Agroforestry homegardens in Ethiopia: rural livelihoods in transition

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Abstract

The traditional agroforestry homegarden has a crucial role in achieving sustainable agricultural land management that combines production of food, wood and livestock for rural livelihoods while sustaining the natural environment. However since 1990's it has been challenged by the transition to monoculture production of new cash crops. The aim of my thesis is to provide an in-depth analysis of the livelihood assets and outcomes delivered by agroforestry homegardens, the drivers of the recent transition of this farming practice, the impacts of this transition, and consequences for sustainability of rural livelihoods in south Ethiopia. I made 400 structured interviews with urban and rural inhabitants; 218 structured interviews with farmers; 40 semi-structured household interviews; 8 focus group discussions with 47 participants and 24 key informant interviews. The agroforestry homegarden is perceived by both urban and rural respondents as one of the most preferred land covers that deliver multiple ecosystem services. This farming practice has been a livelihood strategy of smallholder farmers to achieve balanced livelihood assets, multiple outcomes and food security. However the efficiency and capability of the agroforestry homegarden to deliver the livelihood benefits are confronted by variety of external and internal drivers. I identify three main trajectories of change (1) towards khat monoculture production, (2) adaptation of this traditional farming practice to the new socioeconomic conditions, and (3) returning to the traditional agroforestry homegardens after practicing new cash crop monoculture. The first trajectory towards khat monoculture is currently dominant; and leads to declining livelihood assets at the household level. The underlying driving forces of this transition are demographic, economic, socio-cultural, institutional and technological. Customary institutional practices in combination with the khat mono-cropping negatively affect the household gender relationship and contests women's rights. International and national policies recognize women's contributions, and their civil rights, however customary institutions restrict women's rights in practice. I suggest that creating new opportunities for landless rural inhabitants and controlling population growth are essential. Research and development efforts towards introducing new technologies on how to integrate high-yielding crops in the diverse homegarden system are equally important. Moreover, minimizing the tension and mismatch between formal and informal institutions is crucial to guarantee women's equal rights to achieve improved livelihoods and food security at the household and rural community levels.

Keywords: Cash crops, coffee, customary institutions, ecosystem services, enset, food security, gender, khat (*Catha edulis*), land management system, Sidama.

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Dedication

To my late

Brother

Tamerat Mamo

Contents

List of publications

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

I. Elbakidze, M., Angelstam P., Dawson, L., Gebrehiwot, M, Stryamets, N., Yamelynets, T., Johansson, KJ., Manton, M, Garrido, P., Naumov, V. Potential hubs of green infrastructure for human well-being in the Swedish urban-rural gradient. *Landscape and Urban Planning* (In revision)

II. Gebrehiwot, M, Elbakidze, M., Angelstam P., Yamelynets, T. Defining priority areas for securing livelihoods in rural Ethiopia: a case study based on citizens' priorities. (Manuscript).

III. Gebrehiwot, M, Elbakidze, M., Poudyal, M. Is agroforestry homegarden a sustainable rural livelihoods strategy? A case study in Ethiopia. (Manuscript)

IV. Gebrehiwot, M, Elbakidze, M., Lidestav G., Sandewall, M., Angelstam P., Kassa, H. (2016). From self-subsistence farm production to khat: driving forces of change in Ethiopian agroforestry homegardens. *Environmental Conservation 43 (3): 263-272*

V. Gebrehiwot, M, Elbakidze, M., Lidestav G., (2016). Gender relations in changing agroforestry homegardens in rural Ethiopia. *Natural Resources Forum* (Under second revision).

Mersha Gebrehiwot Sahilu

The contribution of Mersha Gebrehiwot Sahilu to the papers included in this thesis was as follows:

I 30%

II 80%

III 75%

IV 90%

V 70%

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Abbreviations

ADLI	Agricultural Development Leading Industrialization
BoFED	Bureau of Finance and Economic Development
CBD	Conservation on Biological Diversity
CSA	Central Statistical Agency
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
DFID	Department for International Development
ES	Ecosystem Service
FAO	Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
GO	Government Organization
GTP I	Growth and Transformation Plan I
GTP II	Growth and Transformation Plan II
Guilt	Civil and military servants received land rights as compensation for their services
ICRAF	The World Agroforestry Centre
IFAD	International Fund for Agricultural Development
IRP	International Recovery Platform
KA	Kebele Administration (the smallest administration unit in Ethiopia)
MA	Ministry of Agriculture
MDG	Millennium Development Goal
NBSAP	National Biodiversity Strategic Action Plan
NGO	Non-Government Organization
NPP	National Population Policy
Rist	Corporate ownership system based on descent that granted usufruct rights
SDG	Sustainable Development Goal

SDPRP	Sustainable Development and Poverty Reduction Program
SLF	Sustainable Livelihood Framework
SNNPRS	Southern Nations', Nationalities' and Peoples' Regional State
SSA	Sub-Saharan Africa
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Program
WFP	World Food Program
Wereda	Sub-district level administration

1 Introduction

1.1 Policies related to sustainable rural livelihoods

A livelihood comprises the capabilities, assets (including both material and immaterial resources) and activities for a means of living (Scoones, 1998). The objective of achieving sustainable livelihoods for everyone provides a focus for anticipating the 21st century through implications of policies and interventions that enhance capabilities, equity, and increase social sustainability for improving the livelihoods of the poor (Chambers and Conway, 1991). Providing access to resource-based opportunities should be the minimum of state-provided social services and livelihood security of pro-poor intervention (Conway et al., 2002).

