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Resilience of communal grasslands in the Ethiopian highlands: Integrating gender and social learning

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Doctoral Thesis

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Declaration

I declare that this dissertation is my original work and no material in this thesis has previously been submitted at this or any other university.

The soft copy of this dissertation can be downloaded from

http://www.wiso.boku.ac.at/afo/forschung/ethiopia-resilience/

Dedication

This thesis is dedicated to
my mother Amleset Gebru (Abestyei)
who passed away at the age of 56, on 08 March 2006;
and to
my father Aregu Behailu

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"Thanks be unto God for his unspeakable gift!" 2 Corinthians 9: 15

Prologue

My journey towards the ultimate version of this thesis was with aspiration, passion, full energy, and open mind to learn and try new things. It has been an iterative learning process to me and I verified as everything is possible in life.

My background on rural sociology on top of my plant science background, and my experiences as socio-economist and gender specialist in the framework of government, non-governmental, and international institutes in the context of rural men and women farmers and pastoralists in Ethiopia, contributed to generate this research. Particularly working for International Livestock Research Institution (ILRI) fascinated me to work on community based-management of communal pasture.

Joining University of Natural Resources and Life Sciences, Vienna (BOKU) opened up further opportunities to bring in ´**RESILIENCE**´ as a new analytical research and development concept in my professional sphere. Offcourse, many theoretical and methodological courses also contributed to the quality of my research through refining the model and the approach (i.e. stakeholders actively participated in the research processes, women and men farmers contributed in data collection, the preliminary findings shared with the stakeholders, and participatory tools used to facilitate community engagement in the discussions). Thus I consider that this research is the outcome of my previous backgrounds, and experiences. In fact many individuals and organizations are still behind the scene.

Despite of the limited time I had to accomplish in three years, the whole process of this research (i.e. from the concept note development until the final write up of the thesis) was appealing and demanding too. My background of plant science permitted me to appreciate farmers´ knowledge about the feed species in their communal pasture. The way they described the characteristics of plant species and their ecological setting was incredible, which demonstrated me the presence of unexplored part of knowledge. As sociologist I was excited when I discovered that farmers organized themselves to solve their own problems and maximize their benefit from the communal pasture using their own social networks. As a gender specialist I was keen to pinpoint how women are marginalized in the decision making process and from the benefits of the communal pasture. At the same time I was also curious about their distinct knowledge of the communal pasture, but sad that the management of the communal pasture is not using women´s knowledge to the best use of their communal pasture - that could have even better ensured the sustainable management of their communal pasture. However, bringing my experiences and background into the framework of resilience was demanding that required a lot of reading and exploration, which created me a window of opportunities for learning.

The results of this research have demonstrated that a community can manage their natural resource sustainably in the face uncertainties and turbulences. Yet, the results also highlights that to be resilient, a management system does not only need to ensure ecological sustainability but also needs to ensure social sustainability, i.e. the equitable distribution of benefits from common resources, thereby contributing to social justice. The question is how the communities can be supported to enhance their ecological as well as social sustainability. I anticipate that this piece of research contributes to the sustainable management of the natural resources.

Abstract

The study aimed at understanding how a community in the Ethiopian highlands has been able to sustainably manage its communal pasture, and effectively coped with various shocks and stresses over the last 40 years. During this period, the stresses were mostly related to demographic growth. As Ethiopia's population increased nearly fourfold, livestock numbers have increased and communal pastures has been reduced in favour of cropland. As a pressure on the remaining pastures increased, many were overgrazed, resulting in land degradation. Yet, the pastures play a key role to ensure the adequate feeding of cattle, especially oxen needed for plowing. The shocks were mostly related to political shifts. Indeed, over the last 40 years, Ethiopia has had three government regimes, with distinct political ideology and land tenure system.

The study focuses on one case study village, Kuwalla, which was carefully selected as a village that has implemented a sophisticated rotational grazing system and ensured a sustainable management of the communal pasture over the last 24 years. **Data** was collected through a range of methods including focus group discussions, key informant interviews and participant observation. The data was collected separately from men and women, thus allowing a gender-disaggregated data analysis. Additional data was collected in the village of Zagra, to compare the perception of farmers and experts on strengths and weaknesses of a rotational grazing system as compared to a cut-and-carry system.

The results show that three factors played a key role in **enabling the community to cope** with the impact of policy changes. Firstly, traditional leaders stepped forward at the collapse of the agricultural producers' cooperative, seizing the window of opportunity and mobilizing the community. They built on their previous experience and used traditional networks to mobilize the community. Secondly, the community established an informal institution to govern the access to and use of the communal grassland. The management rules are adapted based on experimentation, knowledge sharing and negotiation. Thirdly, the community was able to effectively interact with various official government agencies to safeguard their autonomy, and to enforce the rules.

While the Kuwalla pasture has been managed in a fairly sustainable manner over 24 years, **social inequality** remains. Indeed, women are excluded from the informal institution and the poor household, i.e. those who do not own cattle, do not benefit directly from the communal pasture. The study shows that gender-blindness is problematic for three reasons. Firstly, excluding women means that their needs are overlooked, resulting in the sub-optimal use of the communal pasture. Secondly, the exclusion impoverishes the knowledge base, so that future adaptation options might be overlooked. Thirdly, excluding women undermine legitimacy of the institution, thus threatening the whole management system.

The comparison between Kuwalla and Zagra shows that the **cut-and-carry system** may indeed enable the poor and women to benefit directly from the communal pasture. However, the system might not be suited to all grasslands. It thus seems useful to understand the rationale behind farmers' current management choices, appreciate their local experiential knowledge and search for creative ways to address shortcomings such as the unequal appropriation of benefit.

The study has shown how a community can seize windows of opportunity, how it can learn and adapt management practices, how it can manage a natural resource sustainability while facing uncertainties and turbulences. Yet, the study concludes that to be resilient, a management system does not only need to ensure ecological sustainability. It also needs to ensure social sustainability, i.e. the equitable distribution of benefits from common resources, thereby contributing to social justice.

Keywords**:** *Leadership, informal institution, collective action, local knowledge, equity, diversity, legitimacy, participatory approach, natural resource management*

Zusammenfassung

Diese Studie geht der Frage nach, wie es einer Gemeinde im äthiopischen Hochland gelungen ist, ihre Gemeinschaftsweide nachhaltig zu bewirtschaften und die diversen Schocks und Entwicklungen, der letzten 40 Jahren erfolgreich zu bewältigen. In diesem Zeitraum waren Entwicklungen vor allem auf das Bevölkerungswachstum zurückzuführen. Da sich Äthiopiens Bevölkerung vervierfachte, erhöhte sich der Nutztierbestand, gleichzeitig wurden Weiden in Äcker umgewandelt. Dies erhöhte den Druck auf die verbleibenden Weiden, was zu Überweidung und Bodendegradation führte. Dennoch spielen Weiden eine Schlüsselrolle in der Fütterung von Rindern, insbesondere den für das Pflügen wesentlichen Ochsen. Schocks hingen vor allem mit politischen Umwälzungen zusammen. Äthiopien hatte in den letzten 40 Jahren drei unterschiedliche Regimes, die auf unterschiedlichen Ideologien basierten und divergente Regulierungen für Bodenordnung proklamierten.

Die Studie basiert auf der **Fallstudie** des Dorfes Kuwalla. Die Auswahl auf dieses Dorf erfolgte nach sorgfältiger Recherche und wurde aufgrund seines anspruchsvollen Umtriebsweidesystems ausgewählt. Diese Bewirtschaftung der Gemeinschaftsweide ist seit über 24 Jahren nachhaltig. Die Daten wurden durch unterschiedliche Methoden, wie Fokusgruppendiskussionen, Experteninterviews und teilnehmender Beobachtung gesammelt. Die Daten wurden so erhoben, das sie geschlechterdifferenziert analysiert werden können. Um die Stärken und Schwächen zweier Weidesysteme – Umtriebsweide und Cut-and-Carry-System – zu vergleichen, wurden Daten auch im Dorf Zagra gesammelt.

Die Ergebnisse zeigen, dass für die **Bewältigung der Schocks**, drei Faktoren zentral waren. Erstens, haben die traditionellen Führer eine zentrale Rolle gespielt. Als die landwirtschaftliche Kooperative zusammenbrach, erkannten sie die Möglichkeit und mobilisierten die Gemeinschaft. Dieser Schritt gelang aufgrund ihrer langjährigen Erfahrungen und unter Verwendung traditioneller Netzwerke. Zweitens etablierte die Gemeinschaft eine informelle Institution, um den Zugang und die Nutzung der Gemeinschaftsweide zu leiten. Die Bewirtschaftungsregeln basieren auf Experimenten, Wissensaustausch und Verhandlungen und werden stetig angepasst. Drittens war wesentlich, dass die Gemeinde in der Lage war, effektiv mit den verschiedenen Regierungsstellen zu interagieren, um ihre Autonomie zu wahren und ihre Regeln aufrecht zu erhalten.

Obwohl die Gemeinschaftsweide Kuwallas seit über 24 Jahren nachhaltig bewirtschaftet wird, ist der Nutzen **sozial ungleich** verteilt. Davon betroffen sind in erster Linie Frauen, die von der informellen Institution ausgeschlossen sind; und ärmere Haushalte, die keine Rinder besitzen. Die Studie zeigt, dass die Geschlechterblindheit aus drei Gründen problematisch ist: Erstens, werden die Bedürfnisse der Frauen nicht berücksichtigt, was zu einer suboptimalen Nutzung der Weidefläche führt. Zweitens wird das Wissen der Frauen nicht einbezogen, so dass künftige Anpassungsoptionen eingeschränkt werden. Drittens untergräbt der Ausschluss der Frauen und ärmeren Haushalte die Legitimität der Institution, was das gesamte Bewirtschaftungssystem gefährdet.

Der Vergleich zeigt, dass das **Cut-and-Carry-System** ärmeren Haushalten und Frauen ermöglicht direkt vom Grünland zu profitieren. Allerdings ist dieses System nicht für alle Weideländer geeignet. Es erscheint daher sinnvoll, die Gründe für die derzeitigen Bewirtschaftung zu berücksichtigen, und das lokales auf Erfahrung, basierende Wissen der Landwirte einzubeziehen. Auf dieser Grundlage kann gemeinsam nach kreativen Möglichkeiten gesucht werden, um Mängel, wie die ungleiche Verteilung, auszugleichen.

Die Studie zeigt, wie eine Gemeinschaft trotz Unsicherheiten und Turbulenzen Möglichkeiten finden kann, neue Regeln aufzustellen und anzupassen, um so natürliche Ressourcen nachhaltig zu bewirtschaften. Die Studie zeigt auch, dass für Resilienz, neben der ökologischer Nachhaltigkeit auch die soziale Gerechtigkeit gesichert werden muss.

***Schlüsselwörter**: Bewirtschaftung von natürlichen Ressourcen, informelle Institutionen, kollektives Handeln, lokales Wissen, Gerechtigkeit, Vielfalt, Legitimität, partizipativer Ansatz*

Abstract in Amharic

የዚህ ጥናት ዓላማ በኢትዮጲያ ደጋማና ወይናደጋ የሚኖሩ ማህበረሰብ የውል ግጦሽ ቦታቸውን እንዴት በዘላቂነትና በአግባቡ እንደሚይዙ እና ፣ ላለፉት ፴ ዓመታት ያጋጥሙዋቸውን ችግሮችንና ጫናዎችን እንዴት ተቃቃመው ለችግራቸው ምላሽ አንደሰጡ ለመረዳት ነው። በ፴ ዓመታት ጊዚያት ውስጥ ያጋጠሟቸው ችግሮች እና ጫናዎች ከሕዝብ ቁጥር ጋር የተያያዙ ናቸው፤ የኢትዮጲያ ሕዝብ ቁጥር ወደ አራት እጥፍ ያደገ ሲሆን የእንስሳ ቁጥርም እንደዛውጨምሯዋል፣ በተቃራኒው ደግሞ የእርሻ መሬት በመጨመሩ የግጦሽ ቦታ መጠን ቀንሷል። ምንም እንኮን የግጦሽ ቦታ ዋንኛ የእንስሳት በተለይም ለእርሻ በሬ የመኖ ምንጭ ቢሆንም ፤ ይህ ሁኔታ በቀሪው የግጦሽ ቦታ ላይ ጫና በመፍጠር አብዛኛዎቹ የግጦሽ ቦታዎቹ ተጎድተዋል ። ። ሌሎቹ ችግሮች እና ጫናዎች ደግሞ አብዛኛውን ከፖለቲካዊ ለውጦች ጋር የተያያዙ ናቸው። ባላልፉት አርባ ዓምታት አገሪቷን የተለያይ ፖለቲካ አቋም ያላቸው እና የተለያይ የመሬት ሥሪት የሚከተሉ ሦስት መንግስታት አስተዳድሯታል።

ይህ ጥናት የተመሰረተው በአንድ በጥንቃቄ በተመረጠ የኩዋላ ማህበረሰብ መንደር ሲሆን፣ ይህ መንደር የተመረጠበት ዋና ምክኒያት ላለፉት ፪፬ ዓመታት የውል ግጦሽ ቦታቸውን አዟዙሮ የማስጋጥ ስርዓት በመዘርጋት የግጦሽ ሀብታቸውን በዘላቂነት መጠቀም በመቻላቸው ነው። መረጃው የተሰበሰበው የተለያዩ የጥናት መስብሰቢያ ዘዴዎች በመጠቀም ሲሆን፤ እነሱም የቡድን ውይይት እና ቁልፍ ሚና ያላቸውን የማህበረሰብ ኣባላትን መጠየቅ በማድረግ ነው። መርጃዎቹ ከወንድ እና ከሴት አርሶ አደሮች በተናጥል የተሰበሰበው በመሆኑ ፤ በዖታ የተሰባጠረ መረጃዎች ተገኝቶል። በተጨማሪም ስለተለያዩ የግጦሽ ቦታ አያያዝ ዘዴዎች ደካማና ጠንካራ ጎኖችን ለማወቅ ከአርሶ አደሮች እና ከባለሞያዎች እይታ አኮያ፣ ተጨማሪም መረጃ ከዛግራ መንደር ተሰብስቧል።

የጥናቱ ውጤት እንዳመለከተው የኩዋላ ማህበረሰብ የጋጠማቸውን ችግሮች በመቆቃም እና ለችግሮቹ ምላሽ በመስጠት የግጦሽ ሀብታቸውን በአግባቡ መጠቀም ያስቻላቸው ፫ ዋና ነግሮች ናቸው። አደኛ-ባህላዊ መሪዎች፤ የውንድኒን የአምራቾች ህብረት ሥራ ማህበር መፍረስን እንደመልካም አጋጣሚ በመጠቀም ባህላዊ መሪዎቹ ያላችውን ልምድ ተጠቅመው ማህበርሰቡን በማስተባበራቸው። ሁለተኛ ማህበረሰቡ የግጦሽ ቦታውን በአግባቡ መጠቀም የሚያስችለውን ህግና ደንብ ደንገጎ ደንቡ የሚቆጣጠር ተቆም ማቋቆሙ። ሶስተኛ ማህበረሰቡ መንግስታዊ ከሆኑ ተቆማት ጋር በመገናኝት እና በመተባበር የባህላዊ ተቆማቸውን ህጋዊነትና ተሰሚነት በማስከበራቸው።

ምንም እንኩን የኩዋላ የግጦሽ ሃብት ላለፉት ፪፬ ዓመታት በአግባቡና በዘለቄታዊ ሁኔታ ቢያዝም ፣ ሴቶች ከባህላዊ ተቆማት ተገለዋል። ደሃ አርሶ አደሮችም ማለትም ከብት የሌላቸው የግጦሽ ሃብቱ ተጠቃሚ አይደሉም። ጥናቱ አንደሚያሳየው ሥርዖተ ፆታን ያላገናዘበ ህግና አሰራር በሦስት ዋናዋና ምክኒያቶች በውል የግጦሽ ቦታ አያያዝ ስርዖት ላይ ችግር ይፈጥራል። አንደኛ ሴቶች ሲገለሉ ፍላጎታቸው ችላ ይባላል፤ በመሆኑም፤ የግጦሽ ሃብቱ መስጠት ያለበትን ጥቅም በተገቢ መንገድ አይስጥም። ሁለተኛ ሴቶችን ማግለሉ የእውቅት መሠረትን ያጠባል፤ ስለዚህም ለውደፊት የሚያጋጥሙ ችግሮችን ለመፍታት የሚያስችሉ ዘዴዎችንና አማራጮችን ይገድባል። ሶስተኛ ሴቶችን ማግለል የተቆሙን ህጋዊነትና ተሰሚነት አጠያያቂ ያደርጋል። በመሆኑም በአጠቃላይ የግጦሽ አያያዝ ስርዖቱን ያናጋል።

በኩዋላና በዛግራ የተደርገው ጥናት አንደሚያመለክተው አጨዶ መመገብ፣ ሴቶችንና ደሃ አርሶ አደሮችን ቀጥተኛ ተጠቃሚ ያደርጋል። ነገር ግን ይህ አጨዶ የመመገብ ዘዴ ለሁሉም የግጦሽ ቦታ ላይሠራ ይችላል። ስለዚህ የአርሶ አደሮች የግጦሽ ቦታ አያያዝን ዘዴ በተመለከተ፣ ለምን እንደመረጡት እና ለምን እደሚጠቀሙት መርዳት ያስፈልጋል። በተጨማሪም የአርሶ አደሩን የልምድ አውቀትን ማድነቅ እና ችግሮቻቸውን መቅርፍ ማለትም ኢፍህታዊ የምርት ክፍፍልን የሚቀርፉበት አቅም ማጎልበትና ሁኔታዎችን ማመቻችት ያስፈልጋል።

በመጨረሻም ይህ ጥናት እንዴት ማህበረሰቡ መልካም አጋጣሚዎችን ተጥቅሞ፣ እንዲሁም ከችግሮቹ ተምሮ፣ የግጦሽ መሬቱን ባግባቡ የሚያስተዳደርበትን ስርዖት አንዳጎለበተ እና በችግሮች ውስጥም ቢሆን የተፈጥሮ ሃብቱን በዘላቂነት መያዝ አንደሚችል ያስረዳል። ሆኖም ጥናቱ እንደሚያመለክተው ችግሮቹን ለመቆቆም እና ለችግሮቹ መፍትሄ በመስጠት ከችግሮቹ ለማገገም፤ አካባባዊ ዘለቄታነት ብቻ ማርጋገጥ ሳይሆን ማህበራዊ ዘለቄታዊነትን ማርጋገጥ ማስፈለጉን ያስረግጣለ። ማለትም ፍህታዊ የጥቅም ክፍፍልና መጋራትን ።

Abbreviations and Acronyms

AGP	Agricultural Growth Program
ARARI	Amhara Regional Agricultural Research Institute
BoA	Bureau of Agriculture
BoFED	Bureau of Finance and Economic Development
CGIAR	Consultative Group for International Agricultural Research
CoANRS	Council of the Amhara National Regional State
EPRDF	Ethiopian People Revolutionary Democratic Front
FED	Finance and Economic Development
FLDP	Fourth Livestock Development Program
GDP	Gross Domestic Product
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market Success of Ethiopian farmers
LIVES	Livestock and Irrigation Value chains for Ethiopian Smallholders
NLDP	National Livestock Development project
OoEPLAU	Office of Environmental Protection and Land Administration and Use
SNNPR	Southern Nations and Nationalities Peoples' Region

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Roadmap of the thesis

Chapter 1 presents the introduction of the thesis. It provides the general overview of the research and includes the research questions that guided the research. This chapter also presents the background information on the importance of livestock, and communal pasture in the Ethiopia highlands. **Chapter 2** reviews the concepts and theory used to conceptualize the overall research. Community resilience, gender roles and stakeholders' participation in the context of social-ecological system resilience are elaborated. **Chapter 3** presents the research methods and the study area. It describes the study area and explains the site selection process. It also presents and discusses the mix of qualitative methods and approaches used to collect and analyze the data. **Chapter 4** illustrates the results of the research on community resilience through rotational grazing system in Kuwalla village. It covers the evolution of the Kuwalla rotational grazing system; and the mechanisms and institutional structures that allowed the community to be resilient in managing their communal pasture. **Chapter 5** explains the role of gender on resilience-based management of communal pasture, the gender differences in the use and management of communal pasture in Kuwalla, and the implication of gender blindness on the resilience of the management of communal pasture. **Chapter 6** describes the results of farmers' perceptions about the two controlled grassland management system (i.e. the rotational grazing system and the cut-and-carry system). It illustrates the strengths and weaknesses of the two controlled grassland management systems, as perceived by farmers, in Kuwalla and Zagra; and by experts, such as extension agents. **Chapter 7** discusses the implications of the findings in relation to theoretical concepts linked to social-ecological resilience, as well as in relation with empirical evidence from the broader literature. It demonstrates the importance of nurturing resilience through social learning. It also summarizes which mechanisms that enabled the Kuwalla community to cope with changes in the past, as well as with the new challenges they currently face. Finally, the role that the extension service could play to enhance social learning and ensure social-ecological system resilience is discussed. **Chapter 8** presents the practical and theoretical key insights of the research to enhance social learning.

Chapter 1: Introduction

"Challenges are gifts that force us to search for a new center of gravity.
Don't fight them. Just find a new way to stand."
Oprah Winfrey

1.1 Overview

The highlands in Ethiopia, i.e. the areas those are above 1500 m.a.s.l., cover almost half of the total land area of the country. It is the home of more than 85% of the Ethiopian population and more than 70% of its livestock (Dejene, 2003). The highlands predominantly have a mixed crop-livestock farming system, where oxen play an important role as draught animals. Though communal **pastures** are an important **sources of feed**, they tend to be overgrazed (Aune et al., 2001).

The farming system in the highlands has been **challenged by** a wide range of **shocks and stresses** over the last 4 decades. Firstly, over the last 40 years the population has increased more than threefold (Bielli et al., 2011). This has been accompanied by an increase in livestock numbers, and a reduction of pastures in favor of crop land, increasing the pressure on the remaining pastures (Yordanos et al., 2011). Secondly, a range of shocks derived from policy changes, i.e. the distinct political ideology and land tenure system promoted by the three government regimes. The imperial regime of Haile Selassie ended in 1974 (Abegaz, 2005). It was followed by the communist *Derg* regime, which implemented a radical land reform in 1975 which ended the landlord and tenant relationships. It also implemented a villagization and resettlement program in 1985 (Hoben, 1995). The *Derg* was toppled in 1991 and the current regime of the Ethiopian People´s Revolutionary Democratic Front (EPRDF) implemented a second wave of land redistribution in 1996 to benefit landless youth (Deininger et al., 2008). These policy shifts created deep insecurity in institutions governing communal pastures use and access rights. Indeed, resettlements and frequent land redistribution, as well as the broader political uncertainty weakened informal institutions and community by-laws governing communal resources (Gebremichael and Waters-Bayer, 2007). Yet, at the same time these changes were an opportunity to restructure rights and roles. Thirdly, the pastures were influenced by recurrent droughts. For example the severe drought in 1984/85 reduced the productivity of the pastures (Amare, 1988). These droughts are expected to become more frequent and more severe in the coming decades, due to climate change (Tompkins and Adger, 2004).

Despite of this turbulent socio-political environment and weather vagaries, some **communities** have **ensured** a fairly **sustainable management** of their grassland. They developed a controlled system, i.e. either a rotational grazing system or a cut-and-carry system. The question that this thesis will focus on is how institutions that govern the use of communal grasslands were able to co-evolve with their socio-political environment. As Walker et al. (2002) points out, understanding how rules evolve in a social-ecological system is crucial to design institutions that enable these systems to self-organize in response to change. These human responses to ecological processes are strongly influenced by economic, political and cultural processes (Kofinas and Chapin, 2009).

The thesis will build on the concept of **resilience-based management** to understand how communities coped with changes and how they adapted their management practices. The goal

of resilience-based management is to understand the interrelated dynamics of societies and ecosystems, so as to ensure a sustainable flow of ecosystem services (Olsson et al., 2004a; Chapin, 2009). A number of factors that strengthen the resilience of a social-ecological system have been identified in a range of empirical studies. These include: the flexibility of social system and institutions to deal with changes, openness of institutions to provide broad participation, and a social structure that promotes learning and adaptability (see Ebbesson, 2010). Given the fundamental uncertainty in the social-ecological system in which the natural resources are managed, Armitage (2005) emphasizes on the role of experiential learning at community level.

Studying communal grasslands will add to this literature by focusing on an ecosystem whose dynamics are strongly influenced by human activities. Indeed, past studies focused mostly on natural resources that were more extensively used, such as rangeland (McAllister et al., 2006) , community forests (Van Laerhoven, 2010; Lebel et al., 2006), the Great Barrier Reef of Australia (Lebel et al., 2006), or fresh water management in Lake Racken in Sweden (Olsson et al., 2004b).

Particular attention will be given on the **institutional aspects** in the management of communal grasslands, which is poorly understood in the context of the Ethiopia highlands (Watson, 2003). Hence the study will focus on the structure of informal institutions and on the mechanisms that allowed communities to adapt and change. The insights derived from past adaptation processes (i.e. how a community coped with land tenure changes and the impacts of population growth) may help in understanding how institutions need to be structured to flexibly respond to future challenges.

Where humans play a major role in shaping the natural environment, it may be also useful to distinguish between groups of users. Among other, **gender** is a dimension that **shapes** roles and responsibilities, and thus both the use of and **knowledge** about natural resources (Rocheleau, 1995; Rocheleau and Edmunds, 1997; Agarwal, 2009). The gender differences in the management of natural resources are due to dynamic and complex gender roles, in which men and women have both shared and distinct interests (Jackson, 1998). The distinct interest and knowledge of women about communal pastures is not well studied, unlike other communal natural resources such as forests or water (see e.g. Agarwal, 2001). As Folke et al. (2002) point out, resilience is often associated with diversity of knowledge, as it contains the seeds that encourage both adaptation and learning when coping with change. Thus the study will highlight the differences in knowledge held by men and women and their respective interests, and it will assess whether the current informal institution is structured so as to integrate the different views and needs and adapt the management system accordingly. This allows insights into the flexibility of the social-ecological system.

To enhance the resilience of communal grasslands, it may be also important to assess the role of **participatory approaches** in the framework of interventions towards the sustainable use and management of grasslands. In Ethiopia interventions and development programs mostly use a top-down approach, which promotes one specific management system (i.e. the cut-and-carry system). Communities are expected to adopt the recommended practice. However, given the diversity of communities and of grasslands, it is unlikely that a 'one size fits all' approach will be successful in ensuring the sustainable use and management of pastures (Scoones and Cousins, 1989; Gondo, 2011). Moreover, as Dietz et al. (2003) state, uniform rules do not have dynamic attributes. Thus they may not be able to evolve in response to changing requirements and needs. Engaging the resource users in the process of devising the management rules might be important to make use of the local knowledge and indigenous management practices, as well as enhance resilience through social learning.

To summarize, **three questions** – and their respective sub-questions – guide this PhD research:

1. Which institutional structure and which mechanisms allowed a community to adequately respond and restructure the use of their communal grassland in the face of change?
    - How were unanticipated shocks (e.g. political changes) and long-term trends (e.g. population pressure) perceived by the community?
    - How did the community take the initiative to adapt formal and informal rules?
    - How were new opportunities and constraints taken into account? Which 'room for manoeuvre' did the community perceive?
    - What levers did the community use to adapt the informal institution that governs the access and use rights so as to respond to changes?

2. Do gender roles strengthen or hinder resilience-based management of the communal grassland?
    - Are there differences in knowledge and management preferences?
    - Are gender disparities in knowledge and management preferences taken into account?
    - What are the implications of gender on sustainable use of natural resource management in general and communal grassland management in particular?

3. Why do some communities prefer rotational grazing, while the extension system promotes a cut-and-carry system?
    - How do farmers and extensionists perceive rotational grazing and the cut-and-carry system?
    - What is the rationale of extensionists to promote the cut-and-carry system? What is the rationale of farmers who tend to prefer a rotational grazing system?
    - What is the impact of rotational grazing or the cut-and-carry system on the role and benefit sharing of men and women?

1.2 Background: Grassland in the Ethiopian highlands

1.2.1 Importance of livestock

Ethiopia is a predominantly rural country with an agrarian economy (Pankhrust, 1990). Despite being subsistence-oriented, agriculture supports more than 80% of the population and is the main economic activity in the country. **Livestock** is an integral component of the agricultural sector and makes an important contribution to the economy of the county (Gelan et al., 2012). Indeed, it contributes 15-17% of the total Gross Domestic Product (GDP) and 35-49% of the agricultural share of the GDP (Sintayehu et al., 2010). In the crop-livestock mixed farming system, livestock provides food, draught power, fuel energy, and organic fertilizer, as well as serves as a source of cash income (Gebremedhin et al., 2004). Livestock also serves as an asset: in the absence of formal financial institutions and credit services, it can be sold to cover the sudden need of cash, e.g. for social functions (e.g. weddings and funerals), or to purchase farm inputs.

In the Ethiopian highlands, livestock productivity is very low (Gebremedhin et al., 2004). For example, the average production of milk is 1.54 liters per cow per day (FAO, 2009). As a result, the average consumption is estimated at about 16 liter of milk and 14 kg for meat per person and per year (Belete et al., 2010). This is much lower than the average consumption per capita in Africa or the world. Many studies confirm that **feed shortage** is a major cause of the low productivity of livestock (Mengistu, 2002; Mengistu and Amare, 2003; Zegeye, 2003; Amede et al., 2005; Duguma et al., 2012). Given their poor nutritional status, animals tend to be underweight thus producing little meat and achieving low prices when sold as live animals. Moreover there is a higher risk of disease and death of livestock, with severe consequences for farmers as they lose one of their most valuable assets.

The **climate variability** in Ethiopia can further reduce the productivity of pastures and thus feed availability. Especially the recurrent droughts tend to increase the mortality of livestock. The 1973/74 drought has resulted in the death of 66% of the cattle (Amare, 1988); similarly during the 1984/85 drought about 50-80% of livestock died of feed shortage (Amare, 1988). These droughts are expected to continue and be more frequent in the coming decades due to climate change (Tompkins and Adger, 2004; Naustdalslid, 2011).

1.2.2 Natural pastures as a source of feed for livestock

In Ethiopia the feed from natural pastures is estimated to covers 80-90% of the livestock feed (Mengistu, 2006). In fact this figure varies between the lowland and highland parts of Ethiopia. In the lowlands (i.e. the pastoral and agro-pastoral system), natural pasture is nearly the entire sources of livestock feed. In the highlands, natural pasture is the main source of livestock feed but is complemented by crop residues and stubble grazing (Mengistu, 2002; Benin et al., 2006).

Given seasonal and weather-related variations, there are high **temporal and spatial variations** in the amount and quality of feed available from natural pastures (Smith, 1993; Funte et al., 2010). The rainfall pattern, i.e. both the availability and intensity of rain, plays an important role (Cline et al., 2010). In the dry season the availability and quality of pasture reduced to such an extent that livestock may not fulfill the energy requirement to maintain their bodyweight. This results in body weight loss and reduction of milk yield (Galmessa et al., 2013).

The ways people use and manage the communal pasture also influence both the quality and the amount of feed available, as well as its seasonal distribution (Miller and Thompson, 2007). A controlled grassland management system can contribute to an efficient use of the feed

resources, especially in the rainy season. Yet, in Ethiopia most of the pastures can be accessed freely throughout the year. This **open access grazing** system may also affect the composition of species that grow on the pastures, and may lead to palatable and nutritious species being replaced by unpalatable species. Hence the open access grazing system, especially when combined with high stocking rates, may lead to the **depletion of feed resources** through overgrazing, contributing to the low productivity of livestock (Mengistu, 2002; Gebremedhin et al., 2004) and to food insecurity (Devereux, 2000) (see Figure 1).

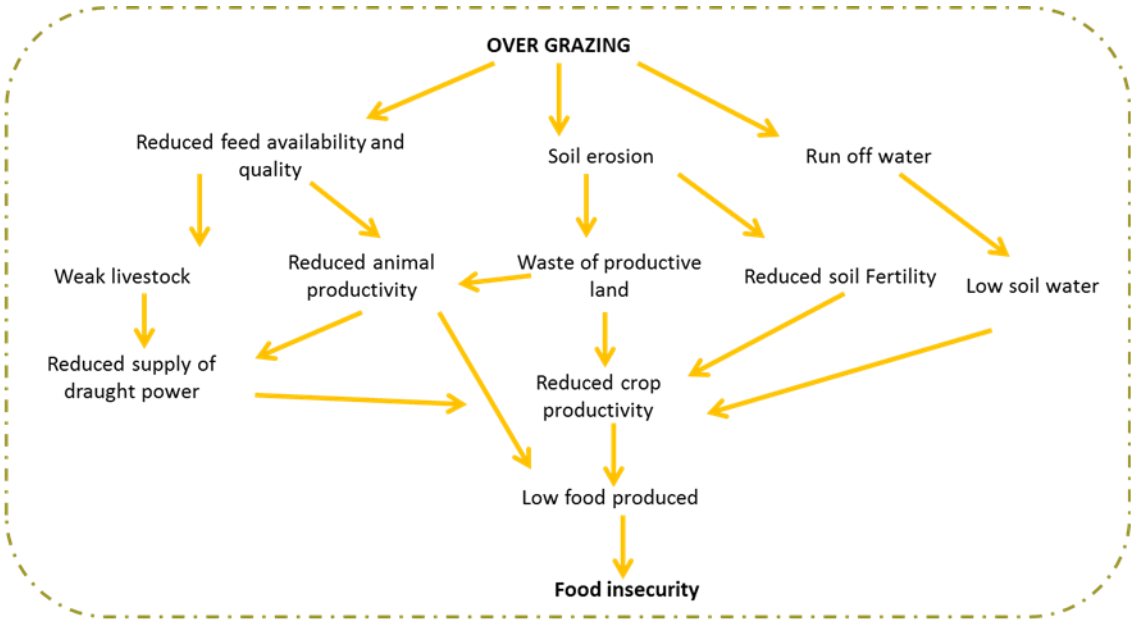

Figure 1: Interrelations between overgrazing and food security

Overgrazing also negatively affects **crop production** as malnourished oxen – the main source of draught power – cannot plow as much land (Figure 1). The number of oxen owned by a household determines the area of cultivated land and the cropping pattern. Indeed, households with less draught power cultivate less land and grow crops such as pulses and other vegetables that do not need as frequent cultivation as for example cereals.

Overgrazing has also been shown to accelerate soil degradation (Dejene, 2003; Tamen and Vlek, 2008; NABS, 2010). Indeed, Melese (1992) estimated that overgrazed pastures accounted for 20% of the annual **soil erosion** in Ethiopia. Soil erosion has serious implications as most farmers lack the capacity to replace the nutrients lost with the fertile topsoil. Studies indicates that about 1.5 billion tons of fertile topsoil is lost every year from the Ethiopian highlands, which could have enabled the production of 1.5 million tons of grain (Tamen and Vlek, 2008). A better management of pastures would thus contribute to food security directly through improving the nutritional status of cattle, and indirectly through reducing soil erosion.

Overgrazing and associated land degradation is exacerbated by the **growth of human population**, which currently shows a growth rate of 2.5%. As a result, the Ethiopian population has increased three fold over the last five decades: Bielli et al. (2011) reconstructed the Ethiopian population as slightly over 28 million in 1965 and projected the population to reach about 94.5 million by 2015. The rapid increase of human population increases the demand for food, thus pushing for a conversion of pastures into crop land (Tekle and Hedlund 2000; Zeleke and Hurni, 2001; Mengistu, 2006; Gebresamuel et al., 2010; Minale, 2013). Indeed, studies show a decreasing trend in the area of pastures (Aune et al., 2001; Mekasha et al., 2013), while the total population of livestock is increasing by 3.2% (Negassa et al., 2011). Given the limited

amounts of cash that farmers have, a smaller pasture cannot be compensated by feed purchases (Benin and Pender, 2006). As a result of feed scarcity, the pressure on the remaining pastures is increased, worsening overgrazing (Kitabe and Tamir, 2005). To mitigate this downwards spiral, the use and the management of communal pastures should be improved, e.g. by supporting communities in establishing a controlled grassland management system.

1.2.3 Access rights to pastures during different government regimes

During the **imperial regime of Haile Selassie** the most common form of land tenure system in the Ethiopian highlands (i.e. Tigray, Amhara, and Shewa) was the *rist* system (Pausewang, 1973). Similarly in the feudal system, landlords – the *'ristegnas'* – inherited land from their ancestors and passed their rights to their children. *Ristegnas* were descendants of those who settled on the land and had lived there over long periods of time (Gebeyehu, 2011). The land was owned by only a few *ristegna* families, who divided it among their descendants. The other members of the community had to work the land as tenants through share cropping (Jemma, 2004). As most *ristegnas* owned large tracts of land, fallowing – i.e. not cultivating cropland for one to three years to restore soil fertility – was widespread. This fallowed land was used to graze cattle.

As density of human population was low, there was sufficient land used for grazing farm animals. These included communal pastures, fallow land and stubbles on cropland after harvests. Moreover, up to the 1950s, about 40% of Ethiopia was covered by forests[1] (Tadesse, 1995). Farmers were allowed to send their livestock to the forest for grazing, particularly during the dry season.

The imperial regime of Haile Selassie was toppled in 1974 by the ***Derg***, which implemented a **communist regime**. This marked a radical political shift, especially through land tenure reform, the formation of peasant associations, the formation of producer cooperatives and a villagization program.

The 1975 **land tenure reform** was one of the key factors affecting the management of communal natural resources (Ashenafi and Leader-Williams, 2005). The reform (Proclamation No. 31/1975) nationalized all land, i.e. put it under the property of the state. It thus eliminated the private ownership of land, including the *rist* system (Miller and Tolina, 2008). Land was redistributed equally to all community members regardless of their traditional or birthright rights, thus ending the exploitive relationship between *ristegnas* and tenants.

During the *Derg* regime there were several waves of land redistribution, to accommodate the request for land by newly established family. Over time, given demographic growth, this reduced land holdings per household and brought land fragmentation. As a result, the traditional practice to fallowing cropland was discontinued (Prabhakar and Alemu, 2013), thus reducing the area available for grazing cattle. Moreover, the land proclamation also deprived farmers' right to access the forests, which had fallen under the property of the state. In aggregate the land tenure changes reduced the diversity of grazing areas, increasing the pressure on the communal pastures.

In 1975, **peasant associations** were established to administer the land at community level. The peasant associations represented the lowest level of governmental administration and were to implement government policies that dealt with land issues and the management of natural resources (e.g. land allocation, access to forests, management of pastures and water resources). This meant that traditional institutions were deprived of their authority, which had included the governance of the communal pastures (Clapham, 1988). Traditional leaders also lost their influence as a result of the ideology that was espoused by the cadres of the communist party.

[1] Currently about 3% of the land is covered by forests (Berry, 2003)

As a result most the traditional management system of communal natural resources were destabilized (Ashenafi and Leader-Williams, 2005).

To structure agriculture along socialist ideals, the *Derg* issued several proclamations that encouraged the formation of agricultural producers' cooperatives between 1978 and 1981. Farmers were enticed to join a **producers' cooperatives** through grating them privileged access to credit, fertilizer, extension and other services (Desta, 1995). A further redistribution of land was implemented to combine the land of the co-operative. Cooperatives usually took the most fertile and centrally located land, both crop and a grazing land, whereas farmers who were not members of a cooperative were pushed out into marginal areas (Pausewang, 1991; Kodama, 2007). While only less than 5% of the farmers in the country were members of a producers' cooperative (Rahmato, 1990) they had the exclusive access to the best communal pastures. The vast majority of the farmers forced to use the poor and marginalized pastures, which strongly increased grazing pressure and often resulted in overgrazing.

In 1987, the *Derg* also implemented a **villagization** program. The farmers, who traditionally had their houses close to their fields, were pressured to settle in villages. The aim of the program was to facilitate the provision of social services such as schools, water and health centers, and thus create preconditions for an agrarian socialism (Hoben, 1995). However the villagization program not only topically increased human population density, it also increased animal density. Around the houses in the villages there was little space to keep the cattle during the night, and around the villages there were only limited areas where the cattle could graze during the day. This resulted in a negative impact on communal pastures (Hoben, 1995).

