted species. More specifically, there are concerns on the potential impacts of unnaturally high, hunting-induced adult mortality on the reproductive strategy of large mammals (Festa-Bianchet, 2003). Lastly, trophy hunting, as a market-based approach to wildlife management entails 'putting a price on wildlife's head', in which utilizable wildlife species are targeted and priced. Aspects of the broader system that do not easily fit into the narrow market-based categories are sometimes not adequately 'valued' or are sometimes considered a 'hinderance' (Snijders, 2012).

From the perspective of communities living in and around controlled hunting areas, there are reports of disenfranchisement as most governments and private hunting operators fail to devolve adequate benefits and decision-making rights to local people (Lindsey et al., 2007; Nelson & Agrawal, 2008). Due to the lack of opportunities for local community participation, many

hunting operators have failed to garner local community support and reduce illegal and uncontrolled hunting practices in and around hunting areas. For example, the presence of corruption, nepotism, and elite capture in the trophy hunting sector of many African counties has resulted in disproportionate distribution of benefits and burdens (Nelson & Agrawal, 2008). Most rural communities living adjacent to hunting areas report conflicts with wildlife including predation on domestic animals and resource competition. In the absence of appropriate compensation or effective benefit distribution and power sharing mechanisms from wildlife management, communities resort to revenge killings, uncontrolled poaching of wildlife, and destruction of their habitat (Lepp et al., 2006; Snyman, 2014).

4.2.2 Trophy hunting in Africa and Ethiopia

Subsistence-based traditional hunting in Africa dates back to time immemorial, governed by indigenous institutions characterized by totemism and scared laws (Muposhi et al., 2016). These traditional collective resource access arrangements coupled with the unsophisticated weapons used by indigenous hunters and gatherers ensured wildlife populations were not depleted in Africa in much of the pre-colonial period before the 1890's (DeGeorges & Reilly, 2009, Muposhi et al., 2016). During the colonial period, 1890-1979 'fortress conservation' as an exclusionary conservation approach of setting aside conservation and hunting areas devoid of human settlement became popular (Jones, 2006). Recreational trophy hunting was introduced during the colonial period where hunting was largely reserved for professional trader-hunters, museum collectors, and explorers, which employed technologically advanced hunting artillery (Muposhi et al., 2016). The subsequent expansion of mass wildlife killing as trophies and for trade by European settlers and traders led to decimation of significant wildlife population in Africa (DeGeorges & Reilly, 2009; Infield, 1988; Muposhi et al., 2016). Game Laws aiming at sustainable wildlife utilization through

regulated licenses and permits were promulgated in the 1960's. However, these policies were exclusionary and restrictive to indigenous African communities and their traditional land use rights and practices. The result was increasing dispossession and alienation of indigenous communities from their ancestral lands which contributed to the subsequent conflicts, environmental degradation, and rapid escalation of illegal hunting throughout much of Africa in the 1970s and 1980s. This has necessitated shifts in conservation policy and governance approaches leading to the various forms of people-centered approaches such as CBC starting in the late 1980's.

In Ethiopia, while licensed wildlife hunting dates back to the early 20th century, formalized oversight of hunting activities was not instituted until 1970 with the establishment of the Ethiopian Wildlife Conservation Organizations (now the Ethiopian Wildlife Conservation Authority) (Fischer et al., 2015). The Ethiopian Wildlife Conservation Authority (EWCA) in collaboration with its regional units is responsible for issuing hunting permits and setting annual quotas for huntable species (Fischer et al., 2015). Hunting takes places in designated CHAs which are leased to safari concession holders on a five-year basis which can be renewed if they remain in good standing (Evangelista et al., 2012; Fischer et al., 2015). Designated hunting areas are managed by EWCA and its regional branches for the regulated trophy hunting and conservation of wildlife and natural resources (Evangelista et al., 2012). Human livelihood related practices such as settlement expansion, farming, grazing, and poaching is prohibited inside CHA boundaries with the exception of regulated access to non-consumptive resource use. While all land in Ethiopia is owned by the government, the CHA boundaries exist next to, and often overlap with, customarily community owned lands creating contention over resource access and use rights (Abebe et al., 2020).

There are six CHAs in the Bale Mountains operating under three concession holders: Hanto, Abbasheba Demero, Besmena-Udubulu, Shedam Berbere, Gasera Wabe, and Adaba-

Dodola (Abebe et al., 2020). The prime species of interest in the Bale Mountains is the mountain nyala (*Tragelaphus buxotni*), a spiral horned antelope which is endemic to the region and considered a highly coveted species among trophy hunters (Evangelista et al., 2012). Other important trophy species include Menelik bushbuck (*Tragelaphus scriptus meneliki*), and Bohor reedbuck (*Redunca redunca*), while in Gasera Wabe CHA, lesser kudu (*Tragelaphus imberbis*) and greater kudu *(Tragelaphus strepsiceros* (OFWE report, N.D). Despite the promises of controlled hunting in the region as a wildlife management tool, there has been growing contention between its conservation objectives and surging livelihood demands propelled by population pressure, land scarcity, and land degradation in and around the CHAs. Starting in 2014, EWCA, its regional unit Oromia Forest and Wildlife Enterprise (OFWE), together with non-government organizations including Frankfurt Zoological Society (FZS), devised CBC programs that would include surrounding communities in benefit sharing from trophy hunting fees and devolve decision-making power. In this arrangement EWCA releases 85% of the total annual revenue earned from trophy hunting fees to the regional OFWE office. The OFWE in turn dispenses 60% of the received trophy fees to each *kebele* (the smallest administrative unit in Ethiopia) located within each designated CHA (Abebe et al., 2020). There are two slightly different models, one involves organized community-based organizations (CBOs) that are responsible for joint resource management, monitoring, and decisions about benefit distribution across multiple *kebeles*, and an older model that involves sharing of incentives from hunting with individual *kebeles* based exclusively on the size of land located within the CHA. The underlying assumption with these CBC program models is that providing community benefits in the form of hunting revenues and sharing of decision-making rights with the community will result in more positive conservation attitudes and behaviors (OFWE, ND).

4.3. Methods

4.3.1 Study area

The Bale Mountains, located in the Oromia region of Southeast Ethiopia, encompasses the largest continuous mountain massive above 2600 km^2 in Africa (Kidane et al., 2012). The mountain ecosystems display distinct altitudinal zonation that include the Afro-alpine (> 3,700 m.a.s.l.), sub-alpine and ericaceous (3,200 m to 3,700 m.a.s.l), upper Afro-montane forests (2,300-3,250 m.a.s.l.), and lower Afro-montane woodlands (1,500 -2,300 m.a.s.l.) (Evangelista et al., 2012). The high-altitude plateau and slopes (> 3500 m.a.s.l) found here represent one of the largest Afro-alpine habitats on the African continent (EWCA, 2007; Uhlig & Uhlig, 1991). The climate of the Bale Mountains is characterized by a short dry season (November to February) and more temperate wet season extending from March to October with a peak in precipitation in April-May and September-October (Kidane et al., 2012).

The Bale Mountains are home to BMNP, a biodiversity hotspot and center of endemism. The national park was established with the goal of safeguarding critical habitats for a number of Ethiopia's endangered and threatened species, most notably the Ethiopian wolf (*Canis simensis*), the rarest canid in the world, and two-thirds of the remaining global population of mountain nyala (EWCA, 2017). The Bale Mountains harbor 26% of the country's total endemic species, that includes 77 mammals (26% endemic), 170 species of birds (57% endemic) and over 1,300 species of flowering plants of which 63 are endemic to Ethiopia (EWCA, 2017; Evangelista et al., 2012; Kidane et al., 2012). The conservation significance of the Bale Mountains is further heightened by the critical role the massifs play in climate control and water flow regulation of five major rivers on which downstream users depend (EWCA, 2017). The bio-physical features and unique ecological functions of the Bale Mountains render it a site of exceptional resource value (EWCA, 2017). Despite its local, regional, and global conservation significance, however, the area

continues to face mounting pressure from growing human population and activities that degrade natural resources such as overgrazing, settlement expansion, cultivation, and firewood collection (Evangelista et al., 2012; Stephens et al., 2001). Unlike protected areas in many other African countries, bushmeat is religiously and culturally tabooed in this region. Hence poaching is currently not a direct threat to unique and endangered wildlife species in the Bale Mountains. Other anthropogenic factors such as forest loss, agricultural expansion and livestock grazing are among the key drivers of habitat destruction and loss of wildlife in this region (Evangelista et al., 2015; Stephens et al., 2001, Young et al., 2020).

Livelihoods in the Bale Mountains are mixed consisting mainly of crop farming and animal rearing. While some areas are more 'livestock zones', maintaining largely semi-transhumant pastoral lifestyles, others are 'cultivation zones', which increasingly integrate livestock holdings into the expanding agricultural economy (Flintan et al., 2008). Since the designation of BMNP, there has been an increasing shift in livelihoods from pastoralism to settled agriculture propelled by the scarcity in grazing pasture and an expansion of cultivated lands that have been encouraged by the provision of seeds and agricultural extension services (Flintan at al., 2017). Despite this increasing shift to agriculture, livestock remains an integral part of the economy and culture and continues to serve as a form of safety net in time of drought for many households (Flintan at al., 2008). The society is predominantly Muslim and from the Oromo ethnic group. There are clear, differentiated gender roles and many households practice polygamy.

We selected two CHAs for this study: Abbasheba Demero and Besmenda Udubulu (Figure 4.1). From each of these two CHAs, we then selected two *kebeles:* Gulba Duma Bole and Ledi Chekata, from the highland and lowland *kebele*s found in Abasheba Demaro CHA, respectively. From Besemena Udubulu CHA, we selected Weltel Wacho and Gebe Keku from the highland and

lowland *kebeles*, respectively. Highland *kebeles* are located at higher elevations, and primarily rely on sedentary agriculture. Increasing amounts of this agriculture is mono-cropping, especially for wheat and barley. Lowland *kebeles* are located at lower elevations, and livelihoods are based on pastoralism mixed with some subsistence agriculture. Many households in the lowlands harvest wild coffee commercially. The four *kebeles* have different histories of interaction with conservation organizations, different proximities to the CHA main hunting camps, and different proximities to major administrative centers. The total population of these *kebeles* ranges from a low of 490 households to a high of 1600 households.

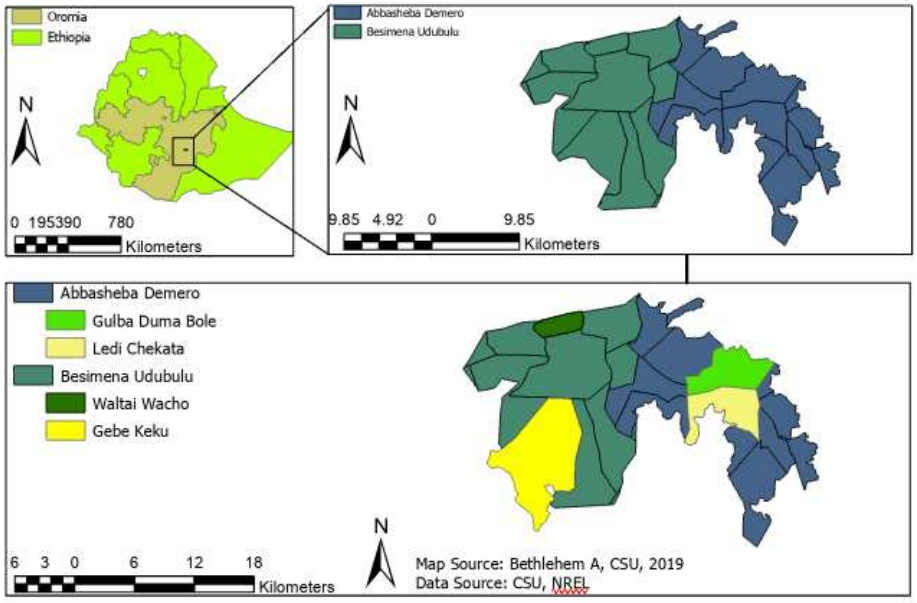

Figure 4.1. Map of the study area

4.3.2 Data Collection

4.3.2.1 Household sampling design

We used simple random sampling methods to select households based on a numbered list of total households which we obtained from *kebele* administrators. We generated random samples

that gave each household on the list equal chance of inclusion in the survey. Fifty households in each *kebele* were sampled for a total of 200 survey responses. To ensure younger generations and women were represented in the sample, we surveyed any household member (not only registered household heads) above the age of 18 that were home and consented to take the survey, with the aim to have at least 15% of our total sample including women and younger generations.

4.3.2.2 Data collection process

We conducted our household surveys in 2019. Prior to this, we conducted two field trips to the Bale Mountains in 2017 and 2018. These visits were key in helping us learn more about the setting and build rapport with representatives from community groups and conservation organizations in the area. Before collecting surveys in 2019, we conducted a week-long stakeholder consultation with *kebele* leaders and community representatives, which helped us to finalize our sample *kebeles* and household lists, as well as build trust and gain permission from community leaders to conduct the surveys.

The survey was translated to the local Afaan Oromo language with the help of local translators who also had conservation social science backgrounds. This ensured the terms and expressions used in the survey were not only conceptually fit to our research objectives but also culturally meaningful to respondents in the study area. We recruited six local enumerators from conservation organizations such as OFWE and the Ethiopian Biodiversity Institute. The enumerators were all fluent in Afaan Oromo and had training and experience in social science field research. The enumerators participated in a week-long training that covered standard IRB guidelines, such as informed prior consent and confidentiality of personal identifiers, as well as appropriate ethical research norms in the study area. The training also familiarized enumerators with the research objectives and the survey questions. To minimize possible interviewer bias

related to the affiliations of interviewers from conservation organizations in the area, we ensured that the enumerators did not have direct previous working exposure to *kebeles* from which they collected data. Enumerators presented themselves as independent researchers collecting data for a study on community perceptions of the controlled hunting area conservation program.

The final step before administering the survey was pre-testing the questionnaire on 15 randomly selected respondents in one of our sample *kebeles*. We revised the final survey based on feedback and questions raised during the pre-testing. The final survey took on average 90 minutes to complete.