Sustainable rural livelihoods have received high priority since the Rio-Summit 1992 and more recently in response to the declaration of World Summit on Sustainable Development (FAO, 2010; UN, 2000, 2015). In 2015 the UN General Assembly formally agreed upon a set of 17 measurable Sustainable Development Goals (SDGs) (UN, 2015). The goals for sustainable agriculture, healthy lives, human wellbeing and sustainable economic growth are considered to be achievable by 2030 (Biggs et al., 2015). The SDGs are designed to enhance livelihoods of the rural poor in developing countries where poverty alleviation and food security are crucial to economic growth and development. My thesis is related to SDGs 1 (no poverty) and 2 (zero hunger) that aim at ensuring the policies and programs of the member countries develop strategies and programs to end poverty and hunger, achieve food security and improve nutrition through the promotion of sustainable agriculture. Furthermore, it is also relevant for gender equality and empowerment, ensuring healthy lives and human wellbeing which are emphasized on SDGs 3 & 5 (UN, 2000).

African countries face significant challenges to ensure food security for rural people who are particularly dependent on local natural resources. It is estimated

that a quarter of the African population will still live in extreme poverty in 2030 (UNDP, 2015b; World Bank, 2016b). Even more, Africa is one of the most vulnerable continents to climate change and climate vulnerability and by the 2050s, 350–600 million Africans will be at risk for increased water stress, predominately in the northern and southern parts of the continent (IPCC, 2007). The growing food insecurity and livelihood deterioration in Africa call for rigorous actions at national and international levels to take advantage of the increasing potential of sustainable agricultural land use. Urgent national, regional and global actions are needed to fully realize the target of SDG 1 as the main priorities (FAO, 2009; UN, 2000, 2015). To achieve the no hunger goal and the resilience to climate change governments give particular attention to small agricultural producers and vulnerable groups of populations (FAO, 2011; Salami et al., 2010 ; WFP, 2015). Producing more food for the growing African population in the coming decades, while combating poverty and hunger and maintaining natural capital, is the main challenge that African countries are facing (Garrity et al., 2010; Ricker-Gilbert et al., 2014). The choice of viable interventions and implementation strategies to address these challenges depends on the existing political, social and economic conditions and resources available (Akanbi, 2014; Galhena et al., 2013b).

Ethiopia is one of the countries that agreed on and signed up to the SDGs to meet the 2030 UN agenda: on achieving sustainable development to ensure healthy lives, human wellbeing and sustainable economic growth. Poverty eradication has been, and is, the key objective of the Ethiopian government with respect to achieving broad-based, accelerated and sustained economic growth (FDRE, 2010). Accordingly, the government of Ethiopia has designed strategies, policies and plans, and initiated implementation activities to guide and manage the overall development of the country. Some of the notable policy documents include the Agricultural Development Led Industrialization plan (ADLI); the Sustainable Development and Poverty Reduction Program (SDPRP, 2002/03 - 2004/05); the Plan for Accelerated and Sustained Development to End Poverty (PASDEP, 2005/06 to 2009/10); the Growth and Transformation Plan (GTP I, 2009/10-2014/15); Climate Resilient Green Economy (CRGE, 2010/11-2014/15); and Growth and transformation Plan II (GTP II, 2014/06 to 2019/2020).

All these policy documents focus on the overall development to optimize diverse opportunities for change and to realize its possible impact on reducing poverty. The PRSP 2000 and PASDEP 2005 documents were considered as the building blocks for GTP I and are important tools for addressing the SDGs (FDRE, 2010). The post-2015 SDGs present a unique opportunity for integrating and mainstreaming the principles of these goals into policies and programs to

articulate the national priorities, opportunities and challenges to pursuit the economic structural transformation in Ethiopia (FDRE, 2016). The GTP I has put emphasis on agriculture and rural based industry development to achieve sustainable development to end poverty. More importantly, agriculture development is viewed as an important vehicle for industrialization by providing raw materials, market base, surplus labor and capital for industrialization.

To achieve the desired changes, agro-ecological based agricultural packages; proper use of land and water resources; access to improved rural finance; better functioning markets; pastoral development; better roads networks; basic health care and education are all crucial targets for development, including sustainable rural livelihoods. In the economic sector development plan, it is clearly indicated that agriculture and rural development focuses are on increasing the capacity and extensive use of labor; proper utilization of agricultural land; linking specialization with diversification; integrating agricultural and rural development; strengthening the agricultural marketing system; and effective implementation of the scaling up of best practices in the economic sector. The World Bank and Ethiopian government assessment report of GTP I emphasize that remarkable achievements have been recorded in real GDP growth rate, infrastructure and social development as well as in crosscutting areas (World Bank, 2016a).