In 1991, after a long civil war, the *Derg* regime was toppled by the **Ethiopian People´s Revolutionary Democratic Front (EPRDF)**, which progressively adopted some market-based policies. However, the land is still the property of the state, and farmers have only the use right over the land. Although there have not been significant changes in the land tenure system, a number of policy adjustments have been made to address the issue of land security.

In the early 2000s, policies were implemented to **decentralize** the responsibility for administering natural resources including the communal pastures. This empowered regional governments to manage natural resources, within constitutional limits. For instance, the Amhara regional state issued several proclamations on rural land administration that aimed at decentralisation, e.g. Proclamation No. 456/2005 in 2005 and the revised proclamation No. 133/2006 in 2006 (CoANRS, 2006). However, not all regional governments were able to set effective organizations at local level, and as a result many regional governments continue to control the management and use of natural resources. In most cases the centralized system employs standardized measures without taking into account the specific needs of the various communities (Ostrom, 2010). So far the decentralization process was not effective in empowering local communities by devolving rights and responsibilities to administer their communal natural resources (Chinig, 2008; Maconachie et al., 2009).

1.2.4 Approaches to improving the management of pastures

Communal pastures in the highlands of Ethiopia are managed either by the community, the church or schools. Management by the community is the most common form, and **three management systems** can be distinguished. The first is a free grazing system: the pasture can be accessed year round, by all animals and is open to everyone. This is the dominant type of management system and is assumed to be the main cause of land degradation (Benin and Pender, 2002). The second management system is a controlled grazing where the pasture can be accessed during selected months of the year and access is limited to certain users. The third management system is a cut-and-carry approach, where the pasture is completely closed year-

round and can only be accessed to cut the grass by hand to feed the cattle elsewhere. This third system is strongly promoted by the experts, who see it as the best way to manage communal pastures.

The agricultural extension system has a long history of **top-down approach**. In such an approach, knowledge transfer is linear, from research to extension system to the farmer (Mattocks and Roger, 1994; Ogunsumi, 2010). The approach has tended to devalue farmers' experiences and knowledge (Kassa and Abebaw,2004). As Kassa (2003) pointed out, the extension system in Ethiopian has never been participatory and thus the extension programs and policies that have been devised, do not give due consideration to farmers' knowledge or their preferences. As Watson (2003) pointed out, the role of farmers in the management of natural resources are disregarded and they are not involved in the decision-making processes. In effect, the top-down approach of the extension system, through discarding farmers' knowledge and the specificities of the local conditions, often contributes to perpetuating the overexploitation of communal pastures.

In the highlands of Ethiopia, many **development projects and programs** have implemented interventions to improve the communal pastures. The government's Fourth Livestock Development Project (FLDP) was implemented in the 1980s (Mengistu, 1994). The program planted and over-sowed feed species on communal pastures as one strategy to improve the quality of the feed. However, except for research trial fields, no successes have been recorded on communal pastures (Mengistu, 2006). This might partly be attributed to the uniform and top-down approach.

The potential of **community based** natural resource conservation and management has received increased attention since the 1980s (Agrawal and Gibson, 1999). Many success stories have been documented of communities using local knowledge and collective actions to manage their natural resources sustainably (Houde, 2007). The experience of NGOs with community-based natural resources management has shown some positive impacts, such as the Participatory Forest Management (PFP) projects, which were implemented collaboratively by the Oromia regional state and Farm Africa in Chilmo and Bonga, or with SOS-Sahel in Borena. The experience of these projects demonstrated how engaging the community could ensure the sustainable management of communal resources (Farm Africa and and SOS Sahel-Ethiopia, 2007). There has also been a revitalization of some traditional institutions to contribute to sustainable use of communal resources (Ashenafi and Leader-Williams, 2005). Given the limited success achieved by imposing new natural resources management rules and the promising experiences of community-based management approaches, there is a renewed appreciation of traditional institutions (Watson, 2003).

Chapter 2: Concepts and theory

In this study a grassland – used as a pasture or through cut-and-carry – is conceptualized as a social-ecological system, i.e. its sustainable management depends on the interactions and co-evolution between the ecological and the social sub-system. In this chapter, the concept of community resilience is discussed to show how communities may use their local knowledge to effectively and collectively act to cope with and adapt to the changes. The role of institutions as a component of community resilience in facilitating social learning and thus enhancing resilience of the communal pasture is illustrated. Issues related to gender are also presented, as part of the social dimension that may affects the capacity of the system to enhance or hinder resilience. Moreover, how participatory approaches could facilitate and enhance the capacity of the community towards resilience is explained.

2.1 Social-ecological resilience

Social-ecological resilience is defined as the capacity of a system to absorb disturbances and to adapt to changes through reorganization process, so as to still retain essentially the same function, structure, identity, and feedbacks (Elmqvist et al., 2003; Folke et al., 2010). The concept of resilience in social-ecological systems is a key concept in ecology (Chapin, 2009; Adger et al., 2011) and provides an inclusive framework to understand the dynamics of human-environment interactions (Holling, 1973). It also offers insights for increasing society's capacity to adapt and cope with changes (Holling, 2004).

A social-ecological system is composed of human and ecological components, which interact with each other in various ways (see Figure 2). This interaction generates **interdependencies** between the **social and ecological sub-systems** so that they cannot be treated separately (Berkes et al., 2003; Folke, 2007). Humans interact with their natural environment to make use of one or several resources (e.g. soils, plants, water) to sustain their livelihood. The way the natural resources are used will affect their ecological dynamics and the production of ecosystem services. Changes in the social system will affect management systems and will thus result different configurations of the ecological system and vice-versa. The dynamic interactions are influenced by the selected management practices (Arrow et al., 2004; O'Brien et al., 2009; Warner, 2010). Hence striving for sustainability involves understanding the dynamics of this linked social-ecological system (Cumming et al., 2005). As the interactions between humans and their environment are complex and dynamic, the system is unpredictable (Steffen et al., 2004).

Unsustainable agricultural practices used by **humans erode the resilience** of many social-ecological systems (Folke et al., 2002; Arrow et al., 2004). The decline of ecosystem goods and services is observable through soil erosion, land degradation, floods, crop failure, etc. Their impact is particularly severe for natural resource dependent, vulnerable and marginalized societies (Adger et al., 2005a).

The increased pressure on ecosystem services globally brought the attention of scholars to center their questions on how to **generate resilience** in social-ecological systems (Folke, 2006). Managing resilience for sustainability might be a way forward to achieve desirable social goals, especially where unpredictable changes and surprises are pervasive (Walker et al., 2004; Adger et al., 2005b). As Bunch et al. (2011) suggest maintaining the capacity of social-ecological systems to meet the socio-economic needs of the present without compromising the ability of

the future generation is paramount, both from a conservation point of view and to ensure the sustainable use of natural resources for sustainable livelihoods.

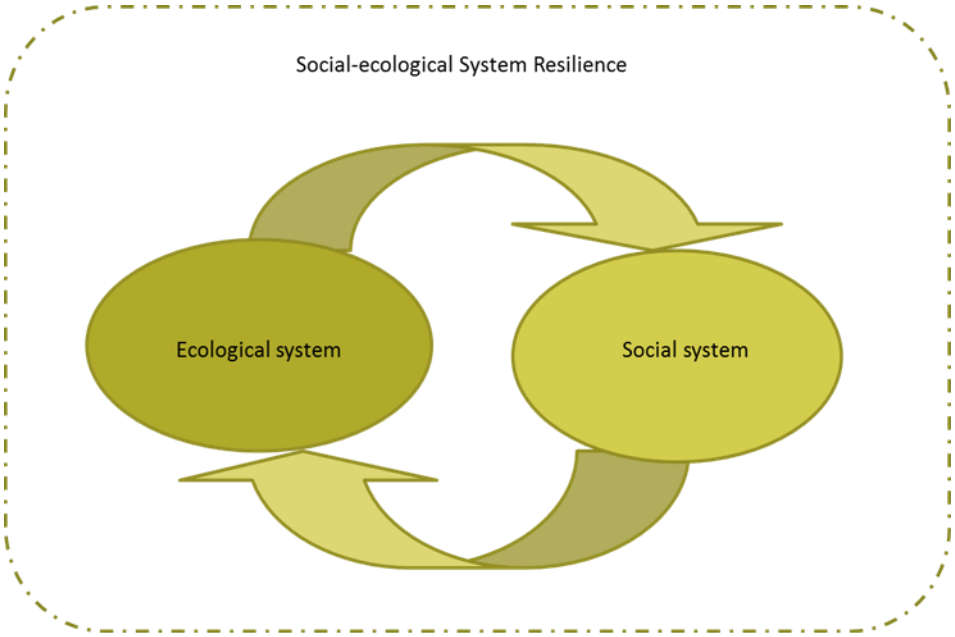

Figure 2: The interdependency and feedback loops between the social and the ecological sub-system

In understanding how people manage their environment, how they cope with changes and adapt their management practices, it may be useful to distinguish between groups of users by gender. **Gender** is one of the social dimensions that **shape roles** and perception of men and women, as well as their responsibilities in managing natural resources (Rocheleau and Edmunds, 1997; Agarwal, 2009). As a result, gender relations may influence the capacity of individuals and societies to manage changes. Hence it can be important to assess gender and its implications on the resilience of social-ecological system.

2.2 Community resilience

While recognizing that resilience is dependent on both the ecological and social sub-system, the emphasis in much of the literature is on understanding ecological dynamics and how ecological dynamics are influenced by human activities. Much less attention has been given to the community's capacity to respond to changes (Matarrita-Cascante and Trejos, 2013; Berkes and Ross, 2013).

Social resilience has been defined as the ability of groups or communities to cope with the external stress and disturbances brought about by social, political and environmental changes (Adger, 2000). Magis (2010) also refers to community resilience as the capacity of a community to come together and work toward a common objective while the system faces disturbances and changes. Communities thus play an important role in enhancing of social-ecological resilience (Tompkins and Adger, 2004). Hence understanding how communities cope with changes and adapt institutions can be critical, particularly in natural resource dependent communities (Olsson et al., 2004a; Tompkins and Adger, 2004; Matarrita-Cascante and Trejos, 2013).

Communities that learn to live with changes and actively respond to the impact of changes are more likely to become resilient (Adger, 2000; Magis, 2010). Thus it is important to examine the ability of the social system to adapt, and to understand the role of **social actors** and their agency. Social actors (which can be individuals or groups) are important agents, as resilience is about the actions taken by the social actors (Magis, 2010) to respond to changes and cope with the impact of changes. The social side of social-ecological resilience is sometimes simplified by depoliticizing it. Indeed, the negotiated nature of most social agreements including management rules and obligations is often underplayed.

2.2.1 Resilience as a function of social capitals

In this research the conceptual framework of social-ecological resilience and community resilience were integrated to study the management of communal pastures (see Figure 3). Resilience is understood as the outcome of a **community's capacity to make use of their social capitals** (i.e. knowledge, institutions and collective action) to engage in a process of social learning. This conceptual framework will allow exploring the mechanisms that allowed a community to ensure a sustainable flow of ecosystem services (i.e. secure the supply of feed from their communal pasture). The framework is also used to examine how the community used their social capitals to enhance social learning, thus strengthening resilience. Thus, resilience can be understood as the outcome of processes of social learning based on observation of the ecological system and appropriate collective actions.

Social capital has been conceptualized in different ways by different authors (Nath et al., 2010). In this research social capital is understood as including institutions, experiential knowledge and collective actions. These components cover shared knowledge, norms, rules, and social networks, and the pattern of people's interactions. Indeed, collaboration determines how these components are coordinated and evolve to ensure the sustainable use and management of pasture (Ostrom, 1999; Pretty, 2003).

As Pretty (2003) states, social capital is a key requirement for sustainable management of natural resources. For instance **social organizations** and norms can define who is excluded from the use of the resources (Ballet et al., 2007). Ostrom (1990) highlighted the role of social organizations to address the over-exploitation of common pool resources. Thus social capital can overcome the problem of free-riders by enhancing the capacity of users to take collective actions and govern their resources in a sustainable way (Pretty, 2003; Ballet et al., 2007).

Networks are also recognized as an important component of social capital in managing natural resources (Olsson, et al., 2004a; Tompkins and Adger, 2004; Newman and Dale, 2005). Bodin et al. (2006) point out that the structure of social networks influence experiences that can be used in times of change and uncertainty. Networks can enhance the reachability of useful knowledge and facilitate social learning through allowing ecological knowledge and information to be shared. Key individuals like leaders can play an important role in linking a community with external agencies, and in building trust (Bodin and Crona 2008). Such leaders may also be in a position to influence other community members and thus mobilize the community for action. They may also provide knowledge and guide to facilitate community towards resilience (Eriksen and Brown, 2011).

Studying how a community used its social capital to ensure the sustainable management of pastures might help to examine the diversity of local knowledge, how it is distributed in the community, how it is used to develop a set of rules, and how the rules are monitored and changed.

Local knowledge is the outcome of processes of learning and adaptation that evolved within a specific local environment (Davis, 2005). According to Crona (2006) local knowledge often

includes important ecological knowledge, which is one of the most important factors for the sustainable management of ecosystems. Angassa et al. (2012) highlighted the positive contribution of local knowledge for the sustainable management of resources and for the preservation of indigenous vegetation in Africa. In this study, experiential knowledge (or local knowledge) is understood as including the process of observing, discussing and making sense of new information.

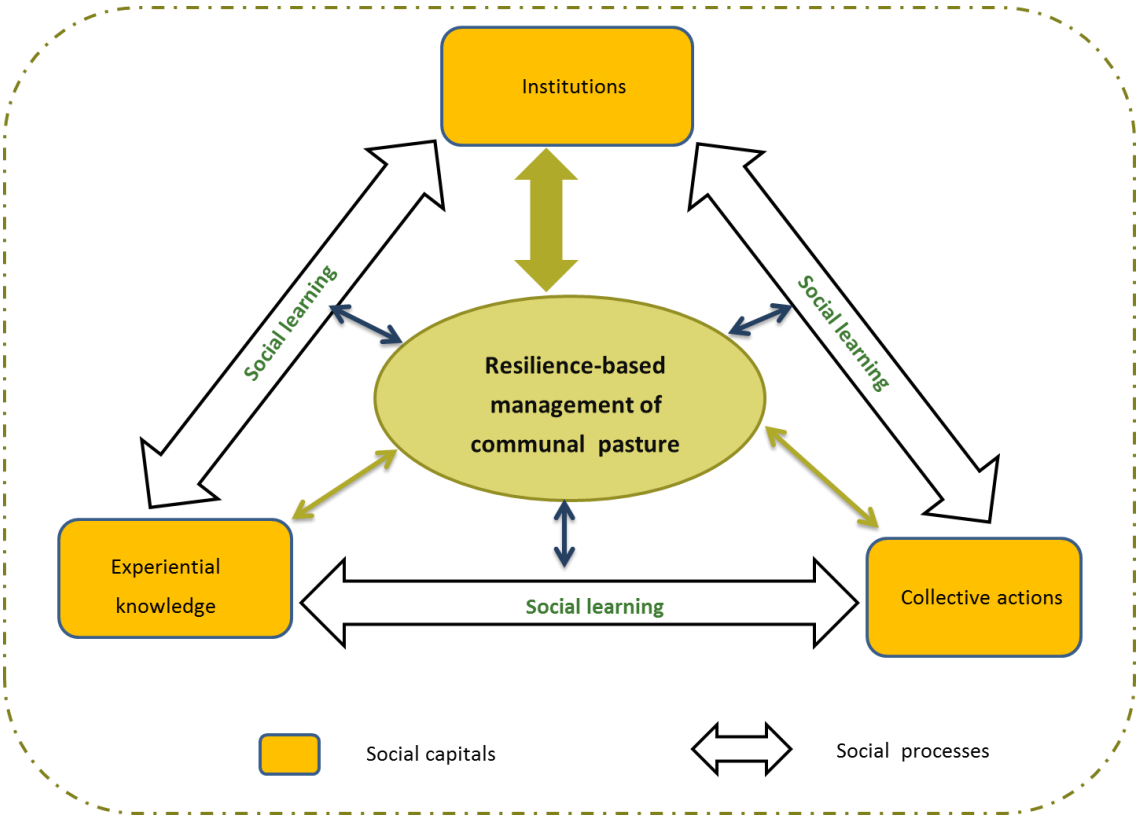

Figure 3: Resilience as a function of social capitals and process towards adaptive management for resilience

People observe and carry out their own experiments and offer alternative suggestions and practices to maximize the benefit derived from a resource (Berkes et al., 2000). As Berkes (2009) points out, people who interact with their environment throughout their life, tend to be able to respond effectively to what they observe. Users of a pasture know about e.g. the plant species that can be found as well as their characteristics such as their feed quality or their resistance to drought. The experiential knowledge people acquire through informal experiments and experiences, plays a key role for sustainable management of natural resources (Becker and Ghimire, 2003). Indeed, this knowledge can be used by the community as a basis for deciding how to manage the pasture, e.g. at what growth stage some plants may have negative effects, when to use the pasture, or which animals can be allowed to graze. This indigenous knowledge about the resources can enable the development of targeted management practices (Berkes et al., 2000; Berkes and Folke, 2002; Colding et al., 2003).

Experiential knowledge may be common to the whole community or be restricted to specific individuals or groups (such as elders, women). As Bodin et al. (2006) state, the existence of many groups of users with diversified knowledge can enhance the social capacity of the system for adaptation and learning. Indeed, if diverse knowledges are combined, it may promote social learning and thus enhance resilience. Hence assessing the type of experiential knowledge held by different community members (e.g. men and women), and assessing how it is used to inform

the management of communal pastureland, can be helpful to understand adaptation processes that can strengthen the resilience of the social-ecological system.

In this research, **institutions** are defined as a set of rules governing the access and use rights of communal grassland. They are the rules and norms that determine the relationship of different groups of users with the resources (Berkes, 2007). As they influence the incentives that guide the use and management of natural resources, institutions are key components for the resilience of social-ecological systems (Adger, 2000). Ostrom (1990) has shown that institutions can enable collective action and play a central role in preventing resources degradation. As a result, common pool natural resources can be managed in a sustainable manner, among other by preventing individuals from free riding behaviour, which often leads to overexploitation (Van Laerhoven, 2010). The significant contribution of institutions – particularly informal institutions – in ensuring the sustainable use of communal resources have been summarized by Yami et al. (2009) in an extensive literature review.

Institutions that have the **capacity to learn** through communication and experimentation, can strengthen resilience by enabling adaptive management (Olsson et al., 2004a; Folke et al., 2005; Plummer and Armitage, 2007). Indeed, if institutions are flexible and self-organized, they can ensure that the management system adapts to change, if they perceive and act upon opportunities despite uncertainties (Colding et al., 2003; Olsson et al., 2004a; Adger et al., 2005a; Lebel et al., 2006; Nelson et al., 2007). How and under what conditions people build and adapt institutions has been informed by studies on social capital, networks, cooperation and trust (Adger, 2003). Self-organized institutions build on experiential learning and collective action. Self-organization emerges as an outcome of multiple interactions (Davidson, 2013).

Institutions also highlight the influence that social structures may have in enabling or preventing the effective integration of available knowledge and mediating between competing interests (Adger, 2000). Thus it may be important to assess the implications of community institutions on **equity** between different users group (e.g. between men and women) in terms of inclusion or exclusion, in terms of participation and distribution of benefits (Agrawal, 2000) (B. Agrawal, 2000).

Collective actions are considered in this study as those actions that require the involvement of a group of people who collaborate in the pursuit of a shared interest (Meinzen-Dick et al., 2010). Collective actions include setting rules of conduct for the users, designing management rules, implementing the rules, and monitoring the adherence to rules (Meinzen-Dick et al., 2010). Hence collective action is needed by the users so that they can agree on goals, set regulations about access to resources, and identify ways to balance the multiple users' interests (Steins and Edwards, 1999). In this study, it is assumed that the shared goal of the users is to protect their communal grassland from overgrazing so that it might contribute to the provision of feed resources throughout the year, now and in the future. Plummer (2006) stressed that communication and negotiations are the basis for collective actions. Hence, while users continually negotiate rules and regulations, collective action also improves their capacity for learning and adaptation which is vital to address future stress and shocks (Daniel and Walker, 2001 in Ratner et al., 2013).

Collective actions allow communities to **work together**, to translate their social capital into other important assets of livelihood (Ratner et al., 2013), i.e. achieve economic and social benefit from the resources. These benefits are important incentives for collective action. Hence studying how users organize the collective action towards the protection of the communal pasture from misuse, (e.g. guarding the pasture to prevent animals from entering it during the closing seasons), and under what conditions the community engaged in collective actions are paramount. These include investigating the processes of social learning by which users collectively set rules of conduct, designed management rules, implemented these rules, and monitored the adherence to them.

2.2.2 Resilience as a social process

Nelson et al. (2007) point out that within a social-ecological system, the social sub-system adapts through various social processes, thus enabling it to adapt and cope with disturbances. Thus, in this research, resilience is understood as strongly influenced by social processes such as social learning and self-organization (Walker et al., 2002; Nelson, et al., 2007). As such resilience presupposes **processes of negotiations** to share responsibilities, processes of communication to develop rules, processes to build trust and collaboration through social networks (Pahl-Wostl et al., 2008; Berkes, 2009). Indeed, communicative actions (Rist et al., 2007) frame the management practices, which are the outcome of negotiations among social actors and their debate over the meaning of practices. Social learning processes thus enable the adaptive management of natural resources (Armitage, 2005; Ison and Watson, 2007; Pahl-Wostl et al., 2008; Rodela, 2011).

As such resilience is linked to the concept of **sustainable adaptation** which emphasizes the need to view adaptation as a longitudinal social process rather than a list of technical measures (Eriksen and Brown, 2011; Taylor, 2012). This concept emerged from the increasing recognition of the shortcomings of conventional natural resources management approaches, which prescribe a fixed set of recommendations and rely on the transfer of technology. They do not take into account the social learning processes on which actual agreements and practices are based on (Kofinas, 2009).

Social learning is often linked to **self-organization.** The latter is the outcome of processes for sharing management rules and regulations after the community continuously interacted among each other and with the outside environment (Davidson, 2013). As a result of these interactions, the social structure and institutions can be reorganized, so as to cope with changes and uncertainties and take advantage of new opportunities (Paton et al., 2001). Hence, promoting conditions that generate self-organization can enhance the adaptive capacity of a community, and thus their ability to successfully manage their natural resources (Agrawal and Ostrom, 2001; Plummer and Armitage, 2007). Studying the dynamic interaction of the community both with their pasture and with the broader context will contribute to better understanding how the institutions re-organized and how a community took actions collectively to respond to changes and to avoid negative impacts on their communal pasture.

Social learning also requires the development of **relational capacities** between social agents, in the form of learning how to collaborate and understand others' roles and capacities (Pahl-wostl et al., 2008). To reinforce collaboration and enhance social learning, it might be important to facilitate users from different social groups (e.g. men and women) to appreciate the specific roles and capacities they have in the management of natural resources. This can fuel social learning by allowing the diversity of knowledge from men and women to be shared and discussed, thus widening the options through which to respond to unpredictable changes, and enhancing the resilience of the social-ecological system. By explicitly including issues of **social justice**, social learning processes can also contribute to minimize negative outcomes for specific groups in the community (Taylor, 2012).

2.3 Gender relations and social-ecological resilience

Resilience-based management of communal pasture requires the involvement of all users, i.e. the active and meaningful **participation of all users** (both men and women) (Meinzen-Dick et al., 2004). Empirical studies confirmed that unequal benefit sharing among different types of users may generate social resentment and disincentives, leading to free-riding, overharvesting and unsustainable use of resources (Andersson and Agrawal, 2011).

2.3.1 Women's role in communal pasture and livestock management

Women are the major contributors to the **agricultural workforce** (Aregu et al., 2010). Regarding livestock management, women are mostly responsible for providing feed, water and taking care of the livestock that is usually kept around home, especially lactating cows and calves (Mogues et al., 2009). In Ethiopia, they are also in charge of cleaning the animal shed and collected cow dung from the grazing area (it is used to make 'dung cakes' which is used as fuel for cooking). In most cases children and young men are in charge of herding livestock. However, when the children attend school, the task of looking after the herd often falls upon the women.

As with labor tasks, **ownership** and control over the sale of livestock and livestock products is differentiated by gender. Women market small livestock such as sheep, goats, poultry as well as dairy products, while men market large livestock such as cattle and pack animals. These gender-differentiated patterns of ownership and control over livestock are not always sufficiently taken into account by extension services and development projects. The recommendations they provide do not necessarily take into account women's needs and preferences. Indeed, the extension services tend to be biased towards men, because men are recognized as farmers (Mogues et al., 2009; Ogato et al., 2009). This is partly linked to cultural norms. For example, the norm that women should not plow restricts their access to oxen, which are the main sources of draught power for crop cultivation.

Ethiopian **legislation** related to communal natural resources – including pasture – do not differentiate between access rights of men and women. Indeed, land legislation encourages equal access right for men and women (Demessie and Yitbark, 2008; Kumar and Quisumbing, 2012). However, in practice, women have less access than men, both in male and female headed households. This is partly due to the tradition that men are active in the public sphere, thus they are the ones who are expected to be involved in decision-making processes on community issues (Debsu, 2009) such as developing rules governing the use right for the communal pasture.

2.3.2 Gender roles and the use of natural resources

The gender differences shape the different **roles and responsibilities** at the household and community level. Women have reproductive roles and are seen as care-takers of the young, the sick and the old, as well as being responsible for the various domestic tasks within the homestead. Men have public and productive roles, and tend to be more involved in the cash economy. To fulfill their respective roles, they need specific resources. Hence gender roles shape the **needs and preferences** of men and women regarding the management and use of natural resources (Reeves and Baden, 2000; O'Shaughnessy and Krogman, 2011).

Related to their specific roles in the society, men and women have both shared and distinct knowledge about the use and management of natural resources (Rocheleau and Edmunds, 1997; Agarwal, 2009). As Jackson (1998) points out, gender differences in the management of natural resources are due to dynamic and complex gender roles, in which men and women have both shared and distinct roles and responsibilities in the use of natural resources. Hence gender roles leads to **differences in ecological knowledge** acquired through the process of on-going and close observation by specific groups of users (Berkes and Folke, 2002). Empirical data from the literature on community forests shows that women are interested in collecting forest products such as fuel wood, grasses and fruit for cooking and preparation of food, while men are interested in timber to raise cash for the household (Agarwal, 1997). As a result, women in India are found to have better knowledge than men about trees regarding their use for energy and fodder (Agarwal, 2001). Another study in South Africa pointed out that middle-aged women tend to be highly knowledgeable about woody plant species for fuel wood and beverages, while

men do have better knowledge on tree species for medicine, craft and fencing (Dovie et al., 2008). Evidence from Nepal also indicates that women have better knowledge on water quality, reliability and acceptable storage methods (Upadhyay, 2005).

In social-ecological resilience, **diversity of knowledge** is understood as an important element to enhance social learning, as it fuels the renewal and reorganization process after a disturbance (Holling, 2004; Chapin et al., 2009). However, gender is rarely conceptualized as a source of knowledge diversity. Indeed, despite of its importance in shaping users' knowledge, experiences and perceptions in the management of natural resources, the gender dimension is noticeably absent in the literature on social-ecological system resilience. Yet, if social structures are rigid (Scheffer and Westley, 2007), they will not provide equal opportunity for inclusion and negotiation. This may be particularly problematic if the goal is social innovation to allow adaptiveness (Biggs et al., 2010). Moreover, a failure to accommodate the different interests and preferences of men and women may undermine the perceived legitimacy of rules.

The social roles thus guide the interactions with natural resources, and these interactions are likely to lead to knowledge on how to use a certain resources in more creative ways. Hence as Holling (2004) points out, to plan for sustainable natural resources management and enhance resilience, it may be important to explore new knowledge, and **incorporate the new knowledge**. In this study it is argued that women's knowledge about communal pasture is overlooked in the management of communal pasture, which may reduce resilience (Wuelser et al., 2011) as it narrows the knowledge base.

Ignoring the gender roles in a social-ecological system may also affect the ability of a specific group of users – such as women – to cope with and adapt to changes (O'Shaughnessy and Krogman, 2011; (Figueiredo and Perkins, 2013). If we fail to recognize that women can be affected by the changes in the social-ecological system differently than men, it may mislead our understanding of social processes initiated by the different responses of men and women. This might **mislead the management** of natural resources to unintentional system configuration that may hasten the exploitation of specific type of species, resulting in loss of biodiversity. This might lead to the loss of elements that enable the system to renew and reorganize itself following a large change (Walker et al., 2002).

However, there is **little empirical data** available on how the benefits derived from a communal pasture are shared among different groups in a community (e.g. men and women from different wealth status and marital status). Similarly, there is little empirical data on the knowledge held by men and women, or on their access rights to the communal pastures.

2.4. Participatory approach strengthens social-ecological resilience

Participatory approaches imply that **experts and community members** from different groups work together to develop a solution to problems (Lave and Wenger 1991; Biggs, 1994). The aim of participatory approaches is not only learning about the bio-physical aspects and ecology, but also to further social learning and critical thinking.

There has been an emphasis on participatory approaches to **integrate** the diverse sources of **knowledge** as well as contested claims influencing the management of natural resources (Walker et al., 2002; Adger, 2003). The integration usually involves debates over the meaning of information and debate about which information is relevant for specific management of natural resources. On one hand a variety of stakeholders need to be involved in participatory approaches to be successful enhance further social learning and collective action (Barreteau et

al., 2010; Taylor, 2012). On the other hand, such debates are almost invariably shaped by the power relationships, hence brokering a consensus can be challenging (Bodin et al., 2006; Cleaver and Toner, 2006; Von Korff et al., 2012). As Rist et al. (2007) explain, participation is thus not an end in itself, but is a means to facilitate communication and process of deliberation among different groups.

The quality of the social learning process is dependent on the **inclusiveness and meaningful participation** of all users groups (Meinzen-Dick et al., 1997). Particularly the question of power is critical for social learning, as it determines whose reality, priorities, needs, and preferences are taken into account in the management of natural resources. The active participation of the social actors ensures the possibility of learning, through the interaction among actors and the deliberation of ideas from various sources (Rist et al., 2007). Participatory approaches can thus contribute to **building resilience** through creating mechanisms through which various stakeholders' ideas and knowledge are shared and discussed, approaches negotiated, and solutions implemented through collective actions (Sims and Sinclair, 2008; Kofinas et al., 2009).

Chapter 3: Research methods and the study area

Since the social-ecological system around the communal grassland is complex and dynamic, studying this system needs inquiries into various components and aspects of the system. Ideally a comprehensive study would integrate ecological aspects (e.g. diversity of the plant species), animal nutrition aspects (e.g. nutritional quality of the species, dry matter production), and sociological aspects. However, due to time and resource constraints, this study focuses solely on the **sociological components** of the communal grassland management system. Hence the study focuses on the capacity of the community to cope with the various changes that challenged their communal pasture; the perception of men and women regarding the management rules that define access and use rights as well as their respective knowledge of the pasture; and the perception of extension agents and farmers regarding the cut-and-carry system vs. the rotational grazing system.

3.1 Research approach

The **case study approach** was selected as a strategy of the research (Yin, 2003 p.5) because it allows an in-depth exploration of the controlled grazing management system of a community, and how it evolved over the last 40 years. This approach allowed to investigate and illustrate the shocks and trends that challenged the sustainable use of the communal grassland, and how a community adapted management rules in response to these changes. Given that there is limited study on institutions governing the use and access right of the pasture in the mixed crop-livestock farming system in Ethiopia, the study is explorative.

Given that also there are two types of controlled grassland management system (the rotational grazing system and the cut-and-carry system) **two villages** were included in the study. The comparison of the two villages was also helpful to contrast the role of men and women in the management of communal pastures and the benefits and drawbacks for each group in the two systems. Indeed, the case study approach allows an in-depth investigation of who is doing what, who controls which resources, who is involved in the decisions on how the communal grassland is to be managed and who benefits how.

To investigate which opportunities and institutional arrangements enable a community to adapt the controlled grassland management system, it was important to identify communities that were widely recognized for their ability to manage their communal grassland sustainably, thus constituting a 'positive deviance', in contrast to the widespread open-access system that tends to lead to over-grazing (Gebreyohannes and Hailemariam, 2001). Spreitzer and Sonenshein (2004) define positive deviance as intentional behaviors, which significantly depart from the norms of a referent groups in positive ways. Hence **positive deviant communities,** recognized as having a sustainable management of their communal grassland were deliberately selected for this study. The aim was to identify 'success stories', and learn from those communities that successfully implemented adaptation processes, in the face of changes in a wider context. The case study approach selected for this research thus does not focus on a 'typical' community, but two positive deviant communities were purposely selected.

Appreciative inquiry is also used as a complimentary research approach to study the positive deviant community. Fitzgerald et al. (2001) define appreciative inquiry as a deliberate searching for people's exceptionalities and looking for their strength, qualities, contributions and achievements. Hence appreciative inquiry allows discovering the practices employed by the

community to sustain their communal grassland. It also allows recognizing rules and actions the community used to management their communal grassland. Inquiring about the positive actions and behavior that enabled the communities to adapt the controlled grassland management system helps to identify mechanisms that strengthen the resilience of the grassland system. Appreciative inquiry searches for the best in people, their organization and the network around them (Hammond, 1998). By intentionally focusing on what is present as opposed to what is missing, it has the potential to reframe a problem into opportunities and possibilities. Yet, appreciative inquiry also allows to see the down-side of a situation (Bushe, 2009). This provides opportunity to point out some of the gaps that the management system encountered and so far failed to address.

The data was collected using complementary **methods** such as focus group discussions, key informant interviews, participant observation and reflection meeting with stakeholders. The mix of methods allowed to capture different aspects as well as to triangulate the information collected, thus enhancing the validity and reliability of the results (Yin, 2003).

3.2 Selecting the study site

3.2.1 The Bure *woreda*

The data for this study were collected from Bure *woreda*[2]. Bure was selected because Bure is known to have a few communities who have a long history of managing their communal grassland in a sustainable manner and the researcher speaks the local language (Amharic).

Bure *woreda* is located in the Amhara National Regional State (see Figure 4), between 10°18'0"N and 10°48'0"N and between 36°48'0"E and 37°18'0"E. Its altitude ranges from 700 to 2600 masl and the long-term annual temperature ranges from 14°C to 24°C (IPMS, 2007). The *woreda* has an estimated area of 839 km^2 of which 5.6% is natural pasture (West Gojam FED, 2010). The majority of the *woreda* (83%) is at mid-altitude – locally known as *Woyna Dega* – which is suitable for agriculture. The *woreda* has a mono-modal rainfall pattern, with the rainy season lasting from May to September. The mean annual rainfall ranges from 1,386 to 1,757 mm, with a relatively good distribution. Due to its diverse ecological setting, good rainfall amount and distribution, Bure is suitable for different crops and livestock production.

Agriculture constitutes the basis for the livelihood of the rural people of the *woreda*. Agriculture is mixed crop-livestock, i.e. **rainfed crop cultivation** complemented by traditional livestock production, and mostly for subsistence. Farmers predominantly produce maize (*Zea mays*), millet (*Eleusine coracana*), teff (*Eragrostis abyssinica*), wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), faba bean (*Vicia faba*), and field pea (*Pisum sativum*) as a source of food, cash and animal feed. The crop residues, esp. the straw and husks are used as a source of feed, particularly during the dry season. Crops such as potato (*Solamum tuberosum*), onion (*Allium cepa*), garlic (*Allium sativum*), cabbage (*Brassica oleracea*), and pepper (*Capsicum spp.*) are also produced as cash crops. These vegetables are usually planted on a very small portion of the arable land and in the backyard of the homestead. A few crops also planted using traditional small-scale irrigation schemes on rivers and streams.

Farmers keep different species of **livestock** such as cattle, sheep, goat, donkey, horse, mule, chicken and bees. They are a source of food (milk, butter, egg, and meat), support the crop production through the provision of draught power (mostly oxen for plowing, rarely horse

[2] *Woreda* is the third level in the administrative division in Ethiopia, below the region and the zone. It is equivalent to the district level and groups about 20 *kebeles* (peasant associations). Each *kebele* groups several *got* (villages).

traction). Some are used as pack animals, especially to transport crops from the farmland to the homestead and to the market. They also serve as source of cash (sale of live animals, eggs, honey, butter and milk). Moreover people keep livestock as way of accumulating assets and means of security in case of crop failure. They also keep their livestock as a status symbol: a household that owns more livestock, especially cattle, is assumed to be rich and thus respected.

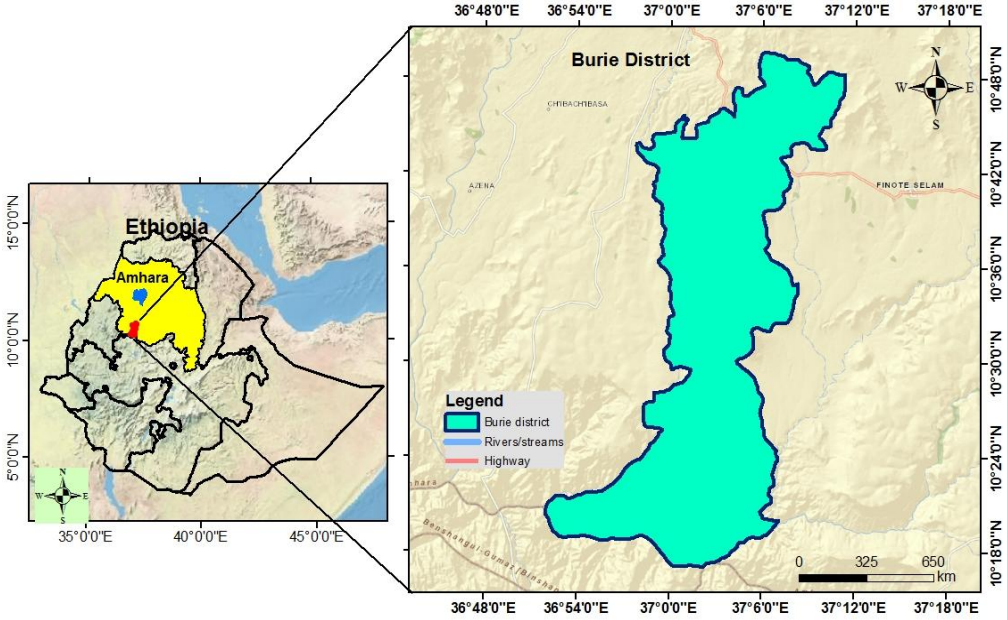

Figure 4: Location of Bure *woreda* in Amhara National Regional State, Ethiopia

3.2.2 Selecting the study sites

Since this research is based on two positive deviant communities, the case-study villages had to be selected in a careful and transparent manner. To identify villages who manage their communal grassland sustainably, the following five steps were followed.

In the **first step**, indicators were developed to describe the management system and assess the sustainability of the communal grassland in each *kebele*[3]. The initial list of indicators was based on theoretical considerations. In consultation with scientists and experts working on the management of pastures in Ethiopia, the initial list was revised and adapted to the local conditions. This yielded 12 indicators (see Table 1). Once the list of indicators was finalized, eight scientists from IWMI and ILRI were asked to rate each indicator regarding its relative importance. The average was calculated, and used to set the weight of each indicator.

In the **second step**, two heads from the Bureau of Agriculture (BoA) and one head from the Office of Environmental Protection Land Administration and Use (OoEPLAU) were asked to list potential *kebeles* that complied with following three criteria: (1) the *Keble* has adopted a controlled grassland management system; (2) it has informal rules and regulations governing the use and access right of pasture; and (3) had project interventions. Out of the 23 *kebeles* in Bure, 12 potential *kebeles* were identified (see the list of *kebeles* in Annex 1 and Annex 2).