4.3.2.3 Survey instrument

The survey included close-ended questions only (Appendix 2.6). We set out to measure three dependent variables: general attitudes toward conservation of natural resources, attitudes toward the CBC rules and attitudes toward CBC program benefits. All dependent variables were measured using 5-scale Likert questions, where a "1" represented strongly disagree and a "5" strongly agree (Chyung et al., 2017). General attitudes toward natural resource conservation were measured using ten Likert questions. These questions focused on the individual's perceived value of conserving forest and wildlife (i.e., nature) for: creating a sense of personal or community identity, benefiting future generations, providing clean air and water, regulating the local climate and rainfall, providing financial benefits in the form of increased income, and providing food sources and other non-timber forest products (e.g., fuel wood).

Attitudes toward the CBC rules were measured using nine Likert questions that focused on how the individual perceived the rules and restrictions of the CBC program on: access to forest products, grazing pasture, agricultural expansion, and if people followed these rules. Lastly, attitudes toward benefits from the CBC program were measured using ten Likert questions focused

on: the direct and indirect contributions of the program to the community's well-being and environmental outcomes. Some specific benefits asked about included changes to climate, water and air quality, wildlife protection, cultural benefits, and income.

To structure data collection on independent variables, we used the five capital assets from the Sustainable Livelihoods Framework (DFID, 1999). For human capital, we asked questions about gender, age, education, household size and composition, and length of residence in the *kebele*. Questions related to household material assets and house construction material were asked to measure physical capital. To assess financial capital, we asked questions about amount of crops and livestock sold in local markets. Natural capital was measured using questions on the total amount of land they had access to, use and frequency of extraction of timber and non-timber products, and access to public lands. In this study, two forms of social capital were measured using 5-scale Likert questions. Bonding social capital was measured using five Likert questions focused on the presence of strong ties across households within the same *kebele* such as neighbors, members of support groups, sub-village associations as well as presence of shared rules and norms (Pretty & Ward 2001). Linking social capital refers to the vertical relations that people have with external agencies that have power or authority to access resources or influence policies (Szreter and Woolcock, 2004). To measure linking social capital, we used five Likert questions focused on perceptions of relationships with external conservation organizations, including the presence and quality of relationships with conservation organizations in the form of addressing community concerns and offering technical and financial support.

Additionally, we used a measure of perceived social equity of the CBC program as an independent variable in the analysis of attitudes toward nature conservation and the CBC program. The three dimensions of social equity (distributive, procedural, and recognition) were measured

using Likert statements, where "1" represented "Completely negative equity perceptions" and "5" represented "Completely positive perceptions of equity", and then combined into an overall measure of perceived social equity of the CBC program.

There are non-trivial challenges when using standardized surveys to collect information on attitudes, particularly in the context of non-Western cultures (Browne-Nuñez & Jonker, 2008). These include multiple interpretations of concepts measured using Likert scales, central tendency bias where participants avoid extreme response categories, and social desirability bias where respondents report what they perceive to be socially desirable answers versus giving honest responses (Bertram,2007). To minimize these limitations, we used neutral probing techniques such as repeating the question, repeating the options, and providing scripted definitions for selected concepts when respondents asked for clarification (Schober & Conard, 1997; West et al., 2018).

4.3.3 Data analysis

4.3.3.1 Variable creation and selection

To analyze the survey data, we used Statistical Package for the Social Sciences (IBM SPSS statistics 26). Using the individual 5-scale Likert scale questions, we first created composite scores for the dependent variables and any independent variables measured using Likert scales. Since composite scores cannot be computed for a given question item when one of the composing items has a missing value using the listwise deletion, we used the delete items solution where we specified the number of questions a respondent must answer to be included in the summated composite index (Vaske, 2008). Individual responses were graded and summed, resulting in an overall score for each respondent on a scale. The internal consistency of the items on the scales was measured by the reliability coefficient, Cronbach's alpha, which ranges from 0 to 1; the larger the value, the greater the reliability of the scale (Vaske, 2008).

We created a composite index for attitudes toward conservation of natural resources using a final set of six Likert-statements. The composite index had a Cronbach alpha of >0.7, which is considered sufficient (Vaske, 2008). After first trying different iterations of composite scores for attitudes toward CBC rules and CBC benefits separately, we found that the highest reliability was found when we combined Likert-statements about attitudes toward CBC program rules and attitudes toward CBC program benefits. Thus, we created a combined variable with a final set of 11 items representing attitudes toward the CBC program more generally. Specifically, four questions asked about attitudes toward CBC program rules, including whether rules were being followed by people inside and outside the community and whether illegal activities were being reported. Seven questions focused on the perceived benefits of the CBC program, specifically: protection of wildlife, improving resource management practices, safeguarding resources for future generations, improving air and water quality, helping improve the climate, preserving the community's culture, and improving community cooperation. The resulting dependent variable had a Cronbach's alpha of >0.8. Thus, our regression analyses (see section 3.3.2) focused on two dependent variables.

For the independent variables of bonding and linking social capital, we created composite scores after checking the internal consistency of the Likert items. Each had Cronbach's alpha of >0.75. We created an average composite equity index that captured three separate dimensions of equity: distributive, procedural and recognition equity (Abebe et al., in preparation). Questions about each separate dimension of equity were measured using Likert-scale questions and combined into separate composite indexes. The average of these three combined equity indexes was used in this analysis and the combined social equity index had a Cronbach's alpha of >0.75.

Following variable creation, we ran basic descriptive statistics on all independent and dependent variables. Then we tested for univariate associations between each independent variable and the dependent variable using the following statistical tests: (1) independent samples t-test using the F-test (Levene's) when there was a binary independent variable; (2) analysis of variance (ANOVA) using Tuekey HSD for post-hoc comparison tests when there was a categorical independent variable; and (3) Pearson's correlations when there was a continuous independent variable (Garson, 2012; Vaske, 2008).

A final set of seven independent variables spanning the five capital asset categories were selected based on theory and exploratory analysis described in Section 3.3. From human capital, we used gender and age, where gender was measured as a binary variable with "1" coded as female and "2" coded as male. We hypothesized that females would have more negative attitudes toward natural resource conservation and toward the CBC program in this study area based on previous qualitative research (Abebe et al., 2020). Age was measured as a continuous variable but then coded as a binary variable where "1" represents ages less than 35 years and "2" as ages above 35 years, based on findings that youth and elders have divergent perceptions of social equity within the CBC program in the study area (Abebe et al., 2020). For physical capital we used household roofing material, measured as a binary variable, and coded as "1" for lower quality roofing and "2" for higher quality roofing. We used this as a proxy for wealth, and the expected relationship was that better-off households would have more positive attitudes toward natural resource conservation and toward the CBC program. For financial capital, we used a measure of how much crop production was sold at market. This was coded into a binary variable with "1" for crop sales of less than half of a household's total production and "2" for crop sales of more than half of their production. We expected that households with lower crop sales would have more negative attitudes

toward natural resource conservation and toward the CBC program. For natural capital we used frequency of fuelwood extraction coded as a binary variable with "1" for higher frequency of fuelwood extraction (>2 times a week) and "2" for lower frequency of fuelwood extraction. We expected that households that had lower frequency of fuelwood extraction will have more positive attitudes toward natural resource conservation and the CBC program, since they are less dependent on natural resources. For linking and bonding social capital, we hypothesized that communities with stronger internal ties and external linkages would have more positive attitudes toward natural resource conservation and CBC rules and benefits. Finally, for our independent variable measuring perceptions of social equity of the CBC program we hypothesized that households with more positive perceptions of social equity would have more positive attitudes toward natural resource conservation and the CBC program.

4.3.3.2 Regression Analysis

Multiple linear regression analysis was used to develop descriptive models on the effects of the five capital assets on each of the two dependent variables. In developing the regression models, we checked that the assumptions for linear regression had been met. Multicollinearity diagnostics tests of Variance Inflation Factor (VIF) >4 and Tolerance <0.2 were used as cut off points for deciding if there was too much intercorrelation between independent variables (Garson, 2012; Vaske, 2008). To ensure the relationship investigated is the same for the entire range of the dependent variables, tests of homoscedasticity were used (Garson, 2012). We ensured that the variance of error terms were similar across the values of the independent variables using scatter plots for the standardized predicted value against the standardized residual value (Garson, 2012; Osborne & Waters 2002). Additionally, we ensured there were no significant outliers using the Cook's Distance with a cutoff of one (Garson, 2012). We used standardized regression coefficients

to report results of the regression models. We also used standard errors as a measure of how well the model fits the sample data for all regression models.

First, we present results from full regression models, which include all seven capital asset independent variables described above. We also present results from a parsimonious model, which was determined independently for each dependent variable by using backward stepwise regression, which is a stepwise regression approach that starts with the full model of all seven variables and gradually eliminates variables from the regression to find a reduced model that best explains the data (Oshima & Dell-Ross, 2016). To help control for potential omitted variables at the *kebele* level, and provide additional confidence in the regression models above, we re-ran the full and parsimonious regression models including *kebele* dummy variables.

Finally, we also used mediation analysis to explore the role of perceived social equity on attitudes toward the CBC program. Previous research in Ethiopia has shown that perceptions of social equity is affected by the form and quality of social capital (Abebe et al., in preparation). Thus, social equity and social capital are often positively related, with both potentially influencing the perceived legitimacy of conservation and conservation programs. In this paper we explore whether the perceived social equity of the CBC program explains the effects of linking and bonding social capital on attitudes toward CBC rules and benefits. To analyze mediation effects, we used the four steps discussed by Baron and Kenny (1986) and James and Brett (1984) for establishing mediation. In Step 1, we tested if social capital was correlated with attitudes toward CBC rules and benefits. In Step 2, we tested if social capital was correlated with social equity. In Step 3, we tested that social equity affects attitudes toward CBC rules and benefits. In Step 4, we checked if the effect of social capital on attitudes toward CBC rules and benefits was zero controlling for social equity. We tested the significance of the indirect effect using bootstrapping

procedures. Unstandardized indirect effects were computed for each of 5000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. We did the mediation analysis separately for linking and bonding social capital.

4.4. Results

4.4.1 Household and livelihood characteristics

Out of our total sample of respondents, 73% were males and 27% females, with 55% of the total respondents being less than the age of 35 years (Table 4.1). The majority of the respondents had lived in the area most of their lives with average length of residency at 33 years. Households were located on average 16 minutes walking distance from the *kebele* center and an hour from the CHA boundary (Appendix 2.1).

In terms of livelihood activity, 97% of our respondents practiced traditional agriculture mixed with livestock keeping as their primary livelihood activity. Households had an average of five cattle with a maximum of 21 cattle per household. In the Highlands, the most commonly produced crops reported were wheat (74%), barley (52%) and beans (42%). About 55% of those surveyed in the Highlands reported selling more than half of their harvest. In the Lowlands, maize (87%), teff (68%) and coffee (49%) were the most common crops grown. Only 28% of the households in the Lowlands reported selling more than half of their produced crops (Appendix 2.1) Across the full sample, about 42% of households sold more than half of their crops at market (Table 4.1).

About 96% of the respondents reported extracting fuelwood from the forest, of which 66% reported extracting more than two times a week (Appendix 2.1). Other common forest uses included timber extraction (52%) and honey production (27%). Households on average owned

between 1.6 hectares of land in the Lowlands to an average of 2.3 hectares of land in the Highlands (Appendix 2.1). About 23% of people surveyed had lower quality roofing construction material (Table 4.1), which included thatch, wood or mud roofing, the majority of these households were in the Lowlands. The average value for bonding social capital was around a 4 out of 5. The mean value for linking social capital was around 3.

Table 4.1: Summary statistics of dependent and independent variables

Variables	Measurement	Average (mean and standard deviation) or Frequency (%)	Hypothesized Relationship
Dependent Variables			
Attitudes about natural resource conservation	Continuous scale 1 through 5, where 1 = Strongly Negative 5 = Strongly Positive	4.6 0.54	
Attitudes about CBC Program	Continuous scale 1 through 5, where 1 = Strongly Negative 5 = Strongly Positive	4.13 0.61	
Independent Variables			
Gender	Women Men	26.6% 73.4%	+ve
Age	Below 35 Above 35	55% 45%	+ve
Roof Type	Lower quality Higher quality	22.5% 77.5%	+ve
Crops Sold	Low sale High sale	58.5% 41.5%	+ve
Frequency of Fuel Extraction	High Rate of Extraction Low Rate of Extraction	71% 29%	-ve
Bonding Social Capital	Continuous scale 1 through 5, With 1 being the poorest and 5 being highest	3.8 0.78	+ve

Linking Social Capital	Continuous scale 1 through 5, With 1 being the poorest and 5 being highest	2.8 0.98	+ve
Social Equity	Continuous scale 1 through 5, With 1 being the poorest and 5 being highest	2.7 0.7	+ve

4.4.2 Regression analysis of attitudes toward natural resource conservation

The average score for attitudes toward natural resource conservation was 4.6 out of 5 (Table 4.1). The full regression model with all seven predictors explained 25% of the variance and was a significant predictor of attitudes toward conservation of natural resources, $F(7, 173) = 8.39$, $p<0.01$. Out of the seven predictors entered in the model, gender, age, frequency of fuelwood extraction, bonding social capital and linking social capital were statistically significant (Table 4.2). Specifically, the model shows that, on average, males reported 0.14 points more positive attitudes toward natural resource conservation than women. Similarly, elders reported 0.12 points more positive attitudes toward conservation of natural resources than those under the age of 35. For natural capital, on average households with lower frequency of fuelwood extraction scored 0.22 points more positive attitudes toward natural resource conservation than households with higher frequency of fuel extraction. For bonding social capital, as internal community bonding increases by one standard deviation, positive attitudes toward natural resource conservation increases by 0.12 standard deviation. For linking social capital, as positive perceptions of relationships with other organizations increased by one standard deviation, positive attitudes toward natural resource conservation increased by 0.28 standard deviation. When *kebele* dummy variables were added to the full regression model, bonding social capital was no longer statistically significant (Table 4.2), but the statistical significance of all other variables remained the same.