The FDRE initiated the Climate-Resilient Green Economy (CRGE) policy to incur early actions against the adverse effects of climate change to secure poverty reduction and sustainable climate resilient green economy development in the country (FDRE, 2011). The CRGE initiative identifies green economy opportunities that will help Ethiopia reach its ambitious growth targets while significantly decreasing GHG emissions below the level estimated under the conventional development path. The agriculture sector provides 46% of the Ethiopian GDP and 80% of the working population. Agriculture, which is vulnerable to climate change, is considered as a priority land use in the Climate Resilient Green Economy (CRGE, 2010/11-2014/15). The CRGE strategy was formulated during the GTP I period to embark on building green economy (GTP II). Adapting international agendas in to the Ethiopian national policies, strategies and development priorities was considered as a basis for the recent GTP II (2015/16-2019/20). SDGs and regional and international economic collaboration initiatives were the basis for the formulation of GTPII in 2016. The major target of GTP II is to transform Ethiopia into an industrialized middle-income country by 2025. The focus of GTP II is ensuring sustainable growth through enhancing productivity of agriculture and manufacturing, improving quality of production and stimulating competition in the economy (FDRE, 2016).

ADLI has been launched to enhance an agriculture-led growth strategy for sustainable economic development for reducing poverty and increasing the level of food security (Devereux, 2000). However, the efforts made by ADLI to consider the small-scale farmers as the primary actors, to serve as an engine for growth and development, does not form an effective strategy because Ethiopian agriculture has virtually exhausted its potential in its present form (Dessalegn, 2003; Devereux, 2000). This is due to mainly the rapid population growth and the related land fragmentation, including the declining productivity of agricultural land. Furthermore contribution to the success of both ADLI and SDPRP in bringing sustainable agricultural development has been limited as the strategic plans were mainly focused on economic development and commercialization of agriculture (Desalgne and Taye, 2006; Dessalegn, 2003; Devereux, 2000). In developing countries income of farmers depends more and more on off-farm employment thus policies and programs in terms of their potential should consider problem of poverty and economic growth equally and simultaneously (Radwan, 1995).

The on-going land fragmentation and the declining farm size in rural Ethiopia has limited the livelihood choices and opportunities of most smallholder farmers. Similarly, the declining farm size due to demographic change in Malawi demonstrated that population pressure, beyond which household can no longer increase income is not an option to improve rural livelihoods. Increasing agricultural production in the face of rapid population growth is the major challenge facing Sub-Saharan Africa (Ricker-Gilbert et al., 2014). Increased input use (fertilizers, improved seeds, etc.) does not lead to a corresponding increase in crop yields in Ethiopia, and hence farm income decreases as population density increases. Rural employment through cultivation of land is no more an option as smallholder farms are fragmented beyond the optimal level for self-sufficient production or to the level of being "*hunger plots*" (Josephson et al., 2014; Tsegaye, 2008). Unlike the above mentioned arguments, a study made by Gebre-Selassie and Bekele (2010) emphasizes that small-scale agriculture in Ethiopia has remarkable potential in decreasing poverty and increasing economic growth through production of staple food crop and livestock.

Government policy documents strongly emphasize that many adjustments have been made in Ethiopia using the GTP, considering the smallholder agriculture sector as one of the priority areas. However, it has not been able to bring effective economic transformation and poverty reduction to rural Ethiopia. Ethiopia is one of the countries considered able to achieve the Millennium Development Goals. However, about 32% of its population still remains in poverty and the country has the highest proportion of malnourished people in

Sub-Sahara Africa (FAO and IFAD, 2015). Although economic transformation and growth is necessary, it is not sufficient to eradicate rural poverty and hunger (FAO and IFAD, 2015). Adoption of effective agricultural development to improve the livelihoods of rural smallholders needs in-depth understanding of the capacity of agriculture to support the rapidly growing population. Furthermore, national commitment to on-the-ground policy implementation, while setting up efficient institutions for promoting sustainable and effective land management systems, is crucial for the success of policies and strategies.

1.2 The traditional agroforestry homegarden

According to World Agroforestry Center, agroforestry is a dynamic, ecological-based natural resources management system through integration of trees into rangeland and farmland to diversify and sustain production for the increasing socio-economic and environmental benefits for all land users at all levels (Atangana et al., 2013; ICRAF, 2006). Agroforestry has been a traditional agricultural practice sustainable for thousands of years and an important element of the cultural rural landscape in tropical and temperate regions around the world (Alam and Sarker, 2011; Kalaba et al., 2010; Kumar, 2006; Lamanda et al., 2006; Maroy, 2016; Peyre et al., 2006). More than hundred different agroforestry practices have been identified in tropical and temperate regions (Atangana et al., 2013). Agroforestry practices range from open parkland assemblages, to dense imitations of tropical rainforests such as agroforestry homegardens, to planted mixtures of only a few species, to trees planted in hedges or on boundaries with differing levels of human management of the various components (Dawson et al., 2013). The traditional tropical agroforestry homegarden has been practiced in East and West Africa, South and South East Asia, Pacific Islands, and Mesoamerica, where it is a predominant tropical land use practice (Kumar and Naira, 2004; Peyer et al., 2006; Tesfaye et al., 2006; Trinh et al., 2003; Wiersum, 2006). The silvo-pastoral practices as wood pastures on the Iberian peninsula (Garrido et al., 2017b; Reisner et al., 2007) and in Sweden are some of the examples of prominent agroforestry practices in Europe (Garrido et al., 2017a).