In the **third step**, the 12 potential *kebeles* were assessed by 11 experts drawn from BoA, using the 12 indicators. Each expert assessed the *kebeles* for which s/he had sufficient information, thus each kebele was assessed by six or seven experts (see Table 2).

[3] *Kebele* is the smallest administration unit, below the *woreda* (district). Each *kebele* comprises several villages (*got*).

Table 1: Indicators used to assess the grassland and their relative importance

Indicators	Average weight
Duration that the grassland has had a controlled management system	16.30
Grassland size	13.00
Number of animals using the grassland (TLU/ha)	10.90
Number of households that depend on the grassland	10.10
Extent of vegetation cover	10.00
Biodiversity (diversity of plant species)	9.00
Presence of soil and water conservation structures	7.63
Mixture of animals using the grassland	7.50
Prevalence of gully erosion	6.13
Weed infestation level	4.25
Heterogeneity of the users	2.88
Bare soil visible on the grassland	2.38

Each expert was asked to give a score for each indicator (see the score value in Annex 1 and the weighted value in Annex 2). The scores given by the experts for each indicator were averaged, and then multiplied by the weight of the indicator. Finally, the weighted scores for the 12 indicators were added up for each *kebele*. This allowed identifying the top five *kebeles*: Wundgi, Wangedam, Zyew Shuwn, Baguna and Jib-Gedel (see Table 2).

Table 2: The top five *kebeles* selected in the third site selection step

Kebele	**Number of experts assessing**	**Total score**	**Type of controlled grassland management system**
Wundgi	7	406	Rotational grazing system
Wangedam	7	306	Cut-and-carry system
Zeyew Shun	7	272	Cut-and-carry system
Baguna	7	256	Rotational grazing system
Jib Gedel	6	252	Both rotational grazing system and cut-and-carry system

In the fourth step, the researcher together with a development agent from the respective BoA visited the five *kebeles* selected in the third step. During the visit the researcher discussed a potential collaboration with the representative of the community, and the bio-physical condition of the communal grassland was inspected to assess the vegetation cover, species diversity, the weed infestation level, as well as the existence and the intensity of gullies. The visit was also used to check basic socio-economic data (esp. the number of households and animals dependent on the communal pasture). Furthermore, the willingness of the villagers to participate and contribute to the research was assessed (Figure 5).

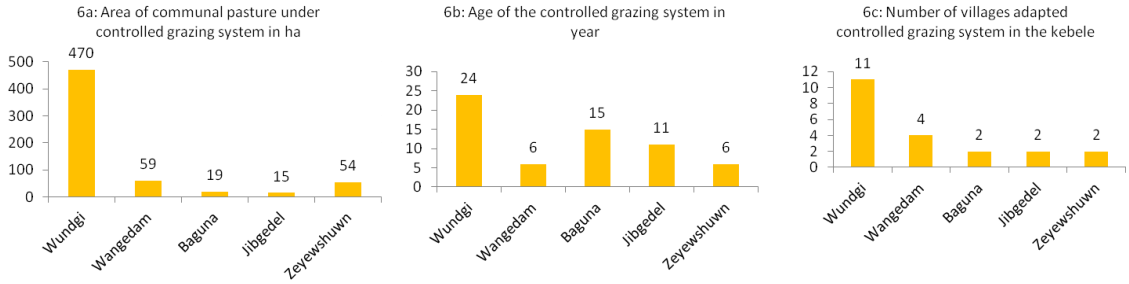

Figure 5: Key data on the 'top 5' *kebeles*

As a result of the four-step process, Wundgi and Wangedam were selected as case studies, as they best matched the attributes that were set as relevant to address the research questions (see Figure 6).

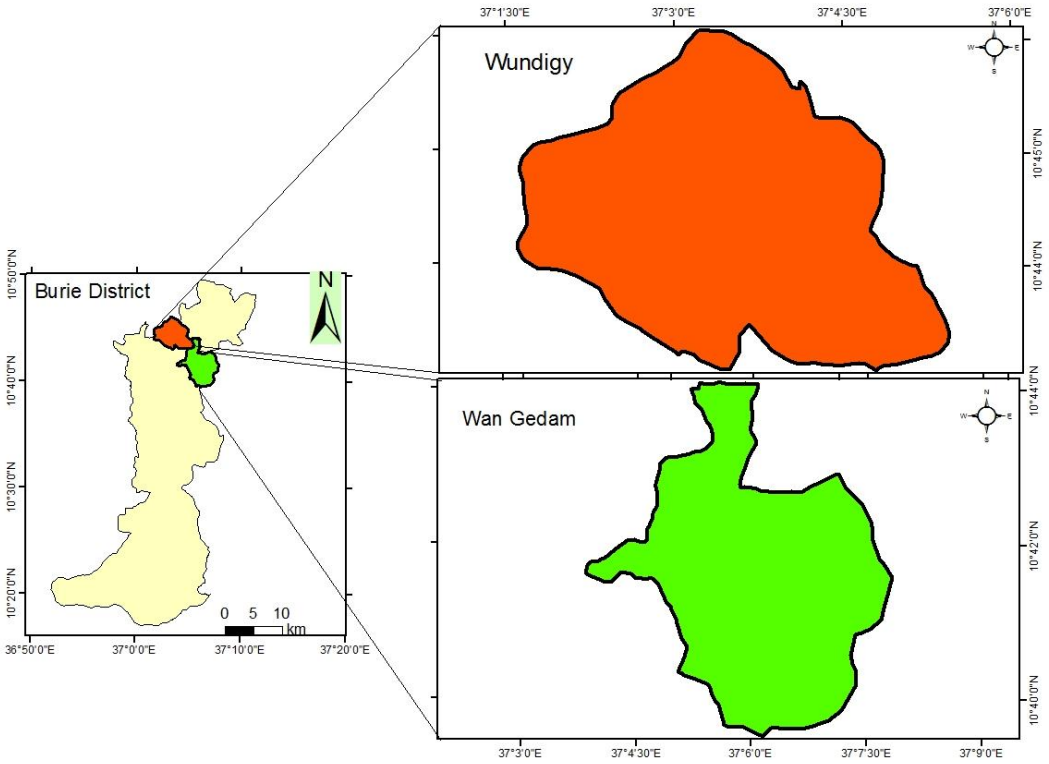

Figure 6: Location of Wundgi and Wangedam *kebeles* in Bure *woreda*

Wundgi was selected as it has a large communal grassland under controlled system, includes more villages, and has the oldest controlled pasture management system (see Figure 5). The site visit confirmed that Wundgi is a pioneer *kebele* as it developed its own controlled grassland management system early on. Since Wundgi has had 24 years of experience, it was selected mainly to address the first research question i.e. to study the institutional structure and mechanisms allowed the community to adequately respond and restructure in the face of change. Moreover Wundgi also targeted to address the second research question, i.e. gender differences in roles, knowledge, access and benefit sharing.

Wangedam was selected as a second study site as it has adopted the cut-and-carry system thus allowing a contrast to the rotational grazing system of Wundgi. The comparative study between the two controlled systems allows investigating the rationales behind the rotational grazing system vs. the cut-and-carry system. It also allowed comparing the impact of the two controlled grassland management systems on the benefit to men and women

In the **fifth step**, villages within the two *kebeles* were identified, since the communal grassland is managed at the village level. In Wundgi, out of 11 villages with controlled grazing, **Kuwalla** village was selected for detailed study, as Kuwalla was the pioneer village in developing the controlled grassland management system, i.e. pioneered the system (see Figure 7). Informal discussions confirmed that the other 10 villages in Wundgi followed the footsteps of Kuwalla and progressively adopted the controlled grassland management system. The spread of the system might have been helped by the fact that the communal pasture of Kuwalla is located near the church, so that all villagers in Wundgi *kebelle* cross the communal pasture every week

on their way to Sunday prayer. Moreover, after the prayer ceremony, there is the *mekleft*[4] where people come together to share a late breakfast and discuss. This continual observation of the controlled grazing system could be one of the reasons for the high rate of adoption of the controlled grazing system in Wundgi.

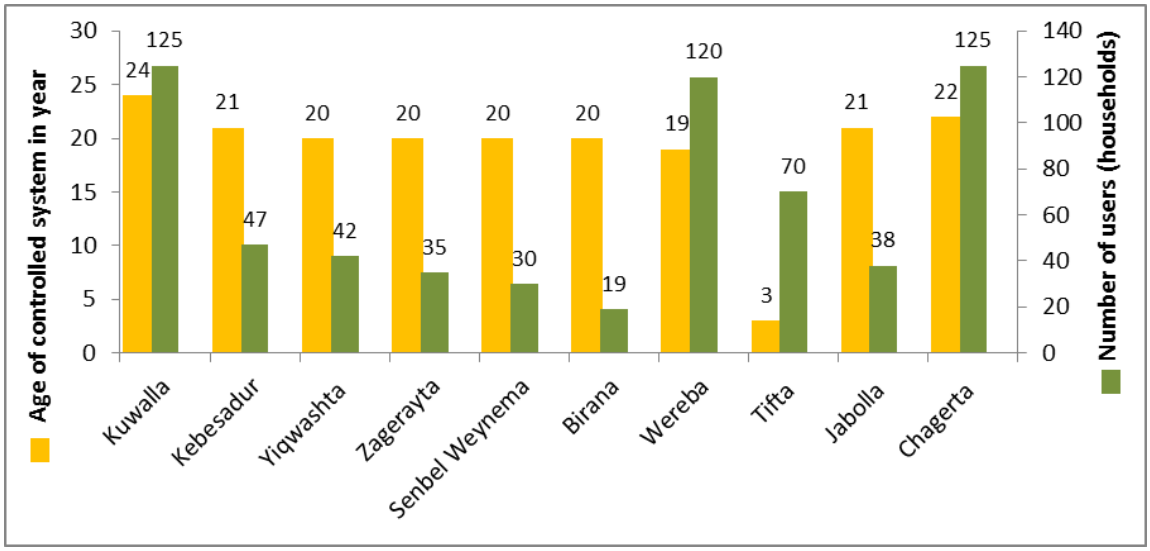

Figure 7: Villages in Wundgi, differentiated by the age of the controlled grazing system and number of users

Within the Wangedam *kebele*, **Zagra** village was selected as a case study because it is the oldest and the pioneer village in adopting the cut-and-carry system: they adopted the cut-and-carry system six years ago, before the three other villages in Wangedam that also adopted the controlled grassland management system.

3.3 Data collection

The **data** were **collected** in two rounds. The first round was between August 2012 and January 2013 and focused selecting the villages and on collecting data in Kuwalla. The second round was between September 2013 and December 2013 and focused on collecting data in Zagra, as well as addressing specific open issues through additional interviews in Kuwalla. The data was collected by the researcher who speaks the local language (Amharic); she was assisted by a locally recruited assistant who was familiar with the local context and culture.

A **complementary set of qualitative data collection methods** was used to cover various aspects and to ensure the validity and reliability of the results (Yin, 2003). Focus group discussions and key informant interviews were the main data collection methods, complemented by informal discussions, participant observations, and personal records of data. At the end of each round of data collection, the preliminary results were discussed with the community in reflection workshops.

[4] *Mekleft* is a religious practice where the villagers eat breakfast together after church every Sunday after the Morning Prayer. Groups of villagers take turns to bring the food to the church.

3.3.1 Focus group discussions

Focus group discussions were used as a method to gain insights and collect in-depth information on particular topics. The **topics** include characterization of farming system; assessment of changes in the communal pasture, identification of events that challenged the use and management of the communal pasture, description of the access and management rules, and investigation of the role of men and women in the use and management of communal pasture.

Four focus groups were formed to collect information on the specific topics: the core group, the management group of the informal institution, a men's group and a women's group. For each group six to ten community members were selected (Silverman, 2010), based on their familiarity with the targeted topics of discussions. Moreover it was ensured that the participants covered a range on criteria such as age, gender, wealth status, and their roles in the use and management of communal pasture. With each group one to three consecutive discussions were conducted to explore adequate information in each topic. Each group was asked to discuss issues that it was particularly well suited to provide information on. For instance the farming system was characterized mainly with the core group. The management and access rules were discussed with the management group. The role of men and women in the use and management of communal pasture was discussed separately with men's and women's groups. During the focus group discussions, a range of participatory tools were used to facilitate the discussions and encourage the participation of all members. A total of 11 focus group discussions (FGDs) were held in Kuwalla (see **Error! Reference source not found.**). The focus roup discussions were primarily targeted at collecting data on the institutional structure and the mechanism that allowed the community to manage their communal pasture in a sustainable manner (research question 1).

The **core group** was made up of elders, youths, and committee members from informal management of communal pasture, men and women. The three focus group discussions with **core group** enabled to identify the historical events (changes) affected the communal pasture and its management system over the last 40 years; and to assess their impact on communal pasture and its management. Moreover the discussions with the core group enabled the researcher to characterize the farming system and the controlled grassland management system.

The management group was composed of members of the management committee from the informal institution and the father of herders. Two focus group discussions were conducted with the management group to explore the management rules governing the use of communal pasture and the access right of the community members to the use of pasture. This helped to assess how the structure of the informal institution ensured the smooth communication between the informal management body and the users. Moreover it helped to describe the rotational grazing pattern to use the communal pasture in the specific months of the year.

To understand the role of men and women in the use and management of the communal pasture (research question 2), **gender-specific focus groups** were formed (see Figure 8). A separate focus group discussions were organized to create conducive environment for the women group to express their views freely in the absence of men. Three separate focus group discussions were conducted with each group (see **Error! Reference source not found.**). Both the en and women groups asked the same questions, aimed at identifying the distinct and different knowledge about the communal pasture possessed by men and women.

Table 3: Data collected through focus group discussions (FGD) in Kuwalla village

Focus group discussion	Number of attendees		Information gathered, issues discussed
	Men	Women	
1st FGD with core group	7	3	• Characterize the farming system • Draw community resource map • Assess status of natural resources over 40 years
2nd FGD with core group	5	2	• List events that challenged the communal pasture • Prioritize events that challenged the communal pasture
3rd FGD with core group	7	2	• Assess the impact of events on the management rules • Change in size of the communal pasture • Change in the availability and quality of the pasture • Change in the management system • Characterize the management of the rotational grazing
1st FGD with the informal management body	6	0	• Characterize the management of the rotational grazing • Describe the rules and regulations governing the use of the communal pasture • Explain the structure of the informal institution • Assess the information flow between the management of informal institution and the users
2nd FGD with the informal management body	8	0	• Use participatory mapping to illustrate the grazing rotation pattern of the during the opening seasons • Map the pattern of cattle movement to manure the communal pasture land (participatory mapping)
1st FGD with men	8	0	• Identify the criteria that differentiate the wealth status of the community • Assess the proportion of community in the three wealth groups (poor, medium, rich) • Identify the proportion of female and male headed households • Assess the proportion of the female headed household in each wealth group • Compare the proportion of female and male headed households in each wealth group (poor, medium and rich)
1st FGD with women	0	8	

2nd FGD with men	7	0	• Assess the role of men and women in livestock and pasture management
			  ○ Contribution to specific activities, e.g. herding, feeding
			  ○ Sharing of benefits from pasture and well fed livestock
			  ○ The different interests and preferences of men and women regarding the communal pasture
			• Assess their involvement in management and in the informal institution governing the use of the communal pasture

2nd FGD with women	0	6	
3rd FGD with men	8	0	• Assess the knowledge of men and women about the communal pasture: list plant species and rank them based on their importance and abundance (using pair-wise ranking) • Assess the share of pasture from communal pasture under controlled grazing
3rd FGD with women	0	6	

Figure 8: A separate focus group discussions with women (left) and with men (right)

To collect data on the perceptions of farmers on the cut-and-carry system (research question 3), two **focus group discussions** were conducted to characterize the system in Zagra (see Table 4). This allowed for a comparison of the perceived strengths and weaknesses of the management systems between Zagra and Kuwalla.

Table 4: Data collected through focus group discussions (FGD) in Zagra

Focus group discussion	Number of attendees		Information gathered
	Men	Women	
FGD with core group	7	3	• Characterize the farming system of the village • Characterize the cut-and-carry system used to management the communal grassland
FGD with the informal management body	6	0	• Describe the rules and regulations governing the use of communal pasture in the cut-and-carry system • Demonstrate the mode of communal pasture appropriation

3.3.2 Participatory tools

Participatory tools were employed in the process of data collection to facilitate the communication between the research participants and the researcher (Chambers, 1994). The use of visual aids helped both the researcher and the research participants to convey their ideas and message clearly and to ensure that the researcher has understood the content of the discussion correctly. Moreover the participatory tools helped the community to **actively engage in the discussion** in the course of data collection. This was noticed particularly with women focus group discussants. The researcher recognized that women's participation was enhanced by using, e.g. proportional pilling tools to assess who is doing what in the use and management of communal pasture. The following participatory tools were used: community resources mapping, proportional pilling, wealth ranking, seasonal calendar and pair-wise ranking.

Community resources mapping was used to get an overview of the status of natural resources, including the pasture, both in the past and now (see Figure 9). Two volunteers from the core focus group took the lead to draw the map, with active participation from the other participants. The resources map helped the focus group discussants to show and explain the land use changes over time, by showing the status and changes in the use of land before and after the *Derg* regime. The map was also used to guide the discussions about the change in institutions governing the use of the communal pasture, the current and the past management

practices of the communal pastureland. The resource map exercise assisted both the participants and researcher to visualize the key trends such as expansion of farmland, reduction of forest area and pasture land. The resource maps also helped to lead the discussion on the shocks and stresses challenged the communal pasture and its management system overtime.

Figure 9: Drawing the community resources map (left); map with land use before and after *Derg* (right)

Proportional pilling was used widely during the focus group discussions when quantitative data were required. These include the relative amount of feed from different sources, the proportion of female-headed vs. male-headed households, the relative share of households in the three wealth groups (poor, medium and rich), and the relative contribution of family members (by gender and age) to various activities related to livestock and pasture management. Participants were asked to allocate a fixed number of grains (10 to 300) into different circles or cards representing different categories, e.g. the relative contribution of children and adults to herding (see Figure 10). This exercise allowed the focus group discussants to discuss, make an initial distribution, and renegotiate if the group does not agree, thus ensuring that the final estimate represents the consensus within the focus group. The grains allocated to different categories were counted and converted into percent to make a comparison among different focus groups. Moreover it created also opportunity to the researcher to take notes and ask questions regarding the various arguments that were put forth during the discussion and renegotiation.

Figure 10: Men doing proportional pilling to indicate the relative contribution of girls, women, boys and men to herding

Wealth ranking was used to identify the different wealth groups in the community. This exercise was conducted as the current access rules have different implication on community

members based on their resources ownership (especially cattle ownership). Men and women focus group discussants were asked separately to discuss and identify indicators to describe poor, medium and rich households. Following indicators were identified: number of animals (oxen, cows, sheep, and pack animals), size of land holdings, and whether the house had a corrugated iron roof (see Annex 3). The proportional pilling exercise was used to assess the share of households in each wealth group. They were asked to divide the 100 grains representing all the households of the village, into poor, middle and rich households. Each wealth group was represented by circles drawn in different colors on a flip chart, so that participants were able to easily kept in mind the different categories and could allocate the grains proportionally into different circles (see Figure 11). They discussed and negotiated before they reached consensus to put the final grains.

Figure 11: Women's focus group discussants performing wealth ranking (into rich, medium and poor)

The same procedure was used to do the wealth ranking for female headed households. This is important information, as the access to a number of agricultural resources is differentiated by gender. The separate wealth ranking exercise for the female-headed households revealed that Figure 1the majority of the female-headed households (54%) belong to poor households as compared to the whole community, where only 19% of households are considered poor (see Figure 12).

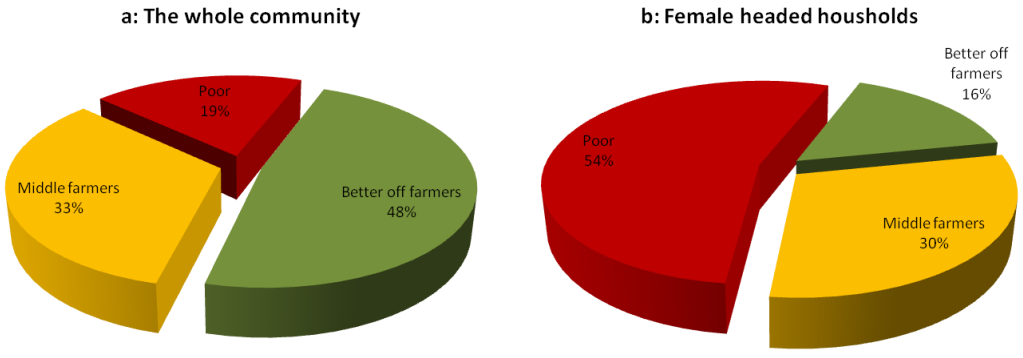

Figure 12: Proportion of households in different wealth categories

The drawing of a **seasonal calendar** was used to understand the feed availability and the use of feed from different sources during different periods of the year. This exercise helped to understand the criteria that are used by the community to decide when to allow grazing on the communal pasture. Participants were asked to indicate the rainfall pattern (number of rainy

days per month), and feed availability in each month (e.g. crop residue, grasses from farm boundaries, communal pasture from controlled and free grazing areas). The data was drawn on a flipchart, first using a pencil, and then markers of different colors to distinguish the different trends of the feed availability. This allowed the community to indicate the overall seasonal pattern of rainfall and feed sources. It also allowed them to give details and discuss how they strategically harmonize the use of the communal pasture with the other feed sources. This enabled the researcher to assess how the community uses their ecological knowledge, of e.g. the rainfall pattern and the optimum plant stage for grazing, when they decide to open the communal pasture for grazing or choose to close it. Moreover it enabled the researcher to identify their strategies in managing and dealing with the critical period of feed shortage, especially when oxen require energy for plowing.

Pair-wise ranking was used to prioritize the type of feed species that were identified as growing on the communal pasture. Men and women focus group discussants were separately requested to prioritize the species in terms of their nutritive value and their palatability. The pair-wise ranking allows each feed species to be systematically compared with each of the other species. The data was then collated in a matrix (see Annex 4). The scores for each species were added up, thus allowing ranking the species in their order of importance. These results were shared with the participants for validation.

3.4.3 Key informant interviews

In the period from September to December 2012 a first round of interviews were held with 21 key informants, including community members in Kuwalla and experts at *woreda* and *kebelle* level. They were asked open-ended questions on their attitude towards and knowledge about the use and management of the communal pasture (see Table 5).

The **community members** were selected to ensure a wide range of different views, thus they varied in gender, age, wealth status, and individual´s use right to communal pasture and their role in the management of communal pasture. This allowed to collect rich, relevant and diverse information on access and use rights of the pasture, such as the perception of whose voices are heard and who might be excluded as well as general information on the institutional structure and the mechanism that allowed the community to be resilient. In Kuwalla a total of 14 key informants from community were interviewed: users, non-users and members of the current management committee (see Table 5).

Users and non-users of the pasture were differentiated on the basis of the cattle they own, as only farmers who own cattle are entitled to use the pasture. Women key informants were selected from the female-headed households, including both users and non-users. A member of the current management committee was interviewed to understand the current management rules and regulations. The roles and responsibilities of the users, father of herders and management committee were also explored from the current management committee. Detailed insights about the rules-in-use, such as which animal types have access to the communal pasture, were explored. A member of the management committee from 20 years ago was also interviewed to understand how the rules-in-use have evolved over time. This elder was one of the leaders who played a key role in mobilizing the community to adopt a rotational grazing system 24 years ago.

Table 5: Data collected through key informant interviews in Kuwalla village

Interviewees	Number of interviews		Interview guideline
	Men	Women	
Community members			

Users	3	4	• What are the accesses right to the use of communal pasture?
			• How are the access and use rights to, and management rules of the communal pasture perceived?
			  ○ Who benefits from what?
			  ○ Who has the power to control/influence what?
			  ○ Who takes what decisions?
			• What other alternative access and use rights are suggested?
			• What alternative management rules do you wish for?
			• What are the interest and preferences of men and women regarding the management of the communal pasture?
			• What are the contributions of individuals to the management of communal pasture?
			• How important is the communal pasture to the livelihood?

Non-users	1	2	
Management committee (from the current committee and past members)	2	-	• What are the access and management rules and regulations of the communal pasture? • How is the informal institution is structured? • What are the roles and the responsibilities of the management committee, of the fathers of herders, and of the users? • How are the rules-in-use implemented and monitored? • How has the rotational grazing system evolved? • How have the rules developed? How/why were they revised? • How was the response of the different group of the community to the change of the management system? • How does the community comply with the rules? • What were the challenges in the past? Current challenges?
Administrators and experts			
Kebelle administrators	1	1	• How is the informal institution governing the management of communal pasture in Kuwalla acknowledged by the *kebele*, and other offices in the *woreda*? • What communication structure exists between the informal institution and the *kebele* administration? • What support does the *kebele* provide to the informal institution and the management of communal pasture? • What types of support have the users or the members of the informal institution requested from the *kebele* administrator? • What are the challenges?
Livestock expert, BoA	1	-	• What are the events that challenged the use and management of communal pasture? • How have the events affected the use and management of communal pasture? • What programs and interventions have been implemented to improve the use and the management of communal pasture over the last 24 years? • How were the interventions implemented? • What was the impact of those interventions?
Nat. resources management expert, BoA	1	-	
Extension agents	1	1	
Development agent	2	-	
Land admin. expert from the OoEPLAU	1	-	

Based on their expertise on pasture management, **experts** and heads of the department from Bureau of Agriculture (BoA) and Office of Environmental Protection and Land Administration and Use (OoEPLAU) were also interviewed (see Table 5). This allowed collecting additional information on the interventions that were made to improve the pasture, and how they were approached. The intervention included the introduction of area enclosures through the cut-and-carry system, over-sowing the pasture with exotic feed species to enhance species diversity, and constructing soil and water conservation structures such as stone terraces to protect soil and water erosion. These interventions were implemented by the government extension system, often in the framework of development programs such as the Fourth Livestock Development Program (FLDP), National Livestock Development project (NLDP), Improving Productivity and Market Success of Ethiopian farmers (IPMS), Sustainable Land Use Management Program (SLUMP) and Agricultural Growth Program (AGP). Furthermore, the interviews allowed exploring the perception of experts on the cut-and-carry system and on the rotational grazing system.

In the period of October to December 2013 a second round of interviews was held both in **Kuwalla and in Zagra** to explore the perception of farmers about the rotational grazing system and the cut-and-carry system. To address this research question, 12 key informant interviews were identified both from Kuwalla and Zagra (see Table 6).

To ensure that a wide range of views was captured, interviewed households were stratified by wealth status, and in each household both the **husband and the wife** were interviewed. Households were selected so as to have a household heads aged between 35 and 45 years, to ensure that the general situation of the selected household is comparable (e.g. family life cycle, children, both spouses are present). To be able to compare the perceptions of men and women, three couples (husbands and wives) from each wealth group (poor and rich) were interviewed (Figure 13). The husbands and wives were asked the same questions separately; to ensure that each person can express his/her views freely.

In each village, three rich and three poor households were selected. The 'rich' households were defined as those who owned a pair of oxen or more; poor households were defined as those who owned only one ox. Poor households who are even poorer, i.e. households do not own cattle at all, were not included, as these households do not have the right to access the communal pasture in the case of Kuwalla.

Figure 13: The interviews with the husbands and the wives were held separately

Table 6: Data collected on the two management systems through interviews in Kuwalla and Zagra

Interviews with	Number of interviewees		Interview guideline
	Men	Women	
Community			• What are the perceptions of poor and rich farmers about the rotational grazing system? o What are the benefits from the communal pasture? o What are the access and use right of the communal pasture? o What contributions are expected as precondition to access the communal pasture? o How are the cost of management (labour, time and money) shared? • What are the perceptions of men and women farmers about the rotational grazing system? o What are the benefits from the communal pasture? o What are the access and use right of the communal pasture? o What contributions are expected as precondition to access the communal pasture o How are the cost of management (labour, time and money) shared?
Rich households in Kuwalla	3	3	
Poor households in Kuwalla	3	3	
Rich households in Zagra	3	3	• What are the perceptions of poor and rich farmers about the cut-and-carry system? o What are the benefits from the communal pasture? o What are the access and use right? o What contributions are expected as precondition to access the communal pasture? o How the cost of management are (labor, time and money) shared? • What are the perceptions of men and women farmers about the cut-and-carry system? o What are the benefits from the communal pasture? o What are the access and use right? o What contributions are expected as precondition to access? o How are the cost of management (labor, time and money) shared?
Poor households in Zagra	3	3	
Experts from BoA			• What is the perception on the two controlled grassland management systems (rotational grazing, cut-and-carry system)? o What are the ecological and technical advantage and disadvantage of the controlled systems? o What are the expected social benefits from the two controlled system? o What are the economic benefits from the two controlled system? • Which controlled grassland management systems is promoted? Why? • How does the extension system promote the adoption of controlled grassland management systems?
Livestock experts	2	-	
Nat. resources management experts	2	-	
Extension expert	2	-	
Development agents	2	-	

3.4.4 Participant observations

Participant observation was included as one data collection strategy (Bernard, 2006) to **better understand** how the management rules and regulations are implemented. Observations were made while the cattle were grazing during the opening season of the communal pasture in Kuwalla. This allowed the researcher to observe and to count how many oxen and cows were grazing each day on the communal pasture. Moreover, the researcher had the opportunity to discuss informally with the fathers of herders, esp. how they organize and guide the grazing of the day, i.e. how they delineate the paddock to be grazed on that specific day, how they keep the time for grazing, and how they control that only allowed animals are there for grazing. The researcher also attended two regular meetings of the traditional management body (see Figure 14), thus gaining insight into the issues that are discussed, and how they are discussed.

Figure 14: Traditional management committee during one of their regular meetings

During the data collection, the researcher also took **field notes** on observations and reflections about conversations made with people in the field. As the researcher always carried her notebook with her, the notes were taken immediately during observations or during conversations with people. Additional thoughts and observations were written down in the evening. The notes were useful to keep a record of actions and expressions that could not be captured e.g. through audio file during the interviews, or on the flipcharts during focus group discussions. For example, the level of engagement into the discussion by various members was noted. Also various observations were written down, such as that especially in women's group the participation was enhanced when participatory tools were used.

3.4.5 Reflection meetings

At the end of the first data collection period, **preliminary findings** were shared and discussed with the stakeholders during reflection meetings. A total of three meetings were organized for different stakeholders at different level:

- The first reflection meeting was organized at village level for member of Kuwalla community who participated in the data collection process. It took place in December 2013 and 28 villagers participated.
- The second reflection meeting was organized at *woreda* level for experts and the heads of BoA, OoEPLAU, and *woreda* administration office. It took place in December 2013 in Bure town and 38 officials participated.
- The third reflection meeting was organized at International Livestock Research Institute (ILRI) campus Addis Ababa, specifically for the staff of two projects that were particularly interested in the research: the Improving Productivity and Market Success of Ethiopian farmers (IPMS) and Livestock and Irrigation Value chains for Ethiopian Smallholders (LIVES). Other staff members of the Consultative Group for International Agricultural Research (CGIAR) also attended the seminar. It took place in January 2013 in Addis Ababa and 32 researchers and project staff attended.

The **comments and feedbacks** from the participants of the reflection meetings were taken into account in the data analysis, and were used to guide the research questions for the second data collection phase (esp. the interest in a comparison of the rotational grazing system and the cut-and-carry system, which was suggested by participants from Addis Ababa seminar).

3.5 Data analysis

An **iterative and reflexive process** was used throughout the data collection (Strauss and Corbin, 1998; Brayman and Burgess, 2005). This approach supports the researcher in collecting useful data throughout the data collection process and look for additional information in the next step of the data collection (Ortlipp, 2008). Thus, to guide the next step in data collection, already available data was analyzed in a rapid, preliminary way. This allowed identifying gaps in information (e.g. through seemingly inconsistent information indicating that there was a 'missing link') as well as to identify possible explanatory variables that could be checked for validity during the next focus group discussion or key informant interview and then amended as necessary. Once fieldwork was completed, the data was analyzed using content analysis.

3.5.1 Rapid analysis

A **rapid analysis** was conducted after each data collection process so as to identify needed additional information (Beebe, 2001). For instance, the community resources map indicated land use changes such as the reduction of the communal pasture over time. The following focus group discussion was used to explore what changes contributed for the reduction of the size of the pasture. This encouraged the participants to identify and discuss the events that affected communal pasture, e.g. shifts in governmental regimes and policies. This list of discussed events was then used in interviews to cross-check information and causal links.

The rapid analysis also helped to point out the **information gaps**, which need to be explored by the other data collection methods. For instance, in the focus group discussions it was possible to collect information that characterized the farming system, the management of the communal pasture, the institution governing the management rules, and the knowledge that men and

women do have about the communal pasture. However for in-depth information on how the management rules affect the different members of the community and how the management rules evolved, other data collection methods were needed. Hence key informant interviews conducted for additional in-depth information on specific aspects.

The on-going rapid analysis of data collected through focus group discussions, key informant interviews, observations and informal discussions also helped to **have preliminary findings** right after the data collection from field was completed. This enabled the researcher to **share** the findings with the different stakeholders during the reflection meetings and thus receive feedback, a valuable input for the detailed analysis.

3.5.2 Content analysis

Content analysis (Berg, 2009) was used to analyze the **qualitative data** collected through focus group discussions, key informant interviews, informal discussions, participant observations and reflection meetings.

To analyze the **institutional structure** and **mechanisms** that allowed the community to adapt to changes, the audio data from the key informant interviews and focus group discussions was translated into English and transcribed. The transcripts were imported into ATLAS.ti (version 7.0.06). Each interview was coded and categorized using pre-defined concepts (Brayman and Burgess, 2005). The initial codes included: changes, adaptation, social learning, knowledge, experimentation, collective action and programs. During data analysis, additional codes were included when it appeared useful. These new codes included: incentive, social network, trust, negotiation and social memories (see Table 7).

The transcripts from the focus group discussions with **men and women** were compared to analyze the distinct and shared roles, preferences, and knowledge of men and women about the communal pasture. Similarly, to understand the implication of the current access right on gender in the appropriation of the communal pasture, the transcripts of men key informants were compared and contrasted with women key informants. Moreover how men's and women's preference and knowledge about communal pasture is taken into account in the informal institution and in the decision of management rules was assessed based on data from various sources: from the focus group discussions with informal management group, men's group, women´s group and from men and women key informants.

To **compare the two controlled grassland management systems**, the interviews of farmers on their perceptions about the rotational grazing system and the cut-and-carry system were organized in SWOT matrix (Strengths, Weaknesses, Opportunities and Threats). Experts were asked to do the SWOT analysis. Hence four SWOT matrices were developed: two for each controlled grassland management system, one based on farmers' interview and one by experts. This allowed to contrast farmers´ and experts' perceptions about the two controlled systems, and highlights the differences between the farmers' reality and experts' assumption on the ecological, economic and social benefit from the two controlled grassland management system.

The analysis of the data from the key informant interviews and from the focus group discussions was also complemented using the field notes taken during participant observation and informal discussions. Furthermore, the analysis was **triangulated** using information obtained from a variety of documents, such as records at the community level kept by the *kebele* administration and development agents, as well as statistics from the regional and zonal Bureau of Finance and Economic Development (BoFED).

Table 7: Code book used to organize and analyze the transcribed interviews

Code	Sub-code	Explanation
Changes	Land use	Change in land use which includes farm size, size of various pasture types
	Livestock number	Change in livestock number over time, i.e. livestock per household and per village
	Access to farming	The type of access community members do have to limited farming resources to produce crops; resources include land, oxen, and labor
	Sources of feed	Change in sources of feed; includes changes in proportion from crop residue, communal pasture, farm boundaries and the likes
Adaptation	Rules developed	Development and implementation of new rules; includes access and use right to communal pasture, inclusion and exclusion of community members and animal types
	Revised rules	Rules and obligations that are revised; revision of the access and use right of communal pasture
Leadership	Elders	Individual's roles to propose ideas and mobilize people to conserve pastures; this includes the respect that the community has for individuals, their ideas and contributions. These individuals could be elders or leaders in one of the traditional associations, and members of the management committee
	Social network	Type of networks used by leaders and users to share information and take actions, e.g. neighborhoods and friends, traditional financial association (*iqub*), religious associations (*mekleft* and *mehaber*); traditional social association (*idir*)
	Trust	The level of trust user have for leaders or elders; and their reliance on the management committee in the use and management of the communal pasture; this includes how trust is built between management committee and users
	Social and institutional memory	The capacity of individuals to recall the previous management rules and notice the change and trends of pasture, and livestock overtime; it also includes the ability of the community to recall the traditional institution used to manage the communal pasture under the imperial regime
Social learning	Sharing information and ideas	The type of information and the way users exchange information (including management rules and practices). It also includes how they comply with the rules to manage the communal pasture
	Negotiations	The level of individuals' engagement in the discussion during the development of new rules and the adjustment of rules over time
	Consensus	Factors that influences users to agree on the need to conserve the communal pasture and current rules

Code	Sub-code	Explanation
Collective actions	Collaboration	Peoples' contribution to the protection the communal pasture from misuse. Their contribution through labor, money, idea, and resources in kind
	Incentives	Community motivations and driving factors that made users cooperate and contribute their resources to conserve the communal pasture through controlled grassland management system
	Participation	The involvement of users in the election of the management committee, father of herders, in the decision of the management rules
	Coordination	How the implementation and monitoring of the management rules by the users are coordinated. Users also include management committee and father of herders. How use of pasture is accomplished and monitored
Knowledge	Knowledge integration	How knowledge from different sources are integrated in the current management rules, e.g. local knowledge and experts knowledge; the knowledge could be about the pasture or how to self-organize
	Observations	Users' ability to recognize changes in the communal pasture; to distinguish reasons of the changes, and look for a solution
	Experimentation	Assessments of the new management rules and practices to get feedback whether the rules and practices work, and make a decision based on the practicality and the proof
	Interactions	How the community interacts with different stakeholders for knowledge, adaptation of management practices from different sources
Policy and programs	Supportive	Government policy, proclamation, guidelines and institutions that encourage and promote community-led management system of grassland resources
	Unfavorable	Government policy, proclamation guidelines and institutions that contradict with or challenge community-led management system of grassland resources
	Interventions	Influence of the past and the current government or non-governmental interventions towards livestock management, feed development and natural resources management to change the current management rules; the influence can be positive or negative
Conflicts	Sources	Includes disagreement over the access and use right of grassland resources among users, among villagers within the village, and conflict with outsiders
	Resolutions	Means of conflict resolution which includes how conflicts over the communal pasture are solved, who mediated the conflict resolution

Chapter 4: Community resilience through rotational grazing system

This chapter covers the evolution of the Kuwalla rotational grazing system. It also illustrates the mechanisms and institutional structures that allowed the community to be resilient in managing their communal pasture.

The historical analysis from the history of the management of the pasture in Kuwalla, based on the focus group discussions, identified **change** as **a main theme**. There were numerous shocks and stresses that challenged the use and management of the Kuwalla communal pasture over the last 40 years. The type of changes that challenged the use and management of communal pasture are discussed in details under each governmental regime which ruled the county over the last 40 years. This chapter also describes how the community in Kuwalla currently manages its pasture, using a rotational grazing system.

The results of the content analysis from the transcripts of key informant interviews and focus group discussions identified **three key** themes as **mechanisms** that enabled the Kuwalla community to manage their communal pasture in a sustainable manner. These include traditional leaders; establishment of an informal institution and the capacity of the community to interact with the wider context. These factors enabled the community to adapt the rotational grazing system over the last 24 years and enhanced their resilience capacity.

4.1 Evolution of the Kuwalla rotational grazing system

The 40 years historical assessment of the communal pasture in Kuwalla illustrates that there is a noticeable **reduction** of communal pasture in terms of **quantity and quality**. The increased number of villagers and livestock over this period are pointed out as main reasons for the reduction in the size of the communal pasture and of the general availability of feed. As the core group discussants noted, the population of the villagers has increased nearly three-fold over the last 40 years (see the trend in Table 8). Similarly, the livestock population in the village has increased by nearly 1.5, while during the same period; the pasture was reduced by 60%. This indicates that there is a shortage of communal pasture which in effect results in the villagers keeping fewer of livestock per household, as compared to the past.