The parsimonious regression model included the same five covariates that were statistically significant in the full model (Table 4.2). This model also predicted 25% of the variation in the outcome variable and was statistically significant with F (5,175) =11.83 p<0.01. The five covariates have similar signs and coefficient sizes as in the full model. When *kebeles* dummies were added to the parsimonious model, bonding social capital again becomes statistically insignificant (Table2.4).

Table 4.2: Regression model explaining attitudes toward natural resource conservation.
******p<0.01, **p<0.05, *p<0.1***

Variables	Attitudes toward Natural Resource Conservation			
	Full Model	Full model + *Kebele* Dummies	Parsimonious model	Parsimonious model + *Kebele* Dummies
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	0.14** *0.08*	0.15** *0.08*	0.14** *0.08*	0.15** *0.08*
Age	0.12* *0.07*	0.13* *0.07*	0.12* *0.07*	0.11* *0.07*
Roof type	0.01 *0.08*	0.00 *0.09*		
Crops sold	0.02 *0.07*	0.02 *0.08*		
Frequency of Fuelwood Extraction	0.22** *0.08*	0.21** *0.09*	0.22** *0.08*	0.16** *0.08*
Bonding Social capital	0.12* *0.05*	0.10 *0.05*	0.12* *0.50*	0.10 *0.05*
Linking Social capital	0.28*** *0.01*	0.30*** *0.00*	0.28*** *0.01*	0.33*** *0.00*
Kebele 1		-0.11 0.10		-0.07 0.10
Kebele 2		-0.04 0.12		-0.06 0.10
Kebele 3		-0.06 0.11		-0.04 0.11
Observations	*189*	*189*	*189*	*189*

R^2	*25%*	*26%*	*25%*	*22%*

4.4.3 Regression analysis of attitudes toward the CBC program

The average score for attitudes toward the CBC program was 4.1 out of 5 (Table 4.1). The results from the full regression model indicated that the model explained 25% of the variance and was a significant predictor of attitudes toward the CBC program with F (7, 164) = 8.10, p <0.01 (Table 4.3). Out of the seven predictors entered in this model, only bonding, and linking social capital were statistically significant predictors explaining attitudes toward the CBC program. Specifically, the model shows that, as internal community bonding increases by one standard deviation, positive attitudes toward the CBC program increases by 0.25 standard deviation. As linking capital increases by one standard deviation, positive attitudes toward the CBC program increase by 0.27 standard deviation. The two variables remained statistically significant when adding *kebele* dummies to the full model.

The parsimonious model only retained the two social capital variables, predicting 22% of the variation in the outcome variable and statistically significant with a F (2,169) =23.97, p<0.001 (Table 4.3). There was no difference in statistical significance or coefficient size in the parsimonious model from the full model, and bonding and linking social capital remained statistically significant after adding *kebele* dummies to the parsimonious model (Table 4.3).

Table 4.3. Regression model explaining attitudes toward the CBC program. ****p<0.01, **p<0.05, *p<0.1*

Variables	Attitudes toward CHA rules and benefits			
	Full Model	Full model + *Kebele* Dummies	Parsimonious model	Parsimonious model + *Kebele* Dummies
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.11 *0.09*	-0.11 *0.10*		

Age	0.08 0.08	0.09 *0.08*		
Roof type	0.08 *0.10*	0.05 *0.10*		
Crops sold	-0.05 *0.08*	-0.02 *0.09*		
Frequency of Fuelwood Extraction	0.06 *0.09*	0.05 *0.10*		
Bonding Social capital	0.25** *0.05*	0.24* *0.06*	0.26** *0.05*	0.22** *0.00*
Linking Social capital	0.27*** *0.00*	0.25** *0.01*	0.29*** *0.00*	0.27*** *0.00*
Kebele 1		-0.01 0.12		-0.03 0.03
Kebele 2		0.06 0.01		0.04 0.04
Kebele 3		0.08 0.13		0.12* 0.12
Observations	*189*	*189*	*189*	*189*
R^2	*25%*	*28%*	*22%*	*26%*

4.4.4 Mediation model for attitudes toward the CBC program

Before testing for mediation effects of social equity, we ran an additional regression model which included the average social equity index as one of the independent variables affecting attitudes toward the CBC program (Appendix 3.2). When social equity was included in both the full and parsimonious regression models, we found that the standardized regression coefficient of linking and bonding capital were considerably reduced.

The results of the mediation analysis revealed that the standardized regression coefficient between linking social capital as the independent variable and social equity as a mediator (path a) was statistically significant with a coefficient of 0.52 ($p<0.01$) (Figure 4.2). We also found social equity to have a significant effect on attitude toward the CBC program (path b) with a coefficient of 0.44 ($p<0.01$). The total effect, which refers to the standardized regression coefficient between

linking social capital and attitudes toward CBC program, was statistically significant (path c) with a coefficient of 0.29 ($p<0.01$). With the inclusion of social equity as a mediating variable, the direct effect, which refers to the impact of linking social capital on attitudes toward the CBC program when social equity was controlled for, was no longer statistically significant (path c') with a coefficient of 0.005 ($p=0.46$). The bootstrapped unstandardized indirect effect, which refers to the mediation effect of social equity was 0.02, and the 95% confidence interval ranged from 0.01 to 0.04. Thus, the indirect effect was statistically significant. These results indicate that the relationship between linking social capital and attitudes about the CBC program is fully mediated by perceptions of social equity about the CBC program. We found that the mediation effects of linking social capital on attitudes toward the CBC program was robust controlling for the effects of the six other capital asset independent variables (Appendix 3.3).

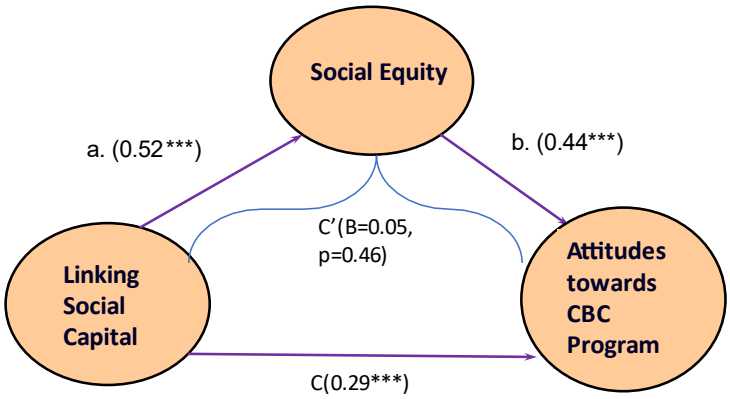

Figure 4.2: Path analysis showing mediating effect of social equity on impact of linking social capital on attitudes toward the CBC program. Path a showing the regression coefficient for the effect of linking social capital on social equity; path b refers to the effect of social equity on attitudes toward the CBC program; path c refers to the total effect, which is the effect of linking

social capital on attitudes toward the CBC program; path C' refers to the direct effect, or the impact of linking social capital on attitudes toward the CBC program when social equity was controlled for.

When we tested for mediating effects of social equity on the effects of bonding social capital and attitudes toward the CBC program, we found that the standardized regression coefficient between bonding social capital as the independent variable and social equity as a mediator (path a) was statistically significant with a coefficient of 0.14 ($p<0.05$) (Appendix 3.1). We also found social equity to have a significant effect on attitudes toward the CBC program (path b) with a coefficient of 0.44 ($p<0.01$). The total effect, which refers to the standardized regression coefficient between bonding social capital and attitudes toward the CBC program, was statistically significant (path c) with a coefficient of 0.20 ($p<0.01$). With the inclusion of social equity as a mediating variable, the direct effect which refers to the impact of bonding social capital on attitudes toward the CBC program when social equity was controlled for remained statistically significant (path c') with a reduced coefficient of 0.18 ($p<0.01$). The bootstrapped unstandardized indirect effect, which refers to the mediation effect of social equity was 0.02, and the 95% confidence interval ranged from -0.012 to 0.114. Thus, the indirect effect was not statistically significant. This indicates that the relationship between bonding social capital and attitudes about the CBC program is not mediated by social equity; the two covariates have independent, and statistically significant, influence on the dependent variable.

4.5. Discussion

Local support and participation is increasingly recognized as a key component of achieving success in biodiversity conservation outcomes (Berkes, 2004; Bennet & Dearrden, 2014; Brooks et al., 2012). This has led to the proliferation of various forms of CBC programs in much of the developing world where local people live next to and/or rely on nature for livelihoods (Hulme & Murphee 2001; Newark & Hough, 2000; Thakadu, 2005). Such programs involve different

mechanisms, such as benefit sharing, devolution of decision-making, and/or integration of livelihoods and conservation, to garner local support and buy-in for conservation efforts. Yet CBC programs are not a panacea, as evidenced by their mixed social and ecological outcomes (Brooks et al., 2013; Galvin et., 2018). This calls for critical assessment of the social feasibility and implementation processes of CBC programs (Agrawal & Gibson, 1999; Blaikie, 2006; Stone & Nyaupane, 2014). Understanding what influences individuals' and groups' attitudes toward conservation of natural resources and conservation programs is one important step in developing CBC programs that lead to more effective and just conservation outcomes. Positive attitudes toward natural resource conservation and CBC programs are expected to lead to positive changes in conservation behaviors and thus contribute to long-term success in biodiversity conservation.

This paper contributes to the literature assessing locals' attitudes toward natural resource conservation and CBC programs by examining how socio-economic and institutional characteristics shape attitudes. We find that gender, age, and frequency of fuelwood extraction are correlated with attitudes toward natural resource conservation. We also find that bonding and linking social capital are key factors shaping attitudes toward natural resource conservation and toward the CBC program. Furthermore, we find that social equity mediates the effect of linking social capital on attitudes toward the CBC program. We discuss the direction of influence of these socio-economic and institutional variables on both attitudes toward natural resource conservation and the CBC program, and their policy implications, below.

In interpreting our results, it is important to keep in mind the limitation that we do not have baseline data on attitudes, in order to compare attitudes before and after the establishment of the CBC program. Thus, our single-point-in-time study does not allow us to tease out any possible causal relationships between attitudes toward nature conservation and the CBC program. Another

caveat in the interpretation of our findings is that we only have data from four *kebeles* (out of approximately 40 *kebeles* involved in these programs in the Bale Mountains). This restricts our ability to generalize widely. Lastly, given the complexity of the socio-ecological setting, we are not able to control for all covariates that could affect attitudes about nature conservation and the CHA program. That said, the findings of this study provide important insight for the CBC community in elucidating the role of specific socio-economic and institutional factors that shape conservation attitudes and CBC programs as discussed below.

4.5.1 Socio-economic factors shaping conservation attitudes

In our analysis of household capital assets, we found that resource use patterns in terms of frequency of fuelwood extraction was a key factor shaping attitudes toward natural resource conservation. Households that have higher rates of fuelwood extraction are more dependent on forest products and had less favorable attitudes toward natural resources conservation. In Sub-Saharan Africa, more than 80% of the population relies on wood fuels for energy and fuelwood consumption patterns reflect the status of household welfare (Sassen et al., 2015; Uhunamure et al., 2017). For example, a study assessing drivers of fuelwood use in South Africa shows that rural households' reliance on fuelwood consumption is correlated with the levels of household income and unemployment rates (Uhunamure et al., 2017). To meet their domestic energy needs, lower income households and those that are unemployed rely more on extracting fuelwood from forest. The role of non-timber forest products for poorer rural households in Africa is well supported in the literature (Cavendish, 2000; Thondhlana & Muchapondwa, 2014; Shackelton & Shackelton, 2004). For example, in rural South Africa income generated from fuelwood and other non-timber products are a coping strategy for poorer households in times of adversity (Shackelton & Shackelton, 2004). While there is regulated access to fuelwood extraction within the CHAs in this

study area, this may be insufficient for households that are more reliant on the forests for their energy needs or livelihoods (Abebe et al., 2020). It is likely that this perception of loss of access to fuelwood, and other forest products, from conservation shapes the negative attitudes toward conservation in our study area. Our results are similar to those in Nepal, where households with greater dependence on the wildlife reserve for basic needs such as firewood, fodder and raw materials held more negative attitudes toward conservation of natural resources (Shrestha & Alavalapati, 2006), and in Sudan, where land poor households showed greater dependency on forest which in turn resulted in negative attitudes toward conservation (Ada & Tayeb, 2014). Our results suggest that CBC programs need to pay more attention to intra community disparities on natural resource reliance and the disproportionate impacts of conservation on marginalized households. This in turn requires devising targeted strategies that duly address varying degrees of cost experienced by local actors in order to encourage more positive attitudes toward nature conservation.

We find that younger people have less favorable attitudes toward natural resource conservation. Given high population pressure and land scarcity, a growing number of younger people are no longer able to inherit land from their families in the Bale Mountains (Abebe et al., 2020). As result of increasing landlessness and a lack of alternative, off-farm livelihood options, young people tend to prioritize extractive uses of land such as farming, settlement, fuelwood collection, and timber extraction. A previous study in the region found that jobless and landless young people are increasingly disenfranchised from conservation of natural resources and the loss of direct financial benefits from nature (Abebe et al., 2020). The youth perceive the conservation of resources for their long-term benefits conflicting with their demand for direct consumptive uses of land for quick monetary returns. The increasing demand by the youth for natural resource access

and use rights is further galvanized by ongoing youth-led political activism and civil unrest in region. Contrarily, other studies have found youth to be better positioned as drivers of sustainable resource management with more positive attitudes toward conservation of natural resources. For example, Garekae et al. (2016) found that young people in Chobe Forest reserve in Botswana had more favorable attitudes on forests than older people. This was associated with greater educational status and or more awareness of the benefits of natural resources among the youth. Our results in the Bale Mountains might be different from those in Botswana because young people tend to have only attended primary school and there are no explicit environmental education or awareness campaigns about conservation of natural resources in this region. Other studies show how the presence of benefit/employment opportunities, recognition of rights and improved relationships with the youth were associated with more positive attitudes toward conservation (Gross-Camp et al., 2019; Tomićević et al., 2010). Based on these results, it would be worthwhile for CBC programs in Ethiopia to strategically invest in strategies that target the youth. This could include programs aimed at diversifying off farm livelihoods and income opportunities that can help alleviate dependence on forest resources, as well as incorporating more educational and awareness raising programs that target the youth.