The concerns about the long-term consequences of agricultural system intensification have raised interest in integrated land-use. Agroforestry, as integrated land use systems, involving both forestry and agriculture has been considered as a solution (Malinga et al., 2013). Most of the developing countries' forest and wood landscapes have been altered by fragmentation, deforestation, land degradation and loss of biodiversity. Agroforestry has been considered as one of the keys to integrate natural resource management interventions for addressing various environmental and social needs including: food security,

biodiversity, carbon sequestration and climate change mitigation and adaption (Admasu and Struik, 2001, 2002a; Almaz and Nieho, 2004; Bhagwat et al., 2008a; Dawson et al., 2013; Galhena et al., 2013a; Gebrehiwot et al., 2016; Jose and Bardhan, 2012; Kumar, 2011; McNeely and Schroth, 2006a; McNeely and Schroth, 2006b; Miller and Nair, 2006; Negash, 2013; Tesfaye et al., 2006; Wezel and Ohl, 2006; Wiersum, 2006).

Agroforestry is an essential system that supplies multiple ecosystem services (ES) important for people and nature (Bardhan et al., 2012). Pinto-Correia et al. (2006) in their agricultural landscape studies in Portugal, Sweden and Slovenia, emphasized that many traditional agricultural landscapes in Europe and temperate countries are hot-spots of ES delivery. In Europe it has since the last 20 years been acknowledged that human management of landscapes increase biodiversity, and EU subsidies are now paid to maintain or restore traditional agricultural practices, whilst in Africa human land use is still mainly seen as detrimental to biodiversity (Neumann, 2014). Traditionally managed agroforestry practices have potential to connect and integrate protected areas with the surrounding landscapes, and mediate the livelihood need of people within the conservation goal of protected area (Ashley et al., 2006). Thus it provides a potential to reduce land-use pressure and improve rural livelihoods in human-dominated landscapes and at the same time conserving a large proportion of biodiversity (Bhagwat et al., 2008b). Several studies have shown the high conservation values of agricultural landscapes particularly in areas where there is a relatively high diversity of plants and animals (Barbhuiya et al., 2016; Bardhan et al., 2012). Many scholars have reported the importance of tree cover in agricultural landscape for conserving birds and mammal diversity (Clough et al., 2009; Harvey et al., 2006; Harvey and Villalobos, 2007). In conclusion, agroforestry with intentional management of shade trees and food crops is a very promising approach to maintain biodiversity and ES while enhancing food security and livelihoods in most of the tropical developing countries (Ashley et al., 2006; Barbhuiya et al., 2016; McNeely and Schroth, 2006b). Therefore, agroforestry systems have the potential to alleviate the resource use pressure on protected areas by enhancing habitats for species and increasing connectivity of cultural landscapes.

Over 750 million people in Sub-Sahara Africa depend on small scale subsistence agriculture as their main source of food and income. This form of farming remains the primary source of livelihoods for the majority of households depending on family labor (Bank, 2008; Dercon and Gollin, 2014; Jackson-Smith, 2010). The attainment of livelihood security in this region is fundamentally linked with reversing the decline in agricultural productivity and conserving the natural resource base (Akinnifesi et al., 2008b). Africa, Asia and

Latin America are often called ‘centers of diversity’, as the majority of staple crops consumed across the world have originated here and crop diversity is still dominantly concentrated in these areas (Thrupp, 2000). However, maintaining agroforestry practices globally is confronted by land use change. The traditional agroforestry practices in the tropics are now declining due to multiple reasons, including: land fragmentation and increasing commercialization that leads to mono-cropping (Abdoellah et al., 2006b; Gebrehiwot et al., 2016; Wiersum, 2006; Witjaksono, 2016). Agroforestry, which was a traditional practice in Europe in the pre-industrial era, has been challenged by increased mechanization which led to the development of specialized crop, animal, and wood production systems, urbanization and intensification of land use (Nerlich et al., 2012)..