The focus group results show that during the three **different government regimes,** there were also three **distinct management** systems for the communal pasture. During the imperial Haile Selassie regime (i.e. before 1974) the communal pasture was controlled, and grazed only during specific periods of the year. Animals also grazed on fallow land, in the forest and the crop aftermaths in a specific sequence. Then, during the *Derg* regime the communal pasture was used in a free grazing system, i.e. it was open for every one throughout the year. After the 16 years' experience of free grazing system, the community recognized that free grazing leads to overgrazing) in 1990, and yet during another regime shift, they took the opportunity to reinstate a controlled grazing system. Since then they have been able to manage their communal pasture in a sustainable manner using and adapting a rotational grazing system.

Table 8: Trends on population of the villagers, livestock population and pasture area estimated by the core focus group discussants, relative to the year 2012 (100%)

Indicator	Before 1974	Between 1974 and 1991	In 2012
Population	35%	60%	100%
Livestock population	67%	83%	100%
Pasture area	160%	140%	100%

Source: Focus group discussion with the core group

4.1.1 During the imperial Haile Selassie regime

During the Haile Selassie regime, pasture was not a problem as there were **sufficient areas** where animals could graze: on the communal pastures, on fallow land, on cropland after the harvest, and in the forest. These sources of feed were used alternatively. The number of households was comparatively low during that time. As a result they used to leave their farmland fallow for one to three years and used them as one of the grazing area. Grazing on crop aftermath was also very common as much of the crop residue was left on the cropland, and as animals grazed it right after harvesting, it provided them with a considerable amount of feed. As one elder mentioned, crop residue was not stored at home as feed for the dry season, but rather left on the cropland.

> *"We were not carrying crop residues to the homestead as we are doing now. No one thought about keeping crop residues and storing them for animal feed as we do now."*
>
> *An elder man from focus group, Oct. 2012*

The feed they had from the different sources was adequate to feed the animals throughout the year. Even during the dry season, also because there were also fewer animals. As explained also by the key informants, animals used to graze in the forest during the dry period. They had a plenty of forest area and the community was allowed to let the animals graze in the forest.

> *"Our village was not bare as you see it now. All the hills up there were covered with forest. During the dry season the animals used to graze in the forest under the trees. They did not get tired from the sun, at the same time they enjoyed the pasture under the trees."*
>
> *Elder man, key informant interviewee, Nov. 2012*

The interviews show that the various grazing areas were **grazed in rotation**, in a specified sequence. There was a traditional ´father of herders´ (*ye-eregna abat*) who was selected by the landlord. He was responsible for the grazing rotation, as each grazing area used during specific months of the years. He proposed a grazing schedule indicating when to graze in which area, e.g. fallow land or communal pasture. After consulting with the landlord, he shared the plan with the community; then the community took actions accordingly. For instance animals were allowed to graze in the forest during the dry season and on the cropland right after the harvest.

Moreover the ´**father of herders**´ was in charge of mobilizing the community to maintain the soil fertility of the communal pasture. He organized and coordinated the traditional practices by which community members were obliged, during the wet season, to let out their animals on the communal pasture overnight so the animals could drop their dung and urine on the communal pasture. This traditional practice is known as ***hura*** that aims enhancing the soil fertility.

The focus groups, while discussing the community resource map, revealed that there was a noticeable **change** in the **size of the communal pasture**. According to the discussants, the size of the communal pasture was much larger, and hence there was a plenty of good quality grass. One of the focus group participants explained that during the Haile Selassie regime:

"I have never heard from my parents that our villagers had a shortage of feed. My father was telling me all the time that they were drinking milk like water, because there was plenty of feed. (…) Even people from town kept their cows with their close relatives in our village, as we had sufficient feed for their cows."

Man from the core focus group, Oct. 2012

4.1.2 During the *Derg* regime

The *Derg* regime brought a number of **policy changes** that challenged the management of their communal pasture. The 1975 land reform, the establishment of peasant association in the same year, the establishment of agricultural producers' cooperatives in 1984 and the implementation of villagization in 1987 were identified as the main driving forces that pushed the community to change their communal pasture management into a free grazing system and to keep it for about 16 years.

The *Derg* regime brought a complete **change of land tenure** through which the state redistributed the farmland to all farmers in the villages. The focus group discussants said that the proclamation of land to the tiller (*ye meret learashu awaj*) made all villagers equal because the land was redistributed to the villagers on the basis of the family size, not on the basis of family ties with the landlords (*ristegnas)*.

"During that time every household was given access to land based on the family size. There was no differentiation between the tenants and the landlords. (…) Everyone was treated equally."

An elder man from core focus group, Oct. 2012

Over time, due to **population growth**, households saw their land holding become smaller. Indeed, the peasant association repeatedly redistributed the land among households to make sure that the newly established families also have some farmland. Land redistribution was also carried on within the family informally, as children got married and needed land to feed their new family. Eventually farmland became scares, and fallowing became a rare practice and the area used for grazing was reduced.

Moreover, as the proclamation of land tenure had put all land under the property of the state, this included the **forest** area. Hence the state controlled the access and use right of the forest resources. Villagers were allowed to enter the forest only to cut wood for house construction and cut grasses for roof thatching. This was allowed only upon individual request, a request that needed to be approved by the administrators of the peasant association. As a result, the animals were banned from entering the forest, which could no longer serve as grazing area. Hence the community became more dependent on the communal pastures for grazing.

In 1975, the Wundgi **peasant association** was formed to administer all land issues, and was thus in charge of redistributing farmland and administering the communal pasture. This has been identified as one of the events that broke up the traditional system that used to manage the communal pasture. The authority of the father of herders was weakened and he lost his role to guide and regulate the grazing system. Indeed, the *Derg* regime dissolved all previous structures of authority and thus traditional, experiential knowledge held by elders and the 'father of herders' were undermined and replaced by new official structures and the 'cadres'.

"Uhm… uhm… during the Derg regime, who noticed elders? Unless you were a cadre, no one listened to you. No one listened to elders."

An elder man, key informant interviewee, Nov. 2012

Thus, the informal management rules that governed the communal pastures, which was led by the ´father of herders´, was disregarded by the cadres of the peasant association and by the

villagers too. The administrators might have seen the ´father of herders´ as part of the old feudal system and ignored him deliberately, or the administrators might lack the experience to appreciate the role of the ´father of herders´, because they were assigned to the position on the basis of their loyalty to the socialist party, rather than their knowledge on agriculture and community tradition. As a result, the community started to freely use the communal pasture, **without any restrictions**. Over the years everyone had access to communal pasture, which was used to feed all types of animals (cattle, sheep, donkeys, and horses) throughout the year. Over time, this resulted in overgrazing and the depletion of the feed resources.

The other policy change that affected the use of communal pasture was the establishment of Wundgi agricultural **producers' cooperative** in 1984. The government put pressure on farmers to join the producers' cooperative (where resources were pooled for collective use) by giving members better access to resources, and the exclusive use of the best communal pasture. Farmers who joined the cooperative were given access to two pastures, one uphill and one close to Kuwalla village, which was owned by the Wundgi agricultural producers' cooperative. Villagers who were not member of the cooperative used only the communal pasture uphill, which was increasingly degraded due to overgrazing.

However, a number of farmers **resisted joining the cooperative**, as they were afraid that they would not receive their fair share of the harvested crops. Indeed, the cooperative leaders were in charge of deciding what amount of produce each member should get, based on the contribution of each member to produce the crops (e.g. land, drought power, labor time). However, the cooperative leaders tended to claim the largest share of the produce for themselves, while the other members of the cooperative received only a small share. The members had nowhere to go to complain about the unfair distribution of the produces. If they did complain, they had no chance of success, as it was assumed that the cooperative leaders were the most educated members of the community, thus they knew more about how to calculate the cost and the benefit of the cooperatives.

The implementation of the **villagization** program in 1987 was also identified as an event that reinforced the free grazing system. Farmers were pressured to leave their houses, which were traditionally located close to their fields, and to settle in a village. There, the government could provide infrastructure such as water, sanitation, schools, etc. However, settling in a village implied that a large number of animals were held on the limited space of the compound surrounding the house. Also, there was little feed during the day, as there were few grazing areas in or around the village. As a result villagers saw the communal pasture as the only place where they could send their animals during the day. The pressure on the communal pasture was worsened by the fact that the open access system allowed also farmers from neighboring villages to access and uses the pastures.

> *"There was no restriction… our neighboring villagers from Senbel and Wereba used our communal pasture to graze their livestock".*
>
> *Elder, key informant interviewee, Dec. 2012*

On top of the shocks related to policy changes that occurred one after the other and maintained the free grazing system, the **increasing human population** resulted in the conversion of the communal pastures to cropland, which in effect increased the pressure on the remaining communal pasture. This worsened the impact of free grazing, i.e. overgrazing and degradation of the feed resources.

To revert the impact of free grazing, the **Fourth Livestock Development Project** (FLDP), demonstrated the benefit of area enclosure on communal pastures in the 1980s. Moreover the project introduced exotic improved feed species. These included trees such as Sesbania (*Sesbania sesban*), Tree-Lucerne or Tagasaste (*Chamaecytisus palmensis*) and Leucaena (*Leucaena leucocephala*); as well as other forage species such as green leaf (*Desmodium* spp.),

silver leaf (*Desmodium* spp.), vetch, lablab and alfalfa. The seedlings of Sesbania, Leucaena and Tree-Lucerne were distributed to individual farmers to plant them in their backyard. The seed of grasses and other forage species were over-sown on the communal pastures, to improve the legume and grass composition and hence enhance the diversity of the feed species. Despite of all these interventions, the Kuwalla community did not adopt the area enclosure to manage their communal pasture in controlled manner, but kept the free grazing system. This could be due to the fact that farmers might not see how to implement an area enclosure as they already had very little grazing area, or be due to the fact that the project did not actively engage farmers in the design process, allowing them to customize the interventions.

Towards the end of *Derg* regime, in 1990, the **Wundgi agricultural producers' cooperative collapsed**, and most farmers moved back to their previous houses. The collapse created a window of opportunity for Kuwalla villagers to change their management system into a self-designed controlled grazing system. Indeed, they took control of the communal pasture that was managed by the Wundgi producers' cooperative, and which was located near the Kuwalla village. Around that time, the Bureau of Agriculture and the peasant association had decided that the communal pasture located uphill would be closed and would be afforested, as it was highly degraded due to overgrazing. This decision alerted the community about the risk of losing their communal pasture due to overgrazing and mismanagement. The reappropriation of the communal pasture near their village from the cooperative was thus perceived as an opportunity to adopt a controlled grazing system. Thus, since 1990, the Kuwalla villagers are managing their communal pasture through a rotational grazing system.

4.1.3 Since the EPRDF regime

When the EPRDF came to power in 1991, there was a high level of political instability, and uncertainty. Despite of this situation, the community managed to maintain and build on the rotational grazing system they started a year before. They successively **improved the management rules** through negotiations. For example, after a successful trial in the first year, the area under the rotational grazing system was extended. Indeed, in their first year with the controlled system (i.e. in 1990) they enclosed only a part of their communal pasture, to test and to prove that enclosing enhances the regrowth of grass species. This convinced the community, that the system worked. After experimenting and demonstrating the positive effect of area enclosure, they enclosed the rest of communal pasture in 1991. Only a small portion of grassland, in the periphery of the controlled pasture, is not enclosed, as it is used to herd the animals at the entrance to the controlled pasture during the opening seasons. Off course, it also used as a free grazing area.

In addition, the management system continued to account for expressed needs of community members. Even though the administrators of the peasant association were changed by the EPRDF and new policies and guidelines were expected, the community did not wait until the political stability was assured. Rather, they used their **traditional institutions** like *idir*[5] as a forum of discussion to continually revise the access and management rules. For instance community members who were dissatisfied expressed their requests and the community discussed them during *idir* meetings. The *idir* was seen as the most appropriate network, as all the villagers of Kuwalla villagers are members. As an example of the changes that were implemented over time: initially only oxen were allowed on the community pasture, but later a

[5] *Idir* is a traditional self-help institution organized at a village level meant for providing burial services when the family member dies. All the costs associated with the burial ceremony such as serving food and drinks to the guests who are gathered for the mourning are covered by *idir,* to which its member contribute money regularly. This is an important institution, and every household in the village is member of *idir* regardless of their wealth status.

limited number of cows were also allowed to graze. This change in the rules was brought about after a number of thorough discussions among villagers in the framework of the *idir* institution.

4.2 A sophisticated rotational grazing system

The Kuwalla community developed its grazing system after they realized the negative impact of the open access system they had until 1990. Soil erosion was severe, gullies were formed to the extent that grazing land was reduced; indeed the feed availability from their communal pasture was uncertain. Elders mobilized villagers to support a controlled grazing system and management measures that would be suitable for the need of the villagers. Through continuous discussions and inclusive negotiations held among community members, the community agreed on a grazing system characterized by excluding all animals during two closing seasons (Figure 15), and designing a sophisticated rotational grazing system during other periods.

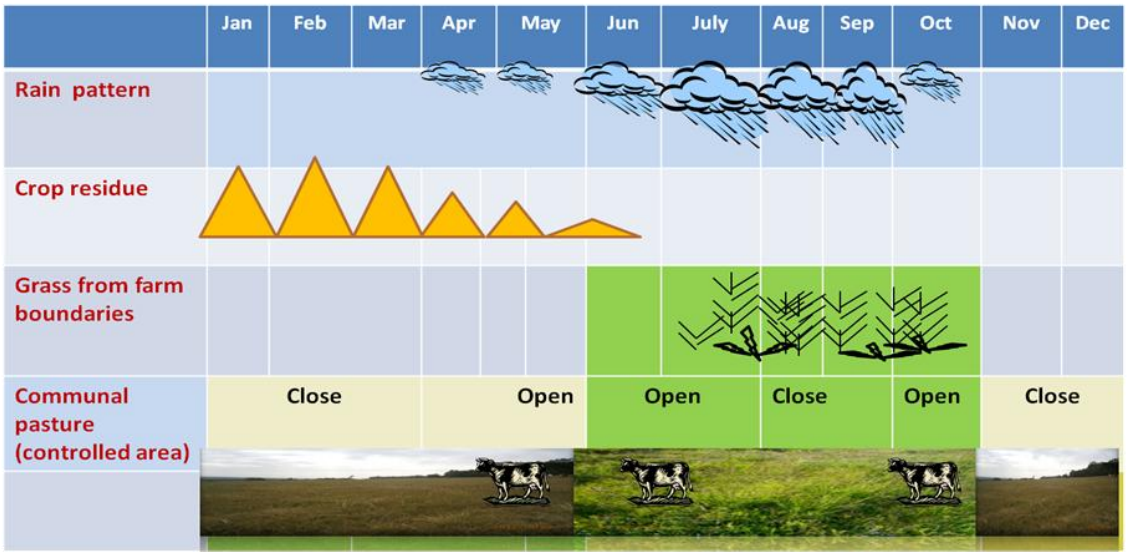

Figure 15: Seasonal feed availability from different sources and the rainfall distribution

This first **closing period** between August and September is set to allow the maximum growth of feed, as it is the main rainy season in the area. The second closing season is between the beginning of November and the end of March. This closing season is set because there is sufficient feed from crop residues. In November animal graze on crop aftermaths right after crops are harvested from cropland. Between December and March animals are provided with feed from the stored crop residue in the homestead.

Similarly, there are **two opening seasons** (Figure 15). The first opening season is between the beginning of April and end of July. During this period the feed from other sources is exhausted, yet oxen need feed to pull the plow as land preparation starts right after the small rain in April. The second opening season is in October, when the feed has grown well since the pasture has been closed for about two months during the main rainy season. Moreover, clover (*Trifolium sp.*) and alfalfa (*Medicago sp.*) have flowered at the end of September, so that there is no more threat of bloating.

"There was a time, during the Derg regime, when about 50 cattle died of bloating after eating clover and alfalfa. They grazed these species while they were young, before they flowered".

An elder from the core focus group, Oct. 2012

Taking the flowering time into consideration and opening the communal pasture only after these species flower, enables farmers to prevent the bloating effect that these species can have on cattle. At the same time opening right after flowering ensures that the cattle benefits from the protein rich species, as they are fresh and green during October. If they would postpone opening until November, they would dry and lose their nutritive value.

"Wajima and Mesobei are very good feed for the cattle, the cattle like them as they have a salty taste. If oxen feed on these species we say: ´siga yiderbalum gulbetm yagegnalu´ which means they will gain weight and at the same time be strong".

A man from core focus group, Oct. 2012

During the opening seasons cattle are allowed to **graze** on the communal pasture for only **two hours per day,** between 4:00 pm and 6:00 pm (see Figure 16). This time is convenient because the oxen and the family members come back home around 4:00 pm, after accomplishing different farming activities in the field. Thus users can herd their cattle without overlap with their other farming activities. In addition the biting flies become inactive after 3:00 pm so that the cattle can graze comfortably.

"During the day time particularly between 11:00 am and 3:00 pm there are biting flies in the communal pasture. These flies bite cattle. The cattle are so sensitive to the biting. They struggle to escape from the insect bite. Therefore it is difficult to herd them during this time."

A man from the core focus group, Oct. 2012

Figure 16: Cattle grazing on the controlled communal pasture during the opening season

Only cattle are allowed to graze, the **rest of animals** such as sheep, donkey, and horse are excluded from grazing. This helps the community to reduce the grazing pressure. However the process was not smooth and straightforward. At the beginning, a few households resisted the exclusion of the other animals from grazing.

"Initially, we have been challenged by the households who had more and a mix of livestock. They thought that they would not benefit, as the other animals such as donkey, horses, and sheep were excluded from grazing."

Elder man, key informant interview, Nov. 2012

These households tried to violate the rules and kept sending their animals to the communal pasture, even during the closing time. They were repeatedly penalized and had to pay fines. After a while they realized that the rules were serious. They also learned that their cattle now had a much better pasture than from their previous management system (i.e. the free grazing system). As a result, all households now abide by the rules.

The **rules** are always **open for revision** when the need arises. This applies especially for the fines that have to be paid in case of infraction, e.g. if grass is cut or if animals are left to graze during the closing season. For example, the fine has been revised quite often to take into account devaluation and the rising cost of hay and crop residues. The management committee revises the fine, after consulting with the users

> *"When people violate the rules, they pay a fine. If the animals enter the communal pasture outside the opening season and time they have to pay 20 Birr[6] per animal. (…) There was a time when it was 5 Birr. But over time it was increased to 20 Birr."*
>
> *A man, key informant interview, Nov. 2012*

4.3 Mechanisms that enhanced the community resilience

The content analysis identified **three interrelated factors** that enhanced the capacity of the community to cope with the changes and helped them to adopt and later adapt the rotational grazing system (see Figure 17).

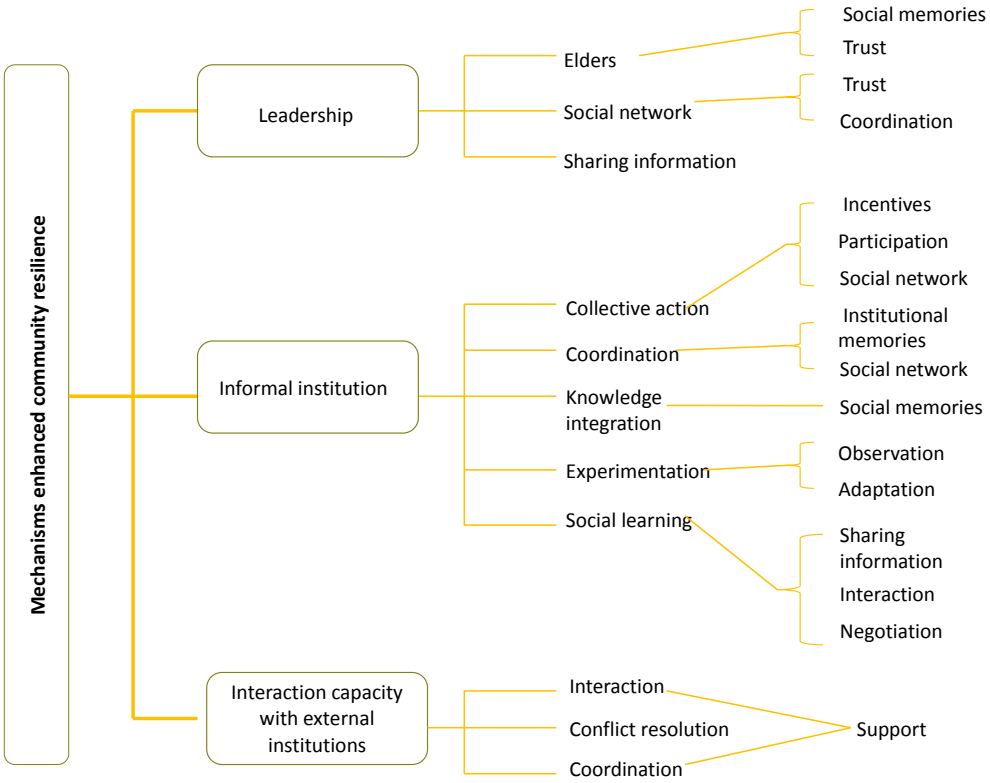

Figure 17: Main themes and structure of codes from the content analysis

[6] The Ethiopian Birr (ETB) is the Ethiopian currency, 1 ETB is equivalent to 0.0375 Euro, and 1 Euro is equivalent to 26.63 ETB (in May 27, 2014)

Firstly, a few elders recognized the window of opportunity offered by the collapse of the Wundgi producers' cooperative. Secondly, the self-organized informal institution enabled deliberation and social learning. Thirdly, the dynamic interaction between the community and the official administration secured the enforcement of the rules and safeguarded the autonomy of the informal institution. Each factor is discussed in detail below.

4.3.1 Providing leadership

The **initiative and leadership** by an individual who was the ´father of herders´ under the Haile Selassie regime was decisive. He recognized the window of opportunity presented by the collapse of the producers' cooperative and by the broader political instability that proceeded the fall of the *Derg* regime. He had the knowledge of how to organize rotational grazing to ensure a sustainable use of the pasture from his past experience as the head of ´father of herders´. He discussed his idea to propose a restricted and regulated system with a few elders, and they presented it to the community. He guided the process of analyzing the problem and designing a solution while ensuring that the community was involved and thus supported the process.

He **raised attention** to the need to adopt a controlled grazing system. He pointed out that their communal pasture was increasingly degraded, so that the pasture did not fulfill its role as a source of feed during critical periods, especially in April, when oxen need to be strong to plough and prepare the fields for the coming rainy season. The feed shortage had become a real concern following the decision by the administration of the peasant association to afforest the severely degraded uphill pasture. He alerted the community that if they did not take action, the situation would worsen. He thus emphasized that there was an urgent need to act to avoid overgrazing of the communal pasture close to the village.

The idea of the 'father of herders' became true with the **help of other three key individuals**. Indeed, he first contacted three other elders to share his idea of replacing the current free grazing system with a controlled grazing system i.e. a rotational grazing system. The three elders had senior positions in the community: one was the chairman of the *idir*, another was a member of the administration of the peasant association, and the third was (*tataki)* a member of the community police. They were influential in the community, and had a network with various official administrations, e.g. the Bureau of Agriculture and district administrators. They agreed that his idea was good, and that it would be accepted by the administration, and they helped him to mobilize the community.

Mobilizing the community was done through raising the idea at gatherings of various **informal institutions**, such as the *idir* (a self-help group meant for helping each other while members of the family die), *mekleft* (common breakfast after the Sunday church service) and *mehaber*[7] (monthly church meetings to celebrate specific saints). Thus, the villagers discussed the issue over coffee with relatives, neighbors and friends. This raised the awareness that the degraded pastures were a serious problem for all, and the afforestation of the uphill pasture was severely reducing the area available for pasture. As they had just lost one pasture, it raised the awareness that there was a risk of a complete loss of pastures. All this raised a sense of urgency, and pointed to the need to self-organize, rather than waiting for a new policy from Bureau of Agriculture, especially since it was a time of high political instability, with a high uncertainty how long the *Derg* would still be in power. While being a time of uncertainty, the leader also

[7] *Mehaber* is also a religious association where villagers express their respect to specific angels or saints by having a get-together party every month in the name of angels or saints. Every member of the *mehaber* will take turns to prepare the food and drinks for the monthly party in the church. So a well-to-do household can organize more than one *mehaber.*

recognized that the collapse of the producer cooperative was **a window of opportunity** to redefine both the access right and the management system.

The ´father of herders´, together with the other three individuals, actively facilitated the **follow-up discussions**. They raised issues such as how to ensure a fair access, e.g. between those households who own oxen, and those that do not own any ox. They also proposed various solutions and approaches which were widely discussed.

The elders also used their network with official **government institutions** (such *kebele* and *woreda* administrators, and experts in Bureau of Agriculture) to ensure that they would support the community initiative towards establishing a controlled grazing system, thus mediating between the community and external formal institutions. As a result, they ensured that the pasture close to their village was handed over to the Kuwalla villagers from the Wundgi agricultural producers´ cooperative.

With the fall of the *Derg*, there was a certain **reevaluation** of both the weaknesses of the *Derg* structures and the strengths of traditional structure. In the *Derg* structure, the *kebele* was the institution in charge of administering all the communal pastures of all villages. The *kebele* administered the communal pastures in a uniform way across all villages. However, the use and management of communal pasture in each village needs specific management rules that fits the specific pasture (e.g. whether it is on a steep slope or in water-logged valley), and the socio-economic settings (e.g. number of households, the alternative sources of feed, size of pasture relative to the number of animals). Yet, under the *Derg*, there was no room in the *kebele* administration to recognize the villagers as responsible users and to allow them having their own rules.

The need for adapted and village-specific management rules is illustrated by the diverse access rules that can be found now. Indeed, after they restored their traditional structure, the different villages within Wundgi *kebele* have all adapted the rules to fit their specific needs. For example, three villages (Kuwalla, Wereba and Chagerta) allow grazing access only for cattle, while the other eight villages provide grazing access to all type of livestock, as they have fewer users than the other three villages (Figure 7 in section 3.2.2).

Yet certain features under the *Derg* were appreciated. For example, the community had better opportunity to engage in discussions over meetings organized by different politically affiliated government associations (e.g. peasant association, and youth association). These improved the community's capacity to discuss problems and negotiate solutions.

The negative impact of overgrazing due to free grazing system also helped them to recall back the previous controlled grazing system they had before *Derg* regime. Thus the **social memory** from the past experiences of the ´father of herders´ on the traditional management communal pasture helped them to deliberately readapt the controlled grazing system. They were aware that a different approach was possible and recalled some of its features.

Hence the four elders took the lead, proposed some practices based on what worked under the Haile Selassie regime, positive features from the *Derg*, but also **experimented** with some recommendations made in the framework of the Fourth Livestock Development Project. For example, area enclosure was tested as a way to regenerate the degraded pasture. Once they were satisfied with the results, and the community could observe the positive impact on re-growth, area closure was adopted as part of the controlled grazing system.

> *"We first needed to prove whether the area enclosure would work on our pasture or not. So in the first year we enclosed only one quarter of our pasture for one growing season. After one rainy season we saw that the local grass species, which were gone for some years due to, overgrazing, regenerated and grew very well. We were happy and*

community members were convinced that we need to use area enclosure for the rest of the communal pasture."

Elder man, key informant interview, Dec. 2012

As an outcome of the informal deliberations between the four elders and the rest of the community, the community agreed to give **the four elders** the responsibility **to design** a new management system. Based on their past experiences the elders designed rules that fit the current social conditions while taking into account their ecological knowledge and the need to enable the pasture to recover from overgrazing.

"Once community members agreed on the need to adapt the pasture management system, they said let us first assign people who would guide the whole management process. So they requested the four of us to lead the management of the controlled grazing system as a management committee at least for the next three years. They also requested us to propose and craft the new management rules. Because they assumed that we know better and could also organize people so we work together".

Elder man, key informant interview, Nov. 2012

4.3.2 Setting up an informal institution

While the controlled grazing system was initiated by the four elders, the community members also ensured the establishment of an informal institution[8] to govern the access to and use of the communal pasture. As illustrated in Figure 18 this new informal institution was structured to have four **committee** members locally called 'the management committee for the conservation of communal pasture' (*Ye amaga tibik committee*). The number of committee members was linked to the fact that it was four elders who had initiated the institution and the community nominated them as the first committee members, i.e. a chairperson, secretary, treasurer, and inspector. Having a 'committee' was modeled on institutions and working groups established under the *Derg* regime (e.g. the administration committee of the peasant association had 5 to 7 members, the People's tribunal (*fird shengo*) committee had 5 members).

The committee is backed-up by nine '**fathers of herders'**. This indicates that the community mixed elements of the Haile Selassie regime (e.g. 'father of herders') with new elements the community had experienced under the *Derg* (i.e. committees are better than single leaders). The 'fathers of herders' were needed to ensure good communication with users:

"We asked ourselves how can we have a close communication with the users because we were only four. So we realized that a regular communication and information flow would be a problem. (….) We asked the community to be grouped based on the proximity of their house and have a representative for each group of neighbors. We called the neighborhoods representative 'fathers of herders'."

Elder man, key informant interview, Nov. 2012

Given that the village was now much larger than during Haile Selassie, it was clear that one 'father of herders' would not be sufficient. Thus they decided to have nine 'father of herders', to meet the purpose of having a close follow up to the growing number of villagers and reach the users easily. Each 'father of herders' is able to coordinate thirteen to fifteen households of users (see Figure 18). This structure also facilitates the implementation and the monitoring of the rules-in-use.

The **roles and responsibilities** among the users, 'father of herders' and the management committee were defined clearly so as to implement and monitor the rules-in-use. Currently, the

[8] Informal institution refers to social rules and regulations agreed and shared among community members to access and manage their communal pasture even though they are not codified by the state.

four members of management committee are responsible to oversee the implementation and the revision of the rules-in-use. The nine 'fathers of herders' coordinate and facilitate the implementation of the rules by providing information from the management committee to their sub-group of users, e.g. when grazing is allowed, when *hura* starts and ends, whose turn is to protect the entrance of animals in a certain period. Fathers of herders also relay concerns raised by the users to the management committee for discussion, possibly leading to rules being amended. This allows social learning as new concerns and preferences from the users are relayed to the management committee. The users also collectively contribute their labor and time for the management practices in turns (e.g. *kello, kirat and hura)*.

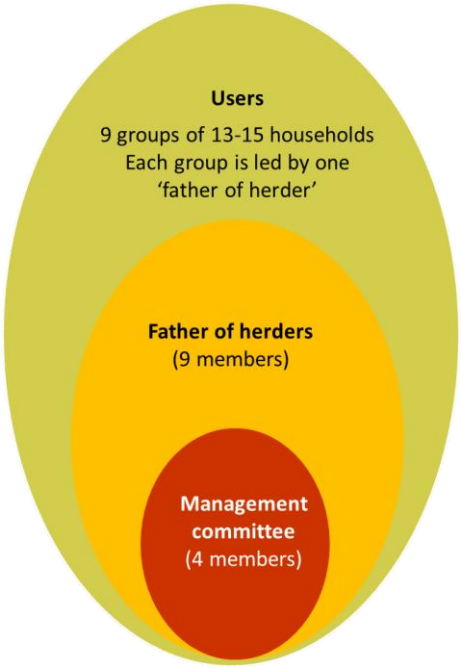

Figure 18: Structure of the informal institution to facilitate communication and coordination

The management **committee** members are **elected** every two to four years by active participation of users, in the general assembly. Usually it is the men as head of the family who attends the general assembly and takes an active role in the election. Women heading household also attend the general assembly meeting, but usually they do not speak up, nominate for a candidate. The management committee members have been changed regularly over the last 24 years. This ensured that a range of community members had the opportunity to learn, through taking a leadership position as a committee member or as a 'father of herders'.

> *Before the final selection day we informally discuss among neighbors, relatives and friends who should be selected as candidates for the next management committee."*
>
> *A woman, key informant interview, Nov. 2012*

Though women do not attend the general assembly and participate in the election, they may discuss with their husbands whom they would favor as committee member or as 'father of herders'.

Similarly, the users´ group also **elects** the nine **'fathers of herders'** regularly. A 'father of herders' usually serves for one or two terms, depending on his acceptance by the user´s group and his willingness to serve for one more term. One term is two to three years. Users in each user´s group nominate their 'father of herders' and the management committee confirms him. This ensures trust in the father of herders and enables the spreading of knowledge. This participatory selection process also helped the users to build trust into the institution. Not only

through transparent selection procedures for leadership positions that enhanced social learning; but there is also a room to ask for the revision of the rules-in-use and discuss openly about the rule-in-use with the management committee.

On the basis of local knowledge and context of this **informal institution** the management **rules** were **defined**. For example as illustrated Figure 15 under section 4.1.2, the communal pasture opens for grazing when the feed from other sources such as crop residue is depleted, when the oxen require energy for plowing, when the growth of plant species reach an optimum level (right after the main rainy season), and they also considered the right stage of plant growth to ensure safety (e.g. they control bloating effect from *Trifolium spp.* and *Medicago spp.* by preventing grazing of these species before flowering). The fine-tuning of these rules overtime illustrates how the informal institution facilitated the deliberation of local knowledge and enhanced social learning.

Moreover during the opening seasons, the community gradually developed **a sophisticated rotational grazing system**. During the Haile Selassie regime they used to allow their animal to graze on different areas such as communal pasture, fallow land, farmland (crop aftermaths) and forest area, depending on the seasons. Similarly, in the new management practice, the pasture is divided into paddocks, and the animals graze in a paddock for a day, and graze another paddock the next day. Hence each paddock is grazed once in a year (see the pattern of grazing in Figure 19). The 'fathers of herders' guide the rotation of the grazing. They demarcate the paddock that is going to be grazed for a specific day and control the grazing time (i.e. 2 hours). Only one 'father of herders' is responsible for a day and the nine 'fathers of herders' rotate every day during the opening season. This rotation is a fusion of the area enclosure, which was demonstrated by the Fourth Livestock Development Project (FLDP) through Bureau of Agriculture in the 1980s, and the rotational grazing as it was practiced under Haile Selassie. It thus shows how important social memory is to create new practices that are adapted to the current situation.

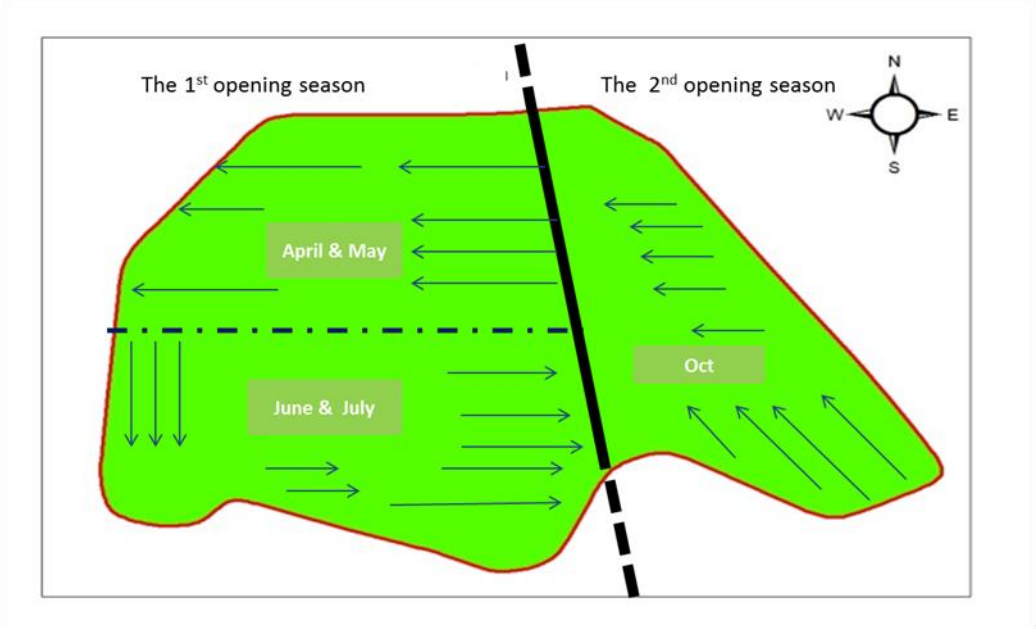

Figure 19: The pattern of cattle movement for grazing, based on discussions with the informal management committee and the father of herders

Users also send their cattle every day for grazing through their representatives of the sub-groups (one person from each sub-group looks after the cattle of the members of his/her sub-group for a day). Here too, sub-group members take turns throughout the opening season. This

arrangement helps the **users** to **save time**, so that they can do other tasks on the farm or around the homestead.

Similarly, the informal institution organizes the collective action that ensures the maintenance of soil fertility. Users are obliged to let out their cattle and tether them on the communal pastures overnight (between 7:00 pm and 5:00 am), so that animals are able to drop their dung and urine on the pasture.

The next night the cattle will be tethered on the next paddock and by the end of the wet season the whole communal pasture will be manured (see Figure 20). This practice is usually carried out during the wet season to allow the decomposition of the dung. The practice is traditionally known as ***hura*** and incorporated in the management rules as an important management practice.

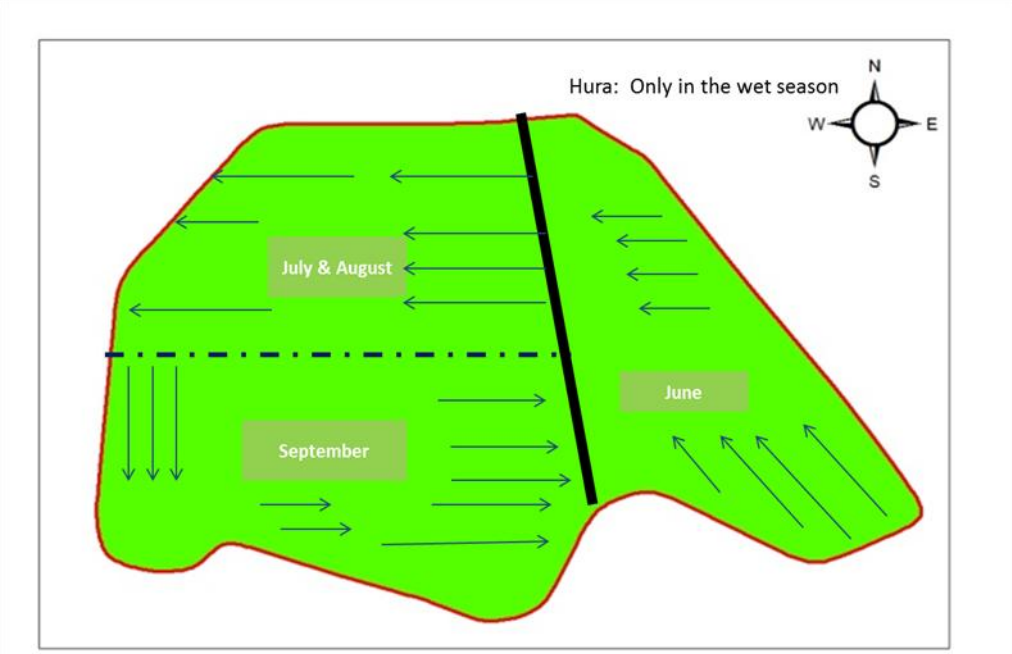

Figure 20: The pattern of cattle rotation to manure the communal pasture land during the wet season; sketch based on discussions with the informal management committee and the father of herders

The informal institution also coordinates ***kirat,*** a practice where users look after the cattle at night, to protect it from theft and wildlife attack during *hura* period. Users are not expected to look after their cattle every night individually. Instead, 10 adults (one 'father of herders' and one user from each of the users sub-groups) stay to look after the cattle. Hence every user participates in the *kirat* in turns, every 9 days for 'fathers of herders' and every 13-15 days for the users, depending on the size of sub-groups. Households headed by elderly or by women, who do not have an adult male in the family do not participate in the *kirat*, but have to pay 200 ETB annually. As a result of the well-coordinated practice, no cattle are stolen or attacked by wild animals in the last 24 years.