Additionally, we found in our analysis that women are more likely to hold negative attitudes toward natural resource conservation. These negative attitudes toward natural resource conservation among women might be linked to the lower socio-economic status of women in the region and their gendered intrahousehold responsibilities which make them more reliant on extraction of forest products (Abebe et al., 2020). Women in the study area, as is the case in many rural parts of developing countries represent a marginalized group of society (Parveen & Leonha¨user, 2004). Forest products such as fuelwood, fodder and honey serve as important safety

nets or supplemental sources of income for women in the study area (Abebe et al., 2020). As a result, women tend to be more concerned about their ability to access and utilize forest products for sustenance and/or additional income over the protection and preservation of resources. In the literature, there are mixed findings related to women and their attitudes toward conservation of natural resources (Allendorf et al., 2017; Jackson, 1993; Tomićević et al., 2010). Some studies have found women to be more likely to support conservation of resources based on disproportional impact they incur as a result of resource degradation, their particularly nurturing and caring disposition toward nature, their knowledge and use of forest products and medicinal plants, or their attitudes toward the scared values of nature (Gaard, 2001; Raim et al., 2019; Swain, 2004). Other studies have found women to hold more negative attitudes toward conservation as a result of their greater dependence on collection of timber and forest products from conservation areas (Larson et al., 2016; Roy, 2016; Sarker & Røskaft, 2011). These mixed findings support the claim by Jackson (1993) and Colwel et al. (2017) that women as a group do not experience environmental degradation or respond to it in a uniform fashion. Instead, these are mediated by the cultural context, age, livelihood strategies, socioeconomic status, access to credits and loans, as well as social capital. Hence the negative attitudes reported by women in this study should be seen in the context of other intersecting factors such as socioeconomic status, frequency of fuelwood extraction, as well as access to other capital assets. These results highlight the need to incorporate gender specific strategies into CBC programs that can help alleviate women's reliance on forest resources; this could include increasing access to credit to encourage alternative livelihoods or subsidizing adoption of alternative cooking methods.

None of the three socio-economic variables discussed above, frequency of fuelwood extraction, gender, or age, were significantly correlated with attitudes toward the CBC program,

despite their relationship with attitudes toward conservation more broadly. A possible explanation for this is that statements measuring attitudes toward conservation focused more on people's daily needs, lived experiences, and priorities, which elicited differences across age, gender, and resource dependences in our study area. Statements in this study about attitudes toward the CBC program focused more on perceptions of rules and the perceived impacts or benefits of the program. The CBC program may not have had a long enough operational history to allow us to observe any significant differences in attitudes toward the program's rules and impact on natural resources. Ulambayar et al. (2017) argue how CBC outcomes and their linked feedbacks are slow and complex and could take time to observe. This highlights the need for conducting longitudinal assessments that build on the findings of this study to support adaptive evidence-based decision-making (Conley & Moote, 2003; Ferraro, & Pattanayak, 2006).

Measures of household financial and physical capital were not correlated with attitudes towards conservation of natural resources or attitudes toward the CBC program. For financial capital we used a measure of how much crop production was sold at market. We expected that households with lower crop sales would have more negative attitudes toward conservation of natural resources and toward CHA rules. Accurately measuring financial capital using economic proxies is particularly difficult in developing countries (Ravallion, 2003), and so we cannot completely rule out that the relationships found in other studies (e.g., Hariohay et al., 2018; Tessema et al., 2010) do not exist here. For physical capital we used household roofing material as a proxy for wealth. The expected relationship was that better-off households would have more positive attitudes toward conservation of natural resources and toward the CHA program (Hariohay et al., 2018). Roofing material appeared largely homogenous in the study area. Future

studies should try to use a combination of household assets that could better indicate inter-household differences in material asset possession.

4.5.2 Institutional variables shaping conservation attitudes

When it comes to natural resources which are managed as common property institutions, the presence of social capital is key as it generates appropriate norms and rules and enhances trust and reciprocity that promotes communal goals toward the environment (Pretty & Ward, 2001; Musavengane & Simatele, 2016). The general assumption is that higher social capital leads to better environmental protection (Jones, 2005). Our findings are in line with this assertion, in that both bonding and linking social capital were positively correlated with shaping attitudes toward conservation of natural resources and attitudes toward the CBC program.

4.5.2.1 Bonding social capital

Shared rules and norms in our study were linked to more positive conservation attitudes, including reverence for forest and wildlife, and the value placed on protecting natural resources for the greater benefit of the community and future generations. These shared norms around conservation are related to the Oromo culture through the *Gadda system*, which is an indigenous institution that has historically served as a political and socio-cultural organizing system among the Oromo people for several centuries (Aliye, 2019). For households in communities with strong and active social norms, noncompliance in terms of killing wildlife, burning the forest, or indiscriminate cutting of trees are perceived as socially unjust and unacceptable. The significance of such social institutions in enhancing effective wildlife conservation in Ethiopia has been highlighted by Asefa et al (2019). The authors found that the *Gadda system* played a vital role in the protection of the Swayne's hartebeest in Sankalle Sanctuary when in 1993 the *Gadda* leaders or *Abba Gadda* declared laws which legitimized the adoption of the hartebeest as clan member,

affording it with the recognition and protection of rights given to human members of the clan (Asefa et al., 2019). This profound move was critical in significantly reducing the killing of Sawyne hartebeest and safeguarding its population in the subsequent decades including during periods of political unrest in the region (Asefa et al., 2019). Incorporating such indigenous institutions will become increasingly critical for effective conservation outcomes in countries like Ethiopia experiencing recurring political instability with frail government units and institutions.

Bonding social capital can be positively linked to attitudes toward the CBC program through the presence of strong mutual support practices and social networks within communities. Indigenous mutual support practices underpinned by social networks have been widely practiced among rural households in Ethiopia for several centuries (Endris et al., 2017). In the face of limited or non-existent formal safety nets, rural communities have put in place social capital-based support systems to offer various services such as credit and savings, labor sharing, or insurance arrangements (Dercon et ta., 2006; Wossen et al., 2015). The presence of mutual support networks has been shown to facilitate information exchange, define shared interests and mobilize collective action toward sustainable natural resource management through social interaction and learning (Teshome et al., 2016). In this part of Ethiopia, women's groups, known as *Afosha*, are a multi-purpose mutual support and risk sharing indigenous network. These groups offer social assistance to members in times of need such as sickness and death but has added broader dimensions of contributions including rotating savings and setting up entrepreneurial cooperatives (Endris et al., 2017). Self-support units such as *Afosha* serve as a means where members share information, resources, and enhance the needs of marginalized groups (Teshome et al., 2014). It is common for conservation programs in developing countries to have limited capacity in raising awareness about a program and its benefits (Elias & Karippai, 2014; Şekercioğlu, 2012). In these cases, existing

internal networks, such as *Afosha*, may serve as key sources of information about the benefits of the program and rules. Such community social networks can serve to diffuse information on the benefit of the program, and the rules resulting in more positive attitudes. For example, Thuy et al. (2011) shows how cohesion and interactions among community members among the Indigenous Stieng tribe in Vietnam played an important role in information exchange and shared moral standards that resulted in positive perceptions about benefits from conserved forests. Similarly, García-Amado et al. (2012) discusses the role of internal cohesion among farmers in facilitating sharing of common knowledge, forging trust, and fostering strong consensus on the benefits of conservation in a biosphere reserve in Chiapas, Mexico. Strengthening and building on such social networks is particularly valuable to foster positive conservation attitudes among marginalized groups such as women. This position is supported by Pretty and Smith (2004) who demonstrate that relationships of trust, common rules, norms, and connectedness in communities are all necessary for shaping individual action to achieve positive biodiversity outcomes.

4.5.2.2 Linking social capital

In this study we found linking social capital was important in shaping positive attitudes toward both the conservation of natural resources and the CBC program. Key conservation organizations in this study area, including OFWE, FZS, and the private hunting concessionaire, have varying degrees of presence and working relationships with communities. For example, the private hunting concession holder has provided community infrastructure such as roads or permitted regulated access to grazing rights inside the CHA as a way of building rapport with communities living near hunting camp sites. Similarity OFWE and FZS have built positive relationships through extended negotiations in some communities in the process of setting up community-based management organizations (Abebe et al., 2020). Pretty & Ward (2001) propose that such social capital has the potential to lower the transactional costs of working together and

increase the confidence of individuals to invest in collective actions. In the case of this study, external relationships helped shape community attitudes about seasonal restrictions on grazing, collecting honey from the forest, and the attitudes toward wildlife. Specifically, we find a positive correlation between individual's perceiving stronger linkages with OFWE and FZS and more favorable attitudes about the CBC rules and benefits and protection of natural resources. Our results corroborate similar findings in that strong linkages with external agencies have been shown to facilitate exchange of information, foster cooperation and enhance coordination, which in turn improves positive conservation outcomes (Adhikari, 2008).

Our findings refute the simplified notions that 'local' is the intrinsically ideal scale for fostering positive conservation outcomes without recognizing important linkages at multiple scales (Berekes, 2004; Blaikie, 2006). This heightens the importance of building and sustaining meaningful and functional relationships between community groups and conservation organizations. Our findings suggest that relationships that are grounded on access to information, mutual awareness of needs, support, and lasting ties are key in shaping locals' positive attitudes about conservation programs and natural resources. Related to the broader discussion on decentralization in natural resource governance regimes, our findings suggest a need to maintain dynamic and multi-scalar linkages between different community groups and conservation agencies for sustainable conservation outcomes (Andersson & Ostrom, 2008; Berkes, 2007).

4.5.2.3 Mediating effect of social equity

Overall, we found that social capital is a key factor that shapes attitudes toward the CBC program in Bale Mountains. Social capital is also key in fostering positive perceptions of equity in conservation programs (Abebe et al., in preparation; Diedrich et al., 2017), and studies have shown the importance of social equity in shaping conservation outcomes (Halpern et al., 2013;

Pascual et al., 2014). Specifically, addressing equity considerations in the distribution of program costs and benefits, representation in decision-making and recognition of multiple priorities and identities, is associated with positive feedbacks in conservation programs, such as increased local buy in and perceived legitimacy of conservation efforts (Roe et al., 2013; Zafra-Calvo et al., 2017).

The mediation analysis carried out in this study explored the relationship between social equity, social capital, and attitudes toward the CBC program. Our findings suggest that social equity fully mediated effects of linking social capital on attitudes toward the CBC program. This implies that relationships with external organizations have a strong positive impact on attitudes toward the CBC program only if these relationships were perceived as legitimate in distributive, procedural and recognition equity dimensions. Perceptions of social equity is thus a critical factor that explains how linking social capital, or the strength and quality of vertical relationships, is leading to positive attitudes toward the CBC program. This elevates the need to improve the perceived equitability of programs while strengthening external ties to foster positive attitudes about the conservation program. In order to foster effective conservation outcomes, CBC programs should adopt equity conscious designs that address the needs and priorities of marginalized groups and build on strengthening internal communal institutions and external links with conservation organizations.

On the other hand, we found that social equity does not play a mediating role in the impact of bonding social capital on attitudes toward the CBC program, even though bonding social capital has been linked to perceptions of social equity (Abebe et al., in preparation) and in this analysis we found that bonding social capital is correlated with attitudes toward the CBC program. We cannot say with confidence why there is no mediating relationship. However, we can say that bonding social capital has a direct effect on attitudes about the CBC program that are not explained

by individual's perceptions about the equity of the CBC program. Future studies could delve deeper into the relationships between social capital, social equity and how they relate to conservation attitudes. Overall, our findings point to the importance of building on and strengthening bonding social capital, as well as addressing equity concerns, in order to foster positive conservation attitudes.

4.6. Conclusion

CBC programs seek to change or promote pro-environmental attitudes and behavior among different groups with the goal of achieving long term biodiversity conservation outcomes. CBC programs utilize mechanisms such as benefit sharing, devolution of decision-making and/or integration of livelihoods and conservation projects, in order to achieve these outcomes (Nillson et a., 2016). One of the persistent assumptions in CBC programs is that they will result in similar attitudinal or behavioral changes across diverse groups and individuals that constitute communities. Such thinking does not give due regard to the socio-economic and institutional factors that can shape if and how different groups are affected by conservation interventions (Calfucura, 2018). These assumptions can lead to conflict, inequity, and failure in achieving conservation goals.

In this research we have shown the importance of in-depth understanding of attitudes toward conservation and how different groups, such as the youth, women, and the more resource-dependent, vary in their attitudes toward conservation of natural resources. The differences in attitudes across different groups suggests that a uniform one size fits all approach will not be successful in garnering support from all members of a community. Instead, CBC programs should be tailored to address the particular needs of different groups. Based on our findings some important CBC program suggestions include creating/ expanding access to off farm income/job

opportunities and facilitating access to credits and savings programs that could lessen reliance of vulnerable groups on forest products. We also argue for targeted environmental education programs among different groups of the community that fosters understanding on the holistic value of nature as well as on the links between conservation of resources and human well-being.

Our results also demonstrate the need to strengthen bonding and linking social capital as vehicles for sharing information about rules and benefits of conservation programs, fostering trust, and instilling social norms that promote positive conservation attitudes. This reiterates the notion of managing the commons at multiple levels and the need for horizontal and vertical integration of institutions and giving due attention to processes at multiple levels (Berkes, 2007). In particular, strengthening relationships with external organizations is found to be key in forging institutional trust that in turn leads to positive attitudes toward the CBC program. We also found that perceptions of social equity is a critical factor that shapes how relationships with external organizations affects attitudes toward the CBC program. This supports the argument that social equity considerations are critical for not just ethical or social outcomes, but also for enhancing long term biodiversity conservation outcomes. Thus, conservation agencies should invest in building lasting relationships of trust, that are based on equitable access to information and resources, decision-making rights and recognition of needs and priorities among different groups of the community.