The traditional agroforestry homegarden is one of agroforestry practices that has been ingrained in the traditions and culture of local communities and is widely distributed in the tropics (Miller et al., 2006). The knowledge gained over time from traditional agroforestry homegardens is the basis for the development of agroforestry practice employed by farmers in many parts of the world today. These homegardens contain a variety of species that represent social and traditional aspects of various societies, where the selection of species and their arrangement and management, varies between and within homegardens (Mendez, 2000). This traditional land use originated from the natural forest that has been altered by local communities for production of food crops and livestock. Thus it’s structure resembles a forest that combines the architecture of a natural forest with species fulfilling the social, economic and cultural needs of people (Roshetko et al., 2006; Soemarwoto and Conway, 1992). Roshetko et al. (2006) reported that the above-ground carbon stock stored by Javanese agroforestry homegardens is equivalent to secondary rain forests of similar age in the same area. Farmers established and developed agroforestry as a livelihood strategy, to manage their agricultural systems by nurturing trees in their homesteads, farms and grazing lands, making crops and tree-farming practices as an efficient agricultural and natural resource production system (Mohri et al., 2013).

Agroforestry homegarden is one, among the smallholder agriculture practices, that has been considered as an opportunity to contribute to feeding the estimated 9 billion people in the world by 2050 (Christiaensen et al., 2011). There is a growing need of strengthening and intensifying food production in order to mitigate the adverse effect of global food shocks and food price volatilities. Agroforestry homegardens are considered as one of the major source of food and income in Africa to meet the needs and the wellbeing of the rural community (Galhena et al., 2013b).

The agroforestry homegarden is a cultural and traditional locally developed agroecosystem practice with rich biodiversity in south and south west parts of Ethiopia (Tesfaye et al., 2006). It has been developed through maintaining indigenous trees or by planting trees on farm lands, grazing fields, around individual household, as shelter for humans and livestock, wind break, live fence and shelter belt (Tsegazeabe, 2012). Agroforestry homegardens are highly diverse in species composition, thereby delivering multiple products and services essential for food security, sustaining livelihoods and wellbeing of rural households in Ethiopia (Admasu and Struik, 2002b; Almaz et al., 2002; Almaz and Nieho, 2004; Gebrehiwot et al., 2016; Tesfaye et al., 2009). For example, only in four sub districts in southern Ethiopia, Tesfaye (2005) reported 198 plant species (114 tree and 78 food crops); Feleke (2011) and Kebede (2010) identified more than 100 different plant species, including trees, shrubs, herbs and climbers. The presence of the two dominant perennial 'keystone' species, enset (*Ensete ventricosum*) and coffee (*Coffea arabica*), which together usually cover more than 60% of the crop land make this farming practice unique and attractive (Admasu and Struik, 2001). Enset is planted in the living quarter very close to individual houses together with vegetables, pulses, roots and other food crops; and then mixed with shade grown coffee, mixed with native trees, fruit trees and various undergrowth species. Within enset production systems, seven to ten million people cultivate enset as a staple food, or as a co-staple with cereals and root- and tuber crops (Admasu and Struik, 2002a). Brandt et al. (1997) concluded that enset has been used as a food crop for thousands of years in Ethiopia, and is an important staple food that supports over 20% of the population living in the southern and southwestern parts of the country (Figure 1 & 2). Small areas of the front yard of houses are used for keeping livestock and for social gatherings. The edge of the living quarter and road sides are mainly used for Eucalyptus woodlots. In addition to their shade and timber value, the shade trees are used for hanging traditional beehives for honey production.

Figure 1. Example of a homegarden with the main staple food enset and beehives. Photo – Marine Elbakidze

The ecological, economic and social attributes of agroforestry homegardens are recognized 'worldwide' as the best sustainable land management system. It has received significant attention by an increasing number and quality of scientific publications, expanding the knowledge based agroforestry systems in various contexts and aspects in the developing and industrialized nations since the 1970s (Kumar, 2006). Some examples of publications around the world are: agroforestry homegarden in the Pacific islands (Thaman et al., 2006); the ethno-history and potential contribution of Amazonian homegardens (Miller et al., 2006); biodiversity, food security, and nutrient of homegardens in Mesoamerica (Montagnini, 2006); the structure, function, and dynamics of homegardens in India (Kabir and Webb, 2008; Peyre et al., 2006); the coconut-based agroforestry in Melanesia (Lamanda et al., 2006); the enset coffee based agroforestry system in Ethiopia (Tesfaye, 2013; Tesfaye et al., 2009; Tesfaye et al., 2006); the gender and social dynamics of homegardens in Latin America (Howard, 2006); medicinal plants in tropical homegardens (Rao and Rajeswara, 2006); use and commercialization of homegardens in Indonesia (Abdoellah et al., 2006a; Wiersum, 2006); ecology versus economics in tropical multistate agroforests (Torquebiau and Penot, 2006); sustainability and diversity of homegardens (Leuschner and Khaleque, 1987; Pandey et al., 2007; Peyre et al., 2006; Tadesse, 2002; Tesfaye et al., 2006; Torquebiau, 1992); financial analysis of homegardens in India an ES in homegarden systems in Indonesia, Sri Lanka, and

Vietnam (Mohri et al., 2013); biomass and carbon sequestration potentials of agroforestry (Jose and Bardhan, 2012; Kumar, 2011; Nair, 2011; Negash et al., 2012; Ramachandran Nair et al., 2009).