The informal institution also defined **the access rules**, i.e. who could send which cattle for grazing. The aim was to ensure that the most important type of cattle have enough feed, while avoiding overstocking and overgrazing. Initially, it was decided to provide grazing access only to oxen, as they are needed for plowing and thus they are crucial for crop cultivation. As a result households with oxen were allowed to send all their oxen to the pasture. However, this excluded all households that do not own oxen. Thus, in the following year, this rule was re-negotiated and modified. As a result, in case a household had no ox to send for grazing, it can send up to two cows, or bulls, heifers and/or calves to graze. This new rule provided the

households with more flexibility, as they could make their own choices. However, households with more oxen still benefit most from the communal pasture, as they are allowed to graze all the oxen they own (in the village the richest households own 5 oxen). Households who do not own any ox can send only up to two cows, heifers, bulls or calves. While tensions are still present, this arrangement is accepted by the poorer households as well (i.e. those without own oxen) as they borrow or exchange oxen[9], and thus also benefit from strong and healthy oxen.

> *"I have an ox, it is very strong as it feeds on the controlled pasture. Although I do not have farmland, I can still produce my own food through sharecropping. I pool my ox with a friend or relative to have a pair of oxen for plowing. So we use the pair of oxen turn by turn. So the ox is my food and the conserved pasture is the feed for my ox."*
>
> *Landless man, key informant interview, Nov. 2012*

While giving oxen priority over other types of cattle does benefit mostly wealthier households, oxen are crucial for cropping and thus subsistence agriculture. Hence having nutritious feed for their oxen, especially during the plowing seasons, ensured that the users collectively contribute whatever resources they have (e.g. time, labor). In addition to the regular access right, there is also a provision of grazing access to sick and injured cattle for about two weeks to recover. This special access is provided upon request and after the management committee approved the case.

The informal institution also serves as **a platform** for users to **communicate**, negotiate, learn and adapt the rules through having regular meetings. The management committee meets regularly with the nine 'father of herders' twice a month[10] to discuss issues related to the use and management of communal pasture (e.g. what went right and wrong during last two weeks, what will be the plan for the next two weeks) (see Figure 21).

Figure 21: Members of the management committee and several 'father of herders' during one of their bimonthly meetings

[9] There are traditional arrangements by which poor households get oxen services: *wenfel* or *tenad* is a tradition of pooling oxen between individuals who have only one ox to make a pair of oxen required for plowing; so both individuals cultivate using a pair of oxen on their farmland in turn. *Megolem* is also another type of arrangement through which farmer who do not have an ox, can exchange the oxen services with labor: he works for two days for the owner of the oxen and on the third day he will use the oxen on his own land.

[10] They meet on the 12 and 21st day of each month when Saint Michael and Saint Marry are commemorated respectively. These days are considered as local holidays, so no major works like plowing, weeding and harvesting are allowed on these days. The management committee devotes these days to discuss issues linked to the use and management of the communal pasture.

In addition there are also one or two **general assembly** meetings annually with the users, where new issues are shared, discussed and settled. For example, in 2013 the management committee revised the access rules and allowed grazing access for one additional cow for households with two or less oxen. The need to increase the grazing access for cows had been discussed among the users in the general assembly for the past three years. It has been also an issue in a number of regular meetings of the management committee. As an outcome of these discussions, the access rules were revised and households who own less than three oxen are allowed to send one additional cow. Thus, in the new rules households who do not own oxen can send up to three cows. The revised rules agreed and decided to be effective as of April 2014.

Such a well-coordinated management **structure and functions** of the informal institution enable every user in the community to contribute to **collective actions** and ensure the sustainability of the new management system. This governance structure ensures both transparency of decision making processes, and the accountability of all users as well as of the management body, hence any defaulter in the community can be easily traced by the respective 'father of herders' and the defaulter obliged to pay fines.

> *"A person who sends his or her animals to the communal pasture during the closing time will pay 20 ETB per animal as a fine. If a person does not participate in kello (guard the animal) during his or her turn, they will pay 30 ETB."*
>
> *The secretary of the current management committee, key informant interview, Nov. 2012*

4.3.3 The capacity to interact with the wider context

While the effective management of the communal pasture relies on the leadership of elders and on the self-organization capacity of the community (i.e. its ability to establish an informal institution), it also required **an effective negotiation** of the **external influences**. This is necessary to ensure the support of *kebele* and *woreda* administrators, and to negotiate with experts who are pressuring the community to replace the rotational grazing system by a cut-and-carry system.

The **elders** were able to **motivate the government institutions**, especially *kebele* and *woreda* administrators, to collaborate with the Kuwalla villagers and helped them to get assistance from other external experts when they requested it. For instance when the community discussed area enclosure, they requested technical assistance from the experts. The experts also used exotic feed species to improve the nutritional value of the communal pasture.

> *"I do not exactly remember what we have sown on the Kuwalla communal pasture, but alfala, vetch, silver, silver leaf Desmodium, and green leaf Desmodium*, *were widely over sown on the communal pastures through the Fourth Livestock Development Project".*
>
> *Expert from BoA, key informant interview, Dec. 2012*

However, after they germinated and grew well in the first year, the exotic species disappeared. On the other hand, the indigenous species which had disappeared due to overgrazing regenerated quickly when the pasture was enclosed.

> *"The local grasses are adapted for grazing, though they are grazed every year they grow again and again when they get rain. (…) Our species have long roots in the soil. Probably the improved ones do not have long roots and they disappeared when they were grazed."*
>
> *A man, from men focus group, Nov. 2012*

The community discovered that the indigenous species are more tolerant and better adapted to their conditions than the exotic species. As a result, indigenous species reappeared and have established after the enclosure of the grassland (see Figure 22).

Figure 22: Indigenous grass and clover species have re-established due to the controlled grazing system

The support by administrators was also necessary **to prosecute cattle thieves**. Indeed, robberies could happen when cattle are outside over night in the framework of *hura*. Before the *hura* period starts, the users, through the informal institution, inform the *kebele* administration as they will let out their cattle overnight and might request security support if needed. However, over the last 24 years, no cattle were stolen during *hura* period as the users themselves have a well-coordinated security scheme in the form of *kirat*.

The support by administrators was also necessary to **enforce the exclusive use of the pasture** by Kuwalla villagers. Especially at the beginning it was necessary to exclude users from other villages, as they were accustomed to use the pasture while it was owned by the Wundgi producers' cooperative and managed as an open-access pasture.

> *"Before we had the controlled grazing system (…) the Senbel and Wereba villagers used to graze their livestock on our pasture. After we excluded the other villagers from access (…) there was a lot of resistance from the Senbel and Wereba villagers. (…) The management committee frequently appealed to the kebele and through the mediation of the government officials, they learned over time that the pasture is ours."*
>
> *Elder man, key informant interview, Dec. 2012*

Indeed, since this informal institution is at village-level, people from other villages may not perceive its rules as legitimate. Hence the *kebele* administration needs to intervene to force trespassers from other villages to pay fines if they violate a rule.

The **endorsement** of the informal institution governing the communal pasture by the *kebele* **administration** ensured the effectiveness of the informal institution. The management committee thus ensured support through submitting the proposed rules to the *kebele* administrators, who endorsed them. Indeed, the *kebele* administrators are acutely aware of the problem caused by degraded grassland, and thus supported the initiative as it would allow them to report progress in rehabilitating degraded land and allow them to use scarce resources in other areas. Indeed, each *kebele* is supposed to have a land administration officer; however, the position was never filled in Wundgi. This left a void, but the informal institution which organized and manages the sophisticated communal pasture management, and strengthens the autonomy of Kuwalla.

Still, the Kuwalla communal pasture management is widely acknowledged as a well-organized management system by individuals whom work for the government institutions.

> *"The Kuwalla communal pasture management system is strong and we consider it as a model for the other villages. (…) These days there is a push from the government's side to adopt the controlled grazing system; so far 11 villages have already adopted the controlled grazing system in our kebele. But still there are four villages (Musayta,*

Shalegna, Nigusta and Wulanta) that have a free grazing system. (…) We want all the 16 villages to have a controlled grazing system."

Kebele administrator, key informant interview, Dec. 2012

Yet, **negotiating external influences** is also **a challenge** for the community. Indeed, the extension system of the Bureau of Agriculture often advocates for the cut-and-carry system as the best management of the communal grassland. As a result, the Kuwalla villagers are expected to comply and implement specific strategies (i.e. the cut-and-carry system) which are defined centrally. This program aims at systematically replacing grazing through a cut-and-carry system combined with stall feeding.

"We have been told to start zero grazing and adopt the cut-and-carry system on our communal pasture this year. But since we were not sure how it fits with our situation we delineated one quarter of the communal pasture for the cut-and-carry system. So we will see how it works."

Management committee member, key informant interview, Oct. 2012

The committee members thus need to step a fine line **between antagonizing officials** and **changing their system.** Changing the system may well suit external demands, but does not fulfill the needs of the villagers. For example, in the year 2012 grass growth was poor, as there was little rainfall in September. As a result, the grass was unsuitable to be cut by hand; hence farmers had an argument to keep the rotational grazing system. However, the experts perceived this as a resistance against adopting the zero grazing system and have continued to put pressure on the Kuwalla villagers to replace their customary rotational grazing system.

"Most of the time, the farmers do not do what they promised to the experts. (…) The reason for not having the cut-and-carry system is not the poor re-growth. In my opinion there are users who do have more oxen; these people do not want the cut-and-carry system at all. Because if the cut-and-carry system would be adopted, they may be forced to share the harvest equally with all villagers, which would potentially reduce their share. (…) It is a matter of time; hopefully we will be successful to have the cut-and-carry system in Kuwalla."

Development agent from BoA, key informant interview, Dec. 2012

4.4 Key insights

The rules governing the access to and the use of the **communal pasture** in Kuwalla haves changed substantially over the last 40 years, not least due to policy changes led by governments with different political ideologies. Particularly during the *Derg* regime a number of policy changes such as the 1975 land tenure change, the formation of Wundgi peasant association, the establishment of the Wundigi agricultural producers' cooperative and the implementation of the villagization program influenced the authority over the grassland and the overall availability of feed for the animals. Over time, the availability of grass was reduced, especially through a free grazing system that led to overgrazing and gully erosion.

However, with the collapse of Wundgi agricultural producers' cooperative in 1990, the Kuwalla community recognized the window of opportunity and took the initiative and designed a **controlled grazing system** built around a sophisticated rotational grazing system with clear rights and rules.

Three factors were found to play a key role in enabling the Kuwalla community to regain controlled grazing system: the leaders who mobilized the community, the participatory structure of the informal institution, and the capacity of community to interact with officials.

Traditional leaders stepped forward at the collapse of the producers' cooperative in 1990 and mobilized the community. These leaders recognized the window of opportunity and seized it to change the management system. They surfaced the wide-felt need for change in the management rules, as their communal pasture was severely degraded and no longer secured adequate nutrition for the oxen. They built on their previous experience and authority as 'father of herders' and their influential positions in as *kebele* administrators to mobilize the community.

In addition **informal institution** that governs the access to and use of the communal pasture was established at the community level through the active participation of the community. The management rules were adapted based on experimentation (e.g. with enclosures allowing regeneration), shared knowledge (e.g. rotational grazing, keeping animals on the land at night to fertilize through dung), and negotiated practices (e.g. allowing some access to dairy cows so that poorer households (i.e. those who do not own oxen) also benefit from the grazing land). The informal institution also coordinates and monitors the implementation of the rules-in-use. This enabled the community to rehabilitate the degraded communal pasture and conserve it to ensure adequate nutrition for oxen and cows (see Figure 23).

Figure 23: A typical gully in the area, and the rehabilitated gully in Kuwalla, with different feed species

To secure the autonomy they need to design a system that fits their needs, the community also needed to be able to effectively **interact** with various **official** government agencies. These are also needed to enforce the rules, such as excluding cattle from neighbouring villages. Yet, negotiating with external influences is not trouble-free for the community, and it currently faces the challenge of coping with the pressure to adopt the cut-and-carry system.

Chapter 5: Gender and resilience-based management of communal pasture

This chapter describes the gender differences in the use and management of communal pasture in Kuwalla. It also illustrates the implication of gender blindness on the resilience of the management of communal pasture.

To understand how gender roles might affect the resilience and the sustainable management of the communal pasture in Kuwalla, the roles and responsibilities of men and women in the management of livestock, and their involvement in the management of the pasture is explored. The transcripts from the separate focus group discussions with men and women are used to assess whether men and women have different knowledge about the communal pasture and whether there are differences in their preferences regarding to the management of the pasture.

Moreover, the role of women in the informal institution governing the access and use right of the communal pasture is also assessed. The transcripts from men and women key informants and focus group discussions with the management committee are analyzed to assess whether women's preference and knowledge is taken into account. Finally the implication of gender blindness on sustainable use of communal pasture and community resilience is explored.

5.1 Social roles and sharing benefits from livestock

Livestock is an important resource for the livelihood of the community in Kuwalla. As a **subsistence farming** community, households keep animals as a source of food (egg, milk, butter, cheese, and meat), drought power (for land cultivation, crop threshing, and transporting farm produce), fuel (sun-dried dung for cooking), and as a source of organic fertilizer (manure, compost). Livestock also serves as a source of income from the sale of butter and cheese; and as an asset which can be sold to cover the urgent need of cash for the households (e.g. purchase of farm inputs, house re-innovation, weddings). Moreover, cattle is also a symbol of social prestige: a household with more oxen is considered a wealthier household. In Kuwalla, households who can offer an oxen and/or cows to their children as a wedding gift are perceived as responsible and respected parents.

However everyone in the community does not have the same access and control over all type of livestock and their products. The access to and the control over the specific type of livestock and their products varies based on the social roles of the members, especially on the basis of their gender. The gender roles in a community also vary according to age, marital and wealth status. Thus, the gender roles in a community influence the division of labour among members in the use, production, and management of livestock. Moreover, it also influences the sharing of the benefits between men and women from the production of livestock.

5.1.1 Gender division of labor

The results from the separate focus discussions with men and women groups, as well as the results from the key informant interviews held with men and women revealed that men and women do not have the same **access to** the **use of livestock** products and services. These are predetermined by cultural norms. For instance, men quite often care for cattle and larger animals such as donkey and horses, while women care for sheep and poultry. As men are

generally expected to be the bread winner of the household, they control activities related to the use of oxen (plowing, using oxen for crop threshing and using pack animals to transport farm products to market). Women care for lactating cows and calves as they are kept around homestead while the other animals stay on the free grazing area during the day time. Moreover women control activities related to food preparation, hence they control activities like milking the cow and making butter and cheese, which might be used as food for the household or sold.

The division of activities between women and men are influenced by **cultural norms** which tag specific activities as men's or women's roles. For a male headed household, which considered as the standard family in Kuwalla, the different activities in the management of livestock presented in Table 9

Table 9: Roles of men, women and children in the management of livestock and of the pasture.

Activities		**Women's group (% of work)**			**Men's group (% of work)**		
		Men	**Women**	**Children**	**Men**	**Women**	**Children**
Supervision	Let the animals out from barn	30	10	60	50	30	20
	Let the animals into the barn	30	10	60	60	40	0
Provision of feed	Provide feed at home	60	20	20	70	10	20
Herding	Let animals out for free grazing	20	20	60	30	30	40
	Take them to the water place	30	10	60	30	30	40
	Give animals to the herder (*kello*)	30	10	60	20	10	70
	Take the animals back from *kello*	40	20	40	40	20	40
Collecting, storing feed	Cut grasses	40	30	30	60	20	20
	Pile crop residues	70	10	20	50	0	50
Hygiene	Clean the barn	10	60	30	20	60	10
Food preparation	Milk the cow	20	80	0	50	50	0
	Process the milk	0	90	10	0	80	20
	Slaughter animals	90	0	10	90	0	10

Source: Focus group discussions with men and women groups, October 2012

Generally **men** are **main players** in livestock production. Men take the lead responsibilities on activities related to controlling and administering the use of feed such as provision of feed to animals at home before they go for grazing and plowing; cutting grasses, pilling the hay and crop residue for the dry season. They also take more responsibilities in letting out the animals from the barn in the morning and bringing them to the barn in the evening.

However, there is a **discrepancy** between the men´s and women´s group in the recognition of men´s contribution to various activities (see Table 9). While women acknowledge men as key contributors for the provision of feed to animal, and pilling crop residue and hay; the men also see themselves as key players in activities such as cutting grasses, letting out the animals from the barn and letting in them to the barn in the evening. It thus seems that men overestimate their responsibilities, which might be due to the fact that men closely oversee children's activities and give them guidance, e.g. when the children let out the animals from the barn in the morning and let them back to the barn in the evening. Thus while men consider themselves as key backstops of the children, women considered children as main contributors for those activities as they actually are performing the task. Moreover, if the children are at school, it is the women who have to perform the children's task, which might also contribute to women acknowledging children´s contributions more than men do.

Women are involved in activities closely associated with their household responsibilities, and thus with task that are performed around homestead such as cleaning, and food preparation. Women thus take the major responsibilities in cleaning the barn, drying dung for cooking fuel, milking and milk processing (making butter and cheese). Moreover since calves and lactating cows are mostly kept around home during day time, women look after them by providing feed and water. Over time, the contribution of women to livestock husbandry and pasture management has increased due to the increasing enrolment rate of children in schools.

5.1.2 Gender roles by age

The gender division of labor in livestock management and the use of communal pasture within the household are also **differentiated by age**. Since the management of livestock is laborious, elders are not normally involved with activities related to management of livestock. Rather they provide guidance and tell children how to undertake the activities properly. There are also notable distinctions in the division of labor between children and adults (see Table 10). Generally children (both boys and girls) engage almost in every activity of livestock management with different level of contributions, except milking which is done entirely by adults (mainly by women). Girls are also involved in making butter and cheese as part of their duties to assist their mothers in the household activities.

Table 10: Contribution to the work of managing livestock and the use of pasture, by gender and age

Activities		Women´s group (% of work)			Men´s group (% of work)		
		Boys	Girls	Adults	Boys	Girls	Adults
Supervision	Let the animals out from barn	40	20	40	10	10	80
	Let the animals into the barn	40	20	40	0	0	100
Provide feed	Provide feed at home	10	10	80	10	10	80
Herding	Let the animals out for free grazing	40	20	40	30	10	60
	Take them to the water place	40	20	40	20	20	60
	Give animals to the herder (*kello*)	40	20	60	40	30	30
	Take the animals back from *kello*	40	0	60	30	10	60
Collecting and storing feed	Cut grasses	20	10	70	20	0	80
	Pile crop residue	20	0	80	40	10	50
Hygiene	Clean the barn	10	20	70	10	10	80
Food processing	Milk the cows	0	0	100	0	0	100
	Process the milk	0	10	90	0	20	80
	Slaughter animals	10	0	90	10	0	90

Source: Focus group discussions with men and women groups, October 2012

As indicated in Table 10, **children** are major contributors (50% or more) to activities related to herding, such as letting out the animals from the barn, herding them to various feeding areas around the village and taking them to river for watering during the day time. They also take the animals to the controlled grazing area and handover the cattle to the *kellogna*[11] during the opening seasons. The results reveal that the contributions of children also vary between the boys and girls depending where the activities are taken place. **Boys** seem to have more contributions in activities that are carried out outside the homestead such as herding, watering animals and cutting grasses from farm boundaries. **Girls** tend to be more involved in activities carried out around the homestead, such as cleaning the barn and milk processing.

[11] The *kellogna* is the person who is responsible for herding his and his neighborhoods' cattle on the controlled grazing area in his turn.

In the men's focus group, children's contributions are perceived as smaller than by the women's focus group. This might be due to the fact men supervise children, thus men may not recognize **children as independent contributors** of the activities they are doing.

Figure 24: Children herding livestock cattle and sheep (in the background) before the afternoon school

Children used to have more responsibilities in the past. As children are obliged to attend school, some of the tasks they used to perform are now done by other members of the family. Since 1994 the new education policy of the government asserts that parents should send their children to school (Joshi and Verspoor, 2013). This increased the enrolment of children in **schools**, and the key informant interviewees confirmed that all the households interviewed are sending their children (both the boys and girls) to school from the age of 6 or 7 years. In the previous days boys were more privileged than girls to schooling. This societal shift effect changed the division of labor among household members. To use the resources such as classrooms efficiently, the schooling system designed in **shift system**: children attend school for half a day, either in the morning shift (between 8:00 and 12:30 hrs) or the afternoon shift (between 13:00 and 17:30 hrs). In a household where there are several children, there is high chance that children will attend school in different shifts, so some of the children can still e.g. herd the animals both in the morning and the afternoon (see Figure 24). In households with few children, either the men or the women perform the tasks while the children attend school.

5.1.3 Gender roles by marital status

Households headed by women are common in Kuwalla. While 23 % of the households are headed by women, there is no household headed by a single man in the village (see Figure 25). According to the focus group discussants, culturally it is very hard for men to lead their household alone in the absence of their wives; hence they are supposed to re-marry immediately upon divorce or death of their wives. However, widowed and divorced women in Kuwalla able to cover their husbands' roles and the women confirmed as they can lead a family alone, despite the high workload.

Hence women's contribution in activities of livestock management in the female and male-headed household differs. In a **female-headed household**, women engage in almost all activities related to livestock management, i.e. they cover almost all activities that are supposed to be

covered by their husbands. Only a few activities are seen as being only men's responsibilities, especially plowing, so women get assistance from their men relatives, neighborhoods, in-laws or they hire a laborer. Thus overall women in female-headed household have a much higher workload compared to women in male-headed households.

The constraints of women in female-headed household also differ by their **wealth status**. The majority (54 %) of female-headed household are poor households (see Figure 25). These poor households do not own cattle, thus they lack oxen, thus reducing their ability to produce crops for the family. Hence even if they own land, they have to either sharecrop or rent it out. Under a share cropping arrangement they tend to end up with less than half of the produce.

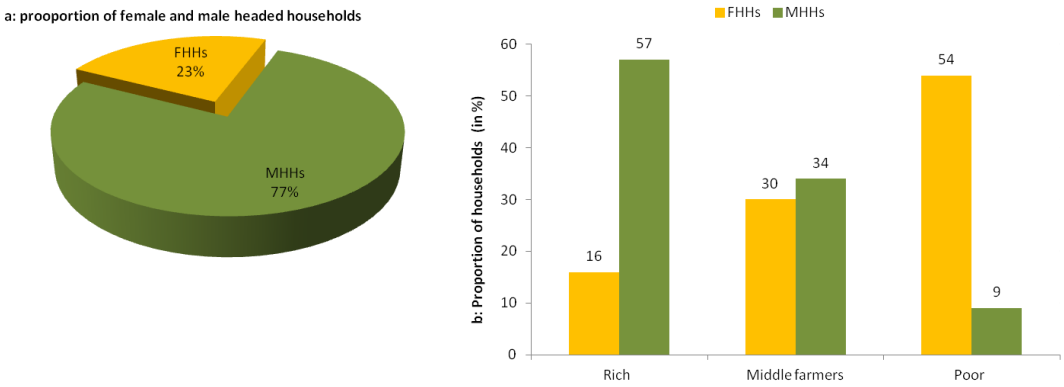

Figure 25: Share of female-headed households (FHH) in Kuwalla (a), and share of male-headed households (MHH) and female-headed households in the three wealth categories (b), as estimated by the focus group discussants

For female-headed households in the **middle and rich wealth group**, the women enjoy better access to livestock resources than married women, as they have full control of the benefit from their resources. Due to the cultural norms that prohibit women from plowing, they still depend on the assistance of men. As they have to hire labor, or get assistance from their male relatives or neighbors, it limits their choice of plowing time, thus reducing their yield; and they may not be able to cultivate crops that require frequent plowing.

In **male-headed households**, resource constraints are less of an issue, as only 9% of them belong to the poor households. Thus, the majority own the resources that are important for crop cultivation. However, the women in these households do not control the income from large animals such as oxen, live sale of cows, calves, donkey and horses. They also rarely share the benefit from sheep. Mostly, the women control poultry, eggs and dairy products such as butter and cheese. This is due to cultural norms that assure the dominance of men as the head of the households; thus men are entitled to the most important resources like land and large animals.

5.1.4 Gender roles by wealth status

The wealth status of the household also influences how the family uses their livestock and the division of labor among family member in activities related to livestock management. In the **rich households**, many of the activities are assisted by hired labor, which might be hired casually[12] to

[12] Households, who can afford it, hire labor for activities such as plowing, weeding, harvesting, and cutting grasses from farm boundaries for feed. The laborer is paid 20-30 ETB per day, depending on the burden of the task.

cover labor peaks, or permanently[13]. Hence family members have moderate workload in the management of livestock and use of pasture as compared to the middle household and poor households who totally depend on the family labor.

Since the **poor households** do not own cattle, men mostly spend their time with activities related to farming, as they have to work both on their own farmland and for other farmers to get oxen services by exchanging with their labor. A man from a poor household can get oxen service through *megolem*[14]*:* he can get oxen services for one day in exchange for two days of labor. The men in poor households thus spend about three times as much time with cropping activities, than those families who own a pair of oxen. As a result, the women are mostly responsible to look after the livestock (mostly sheep) they own, i.e. feeding, cut grasses, cleaning and watering. Children also herd the sheep on the free grazing land.

The situation is similar, families in the **middle wealth group**, i.e. those that own only one ox, and cultivate their farmland through pooling their oxen with neighborhoods or friends to make a pair of oxen. This arrangement of pooling oxen and using them in turn is called *wenfel* or *tenad*.

5.1.5 Share of benefits from livestock production

The **benefit sharing** from and control over the benefits of livestock production differs notably between women and men, and is partially reflected in their contribution to the management of livestock and the use of the produce in the home or for sale. But it also essentially reflects the cultural norms of ownership, with men being entitled to the most important and large animals such as cattle and pack animals; while women are entitled for small animals such as chicken. In most cases men and women and sometimes children have a joint control over sheep.

Thus, even though women play a considerable role in the production and management of livestock, they **do not** control the **benefit** from the sale of **large animals**. As a result, women rarely participate in marketing. As women culturally do not market large animals such as ox, cow, heifer, bull, and pack animals, they also rarely sell sheep. Women in male-headed households also have little control over the use of the income from the sales.

Women do sell **chicken** and **products** such as eggs, milk, butter and cheese at the market and have full control over the income from these products. Indeed, it is taboo for men farmers to be involved in the sale of products such as butter and cheese. Though the income from chicken and dairy products is small, it is an important and continuous source of cash, in contrast to the sale of live large animals which is rather infrequent.

Even though **sheep** are sold by men at the market, the income from the sale of sheep is controlled by **both men and women**. In most cases women and children keep their own sheep in the households and have a full control on the income from the sale.

[13] Rich households hire a permanent laborer (a *kanja*) who works on all activities, on crop and grazing land, and around the homestead. The laborer lives and eats together with the family and is paid in kind annually (he shares $1/6^{th}$ or $1/7^{th}$ of the total crop produced).

[14] *Megolem* is a traditional labor exchange arrangement with oxen services through which farmers who do not own oxen get oxen services as an exchange of their labor. Farmer without oxen exchange his labor with a pair of oxen, and he plough, and sow for two days on the farmland of the oxen owner, then he will get the oxen service and plough on his own land for a day.

5.2 Gender roles lead to differences in preferences and knowledge

As women and men have different access to the use of specific type of livestock to accomplish their social responsibilities they tend to have **different interest** and preferences how to use the communal pasture. For example using oxen for plowing is culturally a men's domain, thus men are highly interested to get grazing access for their oxen. Since women control the income from milk products (butter and cheese), they are interested in ensuring sufficient and high-quality feed for their cows so as to increase the milk production, which allows them to better feed their family and to increase their cash income.

Moreover, depending on which animals they are familiar with and interested in, they have better **knowledge** on which species are good to increase the performance and productivity of animals. As it is mentioned earlier as women are interested in milk, they know more about the type of species that increase milk production than men do.

5.2.1 Women´s interest and preferences regarding the communal pasture

As one of women´s household responsibilities, they are expected to make *sifet*, a traditional plate and basic household utensil used to serve and store food (Figure 26). To make the *sifet*, women from all wealth categories (poor, middle and rich) would like to collect two specific grasses: *zeba* (*Hyparrhenia dregeana)* and *arma (Eleusine floccifolia)*. These two grasses are found mostly on the communal pasture, yet **women are not allowed** to collect them from there. They thus have to purchase the grasses at the market. As there is a low supply of *arma* at the market, women sometimes have to use a plastic thread locally known as *madaberia,* which is named in Amharic after the bag of fertilizer. According to the women focus group discussants *sifets* made with *madaberia* are not convenient to serve and keep hot food.

Figure 26: A woman making a *sifet* from *zeba* grass and *madaberia,* in the place of arma grass (*Eleusine floccifolia)*

The irony is that while the women are not allowed to collect these two grass species from the communal pasture, the management body reported ***Eleusine floccifolia*** as one of the species that is becoming a dominant species, and **threatens the quality** of the feed resources. Indeed, *Eleusine floccifolia* is hard for the cattle to chew. As it remains un-grazed, it reproduces every year aggressively and overtime is becoming a dominant species. As one of the men focus group discussants mentioned, they tried to control the spreading of *Eleusine floccifolia* using a couple of approaches.

> *"We asked the experts to tell us if there is any herbicide that kills it. But we learned from them that it will kill also the other grass species. So we were afraid to use herbicides and did not try any herbicides. (…). Since last year, we are uprooting a few of them but still it is expanding from year to year".*
>
> *A man from management focus group discussants, Oct. 2012*

Surprisingly, no one has thought about allowing women to harvest *Eleusine floccifolia* as a **possible solution** to control the spreading of the grass. If the diverse interests of women were taken into accounts in the management rules, and women were provided with special access to collect *Eleusine floccifolia,* it would contribute to the quality of the communal pasture in two ways: Firstly, the likelihood of this unpalatable species becoming dominant would be reduced. Secondly, the women´s needs of the grass for *sifet* would be covered, and they might even be able to sell it on the market. Hence considering women´s interest could contribute to ensure the sustainability of the communal pasture, and it would strengthen the capacity of the management system by effectively responding to the change i.e. the spread of *Eleusine floccifolia.*

As the current rules provide priority grazing access to oxen (see the details of the rules in section 4.1.2), women have **limited options** to increase the milk production through having quality feed from the well-managed communal pasture. This is particularly problematic for women of the rich male-headed households who own more than a pair of oxen, as the current rules allows these households to have a grazing access for more than two oxen. If these households want to send their cows, they would be limited to only two cows. However, they can make the rational decision to maximize their benefit by sending all their oxen, i.e. up to five oxen. This leaves no room for the women to negotiate with their husbands to switch the oxen grazing access to their cows.

One of the key informants gave an example for the possible tension between husbands and wives: while she would like to send a lactating cow, this would mean that they could only send two heads of cattle (one ox and one cow), which is less than if they sent the three oxen they own.

> *"I wish to send my cows when they are in a lactation period, however my husband will not permit me to send it".*
>
> *A married woman key informant from rich households, Nov. 2012*

Poor households who do not own cattle have no direct benefit from the communal pasture, as the access right is only for cattle through grazing. This affects mostly the female-headed households, as 54% of these do not own cattle and can thus not access and benefit from the communal pasture. Also, sheep are excluded from grazing on the communal pasture. However sheep are the most common assets of the poor female-headed households and also women in male-headed households have a considerable control over the income from the sale of sheep.

5.2.2 Women's knowledge about the communal pasture

The results from the separate focus group discussion with men and women groups indicate that women´s contributions in the management of livestock increased as a result of the increased

school enrolment of children. For example, while herding and taking animals to the river for watering used to be entirely the responsibly of children with a close supervision of male adult, women and other family members now have to contribute towards this task.

> *"Mostly, my ´kanja´ [contract hired labor] does the herding when the children are in school. But there are times when my husband and the kanja are busy in the field. During that time I have to do the herding until the children get back from school".*
>
> *A married woman from key informant interviewees, Nov. 2012*

While this adds further workload to **women**, at the same time it provides for women further opportunity to **have a close observation** of the communal pasture and to know more about the characteristic of species. For instance women have recognized more feed species (11 species) than men who recognized only 9 species (see Table 11). Indeed, two species that are found only rarely in the communal pasture (i.e. *Armetmato and Anthraxon prionodes*) were listed only by women. When asked about these two species, the men stated that they knew them, but they were not important.

> *Yes, right you are. Armetmato and Ye-kok Sar are there, but they are insignificant, you find them rarely. (…) That is why we did not mention them to you last time.*
>
> *A man from focus group discussion, Nov. 2012*

Yet, while the men felt that *Armetmato* did not deserve mentioning, the women ranked it at the 7th species by abundance (Table 11). The table also shows that while both the men and women focus group discussants know about the abundance of *Eleusine floccifolia,* men rank it as the 4th most abundant species while women perceive it the 6th most abundant species. This may be the reflection of women interest on *Eleusine floccifolia* and they might not perceive the species as threat for the communal pasture.

Table 11: The most abundant feed species in the communal pasture, identified by men's and women's group

Rank	Men's group	Women's group
1st	*Andropogon abyssnicus (Gaja)*	*Cynadon dactylon (Serdo)*
2nd	*Medicago polymorpha (Mesobei)*	*Andropogon abyssnicus (Gaja)*
3rd	*Cynadon dactylon (Serdo)*	*Medicago polymorpha (Mesobei)*
4th	*Eleusine floccifolia (Arma)*	*Sporobolus natalensis (Murgn)*
5th	*Sporobolus natalensis (Murgn)*	*Trifolum spp(Wajima)*
6th	*Trifolum spp (Wajima)*	*Eleusine floccifolia (Arma)*
7th	*Cyperus rigidifolius (Engecha)*	*Armetmato*
8th	*Hyparrhenia dregeana (Zeba)*	*Cyperus rigidifolius (Engecha)*
9th	*Lanceolata minor (Gorteb)*	*Hyparrhenia dregeana (Zeba)*
10th		*Lanceolata minor(Gorteb)*
11th		*Arthraxon prionodes (Yekok Sar)*

Source: Focus group discussants from men and women groups, October 2012

Some similarities and some discrepancies between the assessment by men and women on the palatability of the feed species were also observed (see Annex 4). For example, in their top five palatable feed species lists, both men and women put *Cynadon dactylon* as the most palatable species. Also, both groups included *Andropogon abyssnicus* and *Medicago polymorpha* in the list of top five most palatable species. However, while men included *Sporobolus natalensis* and *Cyperus rigidifolius*; women included *Armetmato* and *Trifolium spp* in their top five palatable species lists.

When asked to rank the species by their importance, the list by men and by women also showed quite some differences (Table 12). Women identified *mesobei* (*Medicago polymorpha)* and *wajima (Trifolium spp.)* as important species to increase the milk production. Consequently,

the women put these species on the top list of important feed species. While men acknowledge the importance of these species to oxen, they rank them as somewhat less important overall.

> *"When the oxen have 'mesobei' and 'wajima', their body looks good and they gain weight"*
>
> *A man from men focus group discussants, Oct. 2012*

Table 12: Importance of feed species in the communal pasture identified by men's and women's group

Rank	Men's group	Women's group
1st	*Cynadon dactylon (Serdo)*	*Cynadon dactylon (Serdo)*
2nd	*Sporobolus natalensis (Murgn)*	*Andropogon abyssnicus(Gaja)*
3rd	*Andropogon abyssnicus(Gaja)*	*Medicago polymorpha (Mesobei)*
4th	*Cyperus rigidifolius (Engecha)*	*Trifolium spp (Wajima)*
5th	*Medicago polymorpha (Mesobei)*	*Armetmato*
6th	*Trifolium spp (Wajima)*	*Sporobolus natalensis (Murgn)*
7th	*Eleusine floccifolia (Arma)*	*Anthraxon prionodes (Yekok Sar)*
8th	*Hyparrhenia dregeana (Zeba)*	*Cyperus rigidifolius (Engecha)*
9th	*Lanceolata minor (Gorteb)*	*Lanceolata minor (Gorteb)*
10th		*Eleusine floccifolia (Arma)*
11th		*Hyparrhenia dregeana (Zeba)*

Source: Focus group discussants from men and women groups, October 2012

The differential control over the income from different types of animals by men and women also contributes to different assessments of the importance of the controlled communal pasture as a feed source. Men estimated that 36% of the feed sources to come from the controlled communal pasture, while women estimate that 26% of the feed comes from there (see Figure 27).

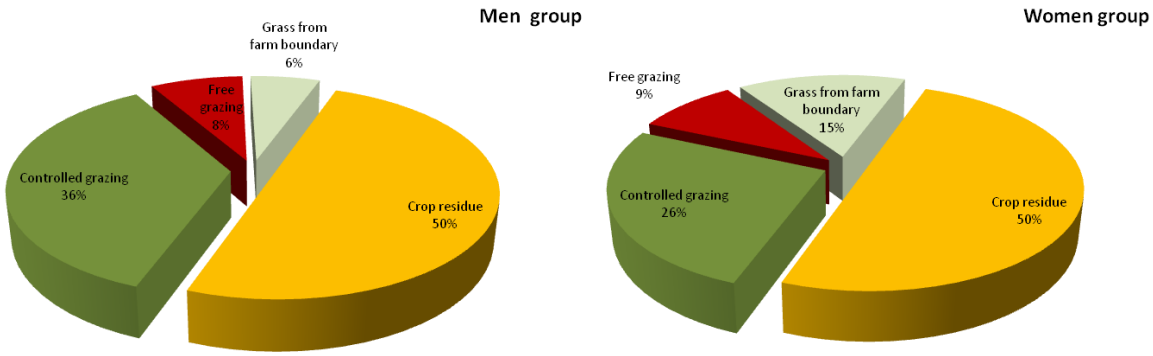

Figure 27: Various sources of feed revealed by men's and women's group using proportional pilling

The higher estimation of men should not be a surprise as it reflects their benefit: it is primarily the oxen who benefits from the pasture, and men use them as draught power to plow. Women´s estimation of the importance of controlled communal pasture might reflect their dissatisfaction due to unequal benefit sharing from the communal pasture.

> *"The feed from the controlled communal pasture is not always accessible. (…). It is also an oxen pasture, only oxen are allowed to graze. I feed my cows mostly with crop residue, and during the cropping season I also feed them fresh grasses harvested from farm boundaries and weeds collected from the cropland".*
>
> *Woman from key informants, Dec. 2012*

This calls the need to harnessing the diversity in interests of men and women for optimal use of the communal pasture and a **fair distribution of benefits** between men and women.

5.3 Women's exclusion from the informal institution

The differences between gender roles at the household level are also reflected at community level. Cultural norms influence the expectations regarding the role that men and women should play in the informal institution that governs the access and the use right of the communal pasture. This informal institution is the platform on which rules are discussed and revised, i.e. negotiated before they are implemented (see section 4.3.2). However due to women's low status in the community, they have little say on public issues and are thus **excluded** from the **informal institution**. Hence women have no role in the decision whom to grant access and how to manage the communal pasture.

In Kuwalla, there has **never** been a **woman** that was a member of the **management committee**. Women also cannot be a ´father of herders´ (i.e. there are no 'mothers of herders'), which is also part of the management and in charge of supervising and monitoring the rules-in-use. This is not only unique to Kuwalla, as in none of the 12 *kebeles* that have adopted a controlled grazing system in the district; a woman has ever been a member of the management committee or a 'father of herder'. As such, the institution is entirely dominated by men, and there seems to be little discussion about involving women in the decision making process.

> *"In the history of the controlled grazing system in our village, I have never seen and heard a woman in the management of communal pasture, ruling the grazing system. It is also hard for me to think of women taking care of all the management issues. You know they are not strong enough to assert rules that need to be implemented and to say somebody who breaks the rules has to be penalized."*
>
> *Man, men's focus group discussion, Oct. 2012*

Women have a very similar perception, and assume that they are not qualified to serve as a management committee or a 'father of herders'.