Future investigation into attitudes about conservation and conservation programs could build on this study in order to identify whether there is a causal relationship between attitudes toward the CBC program and attitudes toward the conservation of natural resources. This would require longitudinal study of attitudes, which tend to be lacking in the human dimensions literature. Additionally, future studies could link attitudes to conservation behaviors and outcomes. This too

would require a longer time perspective and ideally, communities that serve as the counterfactual in that they do not have the current CBC program. Overall, our results signify the need for biodiversity conservation program designs to be based on and tailored to the social nuances of the local community, and to incorporate adaptive management approaches that address the dynamics and feedbacks in social processes that affect conservation outcomes.

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5. CHAPTER FIVE. CONCLUSIONS

This dissertation investigates the socio-economic and institutional factors shaping social equity and conservation outcomes of a community-based controlled hunting area program in Ethiopia. Conservation programs and efforts in Ethiopia, similar to other biodiversity-rich developing countries, are increasingly being challenged to address mounting social inequities inherent in the conservation of natural resources. The ongoing efforts to promote CBC programs, which seek to devolve decision-making rights and increase benefit sharing opportunities, while promising, are not a panacea. The outcomes of CBC programs are challenged by the heterogeneity among local actors, including variations in reliance on natural resources, power, and decision-making rights. Given the recent advent of CBC programs in Ethiopia, there is little understanding of the achievements and shortcomings of these programs in attaining just conservation outcomes.

The findings of this dissertation shed light on the need to critically engage with differences within communities in access to resources and decision-making power, and to consider the multiple dimensions of equity in CBC program design and assessment. Additionally, CBC programs need to build on existing internal social capital and strengthen links with key conservation organizations in order to craft more equitable CBC programs and shape positive conservation outcomes. Empirically, the dissertation provides a mixed methods assessment of social equity and conservation outcomes. The focus group discussions and the use of grounded theory helped elicit locals' nuanced and contextualized perceptions of social equity and conservation attitudes, that were then developed into locally relevant quantitative measures. Overall, by analyzing the socio-economic and institutional factors shaping locals' perceptions of equity and conservation attitudes, the three chapters contribute insights and future research directions to the science and practice of CBC in Ethiopia and beyond.

5.1 Conceptualizing multiple dimensions of equity

In Chapter 2 of this dissertation, I examined social equity as a pluralistic concept involving distribution of benefits and costs, the processes of engagement and participation, and the recognition of traditional land use practices and values. I analyze the inter- and intra-community power dynamics, institutional characteristics, and broader contextual factors that shape perceptions. Individual attributes that influenced perceptions included the landlessness and joblessness of youth and extreme reliance of women on forest products for subsistence. These findings underscore the importance of disaggregating the simplified notion of "community" and assessing precisely which people benefit and which people are at a disadvantage, how and why, in equity assessments.

Important contextual dimensions shaping equity included pre-existing and ongoing social, political, and economic processes such as population growth and land scarcity, legacy of land use interactions, lack of community infrastructure, and youth-led political activism and unrest. These results underscore how conservation interventions are inevitably embedded in broader social and political processes. For example, the issue of land scarcity overlapped with rampant landlessness among the youth shaping their perceptions of equity. The research disputes the notion that providing economic incentives in CBC programs to offset for lost access to resources will lead to conservation programs that are considered just. For example, despite the presence of incentive mechanisms in the original CBC program, it is still perceived as inequitable due to unaddressed negative historical legacies and lack of trust with implementing organizations. The findings of this Chapter support the argument that conservation programs must be cognizant of and work to address pre-existing and ongoing broader contextual factors or run the risk of not delivering benefits to the most marginalized groups.

5.2 Measuring multiple dimensions of equity

Informed by Chapter 2's in-depth qualitative work, I developed locally relevant indicators and measured distributive, procedural, and recognition dimensions of equity in Chapter 3. I examined how different levels of access to capital assets affected these three dimensions of equity. I further explored if and how social equity perceptions varied between a CBC model that involved creating specific management and benefit sharing mechanisms and one that did not. The results showed slightly negative perceptions of all three dimensions of equity across the four communities. Gender and wealth were strong determinants of perceptions of distributive equity, with women and poorer households having more negative perceptions. Social capital, measured separately to capture internal community cohesion and strong relationships with external organizations, positively affected all three dimensions of equity but had the largest impact on procedural and recognition equity. Finally, I found that communities involved in a CBC model that emphasized joint management, monitoring, and transparency had higher perceived equity than communities involved in a CBC model without these features. These findings highlight the need to strengthen ties with external organizations, facilitate intra-community organization, and design programs that emphasize transparency, in order to facilitate more equitable conservation outcomes. Our results also suggest that more attention to incorporating marginalized actors into Ethiopia's CBC programs is still needed in order to benefit all groups in these communities.

5.3 Understanding conservation attitudes

In Chapter 4, I examined how socio-economic and demographic factors influence attitudes toward natural resource conservation and attitudes toward the CBC program in the Bale Mountains of Ethiopia. The results uncovered important differences across gender, age, and reliance on natural resources. Women, youth, and households more reliant on fuelwood were found to have more negative attitudes toward conservation. Bonding social capital shaped attitudes toward

natural resource conservation and the CBC program. Similarly, we found that linking social capital was a critical factor in shaping conservation attitudes. Lastly, social equity mediates the relationship between linking social capital and positive attitudes toward the CBC program. Overall, the results underscore the need for CBC programs to recognize the disproportional reliance of women, youth, and poorer households on nature, and how this influences their attitudes toward conservation. To foster positive conservation attitudes, these findings suggest that CBC programs build on and strengthen internal communal institutions and external links with conservation organizations, while adopting equity conscious designs that recognize the needs and priorities of marginalized groups on natural resources.

5.4 Research limitations

A main limitation of this dissertation is that I did not have baseline data on social equity or conservation attitudes before the establishment of the CBC program. Thus, the single-point-in-time method does not allow teasing out the effects of the CBC program to infer causality on whether it has influence on social equity perceptions or attitudes toward natural resource conservation. Furthermore, given the nature of the methods and the recency of the programs, I could not empirically ascertain if and to what extent the different CBC models lead to attaining long term conservation goals. This would require methods such as remote sensing and longitudinal data that would enable analyzing spatial-temporal trends of different governance models and assessing their casual effects on conservation outcomes. Another caveat in the interpretation of the findings presented here is that the study considers four sample *kebeles* out of approximately 40 *kebeles* involved in CHA programs. While I strove to choose *kebeles* that represented the two different CBC program models and different bio-physical and socio-economic contexts, the focus on only four *kebeles* restricted the ability to fully contrast the different CBC models. Lastly, given

the complexity of the socio-ecological setting and the cross-sectional nature of this study, we are not able to control for all covariates that could affect perceptions of social equity or attitudes about conservation and the CHA program.

Lastly, there is the potential for unintended bias stemming from the interpretation of the results coming mainly from myself as the first author, the language translation processes, and my positionality. On one hand, being from Ethiopia and having previously worked in the region gave me an 'insider' positionality in terms of existing relationships I was able to build on and having background on the broader cultural context that facilitated some of the research process. On the other hand, being a young Ethiopian woman in conservation research, with Western higher education and not speaking the local language presented a non-traditional and 'outsider' positionality that I had to learn to navigate during the process of data collection. I acknowledge the implications my positionality has in the data collection process and in interpretation of the findings.

Given the complexity of the social equity constructs examined in this study, I recognize it would be highly valuable to validate the results by various community groups from which the results come. Furthermore, it is critical to ensure reciprocity in research ethics by sharing the results back with the community groups as well as conservation organizations. I was unable to go back to these communities to conduct follow up interviews due to financial constraints and the political unrest in the region. I acknowledge the limitations this has on the interpretation of the results.

5.5 Research process and future directions

This Ph.D. has allowed me to engage in both the practice and science of conservation. Throughout the dissertation work, I have collaborated with various community groups,

government agencies, non-governmental organizations and practitioners working on the ground in the Bale Mountains. I have developed firsthand experience of the importance of crafting and sustaining meaningful relationships with various local actors in order to conduct meaningful conservation social science. I have also developed a much-nuanced understanding on the importance of commitment, adaptability, mutual respect, trust, and communication as key elements that sustain a collaborative process in the face of unforeseeable challenges during the research process. Moving forward, I hope to strengthen and create similar collaborative platforms using the experiences gained in this dissertation.

My guiding approach would be to use the research process as an opportunity for mutual and continuous learning. I plan to use research as a critical tool to question dominant narratives, to serve as an outlet for the voices of diverse, underrepresented actors and as an avenue to engage in multiple ways of knowing in conservation. I plan to work towards embedding knowledge co-production, equity, and reciprocity at the core of my research undertakings. To do so, I plan to factor in time and resources that would allow building meaningful relations, trust, and mutual learning as integral parts of the research work. I acknowledge the need for and will work to engage local actors (e.g., community groups, conservation practitioners, implementing organizations) more actively from the initial phases of co-developing research questions to disseminating results and charting future research directions. Recognizing the heterogeneity among local actors, I would ensure methods of data collection and dissemination are culturally relevant and sensitive to different identities, roles, and capacities within and across communities. I would also work on strengthening institutional links with and between government and non-government conservation organizations, universities and research agencies that would enable building local capacity, facilitate learning and cooperation.

To validate the research findings and disseminate results back to the community and other conservation organizations, I plan to conduct stakeholder workshops with different groups at a future date following the end of the dissertation. In a stakeholder workshop with conservation organizations, I would bring together national, regional, and local government and non-government agencies, hunting concessionaires and community representatives from different groups in an open forum to share results and facilitate collaboration towards creating and strengthening productive knowledge-action spaces. To ensue accessibility of results to different community groups, I plan to conduct additional community workshops that would include *kebele* and CBO leaders, women, youth, and elder men representatives. Furthermore, I plan to submit summaries of the results in the form of policy brief documents to EWCA and its regional units including OFWE, FZS and Farm Africa.

Future studies that look at the long term the impact of the CBC programs on social and conservation outcomes would be a key input to the ongoing adaptive management efforts by conservation organizations in the area. The results obtained from this dissertation would serve as key baseline data informing these future longitudinal studies. Furthermore, the research process and results will strengthen existing collaborations and contribute to the continued research efforts that examine coupled natural and human systems in the Bale region and beyond. Follow up research questions could include: 1) What is causal relationship between attitudes toward CBC programs and attitudes toward the conservation of natural resources? 2) Does change in attitudes as a result of CBC programs lead to positive conservation behaviors and outcomes? (e.g., using longitudinal study of changes in attitudes) 3) What is the impact of different and evolving CBC models on achieving long-term conservation goals (e.g., quasi-experimental research design and remote sensing methods to assess trends in land use/ land cover changes in different CBC models)

4) What diverse conditions and mechanisms could foster synergies between equity and effective conservation outcomes? (e.g., participatory scenario planning methods) 5) How do contextual (external) drivers affect equity outcomes and conservation attitudes (e.g., mixed qualitative and quantitative methods assessment of the dynamic social, political, and ecological forces that impact equity outcomes 6) How do equity perceptions vary across different scales of conservation organizations and what implications does this have for conservation outcomes?

In summary, this dissertation research contributes to empowering local people to have a voice in conservation program design. It generates a nuanced assessment of social equity in conservation programs based on locals' diverse relationships with the natural world and other actors. It addresses the multiple and evolving dimensions of equity to account for diverse views, relations, and tradeoffs between these. The strong focus on analyzing equity from the perspectives of less represented groups such as women and youth while actively engaging with local partners in co-producing research questions and data collection will contribute to the growing call for pushing boundaries for transformative discovery in conservation social science. By working directly with conservation organizations and disseminating results to them and communities, the research seeks to foster improved communication, engagement, and consorted action towards making conservation work for people and nature.

APPENDICES

APPENDIX I

A1.1 Focus Group Discussion Guide

1. Livelihoods and changes
    - About how many households (approximately) live in this community?
    - What do people do for supporting their livelihoods in your community?
        - What are the principal crops grown?
        - What type of livestock do families raise?
        - Have most people lived here for a long time? Are there people that have moved from somewhere else? If so, from where?
    - Have you seen changes in the livelihood activities over the last 5-10 years?
        - If so, what are the reasons why people are changing livelihoods?
2. Broader context/threats/pressures/concerns affecting HWB/Livelihoods
    - Are people in your community able to meet their basic needs and desires (e.g., enough food, money, land, education, health care, etc.)?
        - If not, why? (e.g. political, markets, economic, climate factors?)
3. Broader social, human, physical and financial assets in community
    - What community resources or infrastructure do people in your community use to support/improve their lives (e.g., schools, health centers, wells, latrines, roads, electricity)? (physical, financial, human capital)
    - How does your community make decisions about important community matters?
        - Who gets to participate in this decision making? (leadership/social capital)
4. Use of nature and how it is used for livelihoods/personal needs

- What are some of the natural resources people use in their daily lives and to support their livelihoods and well-being in your community? How are these used?
- Has the availability of these resources changed over the last 5-10 years? How/ Why?

5. Broader context on conservation/natural resources – what they have access to and what threats/concerns are (political, markets, economic, climate, etc.) (Potential Moderators of CHA).
    - Do you have access to natural resources across all areas in your community? (e.g. access to wildlife, forest, water resources?)
    - What are the areas where you do not have access to? or limited access? Why?
    - Do you have access to natural resources across all times of the year in your community?
    - Do you use the national park for any of this or buffer areas only?
6. Informal rules and intuitions for managing natural resources, cultural norms and expectations
    - What are some local rules or cultural practices in your community (e.g. in conflict resolution, to manage natural resources?).
        - Do you still have these practices?
        - How are these used? Enforced?
        - Who sets these rules/established these rules?
7. Understanding of CHA, the rules, purpose, perceptions of program
    - Do you know about the CHA program?
        - Who is involved in the CHA program in your community?

    - How do people decide to join CBOs?
    - What do you know about the rules and requirements of the CHA programs?
        - What happens if these rules are not met?
- Are there other conservation programs that are active in your community? e.g. PFM?
- Do you get to participate in the decision-making processes of the PFMs?