Figure 2. Main food products from enset

Most research findings on agroforestry homegarden in Ethiopia are mainly focused on the structure and diversity of species, the potential growing biomass for carbon sequestration, and the role of enset in the system for food and nutrition. There have been no broad and inclusive studies attempted on understanding the role of this land use practice for delivering livelihood assets/capitals and the challenges of its capability to reduce vulnerability and maintain sustainability for the rural smallholder farmers.

Agroforestry homegardens in the tropics and in many developing countries have been challenged by commercialization driven by population growth, market prices change on traditional and new cash crops, and socio-economic and

cultural changes (Gebrehiwot, 2013; Gebrehiwot et al., 2016; Gessesse and Kinlund, 2008; Tesfaye, 2013; Tesfaye et al., 2006; Torquebiau and Penot, 2006; Wiersum, 2006). Many recent land use changes are driven by global economic and market related needs and demands for specific goods and products (Geist and Lambin, 2002). The term "land use change" reflects the modification of land to obtain food and other products, which has been going on for thousands of years (Ellis et al., 2010; Rindfuss et al., 2004). Generally, those changes in land use have occurred successively and at a rather slow pace, predominantly to meet local needs; however, its current rates are far greater than ever in human history at the regional and global scales (Ellis et al., 2010). Many Ethiopian smallholders are in the process of transforming their farming strategy under pressure from market and socio-economic changes (Gebrehiwot et al., 2016; Gessesse, 2013a; Ramachandran Nair et al., 2009).

The recent transition of the agroforestry homegardens in Ethiopia into commercial production of new cash crops, including khat (*Catha edulis*) is a farming strategy undertaken by smallholders to address demographic, market and socio-economic changes (Gebrehiwot, 2013; Gebrehiwot et al., 2016). Khat has emerged from being an obscure crop with limited commercial value to an export earning hundreds of millions of dollars in Ethiopia over the past century (Gessesse, 2013a). In order to adapt to such socioeconomic changes, subsistence-oriented agroforestry homegardens are increasingly becoming more commercially oriented (Mohri et al., 2013). In 2009-2010 the export value of Ethiopian khat increased by 51 per cent, while export value of the traditional cash crop, coffee, increased by only 40 percent (Gessesse, 2013a). This on-going land use change has been carried out at the expense of diversity and stability of the long existing farming practices important for sustainable livelihoods and food security (Gebrehiwot, 2013; Gebrehiwot et al., 2016; Tesfaye et al., 2009). Therefore, in-depth understanding of the driving forces, proximate causes and consequences of the recent transition of agroforestry homegardens to monoculture production of new cash crops is important. Such knowledge support and maintain the socio-economic and ecological sustainability of this particular practice for better livelihoods of the rural community and rural development in Ethiopia.

Agroforestry homegardens depend on family labor where women and men actively participate on the management of the productive asset for securing household food and livelihoods. Although economic and social forces are altering the agricultural sector, women still manage the complex households and pursue multiple livelihood strategies in many parts of the developing countries (FAO, 2011). A review of 39 Latin American case studies dealing with swidden agroforestry practices across the regions revealed that women are the prominent

managers of such land use practices to meet the multiple food and material production, investing their emotional and spiritual values and the positive social relationships (Howard, 2006). Although gender has wide differences between cultures and time, it determines power and control over resources (Jägerskog and Jønch Clausen, 2012). Lambina et al. (2001) remarked that "land uses dynamics" must not only consider the socio-economic and biophysical drivers of changes but also the human environmental condition under which the drivers are reacting. However, most research focused on its implication of biodiversity, sustainability, and global national and regional environment with limited consideration of its social dimensions (Lambin et al., 2003; Lambina et al., 2001; Lamin et al., 2008; Maitima et al., 2004). Thus there is limited knowledge on how land use changes affects food and livelihood security and the survival of the women and men in rural households who depend on and make their livings from subsistence farming.

2 Aim and Objectives

2.1 Aim

The aim of my thesis is to provide an in-depth analysis of the livelihood assets and outcomes delivered by agroforestry homegardens, the drivers of the recent transition of agroforestry homegardens, the impacts of this transition, and consequences for sustainability of rural livelihoods in Southern Ethiopia.

2.2 Objectives

1. Develop and test a method to identify land covers perceived as important for personal wellbeing of rural and urban residents in Ethiopia (**Paper I**).

2. Identify and map land covers that provide multiple ecosystem services important for human wellbeing in Ethiopia (**Paper II**)

3. To investigate the role of agroforestry homegardens in rural livelihoods (**Paper III)**

4. To identify the main drivers of change in traditional agroforestry homegardens, and the potential consequences for local households (**Paper IV**)

5. To examine how the formal and customary institutions address gender relationships in the traditional agroforestry homegarden practices and the consequences of the transition on gender relations at the household level (**Paper V**)

3 Conceptual framework

3.1 Sustainable livelihoods approach

The sustainable livelihoods approach (SLA) is a widespread tool to examine complex rural development issues from a local-level perspective, making the links from the local and regional particularities of poor people's livelihoods to wider level institutional and policy framings at multiple governance levels. A sustainable livelihood can cope with, and recover from, stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable opportunities for the next generation; additionally, it contributes net benefits to other livelihoods at the local and global levels in both the short and long term (Chambers and Conway, 1991). Rural households with vulnerable livelihood systems have neither enough of different assets nor the capabilities to create or access them. Such households have problems with providing for their basic needs, are unable to create a surplus, cannot cope with a crisis, and are often chronically in debt (Scoones, 1998). They are often burdened with liabilities, such as having unhealthy family members, losing access to land or living in a degraded or hazardous environment.