> *"It is unimaginable to assume that we women guide the whole management system, come up with all the rules and pass on orders to men. In my opinion this will not work because the men will not appreciate us. (...) No woman tried this before. May be in the future, if we have educated women, things will be different."*
>
> *Woman, key informant interview, Nov. 2012*

Since women are also raised within the same cultural context that asserts women cannot be leaders, it is not a surprising that women too doubt their own ability to take decisions that will affect the whole community, especially as this would imply that they would make rules that men would have to follow.

Women are not only **excluded** from the decision making process in the core management body, they are also excluded from the general **assembly meeting**. They are always represented by their husbands in the annual or biannual meeting, except for those women who head a household. Yet, while these women attend the meeting, they do not express their view, as they are only a few (about 16 out of 160 households who use the communal pasture) and culturally they are shy to speak up in front of a crowd of men.

Hence women in general have **no opportunity to express their views** and preferences as they are not part of the management body, do not attend the general assembly and women from female-headed households passively attend the general assembly. Information transfer to married women from their husbands may be poor. For instance while the management

committee allocated a portion of the communal pasture to try the cut-and-carry system in 2011, as was imposed by the Bureau of Agriculture, that information did not reach the women:

> *"I do not know the plan, what I know is that oxen and cows grazing during the opening season. (…) It is my husband who attends the meeting, probably he might know. I did not hear anything about the cut-and-carry system from our ´father of herders´ either".*
>
> *A married woman, key informant interview, Nov.2012*

Ironically, the cut-and-carry scheme from the **Bureau of Agriculture** also aims at ensuring that women benefit from the communal pasture.

> *"We are teaching the farmers to adopt the cut-and-carry system for the better use of the communal pasture. (…) Since the pasture is a common resource for all, every household in the village need to benefit. Through the cut-and-carry system the poor who do not own cattle, including female-headed households can share the harvested grass".*
>
> *Expert from the BoA, key informant interview, Dec. 2012*

Women did not receive the information from the experts from the Bureau of Agriculture either, as these experts only discuss matters with men, as it is the men who are in the front line as members of the management committee, as 'father of herders' and heading the family (at least in the case of male-headed households).

> *The management committee and the ´father of herders´ have agreed with our proposal for the cut-and-carry system. They promised to start the cut-and-carry system, after we had a number of meetings with them.*
>
> *Expert from BoA, key informant interview, Dec. 2012*

Women's exclusion from the informal institution in effect deprived them of information about a system that is meant to enhance their autonomy and ensure that they receive benefits from the communal resource. More generally, women have no way to express their interest and preference, thus no way to influence the rules that govern the access and management of the communal pasture. Their exclusion from the informal institution has negative consequences: it results in the sub-optimal use of the communal pasture, it subverts the rules, and it undermines the legitimacy of the informal institution.

5.4 Impact of gender blind rules in the management of communal pasture

The **gender blindness** refer to the insensitiveness of the informal institution, its inability to take into accounts the fact that men and women have different interest in the communal pasture, that they have different preferences regarding the animals that are allowed on the pasture. The gender blind rules do not explicitly discriminate specific groups of users on the basis of their gender; rather they blindly favor or disfavor either men or women.

Even though the Kuwalla communal pasture has so far been managed in a fairly sustainable manner, the benefits are not shared fairly between men and women. Rather the informal institution contributes to the perpetuation of gender inequalities and the **marginalization of women**. Particularly the women heading the family whom the majority are poor, and married women from male headed households, whom culturally have less control and decision power over important livestock such oxen are side-lined. Indeed, the access and the management rules are biased towards the interest of men, especially those in rich households. Moreover, excluding women from the informal institution prevents their knowledge about uses of specific grasses from being taken into consideration in the management rules.

This has affected the communal pasture in three ways. Firstly, as oxen are systematically privileged, dairy cows receive less protein-rich feed than would be possible, i.e. the pasture is used sub-optimally. Secondly, as women have been banned from harvesting a specific grass species used to craft traditionally made plates, this grass has become more abundant lowering the feed quality of the communal pasture. Thirdly, poorer (often women-headed) households do not benefit from the communal pasture, as they do not own cattle. These households thus question the legitimacy of the institution governing the communal pasture.

5.4.1 Sub-optimal use of the communal pasture

Given the different roles and responsibilities men and women have; they have different experiential knowledge of communal pasture they depend upon. Since **women** are more responsible for milking and managing milk products such as butter and cheese making, they have **better knowledge** which **feed species** are best for increased milk production.

As a result of that **women recognized** both *Medicago polymorpha* (locally known as *mesobei*) and *Trifolium spp.* (known as *wajima*) as **important feed species** as compared to the men's group (see Table 12). However, this knowledge is not taken into account to optimize the use of the feed, i.e. ensure that when oxen are not needed for plowing, lactating cows should have privileged access to the communal pasture. Instead, oxen are systematically privileged over the dairy cows, as men assert that oxen are the most important cattle since it is needed as drought power for crop cultivation.

Beyond the importance of oxen to till the land and produce crops to ensure the livelihood of the households, oxen also have **social value** as they are used as an indicator for the wealth status of the household. Indeed, a household with more oxen is considered as a wealthy household. Moreover, men derive social status and prestige when they have strong, good looking and beautiful oxen. Men who own strong and beautiful oxen are widely seen as 'good' farmers by the community and thus as deserving respect. This can be expected to reinforce men giving privileged grazing access to oxen. As one interviewee words it: without oxen, a man is as useless as donkey meat is for food (especially as it is taboo to eat donkey's meat):

> *"A man who does not have oxen is just like a donkey flesh. (…) He is helpless. Without oxen, how can he produce from his land and feed for his family?"*
>
> *Man, key informant interview, Dec. 2012*

The women, who fully agree that oxen play a pivotal role in their farming system, do not dispute the importance of oxen.

> *"That is true; oxen produce injera[15], bread and shiro[16] which are the basics of our food. Cows give us milk and butter just to make the foods delicious. (…) We can live without butter and milk, but it is hard to live without injera and shiro."*
>
> *Woman, key informant interview, Dec. 2012*

Yet, women still regret that the cows are only given limited access to grazing, and would wish for a more balanced access.

> *"Even though oxen are important for the family for cultivation and to get what we eat, still cows should not be neglected. They are important to have milk for our children, to get butter as source of income for us [women], and to give the future oxen for the family"*
>
> *Married woman, key informant interview, Nov. 2012*

[15] ´Injera´ is leavened Ethiopian bread made of teff flour that is flat, similar to a very large crêpe.
[16] ´Shiro´ is the flour of roasted pulses (field-peas, chickpeas, or faba-beans), it is used to make sauces.

Due to the absence of opportunities to hear and consider women's views in the management rules, the **blanket rules** that provided primary grazing access to oxen limits the chance that lactating cows have access to protein-rich feed species. Thus the clover (*Medicago polymorpha* and *Trifolium spp.)* are used only by oxen, even when oxen are not expected to plough and thus do not need more energy, which **disappointed** most **women**. It would seem desirable to prioritize lactating cows during the non-plowing seasons.

By having such **gender-sensitive rules** both the productivity of cows and oxen could have been enhanced from the same communal pasture through optimal resources use. If the women's view would be taken into account, it might be possible to give grazing access to lactating cows rather than oxen when the clover is ready in October, as during that period oxen do not have much work to do. This could allow using the feed resources optimally and increasing milk production. It would enhance the nutrition status of the family, and ensure that women receive their fair share of the common resource.

As women are excluded from the informal institution, they have so far not had the opportunity to argue for a change in the rules that decide which type of cattle can access the controlled communal pasture at what time of the year. Yet the **rules have changed** in the past. Indeed initially, it was decided to provide grazing access only to oxen, as oxen are important for crop cultivation. However, as this excluded all households who did not own oxen, who questioned this rule and appealed. Men were the ones who were involved in the re-negotiation process and the rules were changed to allow grazing access to cows. Now, households who have no oxen can send up to two cows, or bulls, heifers and/or calves for grazing. In case households have only one ox, it can be sent together with one cow. Since women did not take part in the re-negotiation of the rule, women could not raise the option of sending only (lactating) cows to the grazing area during the slack period for oxen. As a result, even the revised rules reflect men's preference for oxen over women's preference for dairy cows.

5.4.2 Undermine the capacity to cope with changes

The analysis indicates that while men are happy with the current rules that allow the use of the communal pasture only for feed, **women** are **interested in having additional uses**. They are particularly interested in getting the right to access the pasture to collect *arma* (*Eleusine floccifolia),* as they need it to craft *sifet*, a serving plate made of dried grass.

Arma is recognized by the management body as a species, which is unpalatable once the grass is mature. As a result, the species is becoming increasingly abundant, **threatening** the quality of **the pasture**. However, despite the potential win-win situation, no one in the management body has considered allowing women to harvest *arma* as a possible solution to control the spreading of the grass. This is because women never had the opportunity to be in the meetings and express their need for *arma*; hence their interest has never been discussed as a management issue by the informal institution. Rather, the management committee has been looking for herbicides as one alternative ways of controlling *arma*.

If women were given the right to access the pasture to collect *arma* to craft *sifet,* it would contribute to **maintaining the quality** of the **communal pasture** in two ways. Firstly, the likelihood of this unpalatable species becoming dominant would be reduced. Secondly, the environmental risk from herbicide application would be minimized. Hence considering women's interest would contribute to ensure the sustainability of the communal pasture. It would also show that the management system can integrate various knowledges and thus strengthen its capacity to cope up and respond to the change, in this case the spread of *Eleusine floccifolia.*

Not allowing women to collect *Eleusine floccifolia* and *Hyparrhenia dregeana* that are needed to for *sifet* also has another impact on the sustainable management system and its resilience, which is discussed in the following section.

5.4.3 Subverts the rules-in-use and legitimacy of the informal institution

Despite the strong rules making the harvest illegal, some **women steal** *arma (Eleusine floccifolia)* and *zeba (Hyparrhenia dregeana*), the grasses that they need to make *sifet*. As one key informant woman noted:

> *"My daughter used to steal zeba from the controlled communal pastureland at the back of the guards. She has been caught once but got out of it, before it was reported to the management body where she would have had to pay a fine. (…) The guard realized that the amount she took was too small."*
>
> *55 years old woman, key informant interview, Oct. 2012.*

This indicates that rules which are not perceived as legitimate can be subverted if women have no other means to fulfill their needs. If the needs of women are not taken into account due to their poor participation, they may have little choice but to **undermine the rules** to fulfill their social roles.

The rules are not only questioned by women, they are also questioned by those households who do not own cattle (in Kuwalla 19% of the households are **poor** [see Figure 12], and 63% of these are headed by women). Those poor households only own sheep and thus do not directly benefit from the communal pasture. These deprived households **question the legitimacy of the institution**. They find support, e.g. from the *woreda* Bureau of Agriculture, which is interested to stop the rotational grazing system and implement a cut-and-carry system.

> *We want the Kuwalla community to adopt the cut-and-carry system, because then the households who do not own cattle can also share the feed through cutting. They can either feed it to their sheep or they can sell it.*
>
> *Expert from BoA, key informant, Dec. 2012*

Such a system is appealing to poorer households as it ensures that they receive direct benefits from the communal pasture. However, according to the focus group discussion from management group, households who do not own cattle are excluded as they cannot even contribute towards the management of the communal pasture. For example, they cannot contribute through *hura*, which is an important contribution expected from users and a useful practice to enhance re-growth of the pasture.

Thus, unless the informal institutions governing the communal pasture seek ways to address the needs of marginalized households, including the female-headed households, the pressure to remove this traditional system is likely to increase. This would be unfortunate, as this rotational grazing system is well suited to the pasture and has ensured a sustainable management over the last 24 years. Dismantling the informal institution and the rotational grazing system may thus **undermine** the **sustainable** use of the communal pasture.

5.5 Key insights

Men and women do **not** have **the same control** over the communal pasture and the benefit from well-fed oxen. How the benefits from the communal pasture are distributed is highly influenced by the cultural norms such as the traditional gender division of labor involved in the production and management of livestock. For instance, men are in charge of activities related to

the use of oxen (plowing, driving oxen over the crops during threshing). Whereas women control activities related to cows (milking and milk processing). Hence men and women have different responsibilities related to livestock and thus different interest, preferences and knowledge about communal pasture. These gender role differences in the use of communal pasture at the household level also replicated at community level.

In Kuwalla, **women** are **excluded from the informal institution** governing the use of the communal pasture. Since its inception, the management committee and the ´father of herders' are exclusively composed of men. The committee has established a very sophisticated rotational grazing system to ensure feed availability throughout the year, and has restricted the access to the grazing land to a certain type of livestock and a number of hours each day. Priority is given to the oxen, followed by cows, heifers, bulls, and calves. While each household can send all the oxen they own to the grazing land (i.e. up to five, as no household in Kuwalla has more than five oxen), those households who do not own oxen can only send up to two cows.

While these **rules** have achieved a sustainable management of the grazing land, they are highly **biased towards men's priorities**, especially towards men of richer households (which are defined primarily by the number of oxen owned). Indeed, male farmers take pride in owning strong, well-nourished oxen, thus explaining the priority given to grazing oxen, even outside the periods where oxen are used to plough and thus have higher feed requirement. Yet, to optimize the use of available feed, it would seem desirable to prioritize lactating cows outside the ploughing season. This would allow them to benefit from protein-rich species such as *Medicago polymorpha* or *Trifolium spp.*, which increase milk production. Both women and men know the two species, but when asked to rank the various species found in the grazing land, the women ranked these two higher than the men. Indeed, cows and the milk they produce are traditionally women's domain, and increased milk production is a more noticeable impact of protein-rich feed, than better fed oxen. Yet, as women have no say in defining the management rules, they cannot negotiate a change in access rules, which would address their needs.

As a result, **poorer** households (and most women-headed households belong to the poorer group), do not benefit from the communal pasture since they own few or no cattle. Their dissatisfaction is fuelled by the Bureau of Agriculture, which promotes a cut-and-carry feeding system. This system would give access to all community members. Women, even those from households that do not own cattle, could the cut the grass and use it for sheep, or sell it on the market. There are thus a number of voices that increasingly **question the legitimacy** of the informal institution that manages the pasture. This seems not so much linked to the fact that the traditional system is not generally suitable, but to its lack of adaptability. Indeed, it has so far not been able to adapt the management rules to the changing needs and priorities of the community.

The case also provided another example of the **negative impact** of **not including women's knowledge** of species growing in communal pastureland, or taking into account their needs linked to their social role. Women traditionally craft plates used to store and serve food in the household, using the grass *Eleusine floccifolia*. While this grass is abundant on the pasture, women have not been allowed to cut and use it. This is all the more unfortunate as the grass is not palatable once it matures. As a result, cattle do not graze it, allowing it to spread. If women's knowledge of the properties of the grass and their needs were taken seriously by the men, and if women were invited to a discussion on how to resolve the increasing abundance of *Eleusine floccifolia*, there is no doubt that a suitable change in management rule could be devised that satisfies both the women's needs for material to craft their household items, and the cattle's need for feed.

Chapter 6: Farmers' and experts' perceptions of two controlled grassland management systems

This chapter illustrates the strengths and weaknesses of the two controlled grassland management systems (the rotational and the cut-and-carry system of farmers), as perceived by farmers, in Kuwalla and Zagra; and by experts, such as extension agents. In this chapter the term 'controlled grassland management system' refers to both the cut-and-carry system and the rotational grazing system.

The extension system in Ethiopia promotes the cut-and-carry system. The reasons as stated by extension agents as well as other experts are explored. Then, to understand the reasons why some communities prefer rotational grazing while others prefer the cut-and-carry system, the rationales of farmers in Kuwalla for their rotational grazing system and of farmers in Zagra for their cut-and-carry system are assessed.

Moreover the farmers' reasons are compared with the justifications of experts who are favoring the cut-and-carry system. Finally, the perspective of farmers on the rotational grazing system and the cut-and-carry system is compared to assess their implications on sharing the benefits between men and women farmers, and between poor and rich farmers.

6.1 The rationale of experts

A total of eight experts from the Bureau of Agriculture were interviewed specifically to understand their reasons for favoring the cut-and-carry system. The experts interviewed are from different disciplines and responsibility, including: extension specialist, livestock specialist, natural resources specialist, the head of extension services, the head of livestock institute, the head of the natural resources department and two extension agents. During the interview experts were also asked to make a SWOT analysis.

6.1.1 The rationale for promoting the cut-and-carry system

Experts see the cut-and-carry system as an **effective and efficient** way to manage the communal pasture. Thus, they constantly promote and favor the cut-and-carry system as the best grassland management system for its multifunctional advantages. According to the experts the cut-and-carry system has six advantages over the free grazing system and the rotational grazing system (see Table 13).

Firstly, it **increases the dry matter yield** of the communal pasture as it allows the pasture to be harvested when the plants reach the optimal growth stage. Thus, it ensures more feed for the animals. Moreover, since the cut-and-carry system allows harvesting of the pasture when the nutrient content reaches its optimum i.e. while the plants are still green, the farmers can prepare high-quality hay and store it for the dry season. This allows animals to have nutritious feed throughout the year in the form of hay.

> *"In a cut-and-carry system, farmers are supposed to cut their pasture when the grass grows long enough to have high dry matter. At the same time, they need to harvest it also while the pasture is green, before it turns to yellow or brown. (...) In a cut-and-carry system they can feed the pasture to their animals while it is fresh during the harvesting*

season or they can store it in the form of hay. If the hay is prepared in a proper way, the nutrient content is equivalent with that of fresh grasses."

Extension agent from BoA, key informant interview, Oct. 2013

Table 13: SWOT analysis of the cut-and-carry system, performed by experts during the interview

STRENGTHS	WEAKNESSES
Ecological/technical • Allow grass to be harvested at optimal growth stage • Increase dry matter yield • Have nutritious feed even at critical periods, through making hay from green pasture • Encourage stall feeding • Ensure efficient use of pasture (no trampling) • Pasture can be used in any form as fresh or as hay • Prevent soil erosion	***Ecological/technical*** • None
Economic • The pasture can be used by all animals: oxen, cows and sheep • Poor and female-headed households can have an income from selling cut grass or hay • Maintain the soil and water conservation structures • Prevent the transmission of animals disease	***Economical*** • None
Social • Everyone shares the benefits equally (including poor and female-headed households); thus there are no complaints or conflicts • Households are free to set their own priority which animals to feed • Enhance social cohesion through exchange of oxen	***Social*** • None
OPPORTUNITIES	**THREATS**
Ecological/Technical • Many program and projects support the cut-and-carry system to address feed shortages	**Ecological/Technical** • Farmers do not strictly apply the principles of the cut-and-carry system (i.e. adopt zero grazing) • Expansion of cropland towards the communal pasture
Economic • The price of animals is increasing, this forces farmers to keep only economically important animals • Farmers depend on the available feed resources	***Economic*** • Traditions make farmers keep many animals, beyond the availability of feed; this reduces the productivity of animals • Limited land to cultivate forage
Social • Everyone can have access to the pasture, owning livestock is not a precondition • Strengthen collective action as everyone can participate and contribute	***Social*** • Increased number of villagers • Increased number of livestock

Source: Key informant interviews with experts from BoA, Oct. 2013

Secondly, since the grass is harvested and collected from the communal pasture, the cut-and-carry system **encourages stall-feeding** on which experts have a strong interest. It is their long-term goal to spread zero grazing and stall feeding. According to the hypothesis of experts, if the cut-and-carry system replaces the rotational and free grazing system, animals would not have anywhere to go to search for feed. The community would then collect feed from communal pasture, crop residues, and grasses from farm boundaries and store it at home. This will lead farmers to adopt stall feeding. It would also push them to reduce their livestock holdings in the proportion of the feed resources they have.

> *"You know the main problem of our livestock system is that the number of livestock that farmers keep and the feed resources they have are not proportional. Farmers have a tradition of keeping a lot of livestock, instead of keeping only productive and small number of animals, based on their feed resources".*
>
> *Head of livestock institute from BoA, key informant interview, Oct. 2013*

Hence the cut-and-carry-system is linked with the aim to persuade farmers to keep fewer, but more productive animals. This is expected to enhance the productivity of animals, thereby benefiting both the farmers and the broader livestock sector.

Thirdly, keeping animals around the homestead through stall feeding would stop also the tradition of communally herding livestock (i.e. moving animals around while searching for feed), which would **prevent the transmission** of communicable **disease** as some diseases are transmitted while animals stay together.

> *"While animals graze, they flock together with many animals. There is high tendency of disease transmission. (...) Disease such as Rinderpest, foot and mouth and other respiratory diseases are transmitted from the sick animals to healthy animals through contact."*
>
> *Livestock specialist from BoA, key informant interview, Oct. 2013*

According to the experts, stall feeding would avoid the contact of sick animals with healthy animals while they graze together, thus reducing disease transmission.

Fourthly, animals spend much energy while they move around in search of feed. This means that a portion of the energy from feed is not available to increase their body weight or to increase milk production. Thus stall feeding is expected to **increase productivity**.

> *"Animals need to go long distance from their home and move from one place to other places the whole day, searching for feed. They lose a lot of energy. (...) The energy they lose for searching feed can be used to build their body, thus the animals would have produced more meat or been strong in the case of drought."*
>
> *Extension agent from BoA, key informant interview, Oct. 2013*

Fifthly, limiting the movement of livestock in searching feed also contributes to **preventing soil erosion**. Most of the soil and water conservation structures constructed by the community such as stone bundles are destroyed by livestock while they move to look for feed.

> *"Many of the terraces that community constructed on the farm, pasture, and in the hills are destroyed by animals. (...) Animals smash the soil and water conservation structures while they move to search feed."*
>
> *Head of natural resources management department from BoA, key informant interview, Dec. 2012*

As the experts mentioned, most of the gullies are linked to poorly managed communal pastures, i.e. those managed as open access. The gullies then extend to other land uses such as cropland.

Sixthly, the cut-and-carry system allows the setting up of the rules for **equal sharing of the benefit** among the villagers through harvesting, i.e. even those villagers, who do not own cattle can benefit. It is easier to share the benefit equally through the cut-and-carry system than in

rotational grazing, where the use is possible only through grazing. This will enhance the community's compliance to the management rules and thus the sustainability of the controlled grassland management system.

> *"There are no complaints at all in a community that adopted the cut-and-carry system, as every household in the village harvests and collects the pasture from the communal pasture. (...) It is up to the individuals they can either give the pasture to their animals or they can sell it and have a cash income. (...) Everyone feels that the communal pasture is for all."*
>
> *Head of extension services from BoA, key informant interview, Nov. 2013*

Due to all those advantages, the **experts favor** and try to motivate farmers to adopt the **cut-and-carry system** everywhere. To them, it is the best way of managing the communal grassland and it works everywhere, regardless of the topography or soil fertility status of various communal pastures in the *woreda*.

6.1.2 Experts' perception of the rotational grazing system

Even though **experts** promote a controlled grassland management system to overcome the problems linked with free or open grazing, they **focus solely** on the **cut-and-carry** system (Table. 14).

Indeed, experts do **not promote rotational grazing**, although it is also a form of controlled grassland management. This is because they do not notice many differences between a free grazing and a rotational grazing system, since neither promotes stall feeding. According to the experts' view, the advantages of stall feeding are that it improves the productivity of livestock, rather than solely promoting natural resource conservation (see Table 14). Indeed, they think that the rotational grazing system encourages farmers to increase the number of animals they own – especially oxen – as a household with more animals benefits more through grazing.

This is bound to lead to overgrazing as well as maintain farmers' tradition of focusing on the number of animals, rather than on their productivity, i.e. keep more unproductive animals.

> *"The rotational grazing system favors the rich farmers and they tend to have more livestock and benefit more from the communal pasture."*
>
> *Extension agent from BoA, key informant interviews, Nov. 2013*

Moreover, since rotational grazing does not stop the flocking of animals, it does not contribute to reducing the transmission of the contagious diseases from sick animals to healthy animals.

In the rotational grazing system, since the pasture is accessed through grazing, only households who own animals share the benefits from the communal pasture. Hence poor households, particularly women heading a family, do not benefit from the communal pasture. This raises a social justice issue, and questions the legitimacy of the management rules, as the poor will also claim the benefit from the communal pasture. Hence experts push the Kuwalla community to change their rotational grazing system into the cut-and-carry system.

Table 14: SWOT analysis for the rotational grazing system, performed by experts during the interview

STRENGTHS	WEAKNESSES
Ecological/technical • Encourages plant growth during the closing time • Prevents soil erosion and rehabilitate land degradation	***Ecological/technical*** • Inefficient use of the pasture: it is grazed after the pasture dried during the dry season • The management is too complex to be handled by farmers • It discourages stall feeding, and encourages animals roaming around to search for feed during closing seasons
Economic • Ensures feed from pasture to some extent, thus contributes to: o Strong oxen for cultivation o High milk production o Prevent soil erosion • Limited choice for households on which animals they want to feed on pasture	***Economic*** • Poor and female-headed households do not get economic return from the pasture
Social • Collective action to protect from illegal grazing	***Social*** • The system favors only the rich • It perpetuates social inequality as the poor are totally excluded from the benefit • There are many complaints from the poor
OPPORTUNITIES	**THREATS**
Ecological/Technical • The feed shortage motivates farmers to adopt the cut-and carry system • The possibility of equal sharing motivates the poor to push the cut-and-carry system	**Ecological/Technical** • Rich farmers are powerful, and silence the complaints of the poor • Expansion of cropland towards the communal pasture
Economic • Prevents soil erosion and land degradation	***Economic*** • Encourages farmers to keep more livestock, particularly rich farmers maximize their benefit by having more oxen and other animals
Social • Good for the rich farmers	***Social*** • Increasing population and poor households • Number of excluded villagers is increasing

Source: Key informant interviews with experts from BoA, Oct. 2013

6.2 Farmers' perception

In Bure *woreda* there are 23 *kebeles.* Out of these, 12 *kebeles* have 2-4 villages that manage their communal pasture through some form of **controlled grassland management system**, either a rotational or a cut-and-carry system (see the list of *kebeles* with controlled grassland management systems in Annex 1 and Annex 2). In Wundgi *kebele* the number is higher: out of a total of 16 villages, there are 11 villages that have a controlled grassland management system (see Figure 7). All the villages with a controlled grassland management system have an informal institution at village level that governs the access, use rights and management rules.

In Zagra village (Wangedam *kebele*), they adopted a **cut-and-carry system**. Similar to Kuwalla village, the primary aim of adopting a controlled grassland management system is to ensure they have enough feed throughout the year, especially during the critical period of the year. Both villagers conserve their communal pasture and feed it to their animals during the dry

season when feed from other sources (esp. crop residues) are depleted. In both villages, they conserve their communal pasture through enclosing it during the rainy season, so as to encourage the optimum growth of plants when there is enough moisture. Then the pasture is used, either through grazing (in Kuwalla) or cutting (in Zagra).

The fact that their **management practices differ** is partly linked to the location of the communal pasture and its fertility level. For instance, the Kuwalla villagers manure their communal pasture through *hura,* while the Zagra villagers get a higher dry matter yield without manuring their communal pasture.

> *"Our communal pastureland is very fertile, that is why we do not manure it. (...) It is also a waterlogged area, if the rain stops in the middle of the growing period, the pasture can grow because the moisture remains there even after the rain stops."*
>
> *Man from the management focus group in Zagra, Oct. 2013*

Farmers in Zagra noticed that their communal pasture is fertile, which may be due to the fact that it is situated on the bottom land where the fertile top soil is deposited from the surroundings fields. As it is on the bottom of a valley, it also holds moisture well. Even when the rain stops early (i.e. in October), the pasture grows with the residuals moisture.

6.2.1 The cut-and-carry system of Zagra

In Zagra the community decided to adopt the **cut-and-carry system** in 2008, following the advice of extension agents from the Bureau of Agriculture, in the framework of the research for development project 'Improving Productivity and Market Success of Ethiopian farmers' (IPMS). IPMS was a 'research for development' project implemented in 10 Pilot Learning *Woredas* (PLW) in four regional states (Tigray, Amhara, Oromia, and Southern Nations and Nationalities Peoples´ Region [SNNPR]) in Ethiopia. Bure was one of the Pilot Learning *Woredas*, and the project was active between 2007 and 2011. The project aimed at assisting the Bureau of Agriculture to develop a more efficient system, improve productivity of livestock and encourage market-oriented agricultural development. A component of the project was to improve the management of communal pasture.

The Bureau of Agriculture first approached a few members of the *kebele* administration in Zagra and discussed with them the need to control their communal pasture through the cut-and-carry system. The chairman of the *kebele* then called a meeting with all Zagra villagers and the **community discussed** the need to enclose their communal pasture and use the grass through a cut-and-carry system. As the community had already experienced feed shortages, they were interested in the proposal.

> *"I was the chairman of the kebele. The extension agent advised us to use the cut-and-carry system as he knew we had feed problems. (...) I gathered and discussed with the community members how we would adopt the cut-and-carry system to conserve the pasture."*
>
> *A man from a core focus group in Zagra, Oct. 2013*

The community used to run out of feed in the dry period of the year as the crop residues decline and run out during this period. Moreover, during the wet season a large portion of the pasture from the free grazing used to be wasted because the animals used to smash the grass with the mud while they were grazing. Once the grass was muddy, the animals do not eat it, so that they were not able to fully use the grass from the pasture.

> *"Before adopting the cut-and-carry system animal used to graze in the mud during the wet season, they stay the whole day but do not get enough feed as most of the pasture were used to be smashed with mud. Animals were not interested to graze them."*

A man from key informant interviews in Zagra, Oct. 2013

The **community agreed** to restrict the access to the communal pasture in the valley bottom during the rainy season. This pasture was not well suited to grazing during the rainy season as it was muddy, and animals had health problems during the rainy seasons as they used to stay in the muddy and drenched communal pastureland. The community left the other communal pasture, which is located upland, as a free grazing area. During the agreement process to change their communal pasture into a cut-and-carry system there were community members who expressed their disagreements.

Table 15: SWOT analysis of the cut-and-carry system compiled from farmers interviews in Zagra

STRENGTHS	WEAKNESSES
Ecological/technical • Enclosure during wet season increases high dry matter yield: plants can grow well, and there is no wastage through trampling by cattle in the mud. • Preserves nutritious hay for the dry season because the grass is harvested in the right plant stage • Green dried pasture stored in the form of hay	***Ecological/technical*** • The clover species are not used as they dried out during the harvesting time • Reliance on external input such as herbicide has costs • I reduces the diversity of feed species; broad leaf species like clover are killed
Economic • Ensures feed for cattle (oxen and cows) and sheep • Increased income from the sale of pasture • Grasses used to thatch roofs	***Economic*** • How the pasture is used is controlled by men, thus women in male-headed household have limited chance to feed their cows and benefit from the pasture
Social • Everyone shares the benefit equally: poor and female-headed households also benefit. There are no complaints and conflicts among households • Households are free to have their own priority which animals to feed the good pasture • Enhances social cohesion through exchange of oxen	***Social*** • Women are excluded from the informal institution
OPPORTUNITIES	**THREATS**
Ecological/Technical • Promotion of the cut-and-carry system by experts • The topography of the communal pasture on the bottom land: no risk of erosion, soil is fertile and holds moisture	**Ecological/Technical** • No restricted grazing during the opening (pasture is used in free grazing part of the year) • Use of herbicides • No soil fertility management practices (no manuring)
Economic • High demand and high price for fattened oxen • High price for milk product • High demand and price for fattened sheep • Purchased feed are expensive	***Economic*** • Women in rich households would like to feed the pasture to cows and increase milk production
Social • Social networks enhanced through exchange of pasture: the poor sell pasture to rich households, and the rich lend their oxen to the poor	***Social*** • Increasing number of animals lead to a smaller share of pasture for each household

Source: Key informant interviews with farmers, Zagra, Oct. 2013

They questioned how the pasture would be used and how the benefits would be distributed among the community members. However, after the development agent – through the *kebele* chairman – proposed that the harvested pasture could be distributed equally among all households in the village, the community members agreed and decided to adopt the cut-and-carry system.

Once the community agreed to the cut-and-carry system, they developed the access and management rules. There is only one **closing season** for about 4 months in the rainy season (i.e. between August and mid-November). During this period grazing and cutting of pasture is not allowed. During this closing season every household in the village collectively contribute to the protection of the communal pasture called *kello*. Hence every user takes turn to guard the pasture from illegal harvesting and from grazing by any animals. Every day two people are assigned as guard as they do not have hired guards. According to the key informant interviewees each household participates in *kello* two to three times a year.

In mid-November, once the rains have stopped, the **communal pasture opens** and the users are allowed to cut the pasture and collect their share (see Table 15). The management committee, together with the user representative, divides the communal pasture into plots of equal size. The size and the number of the plots depend on the number of the households who contributed to *kello*. For example at the beginning, in 2009, the size of the plot for each household was 500 m^2 (10m x 50m). But as the number of users has increased over the years, each household gets 400 m^2 (10m x 40m). The plots are assigned to each user based on a lottery. The users are expected to harvest and collect the grass from their individual plot within two weeks.

After harvesting is completed, i.e. early December, the communal pasture is **open for grazing**. All animals are allowed to graze freely on the pasture throughout the day without any restriction. The communal pasture is open until the next closing time at the end of July. This is entirely different from the Kuwalla rotational grazing system where animals are not allowed to graze freely at any time of the year. In Kuwalla, grazing is allowed only for two hours during the two opening seasons.

In Zagra, **all households** in the village **equally share** the pasture regardless of their livestock holdings (see Table 15). The sharing of the **benefits** is on the basis household participation in *kello*, i.e. the protection from the illegal use of the pasture. Households who do not do *kello* are not allowed to harvest the pasture. Any adult member of the family (i.e. men and women) can do *kello* and also, to be entitled to their share of the grassland, each household has to contribute money for the purchase of herbicides to control the weed infestation.

Though Zagra has recently started the controlled grassland management system and has only a few years of experience, three villages in the *kebele* (i.e. Geba, Lasta and Genbo) followed its footsteps and also adopted a cut-and carry-system.

6.2.2 The rotational grazing system of Kuwalla

Though the Kuwalla rotational grazing system is described under section 4.1 in a greater detail, it is briefly summarized here, and the results of the SWOT analysis are presented in Table 16.

The **current access rules** provide grazing access priority to oxen followed by other types of cattle such as cows, heifers, bulls and calves. Hence households who own oxen can send all the oxen they own, whereas households who do not own oxen can send only up to two cows or heifers or bulls or calves. Households who do not possess cattle do not have the access to use the communal pasture. The sharing of the benefits is on the basic household contribution and participation in the protection from the illegal use of the pasture called *kello,* and in letting out the cattle over night to manure the communal pasture through *hura*.

Table 16: SWOT analysis of the rotational grazing system compiled from farmers interviews in Kuwalla

STRENGTHS	WEAKNESSES
Ecological/technical • Plants growth enhanced through enclosure during wet season • *Trifolium sp.* and *Medicago sp.* species can be grazed while they are green and at a safe growth stage in the second opening • Bloating effect on cattle due to *Trifolium sp.* and *Medicago sp.* is controlled • Gullies are rehabilitated, more pasture grown • Hura maintains the soil fertility of the pasture land and enhances re-growth	***Ecological/technical*** • During the first opening the pasture is grazed in the dry season, once it has dried and lost some of its nutrients

Economic
• Ensures feed for oxen and cows
  ○ Strong oxen for crop cultivation
  ○ Increased milk production
	Economic
	• Sheep are excluded from grazing, so income from sheep is reduced
	• Sub-optimal use of resources as oxen are prioritized over lactating cows
	• Women's income from milk products is lower than it could be
	• Women excluded from cutting grass for *sifet*

OPPORTUNITIES	**THREATS**
Social • Strong oxen, enhance social cohesion through exchange of oxen services between rich and poor through *wonfel/tenda* and *megolem* • Saves labor and time: labor is shared for herding and *kirat*	***Social*** • Unequal distribution of benefits between men and women • Households with no cattle (i.e. poor households) do not directly benefit from the pasture • Women are excluded from the informal institution

Ecological/Technical
• Community relies on their resources
  ○ Protection of grazing during closure through for *kello*
  ○ Labor for weeding
  ○ Cattle dung for *hura*
• Support from *kebele* and district offices to ensure exclusion of other villagers and thus avoid overstocking
	Ecological/Technical
	• Dominance of *Eleusine floccifolia* reduces pasture quality
	• Increased number of cattle could lead to overstocking

Economic
• High demand and price for fattened oxen
• High price for milk product
	Economic
	• Imposition of the cut-and-carry system due to increasing tension between poor and rich
	• Undermines local knowledge and adaptation
	• Poor's and women's interest
	  ○ to fatten sheep
	  ○ to increase milk production

Social
• People exchange oxen services through *megolem* and *wonfel*
• Social networks for collective actions
• Community relies on their resources
  ○ Labor for *kello*, *kirat* and weeding
  ○ Cattle dung for *hura*
  ○ Social network for collective actions
	Social
	• Increasing number of households, leads to high demand for and pressure on pasture
	• Increased number of poor and female headed households
	  ○ Leads to up-rise for claiming the access rights to the pasture
	  ○ Threatens the legitimacy of the current management rules

Source: Key informant interviews with farmers, Kuwalla, Oct. 2013

The **rotational grazing** is designed in such a way that the cattle are grazed in a paddock for a day and in a next day they moved to another paddock until all the paddocks grazed in the specified opening seasons. Hence one paddock is grazed only once in a year. The rotation of the communal pasture is guided by the 'father of herders', i.e. he is responsible to gauge the area of the paddock to be grazed for a day and guide the users to it.

Kuwalla community is **a pioneer** in having the controlled grassland management system in the *woreda* and has also contributed to the scaling out of the controlled management system to other neighboring villages. Hence out of the 16 villages of the Wundgi *kebele,* 10 have followed the footsteps of Kuwalla and adopted the controlled grazing system (see section 3.2.2). Most of the villages now have long experiences of having the controlled grazing system; the time period ranges from 19 to 22 years (see Figure 7).

6.3 The cut-and-carry vs. the rotational grazing system

The rotational grazing system and the cut-and-carry system have distinct management practices; while regulated grazing is allowed in the rotational grazing system; in principle grazing is not allowed in the cut-and-carry system. However, as the Zagra cut-and-carry system shows, there is a **discrepancy between experts' descriptions** of the two controlled grassland management systems and how the Zagra farmers have implemented it. For example though the cut-and-carry system supposed to be a zero grazing, the Zagra community uses their communal grassland through cutting only in a certain period of the year, and after harvesting they open the grassland for free grazing (see Table 15). A similar discrepancy exists between the description of a rotational grazing system by experts and the practices in Kuwalla. Thus, the descriptions of experts on the two controlled grassland management systems are compared and contrasted with what farmers in Kuwalla and Zagra actually do. The management practices have been modified by farmers, and it is explored why and on what basis they tailored the management practices.

Moreover, the results from the key informant interviews with different groups of farmers (i.e. poor, rich, men and women) in both villages revealed that the two controlled grassland management systems have different mode of pasture appropriation. Thus, both systems have different impact on benefit sharing from the communal pasture, i.e. between poor and rich households; between men and women, and between women in female-headed and male-headed households.

6.3.1 Experts' vs. farmers' rationales

Farmers in both villages make the difference between a free grazing system and all forms of controlled grassland management system which they label as *tibik amaga,* which literally means: 'a protected communal grassland, where any grazing and cutting of pasture is forbidden during the closure season'. Even if there is a difference between the two controlled grassland management systems regarding how the pasture is managed, protected and used, the community both in Kuwalla and Zagra called both the rotational grazing system and the cut-and-carry system *tibik amaga.*

Experts from the Bureau of Agriculture make a different distinction: between land that is grazed and the cut-and-carry system. They define the cut-and-carry system as a complete enclosure of communal grassland throughout the year, which is never grazed, and the grass is used only through cutting during a specific harvesting time. The grass may be fed fresh or dried and used as hay, but it is to be used for stall feeding. Thus the experts link the cut-and-carry system with a

zero-grazing system. According to the experts, if there is any grazing, then to them it is not a cut-and-carry system.