8. Governance/social equity in CBO/CHAs process
    - What type of benefits are provided by the CHA program?
        - How are the benefits in the CHA programs distributed?
    - How are community members involved in decision-making processes of the CHAs?
        - Who is involved in decision making?
        - How do they get involved? (Refer back to question #6 and ask if these are included in the CHA management, monitoring and decision-making processes)
9. Attitudes and behaviors toward government agencies, national park, NGOs
    - Who are the organization working in your community about natural resources?
    - How do you see your relationship with these organizations? Why?

Thank you for your time. Please let me know if you have any questions or clarifications that I can address.

Table A1.2 Second Round Focused Coding: Developing Axial Codes and Categories

FGD Theme (Appendix I)	Axial Codes	Labels for Emergent Categories
Livelihoods and changes	Land sub-division and shortage	Increasing population pressure and land scarcity
	Population pressure and no more land for the youth	
	Change in livelihoods to mechanized agriculture due land shortage	
	Declining natural resources availability due smaller land size	
	More people intruding forest area due land shortage	
	Decline in agriculture yield	
Broader context/threats/pressures/concerns affecting HWB/Livelihoods	Youth/ querro/ demand on NRs increasing	Political Stability
	Illegal settlement and resettlement in to CHAs	
	Conflict with conservation organizations heightened	
Broader social, human, physical and financial assets in community	Lack of water wells	Broader Community Infrastructure
	Lack of electricity	
	Lack of roads	
	Lack of education facilities	
	Food scarcity and insecurity	
	Lack of financial capital	
Use of nature and how it is used for livelihoods/personal needs	Forest for fuel wood	Values and benefits of nature for community

	Land for grazing	
	Fuel wood for sale in market	
	Forest for construction material	
	Forest as shade for livestock	
	Forest provide clean air Forest use for Medicinal plants	
	Forest area for watering livestock	
• Broader context on conservation/natural resources • CHA, the rules, purpose, perceptions of program	Lack of clarity in forest boundary demarcation	Access to information on restriction on forest/NRs use in CHA
	Restricted access to grazing in designated forest area	
	Restricted access to bee keeping in designated forest areas	
	Not allowed to kill wildlife by law	
	Not aware of CHA rules or requirements	
	No farming in the CHA area	
Informal rules and intuitions for managing natural resources	Traditional rules of not cutting new trees	Traditional customs and rules on resource use
	Traditional rules of not taking axe to the forest	
	Traditional rules not in use anymore	

	Elders role in conflict mediation	
	Traditional rules on not burning forest	
	Traditional Rules on not cutting forest Forested areas as culturally sacred worship sites	
Governance/social equity in CBO/CHAs process	• Access to benefits from NR in CHA • Feel involved in decision-making via community sub-groups • Access to fallen trees/ wood from CHA • Get clear air from forest in CHA • Strengthen rules and traditional customs on NRs since CBO	Equity of community benefit from CHA
	• Awareness of financial benefit/cash from hunting community level • Communal decision to keep hunting revenues in communal saving • Acknowledge involvement in CHA decision-making on cash through CBO committee	Equity of cash payments at community level
	• No cash benefits for household • Promises for cash benefit for households	Equity of cash benefit from CHA at Household level
	• Joint CBO get more benefits • Non-CBO disadvantaged • Lack clarity on share of benefits • Benefit not fairly distributed to all community groups	Distribution of cash benefits Across and within communities

	• Remote villages not benefiting	
	• Corruption • Lack of knowledge on funding use • Rumors on embezzlement • Not clear on money distribution • Only *Kebele* leaders make official decisions • Money from hunting not timely received	Transparency and Trust on benefits from hunting
	• Feel CHA is all about Mt Nyala • Feel the land is sold off to private investors • Feel they are considered as enemies of resources • Feel their land taken away and no compensations made	CHA program respects rights to own and use land and natural resources
	• Minimal role of women in decision making • Lack of follow up by implementing organizations	CHA program respects the rights and needs of women in the community
	• No fair distribution of employment opportunity from hunting for youth • Youth left out since not household heads	CHA program respects the rights and needs of youth in the community
Attitudes and behaviors toward government agencies, national park, NGOs	• Disappointment for years of no benefit from the forest and wildlife • Do not trust the private concessionaire • No or negative relationship with the hunting concessionaire • Do not agree with new rules of CHA	Legacy of interaction

	• Improvement of social infrastructure from hunting concessionaire • No awareness organizations/ relationship with organizations working on CHA	

Table A1.3 Example of Coding Categories across Equity Dimensions in the Two CHA Models

Theoretical Construct	Coding Category	Original CHA		New CHA	
		Perceptions	Exemplary Quotes	Perceptions	Exemplary Quotes
Contextual Equity	Legacy of interaction	Negative	*"We have no contact with OFWE, we don't see them once a year except when there is an emergency situation such as when they heard people moved into the forest…"*	Positive	"*They have been coming to the village and giving us training when they formed the Waldda so we know them."* "*Even though it is not like they used to before, they sometimes come to discuss with us about the forest"*
	Population Pressure and land scarcity	High	*"As you can see all of this land is farmed, there is nothing left of it so what can we do with all of the people we have; we have to go into the forest…"*	High	"*It is becoming beyond our (CBO leaders') control…. there are too many people and there is too little land left, especially for the youth.* "
	Community infrastructure	Poor	" *Our situation is very difficult you see…we have no electricity in our kebele… fuel wood is necessary for many of the households …"even market we have to travel two hours and the roads are very bad…especially*	Poor	*"We are in need of so many services…like clinic, roads, for the youth there is not much left to do if they finish grade 8…there is no high school in our kebele"* *"even the elementary school, they*

			during the rainy season, there even for pregnant women its so difficult to get to the a health center because there is only one ambulance"		*are sitting on the ground, there are no chairs, very few teachers it's like an open house, we send them because it's better than nothing..."*
	Political stability	Poor	*.... "this is the 'Renaissance time', it's time for them (OFWE) to listen to our (youth) problems and give us our rights from the resource.... they cannot ignore us anymore"*	Poor	*"In these unstable times we are facing more and more demands from the landless youth…its beyond what we can do at the kebele level.... we need attention from the higher ups."*
Procedural Equity	Transparency and trust on decision-making process	Poor	*"we are very suspicious of administration and use of funds including conservation funds for personal ends…"*	Improved	*"We collectively decided what is better…to save the money in the communal savings or to distribute it to individual households."*
	Access to information on rules and regulations on resource use	Poor	*"We do not know what has changed…we have always not been allowed to get into the forest since the time of Nassau(private consesssionaire)"*	Improved not uniform for all resident	*"Since they formed the Walddaa, they inform us what is and what is not allowed in the forest….. for example, we can collect dry wood twice a week….*

			"We still do so illegally…to find grazing for the cattle or fuel wood" *"Some people also take out timber at night"*		*"cutting new trees or killing wildlife is not allowed".*
	Community based resource monitoring	Poor	*"The problem is the kebele administrators that are responsible for controlling the illegals are ones responsible for the problem".*	Improved but not uniform for all residents	*"They claim to control illegal cutting, but they turn a blind eye when the rich or their relatives are expanding land or cutting trees because they are also among the beneficiaries. But if the poor like me pick a single fallen tree, they are fine[d].*"
Distributive Equity	Equity of community benefit from CHA	Poor	*"we have not received any cash…we hear rumors that the funds have gone to individuals' accounts…"*	Improved	*"We have been told in the meetings that our kebele received the cash from the Nyala hunting…our kebele did very well in protecting the forest."*
	Equity of cash payments at household level	Poor	*"We are merely informed that the cash is not enough, but we are not told when they received money and how*	Improved but not uniform for all residents	"*We had meetings with the CBO committee where we discussed about the benefits that*

			much we are getting at the kebele level and how it is distributed to the rest of the community" *"We have more resources, more wildlife than the organized kebeles, but they are getting more cash per year than us."*		*our kebele got and what was better to do…. we decided to save it because it would be almost nothing of value if distributed to all of these households."*
	Equity of CHA built Community centers, schools, or health center	Poor	"*Our kebele is forgotten, … we don't even have good roads and we have been asking for this for many years…"* *"the community development is always diverted to other kebeles."*	Improved but not uniform for all residents	*"We have the roads that have been built by the hunting concessionaire"* *"it is only the villages that are near the kebele center that get the most benefit"*
	Perception of fairness of distribution of benefits among communities	Poor		Improved	
	Perception of inequity in compensations for the losses due to restrictions on land from the CHA	Poor	*"The yearly cash we get is close to nothing compared to the loss of access to resources that we depend on to support our daily lives"*	Improved	
Recognition Equity	CHA program respects	Poor	*"We are considered*	Improved	*"The CHA is helping keep*

	community's rights to own and use land and natural resources		*traitors of our own resource….Who protected this resource when the settlers wanted to destroy it? We did…Our fathers and forefathers…. not they (the private concessionaire) but today we are the enemy!"*		*our traditions of protecting the land, these young ones are only thinking about today, about getting land and cash. Had it not been for the CHA, there would be no shade for our cows."*
	CHA program respects the rights and needs of women in the community	Poor	*"…. What has changed for the women? is it not still the responsibility for the women…when the household is lacking, and children need things we still have to find fuel wood and take it to the market"*	Poor	*"We(women) are not getting these benefits from hunting…. but the fuel wood is what we need to feed the children"*
	CHA program respects the rights and needs of youth in the community	Poor	*"….how did they decide where forest boundary is and where we can and cannot collect fuel wood…have they consulted us? do we agree? We are at a disadvantage here"*	Poor	*"What has the CHA done for us (youth)…many have fled this region ……because there is nothing left for us here, no jobs and no land."*

APPENDIX II

Table A2.1 Summary statistics showing the socio-economic and institutional characteristics of respondents in the four-study area *kebeles*

Variable	Measurement	Percentages				
		Kebele 1	Kebele 2	Kebele 3	Kebele 4	Full Sample
Gender	Women	38%	18%	22%	28%	26.6%
	Men	62%	82%	78%	72%	73.4%
Roof type	Lower quality	30%	44%	8%	8%	22.5%
	Higher quality	70%	56%	92%	92%	77.5%
Crops sold	Low sale	42%	48%	84%	60%	58.5%
	Higher sale	58%	52%	16%	40%	41.5%
Cell Phone	Yes	88%	82%	60%	86%	79%
	No	12%	18%	40%	14%	21%
Electricity	Yes	72%	12%	26%	46%	39%
	No	18%	88%	74%	54%	61%
Improved cooking stove	Yes	68%	72%	12%	50%	50.5
	NO	32%	28%	88%	50%	49.5%
Land accessibility in the future	No	6%	18%	10%	4%	9.5%
	Yes	94%	82%	90%	96%	90.5%
Farming primary livelihood	Yes	98%	92%	97.9%	98%	96.5%
	No	2%	8%	2.1%	2%	3.5%
Livestock keeping as primary livelihood	Yes	87.5%	87.8%	68.9%	88%	83.3%
	No	12.5%	12.2%	31.1%	12%	16.7%
Forestry as primary livelihood	Yes	25%	36.4%	21.4%	23.7%	26.8%
	No	75%	63.6%	78.6%	76.3%	73.2%
	Yes	93.9%	91.7%	100%	100%	96.4%

Extract fuelwood	No	6.1%	8.3%	0	0	3.6%
Extract timber	Yes	50%	68.1%	45.2%	44.2%	52.3%
	No	50%	31.9%	54.8%	55.8%	47.7%
Collect honey	Yes	34.1%	18.6%	29.5%	28.2%	27.5%
	No	65.9%	81.4%	70.5%	71.8%	72.5%
Leadership role	Yes	24%	38%	26%	46%	33.7%
	No	76%	62%	74%	54%	66.3%
Community self-organizes	Yes	72%	83.7%	88%	88%	84.4%
	No	28%	16.3%	12%	12%	15.6%
Presence of community rules	Yes	76%	80%	77.5%	94%	79.92%
	No	24%	20%	24.5%	6%	20.1%
Community follows rules	Yes	84.1%	75.5%	66.7%	88%	78.3%
	No	15.9%	24.5%	33.3%	12%	21.7%
Amount of crop Sold:	None	14.3%	22.7%	71.1%	41.7%	37.1%
	Less than half	28.6%	31.8%	22.2%	20.8%	25.8%
	Half	26.5%	31.8%		18.8%	19.4%
	More than half	24.5%	13.6%	4.4%		15.6%
	All	6.1%		2.2%		2.2%
Frequency of fuelwood extraction	Daily	2.1%	2.2%	8.2%	4%	4.2%
	Weekly	62.5%	84.4%	83.7%	34%	65.6%
	Monthly	29.2%	8.9%	6.1%	38%	20.8%
	Yearly	2.1%	0%	0	14%	4.2%
	As needed	4.2%	4.4%	2%	10%	5.2%
Frequency of timber extraction	Daily	0%	0%	0%	0%	0%
	Weekly	17.4%	25.2%	0%	0%	9.7%
	Monthly	4.3%	6.1%	0%	0%	4.3%
	Yearly	69.6%	57.6%	84.6%	38.9%	58.1%

	As needed	8.7%	21.2%	15.4%	61.1%	28%
Frequency of honey extraction	Daily	0%	0%	0%	0%	0%
	Weekly	12.5%	0%	0%	0%	4.1%
	Monthly	6.3%	0%	5.3%	9.1%	4.1%
	Yearly	75%	100%	63.2%	90.9%	85.7%
	As needed	6.3%	0%	31.2%	0%	6.1%
Frequency of meeting attendance	All	45.8%	55.1%	44%	60%	51.2%
	More than half	35.4%	12.2%	18%	22%	51.2%
	Half	10.4%	26.5%	14%	14%	22.2%
	Less than half	4.2%	4.1%	22%	4%	16.2%
	None	4.2%	2%	2%		
Frequency of community service attendance	All	53.5%	52.2%	53.3%	64.6%	56%
	More than half	20.9%	26.1%	28%	27.1%	23.6%
	Half	4.7%	26.1%	13.3%	2.1%	7.1%
	Less than half	11.6%	8.7% %	8.9%	6.3%	8.2%
	None	9.3%	6.5%	4.4%		4.9%