The five assets/capitals of sustainable livelihoods are: (1) natural assets that represent natural resources such as land, water and wider environmental goods that are critical for the rural livelihoods; (2) social assets that refer to the institutions, relationships and norms that shape the quality and quantity of social interaction; (3) economic/financial assets, which denotes the financial resources that people use to achieve their livelihood objectives: incomes, profits, savings, and credits; (4) human assets representing the skills, knowledge, experience, ability to work and good health that together enable people to pursue their livelihood strategies; and (5) physical assets such as transport, shelter, road,

market, adequate drainage facilities, electricity and telecommunications (Kaushal and Kala, 2014; Morse et al., 2009).

Since the introduction of the SLA, it has been defined and modified by different scholars and development agents to adapt it and apply it to their own needs and circumstances (Carney, 2003; Hussein, 2002; Krantz, 2001). The SLA for livelihood analysis was employed in this thesis (Figure 3). SLA shows the main factors that affect people's livelihoods, and their relationships; thus, it could be used in planning new development interventions to livelihood sustainability made by existing activities (DFID, 1999).

The SLA has become increasingly popular as a means for studying and addressing poverty during the last decades, resulting in an ever-growing body of literature on the topic. However, there is a lack of comprehensive empirical assessments of rural livelihood assets in different social-ecological contexts (Allison and Horemans, 2006; Scoones, 1998). Furthermore, many studies have focused on short-term adaptation and coping strategies based on vulnerability analysis (e.g., Scoones 1998), so there remains a lack of evidence-based knowledge regarding how livelihoods respond to changes.

Empirical research is therefore required to better understand how the elements of the SLA are interconnected in space, and time, and to understand the potential systemic implications of these interconnections for the long-term viability of rural populations in vulnerable contexts such as Ethiopia. People-centered analyses of livelihoods is most likely to begin with an investigation of people's assets, the livelihood outcomes which they are seeking and the livelihood strategies which they are adopting to achieve their needs (Ellis, 2000). Use of SLA to structure and understand the livelihoods of rural people in the Global South, where food and livelihood security is a limiting factor for survival of smallholder farmers, is important. This framework was employed in the thesis to identify different assets that rural stakeholders utilized in their livelihoods strategies and analyzed its outcomes under current transition from traditional agroforestry homegardens towards commodity production of new cash crops.

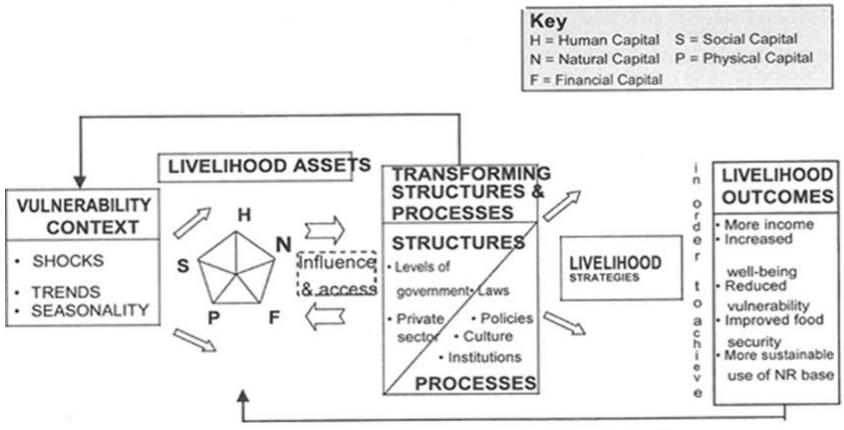

Figure 3. The sustainable livelihood approach. Source: DFID, 1999

3.2 Ecosystem services concept

Ecosystem services (ES) are the aspects of ecosystems functions or processes that provide services and multiple benefits that are utilized (actively or passively) to produce human wellbeing (Fischer et al., 2006; Fisher et al., 2009; Smith et al., 2013). Ecosystem functions or processes become ES when they are consumed or utilized directly or indirectly by humans. In other words, ES have both social and ecological characteristics important for nature and human wellbeing (Fisher et al., 2009; Garrido et al., 2017b; Queiroz et al., 2015). According to MA (2005), there are four categories of ES; provisioning, regulating, cultural, and supporting. The constituents of human wellbeing include basic material for a good life, freedom of choice and action, health, social relations and security (MA, 2005). How these constituents are perceived and experienced by society depend on the context and reflect location, culture, history, social-economic and ecological conditions (Smith et al., 2013).