Though farmers **in Zagra** were advised to adopt the cut-and-carry system as defined by the experts, the **farmers tailored** and adapted it to fit to the biophysical context of the communal grassland and to fit their overall workload. They enclose their communal grassland once in a year only in the wet season between August and mid-November for two main reasons. Firstly, as August is a time when the rainfall is intense, allowing the grass to grow ensures a high biomass yield. Secondly, if they allow the animals to graze during the rainy season, they tend to trample the grass and once the grass is muddy, they do not eat it, thus part of the grass is spoiled. After having harvested the grass through cutting, the grassland is opened to free grazing between December and July. They let the animals graze because they see that the grass is too short and cannot be cut anymore.

> *"It would not be helpful for us to close it during the dry season, since there is no rain during this period the grass will not grow anyway. No need to assign people and protect the communal pasture from grazing."*
>
> *A member of management committee, focus group, Zagra, Oct. 2013*

Also, during the closing time, animals have to be fed on the second pasture, which is always kept under the free grazing system. By December, there is not sufficient feed on the free grazing area, so they need to let the animals graze on both grasslands.

The farmers thus modified the practices and the rules taking into account the various feed sources they have (rather than optimizing the management of one grassland), and taking into account the labor involved (to protect the communal grassland, but also to cut and feed the animals throughout the year). Indeed, it is not practical for them to shift to stall feeding, and they prefer to let the animals graze, i.e. search for their own feed, as far as possible.

> *"We have seen the advantage of area enclosure, but animals also need some free places to stay away from home during the day time, (…) where they can walk around and graze."*
>
> *A man from the core focus group discussants, Zagra, Oct. 2013*

The experts and the farmers in Kuwalla agree on the key characteristics of a **rotational grazing** system, i.e. there is an enclosed pasture, which is used through grazing during the opening season, and paddocks are being grazed successively. However, the experts assert that the rotational grazing system will not be as efficient as the cut-and-carry system, because the management is too demanding and complex to be managed collectively by farmers. Yet, despite the assertion by the experts, farmers in Kuwalla have successfully managed their communal pasture through their informal institution. Their informal institution is well organized and structured to ease the communication between the management committee and the users through the 'fathers of herders'. This helps to ensure the implementation and the monitoring of the management rules such as *kello, hura,* and *kirat.* Farmers in Kuwalla thus seem to be well able to develop a sophisticated rotational grazing system, relying on their local knowledge, their past experiences, community networks and resources (e.g. manure and cattle). Through the informal institution they have been able to learn from experience and adapt rules to fit their ecological, economic and social context.

Farmers face the challenge to ensure adequate feed throughout the year, while at the same time facing various other demands on their labor time. Through experimenting and discussing options, thus engaging in **social learning**, farmers in both villages have adapted the management rules to fit their needs. The local adaptation also allows taking into account the specific ecological setting of their grassland: is it in a fertile and waterlogged valley or is it on a hill, where different grasses grow and might not be practical to cut the grasses by hand? Are there species that cause bloating and that can only be eaten safely after flowering? Then the

opening season can be adjusted accordingly. Thus assessing how farmers in Zagra and Kuwalla enclose their communal grassland and why their modes of enclosure differ may help to recognize farmers' knowledge and reasons why they tailored the management rules.

Different communities might also have **different priorities**. In Kuwalla care is taken to allow cattle to eat clover (*Trifolium* spp and *Medicago* spp) while it is green, but after it has flowered to ensure the cattle benefits from the high protein content. Whereas, in Zagra the community is mostly interested in maximizing dry matter yield than using the clover species. Thus they open the communal pasture in November when the grass species have grown to their maximum, even if by then the clover has dried out. They also use herbicide to inhibit the growth of the weeds and other broad leaf species, so as to encourage the growth of grasses.

> *"We spray 2-4-D herbicide to kill weeds in September then the grasses grow very well when the other broad leaf weeds died out. (...) Yes the wajima [Trifolium spp] also dies with the weeds after we spray of the herbicide, they are not so many."*
>
> *A man from the management committee focus group discussants, Zagra, Oct. 2013*

The Kuwalla rotational grazing system has a second closing season (i.e. between November and March) that aims at preserving feed resources for the **dry season** when the feed from crop residues are depleted. The pasture is then opened for grazing during the dry season (between April and June). At that time the pasture will have dried out and turned grey. The experts consider this a waste of resources, as the nutritional value is lower than if it had been harvested and dried.

> *"During the dry season, the pasture is almost like a crop residue. (...) The pasture is dry, and has already lost its nutritional content. (...) But they could have harvested the pasture right after the wet season through the cut-and-carry system and stored it in the form of hay for the dry season. (...) Then they could have nutritious feed for their animals in the dry season".*
>
> *Extension agent from BoA, key informant interview, Dec. 2012*

The farmers do not see this as a problem, since the system addresses their primary need, i.e. to fill the feed shortage gap during the dry season, and especially to supply the energy that oxen need for plowing, as this is the time land preparation starts.

> *"Yes, the pasture during this period is dry, particularly in April and May. But still the oxen enjoy grazing from the communal pasture, more than eating crop residue. (...) It is still more nutritious than the crop residue too."*
>
> *Focus group discussant, from the management committee in Kuwalla, Oct. 2012*

They are aware that the nutritional value might be lower than if they had harvested it. However, the limited biomass they could harvest does not seem to justify the effort.

> *"We know and have been informed by the extension agent that if we harvest the pasture while it is green and stored in the form of hay, it is good for the oxen. But we do not get much biomass from our communal pasture."*
>
> *Focus group discussant, from the management committee Kuwalla, Oct. 2012*

In Zagra, where the pasture is in a waterlogged area, different grasses grow and there is a higher biomass yield. For Zagra farmers, the effort to cut the grass while it is green and drying it is worth it. They even add salt to make it more tasty in the dry season.

> *"Cattle like the hay very much. During the dry season we do not have much feed to give them, as the crop residue is finished by then. So we give them hay, particularly for oxen. Without the hay it would have been difficult for them to plough."*
>
> *A man key informant from rich households, Zagra, Oct. 2013*

> *"We dried the pasture collected from the communal pasture in the sun for two days. Then we piled it up by spreading some salts over it [bechew eyereberebn*

enkemrewalen]. (...) We do not use it until the feed from crop residue finished. (...) During the dry season we give the hay to all our animals [an ox, a cow and a calf].”

A man key informant from middle households, Zagra, Key informant interview, Oct. 2013

Yet, despite of the **Kuwalla farmers' rationale** (esp. that their pasture is not well suited to a cut-and-carry system, that they appreciated the quality of their pasture and the species mix and do not seek to maximize dry matter yield), their preference for the rotational grazing system, and their success in managing their communal pasture in a sustainable manner for the last 24 years; the experts keep on pressuring them to change their management system into a cut-and-carry system.

On the one hand experts promote the cut-and-carry system to improve animal nutrition. On the other hand they promote it, as it allows the **equal sharing of the benefits among all villagers**. For example in Zagra, all the households in the village have access to use the communal grass. The households who do not own livestock are also still assigned a plot to harvest grass. In Kuwalla, only households who own cattle (especially oxen) benefited from the communal pasture. According to experts, ensuring equity in benefit sharing would be possible in Kuwalla only through the cut-and-carry system.

6.3.2 The implication of the two systems for different groups of farmers

As noted by the experts, the two protected grassland systems, i.e. the cut-and-carry and the rotational grazing system, have different influence how benefits are shared and distributed between poor and rich households, and between men and women. The results from the separate key informant interview of the husbands and wives in the rich and poor households revealed that each system has different impact on the sharing of the benefits from the communal grass. The communal grassland was estimated to contribute 31% of the total feed in Kuwalla and 24% for Zagra (see Figure 28).

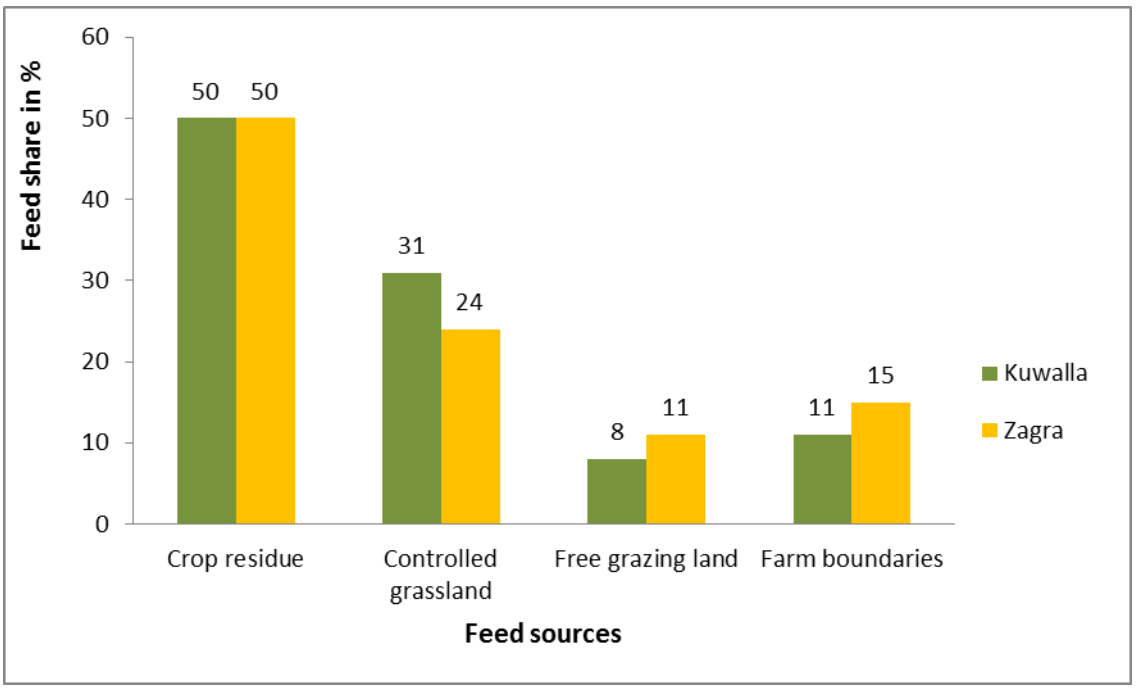

Figure 28: Proportion of feed from different sources for Kuwalla and Zagra community

As a subsistence farming community, in both villages, **oxen** are considered as **key livestock**. The number of oxen that a household owns determines the area of farmland they can cultivate as

well as the amount and type of crops they can produce. Hence, both men and women perceive oxen as economically and socially important livestock in both villages. Likewise, the key informants from Kuwalla and Zagra said that the largest share of the pasture from the communal grassland in both villages is used by oxen.

In **Zagra**, the **rich households** need to prioritize and decide which animals will receive hay, as the hay collected from the communal grassland is not enough to feed to all animals they own. Usually they feed the hay exclusively to the oxen, over the other livestock such as cows, bulls, heifer and calves and sheep.

> *"I store the pasture for the dry season to my oxen. During the plowing period oxen need nutritious feed that give them energy, so I give them the hay during the plowing season. (...) For the other animals I feed them the crop residue."*
>
> *A man key informant from rich households, Zagra, Oct. 2013*

Households who can afford to purchase pasture also buy the pasture from the poor who do not own livestock and thus increase their feed reserve, so they have enough feed for their oxen during the plowing season.

> *"The pasture we harvested and collected from the communal grassland is not sufficient for my oxen for the dry season because I have four oxen. (...) I buy the pasture from my neighbor at 250 to 300 ETB depending on the size and quality of the pasture."*
>
> *A man key informant from rich households, Zagra, Oct. 2013*

Household with fewer livestock tend to sell some of the hay in exchange for using oxen, and provide the rest of the hay to all animals they own (i.e. cow, sheep) without any discrimination as they tend to have enough hay to feed all animals.

This points at the differences in the impact of the management system in poor and rich households. In Zagra all households receive an equal share of the pasture and harvest it through cutting, regardless of their livestock holdings. Poor households who do not own livestock may even sell their entire share of the pasture.

> *"I do have only three sheep; I do not have cows and oxen. (...) I usually sell the communal pasture I harvested and collected from the communal pasture. Last year I sold my share to a neighbor at 250 ETB. (...) My sheep graze on the free communal pasture and additionally feed them the crop residue."*
>
> *A poor man from informal interviews, Zagra, Oct. 2013*

Alternatively, poor households may use the grasses as thatch for roofing of their houses and kitchen.

> *"Last year we renovated our kitchen. The rain was seeping through the roof. (...) We used part of the grasses for the roofing. Now no water leaks through the roof."*
>
> *A woman from the poor household, Zagra, Oct. 2013*

Poor households in **Zagra** benefited much more – and more directly – from the communal grass compared to the poor households in Kuwalla. As a result the poor households in Zagra are very satisfied with the cut-and-carry system. They can use the pasture as a means of building good social relations and networks to get services from the rich households. For example some poor households sell their share of the grass harvest to the rich households, who lend them oxen services for plowing and crop cultivation through *megolome.*

> *"In my opinion, in villages that have the cut-and-carry system, all the villagers are pleased as all have their own, equal share. Even a household who does not have any livestock will receive his or her share. (...) We did not hear much complaining among the users. That is why we are pushing farmers to have the cut-and-carry system in every village."*
>
> *Head of extension services from BoA, key informant interview, Nov. 2013*

The equal sharing of the benefits from the communal pasture by all, and thus the support from the poor is assumed to ensure the legitimacy of the management rules. Having the support by the whole community also contributes to the sustainable uses of the communal grass, as all households comply with the rules.

In **Kuwalla poor households** who do not own cattle and thus do not benefit directly from the communal pasture, the poor households wish to switch to the cut-and-carry system as advocated by the experts.

> *"Yes it would be good to use the pasture through the cut-and-carry system. This year the pasture will be shared through the cut-and-carry system. (...) Hopefully we [the poor] also get some pasture. (...) So I can fatten my sheep and sell them for a good price for Christmas or the Easter festivals."*
>
> *A man from poor households, key informant interview, Kuwalla, Oct. 2012*

The aspiration of the poor to share the benefit from the communal pasture is amplified by experts' promotion of the cut-and-carry system. The system is also attractive to those who own a pair of oxen or less, as they also feel they could benefit more from the pasture if it were managed by the cut-and-carry system.

> *"I have the access to the communal pasture for a cow and an ox. (...) Last time the experts educated us, that it is good to use the pasture through cut-and-carry system. I am convinced that through the cut-and-carry system we can prepare hay and store it for the dry season. (...) It should be up to us to decide to which animal I give the hay."*
>
> *A man from the middle households, key informant interview, Kuwalla, Oct. 2013*

However, despite the wish by the poorer households and the experts, the Kuwalla communal pasture was not used through cut-and-carry in the year 2012, as the management committee found that the rain in September was not enough to have good pasture for cutting.

The **rich** households in **Kuwalla** (i.e. those who own three or more oxen) are happy with the rules and want to stick to the current rules as they are enjoying the largest share of the pasture through their right to send all their oxen for grazing. They thus strongly resist the cut-and-carry system as it would imply equal sharing of the harvest among all households. They also believe that they deserve a privileged access, not least because the access right for their oxen is offset by their contribution in sending more cattle for *hura*.

> *"It is impossible to share the pasture among all households equally. Some send more cattle for hura, some send few, and some cannot send any as they do not have any. (...) It is fair for a household who sends more cattle to have more access than those who send few. Because without hura we could not have had good pasture".*
>
> *A man from rich household, key informant interview, Kuwalla, Oct. 2013*

The **tension** between the poor and rich households, with each supporting a different type of controlled grassland management system, is a potential threat for the sustainable use of pasture in Kuwalla, as it undermines the whole informal institution and all the management practices linked to it. To ensure the resilience of the management system and thus the ecological sustainability of the pasture, it would be necessary to address the tension and look for a way to ensure that all households benefit directly from the communal pasture.

However, there is not only a difference in benefit sharing between rich and poor households. The results from the husband and wife key informant interviewees in both villages confirmed that there is also a difference in sharing the benefits between men and women. Generally, **women** benefit more from the communal grass though the cut-and-carry system in **Zagra**, than through the Kuwalla rotational grazing system. Indeed, the rules in Zagra allow the poor to harvest the grass. Hence women heading a household, the majority of whom are poor and do not own livestock, also harvest the pasture and get income from the sale of the pasture. This is

not the case in Kuwalla, as most of women heading a household do not own cattle and thus have no access to the pasture.

Yet, each controlled grassland management system has a distinct effect on the benefit sharing of **women** in the **married households**, because the rules influence how the households use the grass from the communal grassland. In the case of Kuwalla, oxen are given priority over the dairy cows hence if a household owns two oxen or more, cows will not be given access for grazing.

> *"We have three oxen, two cows, two heifers and one bull. Three of the oxen have the access for grazing. Next year my bull will grow and start plowing, so I will be allowed also to send four oxen by next year. (...) It is nice that all oxen are allowed to graze. It is right they need good feed to plough. (...) If we want to send the cows we will be allowed to send only two cows as the communal pasture is the oxen pasture. (...) That is why we prefer to send our oxen than the cows."*
>
> *A man from the rich households, key informant, Kuwalla, Oct. 2013*

The women in these (rich) households will have little chance to increase her income from the sale of milk products. Women in the rich households are thus not happy with the current rules, as they can rarely convince their husbands to send a cow for grazing in the place of oxen. Indeed, the wife of this man quoted above complains about the unfairness of the rules.

> *"It is not fair that we cannot send the cows to the communal pasture in the place of oxen while they are lactating. (...) Sometimes I wanted to send the cows for grazing but my husband always resists sending the cows in the place of oxen."*
>
> *A woman from the rich households, key informant, Kuwalla, Oct. 2013*

This creates tension between husbands and wives. This is because the rules do not support the women to convince their husbands, as oxen are disproportionately favored over cows: next year they will be able to send four oxen, or just two cows. Such fixed rules obstruct the negotiations between husband and wife in the rich households regarding which animals (i.e. oxen or cows) need to be sent for grazing.

It is not only the fixed rules that make it harder for **women** to argue that lactating cows should be sent to graze, it is also their culturally **inferior position**. Indeed, in Zagra the cut-and-carry does not privilege any animal. It is thus up to the household to decide which animals should be feed the hay collected from the communal grassland. However, even there men take the decision and preferentially feed the hay to the oxen as they want to have strong oxen for plowing. Women who would like to give some of the hay to the lactating cows are rarely successful. This is especially the case in the richer male-headed households, where hay is scarce, thus the hay is given only to oxen.

> *"My husband does not allow me to give hay to the cows. Since the hay is not sufficient for all livestock, as we have three oxen, two cows and two calve. … We give the hay only for the oxen as they need to be strong to pull the plough. (...) Sometime while the cows are calving, I give them hay in the absence of my husband, without his knowledge."*
>
> *A woman from the rich households, key informant, Zagra, Oct. 2013*

Hence women do not have decision-making power in the use of the grass or of the hay, and they need to get permission from their husband to feed their cows (or do so secretly). Generally in both system men in the rich households, i.e. those with more livestock are more favored than their wives.

Both in Zagra and in Kuwalla, **women in the middle households** have relatively the best chance to benefit from the communal pasture. In the cut-and-carry system women do not need to negotiate with their husbands to feed the hay collected from the communal pasture to their cows as they do have few livestock, so there is enough hay to feed all the animals during the dry

season. Hence the cows also get the chance to have hay without any negotiation with the husbands, and women have more milk, butter and cheese. This ensures more food for the family and/or income from the sale of butter and cheese (see Figure 29).

Figure 29: Women selling butter at the local market

> *"We use the hay for the dry season as our crop residues finish in the dry season. (…) We do not differentiate between animals; we give the hay to the ox, cow, and calf. (…) I sell a bowl of butter every two weeks when my cow is lactating (…) I sell a bowl of butter at 50 to 70 ETB."*
>
> *A woman from the middle household, key informant, Zagra, Oct. 2013*

However her husband does not have any idea how much money his wife gets from the sale of the butter as the income from the sale of butter and cheese are culturally controlled by women. What he knows is when the cow is calving they have more milk for the kids, and enjoy butter and cheese on their meal. Similarly in Kuwalla, the married women are also happy that they can send their cow together with their ox.

> *"We have the access on the communal pasture for our ox and our cow. (…) I get better milk production in October as the cow feed on mesobei [Trifolum Spp] and wajima [Medicago polymorpha]. (…) I get a liter or one and half liter more milk when the cow feed on mesobei and wajima."*
>
> *A woman key informant from the middle households in Kuwalla, Oct. 2013*

Hence women in the middle households in both systems do not have tension with their husbands to negotiate whether the cow needs to graze or not. Thus, although the middle households benefit less than the rich households, the women in these households benefit most from the communal pasture, through increased milk production and better cash income.

The mode of pasture use (i.e. cutting the pasture during open season or herding cattle during grazing season) also has an **influence on the use of labor** by different groups of farmers. For example in the Zagra cut-and-carry system, every household is expected to harvest his or her share individually. The rich households usually use hired labor to harvest and collect their pasture from the communal pasture, hence they harvest and collect within two to three days immediately after the management committee assigned the plots to individuals in lottery. As the poor and the middle households use their family labor to harvest the pasture, they may not be able to do so right away as they might have more urgent tasks such as harvesting of crops. Hence they may harvest the pasture a week after the rich households. But the key informants

stated that everyone finishes within two weeks, i.e. when they are supposed to finish harvesting and collecting the pasture.

In Kuwalla, since the pasture is accessed through grazing, labor is required every day to herd the cattle for about two hours during the opening time. However users have organized themselves, so that they take turns in caring and herding all the cattle of his or her group. Users who are organized under a 'father of herders' do the herding every 10 or 15 days, depending on the number of users in a group. Usually the 'father of herders' coordinates the turns. This enables the users to save their labor time, i.e. use it for other tasks.

6.4 Key insights

The comparative analysis between the Zagra cut-and-carry system and the Kuwalla rotational grazing system indicates that in both villages the communities are able to conserve their pasture for the critical period of the year and thus ensure that they have enough feed for their oxen and cows. The cases also illustrate the capacity of the communities to respond to the ecological problem they have been faced with, and to adapt their controlled grassland management system. This means they have ensured the sustainable use of their pasture through the use of their local knowledge and through **social learning**.

Despite of the attempts by experts of the Bureau of Agriculture to impose the cut-and-carry system, the **Kuwalla** community has so far successfully resisted and would like to continue with the rotational grazing system that they established over 24 years ago. They perceive their communal pasture as **unsuitable for cut-and-carry**, as it is located on a slope, so that the grass is not long enough to have the high dry matter yield that is assumed by the experts. The Kuwalla management is more interested in the quality of the pasture (i.e. the mix of grass and legume species) and want to ensure that their cattle utilize the protein-rich feed species *mesobei (Trifolum Spp.)* and *wajima (Medicago polymorpha)* while they are green, i.e. nutritious. To meet their aim they have designed a sophisticated rotational grazing system that encourages plant growth through closing during the main rainy season, and open the pasture for grazing once *mesobei* and *wajima* have flowered so as to avoid their bloating effect on cattle. Still the cattle can graze the protein rich species while they are green and fresh in October.

These observations by farmers cast doubt on the experts' assumption that the cut-and-carry system work well everywhere. The system works well in **Zagra**, which uses it on one pasture located in a **waterlogged area** at the bottom of a valley. They indeed get a high dry matter yield and benefit more from the cut-and-carry system than they did from the previous free grazing system, not least because the animals used to trample the grass into the mud. These experiences point to the need to take into account ecological diversity and target recommendations to where it is most suitable.

The experience of Zagra confirms the expectations of the experts, that the cut-and-carry system ensures equal appropriation of the pasture among all households of a village. Indeed, in Zagra, the poor, middle and rich households all share the pasture equally, regardless of their livestock holding. This may tempt the experts to impose the cut-and-carry system in Kuwalla, assuming that **equal sharing of the benefits** is possible only through the cut-and-carry system. However, there may be other alternative solutions through which the poor and the women can also benefit from the communal pasture in Kuwalla, without having to adopt the cut-and-carry system. Searching for alternative approaches seems particularly important, as it is uncertain whether the cut-and-carry system would be as successful in Kuwalla as it is in Zagra, given that the pasture is less productive. An alternative could be to integrate bee keeping for the poor, so

the bees would get enough forage from the communal pasture; the poor can ensure high honey production and some income from the sale of honey and wax.

Imposing the cut-and-carry system thus carries the risk of dismantling the informal institution that was established 24 years ago, without securing a comparable benefit to the community as a whole or to individual groups of farmers. It would seem more promising to try to understand the rationale behind farmers' choices, appreciate their local experiential knowledge and searching for a way to address shortcomings through a participatory process, thus enhancing social learning.

Chapter 7: Discussions and implications

The chapter discusses the implication of the findings of the research in relation with theoretical concepts of social-ecological system resilience, as well as in relation with empirical evidence from the broader literature. The chapter will summarize which mechanisms enabled the Kuwalla community to cope with changes in the past, as well as the new challenges they currently face. Finally, the role that the extension service could play to enhance social learning and ensure social-ecological system resilience is discussed.

7.1 Fostering resilience through social learning

Resilience in social-ecological system provides a framework to understand the dynamics of human-environment interaction (Holling, 1973). It is also a system concept, as a **social-ecological system** is understood as resulting from inter-dependent social and ecological sub-systems. Thus the sustainable management of the communal pasture depends on the interaction between the ecological and social sub-system (Berkes et al., 2003; Folke, 2007; Folke et al., 2007). The changes in the management system of the communal pasture in Kuwalla (i.e. from controlled grazing system to free grazing system then to rotational grazing system) illustrate the feedback between the social and the ecological sub-system. Indeed, the community managed their communal grassland based on their observations of the grassland (e.g. species diversity, re-growth rate, availability of feed throughout the year). But at the same time the grassland was affected by social changes (esp. due to policies under the communist *Derg* regime). The management may have positive or negative impact on the status of the communal pasture. As Adger (2000) recognizes, human intervention leads to surprises which could be either harmful to the sustainable management of natural resources or create a window of opportunity.

In Kuwalla a number of **policy changes** that occurred during the *Derg* regime undermined the authority of the traditional 'father of herders' (Ashenafi and Leader-Williams, 2005; Clapham, 1988), and forced the community to change their controlled grazing system to a free grazing system. This resulted in overgrazing and a reduction of the biodiversity. Grassland resources were depleted to the extent that the community could not get enough feed from the communal pasture for their oxen during the critical period of the year, i.e. at the end of the dry season when oxen need energy to plow. However, political changes can also offer a 'window of opportunity'. For example, the collapse of Wundgi agricultural producers' cooperative towards the end of the *Derg* regime was recognized as an opportunity to change the free grazing system into a controlled grazing system. The community was able to re-organize the traditional authority, develop rules governing the access and management practices of the communal pasture; and thus enabled the regeneration of the pasture and the rehabilitation of gullies. These examples illustrate that changes in the social system (i.e. policy changes) can lead to both negative and positive changes in the ecological system, through different management systems. Several authors (e.g. Adger, 2000; Arrow et al., 2004; O'Brien et al. 2009; Warner, 2010) highlight the dynamic interactions between a community and their natural resources, which are influenced by the selected management practices, illustrating the link between the social and the ecological sub-system.

Because the interactions between humans and their environment are complex, the system dynamic tends to be unpredictable (Steffen et al., 2004; Nelson et al., 2007). The aim is thus to manage resilience for sustainability, i.e. to achieve desirable goals in a world where

unpredictable changes and surprise are pervasive (Adger et al., 2005a). Rapid changes need flexible responses which enable the system to adapt changes (Holling, 2004). Similarly, over the last 40 years, a range of shocks (i.e. abrupt and often unpredictable change) and stresses (i.e. relatively steady changes, in a fairly predictable way) has affected the management of the communal pasture in Kuwalla. The **shocks** are mostly related to political changes, particularly the political shift from the feudal system to the socialist system under the *Derg* regime. This included land tenure changes, which limited the number of alternative grazing areas such as the forest. **Stresses** are mostly related to the effect of demographic changes, as the population is now about three times higher (Bielli et al., 2011). This reduced the cropland available per family and thus reduced fallowing, decreased grassland as it was converted to cropland, and increased the number of livestock kept (Yordanos et al., 2011). These various trends lead to overstocking and overgrazing the remaining communal pasture.

Yet at these shocks and stresses were also an opportunity for the community to **learn** from the negative impact of overgrazing and adapt their management system into the controlled grazing system. As Milestad and Darnhofer (2003) point out, times of crisis can be opportunities for learning, through recognizing feedbacks. These allow a better understanding of the dynamics of the natural resource, as well as understand emerging threats from the social system. For example, as the community regained control of its communal pasture upon the collapse Wundgi agricultural producers' cooperative, it learned that it might lose the resource completely, if it was not managed sustainably. Indeed, the community had just lost control of the other communal pasture, located on a hill, which the administration had decided would be reforested as it was too degraded. This increased the urgency to act and ensure that the remaining communal pasture is managed sustainably.

The resilience of the social-ecological system thus hinges on the community´s abilities to cope with stresses and shocks as well as its ability to adapt to the changes. To be resilient, the community engaged in a number of adaptation processes, based on experimentation, communication and collective actions, enabling the management system to become effective (see Figure 30).

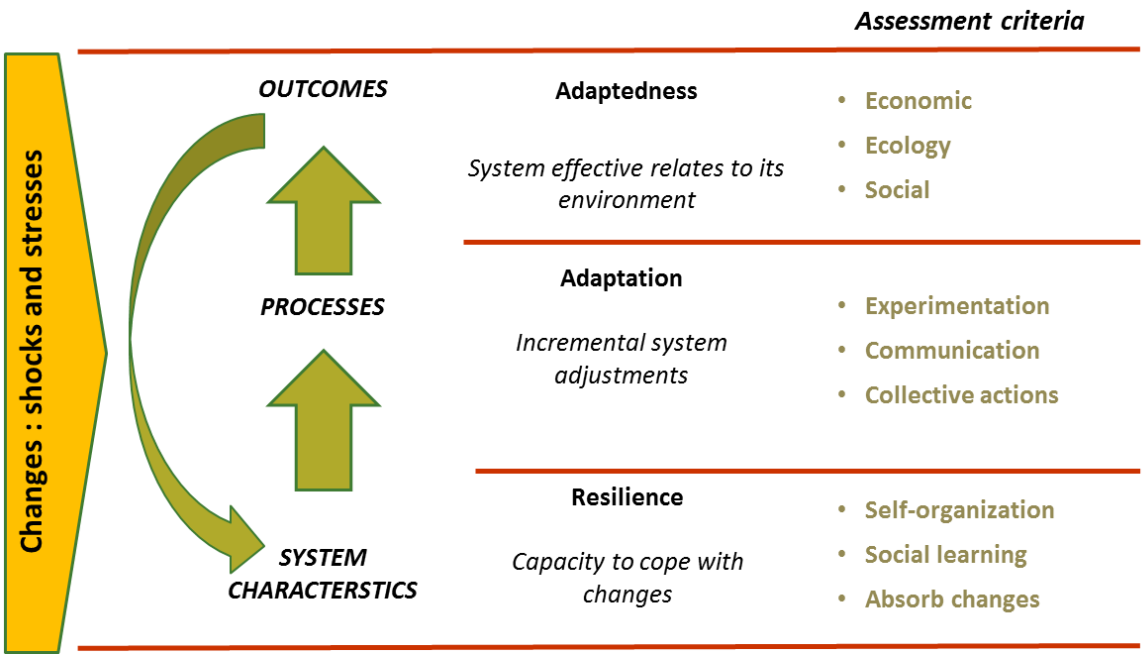

Figure 30: Guideline for resilience-based management of natural resources (adapted from Nelson et al., 2007)

Though communities do not control the circumstances that affect them, they have the ability to change many of the circumstances that enhance their resilience through **social learning** and adaptation (Berkes, 2007; Berkes and Ross, 2013). As Nelson et al. (2007) noted, adaptation as a process of deliberate change in anticipation or in reaction to external changes. For adaptation, social memory can play a crucial role (Adger et al., 2005b). As Davidson-Hunt and Berkes (2003) explain social memory illustrates how individual thought, emerging from a specific experience can become part of the collective knowledge. In Kuwalla, the community recalled the rotational grazing system they had under the Haile Selassie regime, especially the role of the 'father of herders' and the tradition of grazing their animals on different areas at different times of the year. These social memories were used and adapted to create a new controlled grazing system that suited their current needs. Indeed, they also integrated elements from the *Derg* regime that seemed suitable, such as having a committee to guide the system rather than having a single person and electing committee members rather than having a 'father of herders' for life as under Haile Selassie. Similarly, they appreciated the holding of regular general assemblies to ensure the flow of information. Moreover the idea of area enclosure may have been used based on the demonstrations in the framework of the Fourth Livestock Development Project. Integrating these various elements, the community devised a sophisticated rotational grazing system that ensured sufficient feed resources even at critical times during the year, and despite increased population density.

As Davidson-Hunt and Berkes (2003) explains **social memory** illustrates how individual thought, emerging a specific experience and become part of the collective knowledge. The community thus learned to live with changes and actively respond to the impact of changes, strengthening its resilience (Adger, 2000; Magis, 2010). According to Folke et al. (2005); Gooch and Warburton (2009) social learning can be seen as adaptation processes such as establishing the role of leaders and networks, building trust, the use of local knowledge, and create collective actions to build the capacity to adapt to changes.

The community also adapted the various elements to fit their current situation. For example, given that there are now more villagers than under Haile Selassie, it was clear that one 'father of herders' would not be sufficient. Thus it was decided to have nine 'fathers of herders', each of which coordinates 13-15 households, to ensure a good flow of information between the committee and the users. This capacity of the community to **reorganize** themselves is an indicator of a resilient social-ecological system (Cabell and Oelofse, 2012). It is also an example of what Olsson et al. (2004a) called 'internal learning', where both the institutional arrangements and ecological knowledge is tested and revised in a dynamic, ongoing and self-organized way, through the process of trial and error.

In Kuwalla the community used **experimentation** to adapt the management system. As Folke et al. (2002:20) defined it, adaptive management is a "a process by which ecological knowledge is tested and revised in an ongoing process of trial and error". For example area enclosure was adopted as a strategy to enhance re-growth after it has been experimented in one quarter of their communal pasture in the first year. They could observe that a range of species that had disappeared due to overgrazing grew again, even after just one rainy season. As the results were convincing, the community agreed to extend the area closure to the other parts of the communal pasture. Such experimentation can be one way to navigate the process of change (Nelson et al., 2007). Hence institutions that have the capacity to learn through experimentation, strengthens resilience by facilitating the process of developing adaptive management rules (Olsson et al., 2004; Folke et al., 2005; Plummer and Armitage, 2007).

Leaders played an important role in facilitating social learning, as in Kuwalla the four elders were crucial, especially in the initial phase of setting up the rotational grazing system. They recognized the window of opportunity presented by the collapse of the producers' cooperative, provided key suggestions on how to structure the rotational system, they facilitated the

discussions, and set up experiments to demonstrate the benefits of closing the access for certain periods of the year. These four elders had a similar roles with what Fabricius et al. (2007) labeled “adaptive managers”. The role of leaders has been recognized in the literature (see e.g. Olsson et al., 2006; Gutiérrez et al., 2011; Kenward et al., 2011). As Stephenson (2010) notes, leaders create an enabling environment in promoting adaptive learning in their community, thus strengthening community resilience. As Pahl-wostl et al. (2013) elaborates, without leadership self-organization may fail to produce tangible outcomes in a complex governance process. The Kuwalla case also underlines the importance of leaders who initiate and facilitate the change process, and enhance social learning.

The timing of the closing and opening of the pasture for grazing are decided on the basis of **local knowledge**, e.g. the rainfall pattern, the re-growth of the pasture, the growth stage of specific species (e.g. the flowering stage of *Trifolium sp.* and *Medicago sp.* to control their bloating effect on cattle), the feed availability from other sources such as crop residue, and the season when the oxen requires energy for plowing. According to Crona (2006) local knowledge includes important ecological knowledge, which is one of the most important components of sustainable management of ecosystems. As Berkes et al. (2000) point out, there are always components of local knowledge related to a community’s physical and natural resources. Based on their knowledge and observations, they carry out experimentations to maximize their benefits and to respond effectively to what they observe (Berkes et al., 2000; 2009; Berkes and Folke, 2002; Colding et al., 2003).

The Kuwalla informal institution also coordinates users’ **collective actions** for *kello, hura* and *kirat* which are crucial for the sustainability of the pasture. *Kello* is a guarding system through which all users take turns to protect the communal pasture from the illegal harvest or grazing of animals during the closing seasons. *Hura* is a fertility management system by which all users put their cattle on the communal pasture overnight for about 4 months during the rainy season, to manure the communal pasture. *Kirat* is a guarding system during *hura* period, through which users take turns to guard the cattle while are out overnight. These practices show how the community acts collectively to ensure that their oxen and cows have sufficient feed throughout the year. This incentive, i.e. the fact that all benefit from having strong oxen, is considered important to enable collective action (Ostrom, 1990; Baland and Platteau, 1999; Meinzen-Dick et al., 2010). The community’s achievements in the sustainable management of their pasture is not only the product of shared knowledge and skills but also their interactive, co-coordinative and synergetic dynamics (Ross and Berkes, 2013).

The **informal institution** that guides the management of the communal pasture is used as platform to discuss, negotiate and revise rules through ensuring continuous communication. For example, initially only oxen could access the pasture for grazing. As they are needed for plowing, they are crucial for cropping and food production. However, as this excluded all households that do not own oxen, this rule was re-negotiated and modified a year later. Another example for the participatory adaptation of the rules is the increase in fines. In consultation with the users, the fine that is levied in case of infarction has been revised quite often, to take both into account for currency devaluation and for the rising cost of hay and crop residues. Over the years, the fine for illegal grazing was increased from 5 to 20 Birr per animal. As Pahl-Wostl et al. (2007) notice when users are engaged in discussing and negotiating the rules, it increases their commitment for the implementation of the rules. Indeed, the governance structure ensures both transparent decisions, and the accountability of all users involved.

The **governance** structure also ensures a continued flow of information, further contributing to social learning. For example, the management committee meets twice in a month with the ‘fathers of herders’. This allows that issues raised by the users are presented to the management committee through the ‘father of herders’. There are also one or two general

assembly meetings annually, where new rules are discussed and settled. As Crona and Bodin (2012) point out, such structures guide the behavior and the interaction of the people, facilitating collective actions.

Overall the community in Kuwalla has demonstrated that a community can organize itself and effectively respond to changes, can experiment, learn and adapt rules to ensure a sustainable use of its grassland. As is often the case, local networks can be more responsive and adaptable to the changing conditions than can larger groups (Cabell and Oelofse, 2012a). Hence the case of Kuwalla confirms that – given the right framework – decisions taken at community level can ensure the sustainable use of natural resources, protecting a pasture from overgrazing, controlling soil erosion and preventing land degradation, all the while ensuring adequate feed for their oxen. This indicates that it might be beneficial if **villages have more authority** over their resources, that it would be useful to encourage them to build on their traditional, experiential knowledge, their social networks. That it would be beneficial to encourage them to building a platform that enables social learning through open discussions of observations, of needs, and ensures the accountability of leaders.

7.2 Facing new challenges

While the Kuwalla community ensured the sustainable use of their communal pasture, **women** are currently excluded from the informal institution, and the **poor** – i.e. those that do not own cattle –are currently excluded from using the communal pasture. While both groups might benefit indirectly from strong and healthy oxen, as they are shared for plowing cropland, they do not benefit directly from the communal pasture. This leads to emerging tensions, which are likely to increase and worsen. Indeed, with the current population growth trend of the country (Bielli et al., 2011) the number of poor households tend to increase, given the limited land resources. The number of households headed by women is also likely to increase, as men are increasingly migrating to cities to look for jobs (Regassa and Yusufe, 2009; Gibson and Gurmu, 2012; Hunnes, 2012). Unless the informal institution acknowledges the tension and seeks ways to address the unequal distribution of the benefit from the communal pasture, it might well succumb to internal and external pressures that try to dismantle it and impose a cut-and-carry system.