Variable	Measurement	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Size of household	Continuous (Number of household members)	6.75	2.383	7	3.07	8.11	8.1	7.17	3.45	7.24	3.41
Number of dependents under 15	Continuous/ Number	2.93	1.62	3.31	0.352	4.25	2.58	3.72	2.33	3.56	2.26
Livestock sold	Continuous/ Number of livestock sold	3.38	3.86	3.32	3.113	1.57	1.03	2.48	1.82	2.87	2.75
Total number of parcels of	Continuous/ number	3.71	1.84	4.13	2.72	2.12	1.17	2.42	1.2	3.12	2.05

land Accessed											
Total size of parcels of land Accessed	Continuous/ In hectares	2.43	1.59	2.14	1.61	2.12	1.17	1.52	1.06	1.97	1.46
Size of own land	Continuous/ In hectares	2.39	1.6	2.1	1.63	1.74	1.41	1.49	1.11	1.92	1.42
Size of land used in government land	Continuous/ In hectares	30	0	0.77	0.51	1.57	0.88	0.22	0.48	2.08	4.43
Community decision-making (bonding social capital)	Continuous scale 1 through 5. 1 being the poorest and 5 being highest	3.7	0.76	3.3	0.71	3.5	0.7	4.03	0.83	3.8	0.78
External relations (linking social capital)	Continuous scale 1 through 5. 1 being the poorest and 5 being highest	2.5	0.78	2.65	0.93	2.32	0.77	3.63	0.94	2.8	0.98

Table A2.2: Table 2: Summary of Univariate analysis of relationship between predictors and composite social equity scores. *=p<0.1, **p<0.05,*p<0.01**

Predictor Variables	Measurement	Type of Test	Distributive equity	Procedural equity	Recognition equity
Gender	Women	ANOVA	**	*	
	Men				
Age	Number of years	Correlation			
Roof type	Lower quality material	ANOVA	*		
	Higher quality material				
Crops sold	Low sale	ANOVA	*		
	High sale				
Perception of land accessibility	No	Correlation		*	
	Yes				
Community Decision making (bonding social capital)	Continuous scale 1 through 5. 1 being the poorest and 5 being highest	Correlation	**	***	***
External relationship with organizations (Linking social capital)	Continuous scale 1 through 5. 1 being the most negative and 5 being most positive	Correlation	***	***	***

Table A2.3: Full model with *kebele*s dummy coded. *=p<0.1, **p<0.05,*p<0.01**

Variables	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.187** *0.108*	-0.075 *0.132*	-0.084 *0.172*
Age	-0.010 *0.003*	-0.005 *0.004*	0.037 *0.005*
Roof type	-0.127* *0.116*	-0.017 *0.145*	-0.009 *0.185*
Crops sold	0.074 0.097	-0.024 0.120	0.064 0.153

Land accessibility In future	0.107* *0.277*	0.121** *0.340*	0.051 *0.429*
Community decision making	0.001 *0.065*	0.256*** *0.079*	0.165** *0.102*
External relations	0.338*** *0.053*	0.335*** *0.066*	0.303*** *0.085*
R^2	33.4%	45.1%	34.4%
Observations	185	184	181

Table A2.4 : Parsimonious Model with *kebeles* dummy coded
=p<0.1, **p<0.05,p<0.01**

Variables	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.172* *0.105*	-0.075 *0.132*	-0.084 *0.172*
Roof type	-0.133* *0.116*	-0.017 *0.145*	-0.009 *0.185*
Crops sold	0.045 0.094	-0.024 0.120	0.064 0.153
Land accessibility in future	0.090 *0.274*	0.127** *0.335*	0.051 *0.429*
Community decision making	0.001 *0.065*	0.254*** *0.078*	0.165** *0.102*
External relations	0.382* 0.051	0.340*** *.065*	0.303*** *0.085*
Kebele 1	0.014 0.124	0.856 0.047	-0.193 0.199
Kebele 2	-0.023* 0.136	-0.221** 0.160	-0.193 0.206
Kebele 3	0.067 0.142	0.443 0.117	0.135 0.214
R^2	28.7%	42%	31.1%
Observations	185	184	181

Table A2.5: Parsimonious model with CBC dummy coded. *=p<0.1, **p<0.05,*p<0.01**

Variables	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.190* *0.105*		
Roof type	-0.147* *0.108*		
Crops sold	0.100 *0.091*		
Land accessibility in future	0.100 *0.277*	0.139** *0.342*	
Community decision making	*0.065*	0.269*** 0.078	0.211** 0.100
External relations	0.364*** *0.047*	0.382*** 0.063	0.359*** 0.080
CBC	-0.146** .096	-0.023*** 0.120	-0.163 0.153
R^2	26.87%	39.7%	28.5%
Observations	185	184	181

Appendix 2.6: Household Survey

An Evaluation of Perceptions of Social Equity and Conservation Attitudes

in Controlled Hunting Areas of the Bale Mountains, Ethiopia

Instructions for Surveyors

1. *Read the all the text referring to each question when conducting the survey. The text is formatted with normal and italic letters. The surveyor should read everything in the question to those that are being surveyed, <u>except</u> for text that is in italics.*
2. *Every surveyed person has a unique identification number. The number is in the section "ID for data".*
3. *Make sure to complete all the questions that apply. DO NOT LEAVE QUESTIONS UNANSWERED.*
4. *At the end of the survey, make sure to collect all the material used in the survey.*
5. *Note the starting and finishing time for the survey.*

****

Good morning/day/evening,

We are conducting a study from Colorado State University in the United States. The purpose of this study is to better understand the perceptions of local community related to the equity of the benefits from controlled hunting areas program in the Bale Mountains. We are interested in understanding the how socio-demographic, biophysical and institutional factors shape people's perceptions of equity and conservation attitudes and behavior. To complete this evaluation, we have randomly selected households from six communities in the Abansheba Demero and Besmena Udubulu Controlled Hunting Areas for household surveys. We will be speaking with households that live in communities that have joint CBOS, those that only have PFMs and those that do not have either program. Your participation in this survey is completely voluntary, however, we would be much appreciative if you could answer these questions. There are no risks or direct benefits to you, but this study will give inputs for the controlled hunting conservation program to improve its benefits you. The information from the survey will only be used for research purposes; the university researchers will not use your name and will be sure to submit information to the university with all personal details omitted. The survey will take approximately 60 minutes.

If you have any questions about this project at any time, you can contact the Co-Principal Investigator at: <bethya@colostate.edu; 251-912-00-55-24> or PI at: kelly.jones@colostate.edu; 001-970-491-4175. If you have any questions about your rights as a volunteer in this research, contact <the CSU IRB at: RICRO_IRB@mail.colostate.edu; 001-970-491-1553.

General Information (Complete before beginning the interview)

ID for Data: _____(to be entered after data collection)

Name of interviewer: _____

Name of the Kebele: _____

Date (month/day): _____/_____/2019/2020

Start time: _____

Finish time: _____

QUESTIONS FOR THE SELECTION OF THE PERSON TO BE INTERVIEWED

A. Are you a member of this household over the age of 18? 1.Yes ( ) 2. No ( )

(Surveyor: If the person is not a member of the household, DO NOT continue with the survey)

B. Are you willing to take the survey? 1. Yes ( ) 2. No ( )

(Surveyor: If the person is not willing to go ahead, DO NOT continue with the survey)

C. What is your relationship with the household head? *(It is perfectly okay to sample someone other than the household head but please record their relationship; the respondent does not become the household head automatically*.)

Mark only one:

Household Head		1
Spouse of household head		2
Child of household head		3
Sibling of household head		4
Parent of household head		5
Other (list):		6

A. HOUSEHOLD CHARACTERISTICS

1. I will begin by asking question about members of the family and characteristics of the household.

> ***Enumerator, read this definition to respondent****: "A household is a group of persons who normally cook, eat and live together. These people may or may not be related by blood but make common provision for food or other essentials for living and they have only one person whom they all regard as the head of household. Such people are called members of the household. There can also be one-member households where a person makes provisions for his/her own food or other essentials for living."*

Please provide information about Members of this Household that live in this location (for at least 6 months/year):

1.1 How many men (older than 15 years of age): ----------_____

1.2 How many women (older than 15 years of age): _____

1.3 How many children (less than 15 years): _____

For all men and women older than 15 years (up to 6):

	1.4. 0. Person Member of household and relationship	1.4 Age of person *(Years)*	1.5 Sex 1. Female 2. Male	1.6 Can they read and/or write 1. Yes 2. No
1	Interviewee			
2	Significant Other			
3				
4				
5				
6				

2. Do you have any household members that live in a different location for at least 6 months/year:

		1.Yes 2. No	2.1 If yes, what is the Number of people	2.2 How many of these are dependent members of the household?	2.3 Reason for migration 1. Education 2. Job Seeking 3. Other
1	A rural location outside this community				
2	An urban location outside this community				
3	Another country				

3. How long have you lived in this community? (number of years): ----------_____

4. What is the distance from your house to the nearest …? (in *minutes* walking*)*

		Distance (minutes walking)
1	*Kebele* administrative center	
2	Protected CHA boundary	
3	Nearest paved road	
4	Market where you could buy or sell goods	
5	Nearest major town	

5. For your primary house, what is the main material of construction?

		1.Concrete

		2. Thatch 3. Corrugated Iron 4. Dirt/Mud 5. Wood 6. Plastic 7. Other (list)
1	Floor	
2	Walls	
3	Roof	

6. Of the following list of services and goods, which of the following does your household currently have that are in good working order?

		1. Yes 2. No 999. Don't know
1	Cell phone	
2	Television	
3	Electricity	
4	Gas Stove	
5	Improved cooking stove (magedo kotabi midiga)	
6	Open wooden stove Sostu gulucha (ye enchet midiga)	
7	Sofa	
8	Bed	
9	Wooden Chair (tesso muka)	
10	Buffee	

B. LAND

The following questions will be about your land.

1. What area of land does your household have access to (either own, rent, communal lands, public lands, etc.) both in the *kebele* or outside the *kebele* for crops, livestock, forests, houses, or other?

		1.1 Quantity/Number of Different Areas	1.2 Amount/ Unit in hectares (if use different unit, list it) 999. Don't know
1	Inside the *kebele*		
2	Outside the *kebele*		
3	TOTAL		

2. Of the total land you have access to, how much land do you…:

		2.1Unit in hectares (if use different unit, list it) 999. Don't know
1	Own?	
2	Rent from others?	
3	Lease to others?	

4	Is in communal use?	
5	Is in park/govt lands (CHA, OFWE/ forest land)?	
6	Other?	
7	TOTAL	

3. For each of the land use types below that you "own", do you have (Mark only one):

	Land Types	1. Land certificate or title from the government 2. No land certificate, but customary right to use the land from the community 3. Other (documentation)
3.1	Agricultural land	
3.2	Grazing Land	
3.3	Planation Forest (coffee,chat,banna)	
3.4	Other (list):	

4. Would you say you are confident that members of this household will be able to use/have access to these same lands in the next 20 years?

	1.Yes
	2. No

5. Do you think the land you own now will be sufficient to support your livelihood in the next 20 years?

	1.Yes
	2. No

C. LIVELIHOODS/WORK

The following questions will be about your livelihood activities.

1. What are the major livelihood activities for the household? (Mark all)

	Livelihood activity	1.Yes 2. No 999. Don't know	1.1 For the livelihood strategies marked as Yes, rank the top 3 in order of importance (1=most important, etc.)
1	Personal farming/agriculture		
2	Personal livestock raising		
3	Day laborer (on other's farm or livestock)		
4	Forestry activities (e.g bee keeping, fuelwood collection, non-timber products)		
5	Office work (school, government, etc.)		
6	Other (list):		

2. How many people over the age of 15 in your household work in the activities listed above? _____

3. In the previous year, did your household grow/farm any of the following crops for consumption or to sell in the market?

		1. Yes 2. No 999. Don't know
1	Maize	
2	Barley	
3	Wheat	
4	Coffee	
5	Sorghum	
6	Teff	
7	Bean, and pea/ bakle ena ater/	
8	Other (list):	

4. What part of this cultivation was for selling for other people or to the market?

	Top 3 Major Crops produced Last Year	4.1Amount produced in quintals	4.2 Amount sold for market/ other people
			1. None 2. Less than Half 3. Half 4. More than half 5. All
1			
2			
3			

5. How many adult livestock did your household have in the past year?

		Number 999. Don't know
1	Cattel (>1 year)	
2	Goats (>6 month)	
3	Sheep (>6month)	
4	Equines	
5	Chickens &other fowl (>3 months)	
6	Other (list):	

6. What part of this livestock did you sell for other people last year?

	Top 3 Livestock type Sold Last Year	6.1 Number sold
1		
2		
3		

7. In the previous year, did your household collect/extract any of the following items from forests (native or plantation) for household use or to sell in the market?

	List of forest uses	1. Yes 2. No 999. Don't know	7.1 For any marked Yes, how often do you extract these products from the forest? 1. Daily 2.Weekly 3. Monthly 4. Yearly 5.Occassionally	7.2 For any marked Yes, what is the average distance walking in minutes from your house to where you obtain these products?
1	Fuelwood			
2	Medicinal plants			
3	Honey (from bee keeping)			
4	Wood/timber for construction			
5	Other (list):			

8. How much of the collection was for selling to other people/market in the last year?

8.1 Fuel Wood (donkey/horse load)	8.2. Construction wood or timber (donkey/horse load)	8.3 Honey (kilogram)

D. SOCIAL CAPITAL

I will now ask questions about general rules and management in your community and your participation in these.

1. Do you or someone in the household have a leadership role in *Kebele*?

	1.Yes
	2. No

2.How often do you or a member of your household attend *Kebele* meetings when they are held? We attend…

1	All	
2	More than half	
3	Half	
4	Less than half	
5	None	

3.Do people in your community self-organize to work together on community projects such as communal road construction, digging water holes, building community centers, cleaning up areas, etc.?

	1.Yes
	2. No

3.1. If yes, how often do you or a member of your household participate in these community services when they were held? We participate in…

1	All	
2	More than half	
3	Half	
4	Less than half	
5	None	

4. Does your community have (informal) rules that they have developed on how people can use and manage natural resources (e.g., forest, wildlife, water) in your community?