Women are excluded from the informal institution governing the access and use right of pasture. Women have no power in the decision making process of developing the management rules, there has never been a woman that was a member of the management committee, and there is no 'mother of herders' position, equivalent to the 'father of herders'. As women cannot make their needs and preferences heard, they are not taken into account, leading to rules that are biased towards men's priorities, i.e. benefit oxen, which play an important role in providing status to their owner. This shows that gender is one of the social structures that lead to women having less power than men (Rocheleau and Edmunds, 1997). As their voice is not heard in the informal institution, and social injustices are perpetuated, especially regarding benefit appropriation.

Their exclusion from the informal institution leads to women's needs not being taken into account when rules are discussed and decided upon. For example women are banned from collecting two grasses that grow in the communal pasture – *zeba* (*Hyparrhenia dregeana)* and *arma (Eleusine floccifolia)* – that they need to craft *sifet*. However women are expected to make *sifet* as part of their household responsibilities, as a woman who is skilled at making *sifet* considered as a good wife. Yet, the grasses do not grow widely, and women are not allowed to collect them from the communal pasture, as the pasture is accessed only through grazing. Despite the strong rules making the harvest illegal, women often have little choice but to break

the rules to collect *zeba* and *arma*. This is an indication that some **rules are not perceived as legitimate**. Indeed, if rules are perceived as unfair, it might ultimately question and undermine the legitimacy of the whole informal institution (Agarwal, 1997; Leach et al., 1999). Indeed, benefit sharing that is perceived as unfair will discourage marginalized groups of users to comply with the management rules. However subverting rules designed for the sustainable use of natural resources may negatively affect both the ecological sustainability and the social sustainability. Andersson and Agrawal (2011) highlight that inequality between groups of users generates social resentment and disincentives to comply. This point out that social equity and social justice issues are key aspect that can affect the resilience of social-ecological systems (Eriksen and Brown, 2011; Wuelser et al., 2012). Indeed, how rules are defined affects the degree of social trust, the perceived distributive justice, and the legitimacy of rules and institutions, ultimately affecting social-ecological resilience (Ebbesson, 2010).

Excluding women from the informal institution also **impaired the adaptive capacity** of the system. While the women are not allowed to collect these two grass species from the communal pasture, paradoxically the management committee complained about *Eleusine floccifolia* as one of the species that is becoming dominant, threatening the quality of the feed resources. Indeed, *Eleusine floccifolia* remains un-grazed by the cattle as it is hard to chew. Surprisingly the management committee has never thought about giving women access to the pasture, as a measure to control the expansion of this grass, and maintain the quality of pasture. Hence, not including women's needs limited the adaptive options discussed in the committee, preventing the community from identifying a potential win-win situation. Indeed, if women were granted access to harvest the grass they need to make *sifet*, it would contribute to maintaining the quality of the pasture through reducing the spread of the grass (*Eleusine floccifolia*) that is unpalatable once matures.

Not including women's knowledge and preferences also leads also to **suboptimal use of pasture**. Women know better than men that both *mesobei* (*Medicago polymorpha)* and *wajima (Trifolium sp.)* have a positive effect on the quantity of milk produced. Thus, during October when, oxen do not need additional energy as they are not used for plowing, it would seem useful to allow priority access to lactating cows, which could optimally use these protein rich species. Despite this, the priority is systematically given to the oxen, all year round. Yet, it would be an option to ensure that women's needs are addressed, thus securing their support for the informal institution. Here again would be a solution that could create a win-win situation: men would benefit through securing the support of women for the rotational grazing system, and women would benefit by having higher milk yields, which they might use to feed their family or sell to raise their cash income. As Chapin (2009) points out, who is invited to participate affects the adaptive capacity through influencing the selection and implementation of potential solutions in the management of natural resources. Hence resilience is often associated with diversity of knowledge, as it contains the seeds of diversity, that encourage both adaptation and learning when coping with changes (Folke et al., 2002).

This also illustrates that the differential social role imply that specific social groups (men or women) will interact in specific ways with the natural resources they depend upon, thus have different **knowledge** regarding the various species growing on the communal pasture. As in Kuwalla it is the women who are responsible for milking and managing milk products (i.e. making butter and cheese), they have better knowledge, which feed species increase milk production. This difference in knowledge is similar to other instances reported in the literature. For example women need forest products such as fuelwood, grasses and fruit for cooking, while men are interested in timber to raise cash for the household (Agarwal, 1997). As a result, women in India are found to have better knowledge than men about trees regarding their use for energy and fodder (Agarwal, 2001). Hence in tree planting schemes of Chipko in the Himalayas, women have favored trees that provide fuel and fodder, rather than the commercially profitable species often favored by men (Agarwal, 1997). A study in South Africa

pointed out that middle-aged women tend to be highly knowledgeable about woody plant species for fuelwood and beverages, while men have better knowledge on tree species for medicine, craft and fencing (Dovie et al., 2008). Evidence from Nepal also indicates that women have better knowledge about storage methods and their impact on water quality (Upadhyay, 2005).

Taking into account the gender dimension of knowledge about natural resources, i.e. acknowledging that men and women tend to have different knowledge about different species and uses may allow increasing the **diversity of knowledge** that informs decision-making. This diversity is a key element to strengthen the capacity of a social-ecological system to cope with and adapt to changes (Holling 2004, Chapin et al. 2009). Integrating the diverse knowledges requires an awareness of power issues in the social system, as power is directly related to questions of whose voices are heard and whose interests are considered. Yet, if women were invited to discussions during the development of the access rules, it is likely that appropriate changes in the management rules could be identified that would satisfy women's preferences and needs, thus securing their support for the rotational grazing system.

Women in Kuwalla have no opportunity to express their views and preferences as they are excluded from the informal institution and the household is represented by their husbands. However, husbands may or may not relay their wives' ideas, and information transfer from husbands to wives might be poor (Agarwal, 2001; Giri and Darnhofer, 2010). Indeed, women in Kuwalla reported that they do not have information on the intended plan by the management body to try out the cut-and-carry system, which was imposed by agents of the Bureau of Agriculture in 2011. This is paradoxical, as the cut-and-carry scheme is promoted by the Bureau of Agriculture among other as ensuring that women benefit from the communal pasture.

It is not only internal tensions that might undermine the informal institution, which is also increasingly exposed to **external pressure** to shift from the rotational grazing system to a cut-and-carry system. Bureau of Agriculture promotes the cut-and-carry system as part of their strategy to shift towards zero-grazing stall-feeding. This is part of their goal to increase livestock productivity, thus contributing towards the national strategy of food security (Rahmato, 2008). They also promote the cut-and-carry system by arguing that it ensures equal benefit sharing among all households in a community, i.e. including the poor and women.

The results from Zagra showed, that they adopted (and adapted) the cut-and-carry system for part of their grassland, as it fits that particular grassland, which is located on the bottom of a valley and is often water logged during the rainy season. The **cut-and-carry system** seemed useful to harvest the grass after having closed the access to the grassland during the rainy season. Each household gets an equal share of the grassland to harvest, so that the poor indeed benefit. Yet, the Zagra community did not fully adopt the cut-and-carry system, as they use the grassland as open-access grazing during the reminder of the year, and thus have not adopted a zero-grazing, stall-feeding system. When members of the Kuwalla community were asked why they do not adopt a cut-and-carry system, they pointed out that it will not work for their pasture, which is located on a slope and has limited biomass production, thus making it difficult to harvest through cutting. Despite these drawbacks questioning the feasibility of a cut-and-carry system, some groups (the poor who do not own cattle, women-headed households which own only cows) that currently do not directly benefit from the communal pasture support the efforts of the Bureau of Agriculture to impose a cut-and-carry system. They see it as an opportunity to benefit from the communal pasture.

While the informal institution in Kuwalla has faced a number of shocks and stresses over the last 24 years, while it has successfully adapted management rules and ensured a sustainable use of the pasture, it currently does not seem **able to adapt to current social changes.** It has not invited women to voice their needs, concerns or ideas; it has no sought ways to adapt access rights to ensure that the poor households benefit directly from the communal pasture. As

Ostrom (1990) underlines, the sustainability of institutions may be affected by dynamic external changes such as population growth. To respond to these changes, the informal institution needs to question some of its basic assumption regarding what is a fair sharing of benefits. It also calls for reconsidering whether a gender blind approach is still suitable, and what measures might encourage men and women to appreciate each other, regarding their specific roles, knowledge and needs concerning the communal pasture (Crona and Bodin, 2012). Indeed, the collaborative management of natural resources, and the distribution of entitlements needs to be sensitive to social structures, e.g. the impact of gender or wealth (Howard and Nabanoga, 2007; Biggs et al., 2010). If the social structures and the institutions remain rigid, available knowledge will not be integrated and needed changes not accommodated (Scheffer and Westley, 2007).

This shows that it is not sufficient to manage for ecological sustainability. It is also **necessary** to **manage for social sustainability**, i.e. equitable distribution of benefits from common resources, thereby contributing to social justice. Indeed, as Meinzen-Dick et al. (1997) point out the quality of the social learning process is dependent on the inclusiveness and meaningful participation of all user groups. Particularly the question of power is critical for social learning, as it determines whose reality, priorities, needs, and preferences are taken into account in the management of natural resources. Hence a heightened awareness of power issues in the social system might be needed, as most management rules are the results of negotiations and social agreements, which are bound to be influenced by underlying power issues (Eriksen and Brown, 2011).

7.3 The role of extension in enhancing social-ecological resilience

The case of Kuwalla rotational grazing system shows that **farmers** can be **innovative** in defining management rules that are well suited to their specific ecological conditions and farming system. The sophisticated rotational grazing system and the informal institution that manages the communal pasture have ensured a sustainable management of the pasture over 24 years. This is a significant achievement, given that the vast majority of communal grasslands in the Ethiopian highlands are highly degraded (Benin and Pender, 2002). The community has developed their rotational grazing through reliance on their social capital. The local leaders took the initiative and initiated a social process, building on their previous skills, their knowledge and their authority as 'father of herders' under the Haile Selassie regime. The community ensured the establishment informal institution through which they discussed and revised the rules that guide the access to and use of the communal pasture. The community also effectively safeguarded their autonomy, while interacting with various official government agencies to enlist their support, e.g. to ensure that farmers from other villages do not use their communal pasture. However, it currently faces the challenge to accommodate the impact of population growth and male out-migration, i.e. the increasing number of poor and of women-headed households. The question is: how can the Kuwalla community be supported to make the next step, i.e. revise rules to ensuring equity in benefit sharing, and social justice? And more broadly: how can other communities be supported to achieve a similarly sustainable system, finely tailored to the needs and resources of their community?

Indeed, past experiences in development projects have shown that a '**one size fits all**' approach does **not work.** Indeed, in the context of human interaction with the environment a blue print intervention, that is applied equally to all environment is likely to fail (Leach et al., 2010a; Ison, 2012; Leach et al., 2012). Indeed, the dominant approach within extension is quite often focusing on a transfer of knowledge (Kassa, 2003; Kassa, 2008) rather than a negotiation of 'best practices' that are suitable in a specific context. The cases of Kuwalla and Zagra point out the need to take into account ecological diversity and target recommendations to where the cut-

and-carry system is most suitable. As Folke et al. (2005) point out, adaptive management systems that are flexibly tailored to specific places and situations, needs to be supported by various organizations at different level. To support tailored approaches and recommendations, it would be promising to try to understand the rationale behind farmers' current management choices, appreciate their local experiential knowledge and search for a way to address shortcomings i.e. unequal benefit appropriations among the different groups of farmers. It may be also important to find a way to facilitate a process through which farmers in Kuwalla can search for solutions, i.e. ensure that the poor and the women can also benefit directly from the communal pasture, without forcing them to adopting the cut-and-carry system. Indeed, the cut-and-carry system may not be the only solution to ensure equal sharing of the benefits, and may not be the most suitable for all communities. Facilitating such a process would also strengthen the capacity of community to learn effectively from their experience, which is an important part of effective adaptive management (Fazey et al, 2005). Hence the extension need to play a role as facilitators and as knowledge brokers to enhance adaptive co-management systems (Cristóvão et al., 2012).

The aim is strengthening the **self-management capacity** of the community, and their adaptive capacity through social learning (Goldstein, 2008). However such a facilitation role implies an alternative model of extension: moving from the top-down model of transfer-of-technology to a more participatory and collaborative extension approach (Scoones and Cousins, 1989). Indeed, transfer-of-knowledge with one specific recommendation, assumes that technologies developed elsewhere work everywhere, tends to inadvertently create further problems (Leach et al., 2010). Empirical evidence confirmed that a participatory approach is a valuable tool for environmental learning and ensure greater resilience (Ballard and Belsky, 2010). As von Korff et al. (2012) illustrate, a participatory approach potentially leads the community to better make informed decisions and hence enhances their capacity to solve problems and strengthens their ability to respond to new challenges.

Thus the **role of expert** should not be to decide for the community to adopt the cut-and-carry system but need to **assist the community** to take on their decision, as facilitator of endogenous processes, support the community in solving their problem (Cristóvão et al., 2012). This could be possible through creating space for communication, for discussing alternative options, to negotiate various trade-offs. The aim is to improve knowledge sharing between stakeholders, to enable the integration of knowledge by experts and by farmers (von Korff et al., 2012). Such an open space would enable experts to appreciate and understand farmers' knowledge, and to enhance the innovation capacity of the system (Klerkx et al., 2012).

The case of Kuwalla shows that the support by the **formal administration** is important, not least to reinforce the legitimacy of their informal institutions. The support from *woreda* administration officials was needed to exclude other villagers. They supported the community when trespassers were fined. Indeed, the authority of the informal institution was limited to Kuwalla village. Only through the support of the *kebele* administrations it was possible to force neighboring villages to respect the rules that were set by the informal institution. Indeed, the *kebele* administration is formally authorized to regulate the use of natural resources in all villages within the *kebele*. Without the support of the *kebele,* a successful implementation of the rules might be difficult and the legitimacy of the informal institution might be undermined by violations. This exemplify what Ostrom, (1990) notes that the effectiveness of the informal institutions is ensured when they are endorsed by formal organizations.

Yet, negotiating the relationship with formal organizations is a challenge for the community, so that they might keep their **autonomy**. Currently they are expected to comply with the expectations of the Bureau of Agriculture and implement the cut-and-carry system which is defined centrally.

Overall, to enhance social-ecological resilience, there is a need to **empower the community** to take their own decisions. Building integrative platforms (with all groups of farmers: rich and poor, men and women) would be useful to enable the deliberation of local knowledge; and generate a space where people from different social groups negotiate and express their views. This can contribute to reduce the tension between different social groups (Sims and Sinclair, 2008). It would also strengthen the reliance on transparent and accountable leadership. External input can be useful, e.g. through knowledge-brokering, and impulses to open too rigid institutions, such as those that currently exclude the women and the poor households. This can contribute to the integration of ecological sustainability and social justice (Leach et al., 2010; Eriksen and Brown, 2011; Wuelser et al., 2012).

Chapter 8: Key insights on enhancing social learning

This case study indicates that the sustainable management of a communal pasture is possible if and only if the natural resources management is compatible with the current social and ecological conditions, as well as adaptable so as to be able to include future changes. As Chapin et al. (2009) mention, a natural resources management policy that is not ecologically, economically and socially sustainable is unlikely to be successful. Therefore sustainable resource stewardship must be multi-faceted, recognizing the interactions among ecological, economic and social variables; and the important roles that past history and future events play in determining outcomes in specific situations.

Thus sustainable management is not searching for the optimal solution to one problem but it is an ongoing learning and negotiation process, where communication and perspective sharing for problem solving are emphasized (Pahl-Wostl and Hare, 2004). As Pahl-Wostl (2009) highlights, social learning is essential to develop and sustain the capacity of a community to manage their natural resources in a sustainable manner. Hence the role of the experts is to create a forum that allows the community to share a problem (e.g. the issue of unfair distribution of benefits) and look for a possible solution through discussions and negotiation.

8.1 Community resilience

- **Resilience building is about empowering the community**

This research illustrates that **resilience** is not an outcome that is expected overnight, rather it is **a process.** This allows communities to learn from their past experience and to self-organize to respond to the impact of changes (Folke, 2006). Building resilience requires an on-going process of communication, deliberation of ideas about the management problems and solutions. Hence building resilience is about empowering the community to pursue their own management options, learn from experience, and strengthen their ability to cope with changes in ways that suit their needs.

- **Facilitate collective action**

Community resilience needs to be understood as a process of social learning to deal with changes (Walker et al., 2002; Nelson et al., 2007). Paton et al. (2001) mentioned that a number of factors allowed the community to deal with uncertainties, including community development and community self-organization. The case study in Kuwalla stresses the importance of the dynamic interaction of the community with the broader context. Thus a resilient community is understood as one that engages in a process of **collective actions** through communication and networking (Gilles and Jamtgaard, 1981). This allows the community to learn from the impact of actions taken, to respond to changes, and to cope with the impact of changes (Tompkins and Adger, 2004; Newman and Dale, 2005; Magis, 2010).

- **Encourage community reliance on local institutions and experiential knowledge**

The case study highlights the contribution of community networks that contributed to the evolution of an effective self-organized **informal institution**. The various social networks and the informal institution were used as a platform to facilitate negotiations and knowledge deliberation, thus enhancing social learning. As Bodin et al. (2006) explain, social network

structure influences experiences to be used in times of change, not least through allowing ecological knowledge and information to be shared within the network. Furthermore, because the open deliberation ensures that decision-making is transparent and leaders are accountable, it builds trust among the community. This case study also highlights the importance of **leaders**, who through their social capital, their experience and knowledge, can be influential, can initiate and lead change processes. Thus, while ecological knowledge is essential for social-ecological resilience, social knowledge, i.e. recognizing and seizing opportunities despite uncertainties, allowed mobilizing community members for collective action, and ensured a continuous process of social learning.

8.2 Gender as a source of social diversity

The literature on resilience indicates that diversity in social-ecological resilience plays an important role to enable the system to cope with and adapt to change. However, more attention has been given to the influence of ecological diversity (Elmqvist et al., 2003) than to social diversity. Social diversity arises from e.g. age, ethnicity, wealth and gender. In communities dependent on natural resources, each of these social distinctions lead to differences in roles, thus influencing the interaction with natural resources and the knowledge about them. Social differences especially linked to gender, also tend to be linked to differences in power, and thus control over resources. This study showed that harnessing social differences – e.g. through including women in decision-making bodies so as to include their knowledge and take their needs into account – can be directly linked to an increased resilience of the social-ecological system, i.e. its persistence, adaptability and transformability.

- **Include women in decision-making processes**

The degree of users' involvement, i.e. including marginalized groups such as women in decision-making, is a key criterion for the efficiency of natural resource management (Agarwal, 2009; Chapin, 2009). Unless all groups of users are equally involved in defining and revising the rules guiding the management of natural resources, it is likely that the needs and preferences of some powerful users will be served, at the expense of marginalized users (Rammel et al., 2007; Das, 2011; Maryudi et al., 2012). This study shows that such bias based on social structure and power is likely to lead to ineffective natural resources management due to non-compliance and resistance, thus undermining institutions and reducing the resilience of the social-ecological system. Indeed, a gender-blind approach is problematic as it underestimates the effect of gendered roles, needs and preferences in the use of natural resources.

- **Include women's knowledge to enhance adaptive capacity**

Ecological knowledge, which is a key component linking the social and ecological system is acquired through the process of on-going and close observation by specific groups of users (Berkes and Folke, 2002). As roles and tasks tend to be defined by gender, men and women have both shared and distinct knowledge about the use and management of natural resources (Rocheleau and Edmunds, 1997; Agarwal, 2009). The Kuwalla case study showed that in grassland, gendered roles lead to gendered knowledge. Indeed, women were familiar with the properties of specific grassland species and thus the specific uses of those species. Management measures that affect the relative abundance of feed species are thus likely to have a gender component. Unless women's knowledge is pooled and thus included in the collective knowledge base, important information might be missed. This carries the risk of reducing the capacity for innovation and renewal (Folke et al., 2005). Indeed, knowledge diversity is an important

element to strengthen the capacity of the system to cope with and adapt to changes through renewal and reorganization process after disturbances (Holling, 2004; Chapin, 2009). However, despite its importance in shaping users' knowledge, experiences and perceptions, the gender dimension is noticeably absent in the social-ecological system resilience. The Kuwalla case study showed that excluding women and thus their knowledge and ideas prevented valuable social innovations that could solve an ecological problem such as the encroachment of an unpalatable feed species that threatens the quality of the communal pasture. This is particularly problematic, if these social structures are rigid (Scheffer and Westley, 2007). This limits social innovation for integrated and collaborative ecosystem-management approaches (Biggs et al., 2010). Such collaborative approaches could also benefit from better attention to the effect of social structures.

- **Include a gender analysis when designing the use and management of natural resources, to ensure a fair distribution of costs and benefits**

As gender is important issue to be considered in the concept of social-ecological system resilience, a gender analysis allows to shed light on the role of men and women in the use and management of natural resources. It needs to identify who plays what role in the decision-making process of developing the rules as well as whose knowledge, interest and expectations are included. This will allow to assess the diversity of knowledge and needs that inform the management system, and that can be used to respond to the potential negative outcomes of management rules, such as social inequalities. Indeed, social justice issues, i.e. the fair distribution of cost and benefits among users' groups (men and women, poor and rich) are key aspects of sustainability and resilient management of natural resources (Eriksen and Brown, 2011; Wuelser et al., 2012).

- **Enhance and build new relational capacities to appreciate women's roles**

Integrating both ecological sustainability and social justice is important to ensure the sustainable management of natural resources and enhance community resilience (Leach et al., 2010; Eriksen and Brown, 2011; Wuelser et al., 2012). However, unfavorable social structures such as power-biased gender relations may diminish the knowledge and ideas available to a community, thus impairing social learning and reducing its adaptive capacity. As Pahl-Wostl et al. (2008) stated, social learning also requires the development of new relational capacities between social agents, i.e. learning how to collaborate and understand others' roles and capacities.

8.3 Participatory approaches for knowledge-sharing

There is an increased recognition of the need to better understand social dynamics, especially the processes which underlie the definition of rules guiding the use of natural resources (Eriksen and Brown, 2011; Rodima-Taylor, 2012). In this context, Pahl-Wostl et al. (2008) as well as Kofinas (2009) have highlighted that a process such as social learning is a longitudinal process. It frames the understanding of interrelationships between ecological variables and management practices as being dependent on negotiations between social actors. While recognizing that resilience is dependent on both ecological and social dynamics, the emphasis in much of the literature is on understanding ecological dynamics, and how these are influenced by human activities. However, these insights, in themselves, have only limited impact on human behavior, which is primarily dependent on social processes (Röling, 1997). Indeed, human behavior is not primarily driven by objective information, scientific insights or technical rationality. At the

individual level, human behavior is influenced by how they filter and interpret information (Beratan, 2007; Jones et al. 2011). At the collective level, human behavior is substantially shaped by institutions, policies, power, path dependency, and social interaction (Biggs, 1995).

- **A top-down approach undermines the sustainability of informal institutions**

In the case of Kuwalla, the poor and the women are dissatisfied with the management of the communal pasture in a number of ways. Their dissatisfaction is used by extension agents to promote a new management scheme, i.e. the introduction of a cut-and-carry system. This cut-and-carry scheme is promoted in a standardized manner, i.e. without deliberation how the new scheme could possibly disrupt positive aspects of the current rotational grazing system. An open deliberation of the benefits and drawbacks of both the cut-and-carry system and the rotational grazing system would seem more helpful. Especially if the open deliberation is used to highlight that the current system, while having ensured the sustainable management of the grassland, does not adequately address social justice issues and has led to tensions between social groups (men and women, users and non-users). Such a deliberation process, which could be facilitated by an extension agent, would allow to identify exactly what causes dissatisfaction and seek ways to address it, without necessarily dismantling the whole rotational grazing system. It would allow creative solutions to emerge from within the community, thus enabling social learning and strengthening the informal institution. Such a renewal – which could include who is included in decision-making, how decisions are made, as well as how the communal grassland is used at different times of the year – would testify and strengthen the resilience of the community.

- **Appreciate farmers' knowledge and the complexity of the environment in which they operate**

Rather than assuming that the main aim of grassland management is known (e.g. 'maximise dry matter yield'), the specific circumstances of each community need to be understood. This includes both the trade-offs in management (e.g. regarding available labour time), and the specific agro-ecological setting of the grassland (e.g. whether it is on a slope vs. in a water-logged valley bottom) as this will affect the grassland ecosystem and productivity. For example farmers in Kuwalla might be reluctant to adopt a cut-and-carry system because they are aware that their grassland does not produce enough dry matter to enable easy harvesting by hand; or because they do not have the time to collect feed for their animals, as would be needed in a zero-grazing system. Thus assisting communities in identifying a management system that is suited to their needs and to their natural resources is important, not least to strengthen their ability to navigate their futures in a changing world (Davidson, 2013; Ross and Berkes, 2013). To manage natural resources sustainably involves combining diverse knowledges, building institutions for knowledge sharing, and fostering partnerships that provide complementary skills, strengthening the ability to solve problems in the face of crisis and uncertainty (Berkes, 2007; Williams, 2011).

- **The top-down extension approach needs to shift to a participatory approach**

As Ison (2012) explains, in the context of human interaction with natural resources, a 'blue print' approach to intervention is likely to fail. A major shift from the conventional linear knowledge and technology transfer, to a participatory approach building on co-management is required to enhance the capacity of a community to cope with changes. As Berkes (2009) states, by using participatory approaches, important feedbacks are occurring which facilitate social learning. Hence experts and extension agents need to investigate and understand why farmers use their current practices, why they have modified and adapted recommendations. This will allow to better understand the complexity of social processes that underlie adaptive management of natural resources (Allen et al., 2011)

- **Create a platform for discussion, negotiation and knowledge integration**

Participatory approaches allow integrating diverse sources of knowledge as well as contested claims influencing the management of natural resources (Walker et al., 2002; Adger, 2003). This integration usually involves debates over which information is relevant and the meaning of this information. Not least because such debates are almost invariably shaped by power relationships, brokering a consensus can be challenging (Bodin et al., 2006; Cleaver and Toner, 2006; von Korff et al., 2012). Hence carefully designed platforms not only strengthen participatory approaches, but create spaces for the less vocal and less powerful members of the community to express their needs and preferences, and to be heard (Cornwall, 2003). For participatory approaches to be successful – i.e. further social learning and enable collective action – a variety of stakeholders need to be involved (Barreteau et al., 2010; Rodima-Taylor, 2012) such as a variety of community members, extension agents, and administrators.

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Annexes

Annex 1: The average score of each indicator for each kebele assessed by 11 experts from the *woreda* BoA and OoEPLUA

Kebele	**Age of the controlled CPL score** Score values(1=<3year, 2= 3-6 years, 3= 7-10, 4=11-15, 5=>15)	**Size of the controlled CPL** Score value (1=<10 ha, 2=10-30ha , 3=31-50 ha, 4=51-70ha, 5= >71 ha	**Vegetation cover of the CGL** Score value (1=low veg. cover, 5= high veg. cover)	**Bare ground of the controlled CPL score** Score value (1= highly bare , 5= less bare)	**Biodiversity** Score value (1=less divers, 5= high divers)	**Weed infestation level** Score value (1=high infestation of weed, 5= low infestation of weed)	**Controlled CPL with gully** Score value (1=high intensive gully , 5= low intensive gully)	**Presence of soil and water conservation (SWC) measures** Score value (1=few SWC structures, 5=many SWC structures)	**TLU/ha** Score value TLU/ha (1=>40, 2=31-40, 3=21-30, 4=10-20, 5=<10)	**Mixture of animals graze on controlled CPL** 1=mixed (all cattle, SR and equines); 2= fairly mixed (all cattle and SR); 3=less mixed (all cattle, SR and equines); 4= less homogenous (cows and oxen) 5= (homoge-nous only oxen or only cow)	**Number of HHs depend on controlled CPL** Number of HHs in scale (1=<50, 2=50-250, 3=251-500, 4=501-750, 5=>750)	**Heterogeneity of the users group** 1=heterogeneous by (by landholding , gender heading the households, by age, 5= homogenous
Weynma-Ambaye	1.14	2.14	3.71	0	3.92	3.85	2.71	1.85	1	1.85	4	1
Alefa	1.85	1	3.85	0	3.42	3.57	4.42	0.57	4	1.85	1	1
Zyew-Shwn	2.00	3.71	4.14	0	3.28	2.57	4.57	0.57	3	1.57	3	1
Zalema	1.42	2	4.28	0	3.42	2.71	4.71	0.14	4	1.57	1.57	1
Jib-Gedel	2.50	3	3.66	0	4.08	4	2.16	1.66	2	1.5	2	1
Arbisi	2.14	2	3.85	0	4.21	3.85	3.71	2	1	1.42	2	1
Ser-Tekez	1.00	1	4.16	0	3.33	3	4.5	0.66	1	1.5	2	1
Wehni-Dur-Bete	2.00	2	3.28	0	3.92	4	2.85	1.85	1	1.57	3	1
Adel-Ageta	2.00	2	4.14	0	4.14	3	4.14	1.14	1.14	1.85	3	1
Wundgi	5.00	5	4.42	0	4.14	4.28	3	2.85	4	3.14	5	1
Wangedam	2.28	4	4.14	0	3.71	3.57	3	1	3	3.28	4	1
Baguna	1.00	2	3.42	0	3.85	3.85	3.71	1.42	4	3.42	2	1

Annex 2: The weighted value of each indicator computed for each *kebele* as assessed by experts (CGL = Communal Grassland)

Kebelle	**Age of the controlled CGL**	**Size of the controlled CGL**	**Bare ground of the controlled CGL score**	**Vegetation cover of the CGL**	**Biodiversity**	**Weed infestation level**	**Controlled CGL with gully**	**Presence of soil and water conservation (SWC) measures**	**TLU/ha**	**Mixture of animals graze on controlled CGL**	**Number of HHs depend on controlled CGL**	**Heterogeneity of the users group**	**Cumulative weighted value**	**Rank**
Weight value	16	13	10	2	9	4	6	8	11	8	10	3		
Wundgi	80	65	44.2	0	37.26	17.12	18	22.8	44	25.12	50	3	406.50	1
Wangedam	36.48	52	41.4	0	33.39	14.28	18	8	33	26.24	40	3	305.79	2
Zyew Shwn	32	48.23	41.4	0	29.52	10.28	27.42	4.56	33	12.56	30	3	271.97	3
Baguna	16	26	34.2	0	34.65	15.4	22.26	11.4	44	27.36	20	3	254.65	4
Jib Gedel	40	39	36.6	0	36.72	16	12.96	13.3	22	12	20	3	251.56	5
Adel Ageta	32	26	41.4	0	37.26	12	24.84	9.12	13	14.8	30	3	242.96	6
Zalema	22.72	26	42.8	0	30.78	10.84	28.26	1.12	44	12.56	15.7	3	237.78	7
Arbisi	34.24	26	38.5	0	37.89	15.4	22.26	16	11	11.36	20	3	235.65	8
Alefa	29.6	13	38.5	0	30.78	14.28	26.52	4.56	44	14.8	10	3	229.04	9
Weynma Ambaye	18.24	27.82	37.1	0	35.28	15.4	16.26	14.8	11	14.8	40	3	233.70	10
Wehni Dur-Bete	32	26	32.8	0	35.28	16	17.1	14.8	11	12.56	30	3	230.54	11
Ser Tekez	16	13	41.6	0	29.97	12	27	5.28	11	12	20	3	190.85	12

Annex 3: Indicators identified for categorizing households in the village community in different wealth groups by men and women focus group discussants

Men	Women*	Combined
WEALTHY /BETTER OFF HOUSEHOLDS		
At least: • 3 oxen • 2 cows with calves • 1-3 donkeys • 5 female sheep • 1 ha of farmland • House with corrugated iron roof	At least: • 2 oxen • 3 cows with calves • 2 donkeys • 4 female sheep	At least: • 2 oxen • 2 cows with calves • 2 donkeys • 4 female sheep • 1 ha of farmland • house with corrugated iron roof
MEDIUM FARMERS		
• 1 ox • 1 cow • 1 donkey • 2-3 female sheep • 1 ha of farmland • House with corrugated iron roof	• 1 ox • 0-1 cow • 1 donkey • 2-3 female sheep	• 1 ox • 1 cow (or no cow) • 1 donkey • 2-3 female sheep • 1 ha of farmland • House with corrugated iron roof
POOR FARMERS		
• 0 ox • 0 cow • 2-3 female sheep • Less than 1 ha of farmland	• 0 ox • 0 cow • 3 female sheep • Some chicken	• 0 ox • 0 cow • 2-3 female sheep • Some chicken • Less than 1 ha of farmland

*Women did not put land holding as the wealth indicators as many of the households owned farmland and there is not much difference in the size of landholdings.

Annex 4: Prioritizing the feed species in terms of their palatability using pair-wise ranking

Ranking by women's group

	Serdo	Gaja	Wajima	Mesobe	Armetmato	Murgn	Yekok sar	Engecha	Gorteb	Arma	Zeba
Serdo	X										
Gaja	Serdo	X									
Wajima	Serdo	Gaja	X								
Mesobei	Serdo	Gaja	Wajima	X							
Armetmato	Serdo	Gaja	Wajima	Mesobei	X						
Murgn	Serdo	Gaja	Wajima	Mesobei	Armetmato	X					
Yekok sar	Serdo	Gaja	Wajima	Mesobei	Yeko Sar	Murgn	X				
Engecha	Serdo	Gaja	Wajima	Mesobei	Armetmato	Murgn	Yekok Sar	X			
Gorteb	Serdo	Gaja	Wajima	Mesobei	Armetmato	Murgn	Yekok Sar	Engecha	X		
Arma	Serdo	Gaja	Wajima	Mesobei	Armetmato	Murgn	Yekok Sar	Engecha	Gorteb	X	
Zeba	Serdo	Gaja	Wajima	Mesobei	Armetmato	Murgn	Yekok Sar	Engecha	Gorteb	Arma	X
Sum	10	9	8	7	5	5	4	3	2	1	0
Rank	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

Ranking by men´s group

	Serdo	Murgn	Gaja	Engecha	Wajima	Mesobe	Arma	Zeba	Gorteb
Serdo	X								
Murign	Serdo	X							
Gaja	Serdo	Murgn	X						
Engecha	Serdo	Murgn	Gaja	X					
Wajima	Serdo	Murgn	Gaja	Engecha	X				
Mesobe	Serdo	Murgn	Gaja	Engecha	Wajima	X			
Arma	Serdo	Murgn	Gaja	Engecha	Wajima	Mesobei	X		
Zeba	Serdo	Murgn	Gaja	Engecha	Wajima	Mesobei	Arma	X	
Gorteb	Serdo	Murgn	Gaja	Engecha	Wajima	Mesobei	Arma	Zeba	X
Sum	8	7	6	5	4	3	2	1	0
Rank	1st	2nd	3rd	4th	5th	6th	7th	8th	9th

Annex 5: Local name and scientific name

Local name	**Scientific name**
Yekok Sar	*Arthraxon prionodes*
Gaja	*Andropogon dactylon*
Murgn	*Sporobolus natalensis*
Arma	*Eleusine floccifolia*
Engecha	*Cyperus rigidifolius*
Mesobei	*Trifolum Spp*
Zeba	*Hyparrhenia dregeana*
Armetmato	Not identified
Serdo	*Cynadon dactylon*
Wajima	*Medicago polymorpha*
Gorteb	*Lanceolata minor*

Annex 6: Curriculum Vitae

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Education

Oct 2011 - Sep 2014	PhD in Agricultural Sciences University of Natural Resources and Life Sciences, Vienna, Austria Dissertation title: Resilience of communal pastures in Ethiopian highlands: Integrating gender and social learning
Sep 1999 - Mar 2001	MSc in Rural Sociology Wageningen University, The Netherlands Thesis title: Knowledge, technology and rural livelihood in Ethiopia: The case of recommended rate of chemical fertilizer and its adoption in Ginchi
Sep 1992 - Jul 1995	BSc in Plant sciences Alemaya University of Agriculture, Ethiopia

Professional Experience

Oct 2011 - Sep 2014	Research fellow Centre for Development Research (CDR) University of Natural Resources and Life Sciences, Vienna, Austria
Jul 2007 - Sep 2011	Gender specialist International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia
Jan 2006 - Jun 2007	Gender officer SOS-Sahel Ethiopia, Addis Ababa, Ethiopia
Jun 2003 - Dec 2005	Socio-economist GTZ- Forest Genetic Resource Conservation Project, Addis Ababa, Ethiopia
May 2001 - Jun 2003	Assistant researcher Ethiopian Agricultural Research organization, Holetta, Ethiopia
Feb 1997 - Sep 1999	Junior researcher Ethiopian Agricultural Research organization, Holetta, Ethiopia

Paper in Journal

Aregu, L., and F. Demeke (2006). Socio-economic survey of Arba-minch riverine forest. *Journal of the Dry land 1*(2): 194-205

Chapter in books

Aregu, L., I. Darnhofer, and M. Wurzinger (2014). Community resilience, bio-diversity and climate change: Case from controlled grazing system in the Ethiopian highlands. In: *Mountains and climate change* (in press)

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Paper presented at conferences

Aregu, L. and I. Darnhofer (2014). Linking the social and the ecological for resilience and adaptability: The case of controlled grazing system in Ethiopian highlands. Presentation at the 3rd International Conference on the *Resilience of Social-Ecological Systems*, held 4-8 May 2014 in Montpellier, France.

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Behailu, L. A. and I. Darnhofer (2011). Strengthen the resilience of institutions governing communal grazing land in Ethiopia. Presentation at the *Vienna Workshop on Sustainable Development,* held 24-26 Nov. 2011 in Vienna, Austria.

Aregu, L., R. Puskur and C. Bishop-Sambrook (2011). The role of gender in crop value chains in Ethiopia. Presentation at the *Agri-Gender Workshop,* organized by ILRI-IPMS, held 31 Jan-2 Feb 2011 at the ILRI-Addis Campus, Addis Ababa, Ethiopia.

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Mesfine, H., A. Tesfaye, L. **Aregu** and E. Mulat (2004). Market access versus productivity: The case of tef. Presentation at the *International Conference on Ethiopian Economy, Ethiopian Economic Association (EEA),* held 3-5 June 2004, in Addis Ababa, Ethiopia.

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Aregu, L. C. Bishop-Sambrook, R. Puskur and E. Tesema (2010). Opportunities for promoting gender equality in rural Ethiopia through the commercialization of agriculture. Working Paper, Improving Productivity and Market Successes of Ethiopian Farm Project (IPMS). Addis Ababa: ILRI.

Aregu, L., C. Bishop-Sambrook, R. Puskur, A. Mengesha, E. Tesema and Zahra Ali (2009). Gender and HIV/AIDS mainstreaming in a market-oriented agricultural development context: A training manual for frontline staff. Working Paper, Improving Productivity and Market Successes of Ethiopian Farm Project (IPMS). Addis Ababa: ILRI, 83 pp.

Courses

6 June 2013	Atlas Ti. software training Centre for Development Research (BOKU), Vienna, Austria
12-23 March 2012	Attend Spring School on: Developing gender competence in higher education programmes on natural resources management, in Rogów, Poland

Further activities during the doctoral study

24 April 2014	*My experience on gender mainstreaming in project activities*. Invited speaker at the training workshop organized by CARITAS project partners, in Vienna, Austria
23 April 2014	*Gender and communal grazing land management in Ethiopia* Presentation at the training workshop: Participation, knowledge and climate research, organized by carbon project held at BOKU, in Vienna, Austria
31 March 2014, and 7 May 2013	*Communal pasture management in the Ethiopian highlands, including the perspective of resilience and gender* Presentation to BSc and MSc students in the framework of the course 'Animal husbandry in the tropics' held at BOKU University, Vienna
26-27 April 2012	Panel member in the framework of a *panel discussion on importance of academic and research cooperation* between Austria and developing countries. At the internationalization of higher education and its relevance for development conference, Organized by the ´Platform Education Cooperation´, Vienna, Austria
25 February 2012	*My life in Austria: Transforming social skills into intercultural competence* Presentation for OeAD scholarship holders, organized by OeAD in Vienna, Austria