	1.Yes
	2. No

4.1. If yes, do the majority of people in your community follow these rules?

	1.Yes
	2. No

5. We want to understand your views on your community/*kebele* and how they make decisions, please answer the following statements based on whether you **agree** or **disagree**:

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree		No answer or does not know
1	People cooperate in this community	1	2	3	4	5		999
2	It is clear how rules and sanctions are set in this community	1	2	3	4	5		999
3	People help me if I need help in this community	1	2	3	4	5		999
4	All contribute equally to solve problems encountered in this community	1	2	3	4	5		999
5	Everyone has a chance to participate equally in this community	1	2	3	4	5		999

E. CONTROLLED HUNTING AREA PROGRAM (NRM : Abasheba Demro) Besemena Udubulu (PFM-copperatioves)

I am now going to ask you questions about your awareness about the Controlled Hunting Area (CHA) program. CHA refers to the program implemented by Oromia Forest and Wildlife Enterprise and the community that provides monetary and community development benefit opportunities from hunting to the local community found in the controlled hunting area *kebeles*.

1. Have you heard about the CHA **if no Skip to F** .

	1.Yes
	2. No

2. Is your *Kebele* a part of the CHA program?

	1.Yes
	2. No
	999. Don't know

Procedural Equity

I will now ask questions about your participation in the CHA program.

1. Are you (or another member of your household) a CBO member? (that is, do you pay a fee to be a member in the CHA program in your *Kebele*?)

	1.Yes
	2. No
	999. Don't know

2. Do you know the people in your community that make decisions about the CHA program (e.g., CBO Committee, *Kebele* leaders, or others)?

	1. Yes
	2. No

3. Have you ever attended a meeting in your community regarding information about the CHA program?

	1. Yes
	2. No

4. Related to your participation in the CHA in your *Kebele*, please answer the following questions based on how much you **agree** or **disagree** with each statement.

		Totally Agree	Disagree	Neutral	Agree	Totally Agree	No answer or does not know

1	My community members can participate in developing rules for natural resource management in CHA program	1	2	3	4	5	999
2	My community members can participate in managing the finances from the CHA program	1	2	3	4	5	999
3	The management of the CHA include our communities concerns in decision-making	1	2	3	4	5	999
4	I am satisfied with the decisions making by the CHA management	1	2	3	4	5	999
5	I have received information on rules and regulations on access/restriction of resource use within CHA areas (such as not cutting down new trees, poaching, etc.)	1	2	3	4	5	999
6	I have received information about penalties on breaking rules within CHA areas (such as cutting down new trees)	1	2	3	4	5	999
7	I have received information on the amount of money received from CHA program	1	2	3	4	5	999
8	I have information on how to report illegal activities by other members to authorities in the CHA program	1	2	3	4	5	999
9	I am able to report complaints about management of the CHA and get solutions	1	2	3	4	5	999
10	We can easily resolve conflicts related to natural resources	1	2	3	4	5	999

	with the CHA program						

Recognition Equity

I will now ask questions about the recognition given to the values, rights and identities of different groups of people in the CHA program.

1. To what extent to you agree or disagree with the following statements?

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No Answer
1	CHA program respects my community's rights to own and use land and natural resources	1	2	3	4	5	999
2	CHA program respects the rights and needs of youth in the community	1	2	3	4	5	999
3	CHA program respects the rights and needs of women in my community	1	2	3	4	5	999
4	Poorer groups in the community have the means to have their voices heard in the CHA management	1	2	3	4	5	999
5	The CHA program respects our community's traditional knowledge and culture	1	2	3	4	5	999

Distribution Equity

I will now ask questions about the distribution of benefits and cost from the CHA program.

1. Has your household directly benefited from the CHA, for example, from jobs, cash or community projects?

	1. Yes
	2. No

1.1. Which of the following items has your household benefited from in the CHA program?

		1.Yes 2. No 999. Don't know
1	Paid employment (monitoring, employed at the hunting lodge, etc)	
2	Cash received at household level	
3	Cash received at community level	
4	Community development projects. **Mark 1 for each type**:	
	4.1 Community centers, schools, or health center	
	4.2 Roads	
	4.3 Mills	
	4.4 Electricity	
	4.5 Water Wells	
	4.6 Other:	

2. To what extent do you agree with following statements about how benefits are distributed in your community?

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No Answer
1	I believe my community has received sufficient monetary benefits from the CHA program	1	2	3	4	5	999
2	I believe the CHA money received at the CBO level is fairly distributed to member households in my community	1	2	3	4	5	999
3	I believe my community has received sufficient community development benefits from the CHA program	1	2	3	4	5	999
4	I believe the CHA community development benefits are distributed fairly in our community	1	2	3	4	5	999
5	I believe my community has lost access to resources (grazing, beekeeping, fuel wood) due to CHA rules and regulations	1	2	3	4	5	999
6	I believe my community is receiving replacement land in exchange for the losses due to restrictions on land from the CHA	1	2	3	4	5	999

7	Women in my community are the most likely to benefit from the CHA program	1	2	3	4	5	999
8	The Youth in my community are benefiting from the CHA program.	1	2	3	4	5	999

Preferences for Future Benefit Distribution from the CHA program

The following questions are related to potential ways benefits could be distributed in the CHA program – please note that we are not suggesting that there will be changes to the design of the CHA program, but we want to understand your preferences for how benefits could be distributed.

1. If you were offered the following choice of how the benefits in the CHA program were to be offered, which option would you prefer? (Mark only one)

1	In Program A, you receive the cash payment from the CHA program directly to your household.	
2	In Program B, the cash payment from the CHA program first goes to the village leaders/CBO to be decided on collectively how it is used.	
3	Program C, the cash payment from the CHA program be paid to organized group of jobless youth in our community	
4	I prefer none of these CHA programs.	
5	Indicate if any other option	

2. If the benefits were to be distributed to the community and you were offered the following choice of how the benefits in the CHA program were to be offered, which option would you prefer? (Mark only one)

1	In Program A, the cash payment from the CHA program goes to the community and is used for collective development projects (e.g., community buildings, roads) that benefit everyone in your community.	
2	In Program B, the cash payment from the CHA program goes to the community and is used for livelihood improvement projects (e.g., agriculture projects, bee keeping) that benefit everyone in the community.	
3	I prefer neither of these CHA programs.	

4	Indicate if any other option	

E. General Attitudes and perceptions about changes in your livelihood related to the CHA rules

1. As a result of the CHA program in your *Kebele*, have you or anyone in your household changed the following …?

		1. Yes 2. No 999. Don't know
1	The location of where you access natural resources due to CHA areas, for example, where you collect fire wood, medicinal plants, graze livestock, or harvest honey?	
2	The timing during the year of when you access natural resources within CHA areas, for example, where you collect fire wood, medicinal plants, graze livestock, or harvest honey?	

2. I am now going to ask you statements related to your general attitudes towards the CHA rules. Please state how much you **agree** or **disagree** about each of the following statements.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No answer or does not know
1	I believe there should be no CHA restrictions on harvesting of forest products (fuelwood, honey and grasses) in the CHA area	1	2	3	4	5	999
2	I believe grazing should be allowed everywhere in the CHA	1	2	3	4	5	999
3	I believe the CHA land should be open to agriculture and settlement	1	2	3	4	5	999
4	I believe it is important to have CHA rules and programs that protect our forests and wildlife	1	2	3	4	5	999
5	Members of my community report illegal practices on natural resources within the CHA to authorities	1	2	3	4	5	999
6	Younger members of my community follow CHA	1	2	3	4	5	999

	rules related to natural resources						
7	People from outside this community follow CHA rules related to natural resources	1	2	3	4	5	999
8	I believe members of my community follow CHA rules and regulations on natural resources	1	2	3	4	5	999
9	I believe CHA rules on natural resources are not effectively implemented in our community	1	2	3	4	5	999

3. I am now going to ask you questions about your perceptions of the effectiveness of CHA program.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No answer or does not know
1	The CHA program is helping improve the quality of the air and water in this area	1	2	3	4	5	999
2	The CHA program is leading to protection of wildlife and their habitat	1	2	3	4	5	999
3	The CHA program helps preserve our community's culture and tradition	1	2	3	4	5	999
4	The CHA program is safeguarding our natural resources for our future generations	1	2	3	4	5	999
5	The CHA program is helping to improve our local climate	1	2	3	4	5	999
6	The CHA program is leading to conflict with wildlife	1	2	3	4	5	999
7	The CHA program is promoting our cooperation with other communities in other *kebeles*	1	2	3	4	5	999
8	The CHA is creating improved management practices in our community to protect our natural resources	1	2	3	4	5	999
9	The CHA program is negatively affecting our	1	2	3	4	5	999

	community's quality of life						
10	The CHA program is increasing income for our community	1	2	3	4	5	999

F. ATTITUDES TOWARD NATURAL RESOURCES and NR ORGANIZATIONS

1. We want to understand your general views on natural resources in your area. Please answer how much you agree or disagree about the following questions.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree		No answer or does not know
1	Forests and wildlife are important to my community and who we are	1	2	3	4	5		999
2	Wildlife causes more damage than benefits to my community	1	2	3	4	5		999
3	Forests and wildlife are less important to the younger generations	1	2	3	4	5		999
4	Forests and wildlife are important to me because they can provide income/money	1	2	3	4	5		999
5	Forests and wildlife have a right to exist in this place	1	2	3	4	5		999
6	Forests and wildlife are not compatible with our current livelihood practices	1	2	3	4	5		999
7	Forests and wildlife are important to me because they provide food and other products like fuelwood	1	2	3	4	5		999
8	Forests and wildlife are important because they help clean the water and the air we breathe	1	2	3	4	5		999
9	It is important that we protect forests and wildlife for future generations	1	2	3	4	5		999
10	Forests are important for regulating the climate and having regular rainfall							

2. Please answer these questions related to conservation organizations in your community. Which of the following conservation organizations have you heard of?

		1.Yes 2. No 999. Don't know	2.1 Rank the Top 3 of these organizations that you work closely with

1	OFWE		
2	EFCA (Woreda Environment, Forest and Climate and Change Authority)		
3	Ethiopian Wildlife Conservation Authority		
4	Hunting Concessionaire / Ethiopia Rift valley Safari/ Mr Nassau		
5	Farm Africa		
6	Frankfurt Zoological Society		
7	Other		

4. Please state how much you ***disagree*** or ***agree*** with each of the following statements about the top ranked conservation organizations in your community.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree		No answer or does not know
1	This conservation organization has a strong presence in my community.	1	2	3	4	5		999
2	This conservation organization provides trainings or support for members of my community.	1	2	3	4	5		999
3	It is very easy to contact a conservation organization to receive help with projects.	1	2	3	4	5		999
4	Many people in my community work with this conservation organization.	1	2	3	4	5		999
5	This conservation organization listens to our community's concerns and try to help.	1	2	3	4	5		999

G. SUBJECTIVE Human Well-being

We are close to the end of the survey. I just have a few more questions for you regarding changes in your quality of life in the last 5 years, in 2015/2007 (If they need a reminder, you can tell them there were parliamentary elections that year and a severe drought in parts of the country).

1. Do you think your household quality of life is better, the same, or worse, than what it was 5 years ago (in 2015)?

1	Better	
2	Same/Equal	
3	Worse	

2. Do you think the quality of your community (overall the organization of your community) is better, the same, or worse, than what it was 5 years ago (in 2015/2007)?

1	Better	
2	Same/Equal	
3	Worse	

3. Do you think the quality of your natural resources (forest, water, wildlife) is better, the same, or worse, than what it was 5 years ago (in 2015)?

1	Better	
2	Same/Equal	
3	Worse	

We have reached the end of the survey. I want to thank you for your time and the information you shared during the survey.

Do you have any questions about what we talking about?

(If they have any relevant questions about the survey, make a note of them. If you are unable to answer the question, tell them that you will check with the research team conducting the study and they will get back to them.)

Make sure that you have gathered all the materials and noted the finish time for the survey.

Time finished: _____

Name of respondent: _____

APPENDIX III

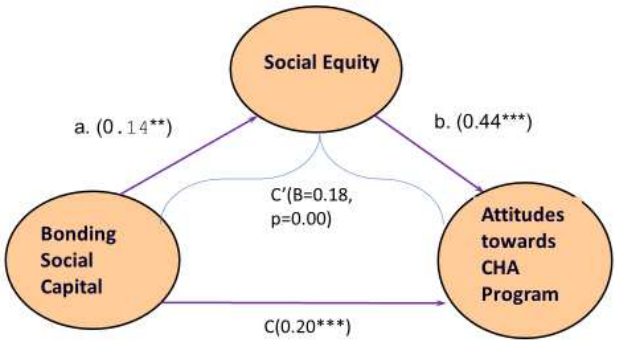

Figure A3.1 Figure on Path analysis: showing mediating effect of social equity on impact of bonding social capital on attitudes toward the CBC program. Path a showing the regression coefficient on the effect of linking social capital on social equity; path b refers to the effect of social equity on attitude toward the CBC program; path c refers the total effect, the effect of linking social capital on attitudes toward CBC program; path C' refers to the direct effect, the impact of linking social capital on attitudes toward CBC program when social equity was controlled for.

Table A3.2: Mediation Analysis with Inclusion of Covariates

Covariates	Coefficient *Std Error*	t
Gender	-0.26 0.08	-0.29
Age	0.07 0.07	0.92
Roof	0.14 0.09	1.59
Fuel extraction	0.16* 0.08	1.95
Crops	-1.7** 0.08	-2.11
Bonding Social Capital	0.12** 0.05	2.44

Table A3.3 : Regression models that include social equity index

Covariates	Full Model	Parsimonious model
	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.03 *0.09*	
Age	0.07 0.07	
Roof type	0.09 *0.09*	
Crops sold	-0.13 *0.09*	-0.15** 0.08
Frequency of Fuel Extraction	0.09 *0.08*	0.12* 0.08
Bonding Social capital	0.18* *0.04*	0.20** *0.05*
Linking Social capital	0.04 *0.01*	0.04 *0.01*
Social Equity	0.44*** 0.06	0.47*** 0.05
Observations	*189*	*189*
R^2	*0.37*	*0.35*