Humans began to domesticate nature through animal husbandry and agriculture to manage ES directly for increased productivity thousands of years ago (Fisher et al., 2009). Over the last 50 years humans changed ES more rapidly than in any comparable period of time in human history, to meet the growing demand for food, fresh water, timber, fiber and fuel; these changes have contributed to substantial net gains in human wellbeing and economic development, but this has been achieved at increasing costs of degradation of many ecosystems and their capacity to provide sustained ES (Lemenih et al., 2012; MA, 2005).

Agroforestry forms social-ecological systems (Lemenih et al., 2012) and are characterized by an interplay between the biophysical and social environment

that constitutes and characterizes a specific landscape (Parrott and Meyer, 2012). Thus, the supply of ES within a traditional agricultural (and cultural) landscape is a result of a combination of biophysical factors (climate, geology, biotic component) and management practices (technology, experience, institutions and societal demands) with in a specific governance context (Angelstam et al., 2013; Swinton et al., 2007).

Rural people's livelihoods in Sub-Saharan Africa often depend directly on the agricultural resources and services provided by traditional agricultural landscapes as specific social-ecological systems. Therefore, a reduced supply of ES constrains attributes to social-ecological systems resilience and are clear indicators of a system development trajectory towards a more vulnerable state (Lemenih et al., 2012). Eyzaguirre (2010) emphasized the importance of diversified agricultural system such as agroforestry intercropping and silvo-pastoral integrated farming practices for resilient social-ecological systems.

There is much rhetoric at different levels about causes of poverty in developing countries. Development agendas have historically been dominated by a broad set of western-centric norms regarding what development is, should be, who should be involved, how it should be done, and what constitutes a good life. Approaches to deal with the complex and multi-dimensional issue of poverty have primarily been designed and developed by researchers and professionals from developed countries. As a result, hegemonic views regarding the poor and what should be done for them are constructed mainly from a distance and from above. However, there is a clear misfit between the perceptions of the wealthy and the poor in terms of comprehending the full implications of poverty (Chambers and Conway, 1991). There is thus an urgent need for comprehensive studies on what and why local people need for their wellbeing from their living environment. This evidence-based knowledge will contribute to future policy interventions and towards more sustainable land management systems that address livelihood security of the rural population while at the same time maintaining a viable natural environment for people and wildlife in Ethiopia.

My study focused on identification of areas that deliver tangible and intangible benefits important for the personal wellbeing of rural and urban citizens in Ethiopia using the ES concept (MA, 2005). Tuvendal and Elmqvist (2011) demonstrated the importance of addressing the demand of ES in relation to the perception and need of various stakeholders to meet their wellbeing. The importance of qualitative socio-cultural valuation of ES and the potential trade-offs and synergies among ES demanded by different stakeholder categories as an input for landscape planning and management is emphasized by (Raudsepp-Hearne et al., 2010).

4 Material and Methods

4.1 Study areas

4.1.1 Ethiopia as a case study at a national level

Ethiopia has a land area of 1.1 million km2 (Figure 4) and has the fifth largest floral diversity with endemic elements in tropical Africa due to its diverse topography (Didita et al., 2010). Ethiopia has been increasingly challenged by high population growth, droughts, poverty, hunger, diseases and environmental deterioration (Wolvers et al., 2015).

Unlike most African countries Ethiopia had no colonial land use or institutional history. During the feudal period of the imperial regime (before 1975), the rural agricultural land tenure system could broadly refer to two categories: usufruct tenure and private tenure (Dessalegn, 2003). The communal "rist" system was dominant in the settled northern highland while the landlord tenant relationship ("gult") was dominant in the southern part of Ethiopia. It was the civil and military servants of the imperial regime who received "gult" rights as a compensation for their service (Desalgne and Taye, 2006; Melaku, 2008). After the overthrow of the feudal system in 1975, the Derg regime implemented "Proclamation No. 31/1975". This proclamation nationalized all rural land and set out to redistribute land with a legal basis for usufruct rights to a large number of rural families who were living under exploitative tenancy contracts. The proclamation prohibited all tenancy relations (Article 4.5) and declared all rural lands to be the property of the state (Article 3) without any compensation to previous land right holders. This was the major turning point in land tenure rights in Ethiopia, which successively evolved into shaping the present land tenure system (Melaku, 2003). Most farmers were entitled to free land holdings through their respective kebele administration (KA). However, it was only user

rights and could not be transferred in any form (Bereket, 2002). After the fall of the Derg regime in 1991, land property rights have remained vested in the state and only usufruct rights have been given to farmers (Crewett et al., 2008). Land policy was one element of the 1995 Constitution of the Federal Democratic Region of Ethiopia (FDRE). For example, article 40 of the Constitution vests the right to ownership of rural and urban land exclusively in the hands of the state and collectively in the peoples of Ethiopia; thus, individual landholders cannot sell, exchange or mortgage their land holdings (Gebre-Selassie, 2006). This has nurtured an antagonistic debate between advocates of the privatization of land by individual land holders and those supporting the government's position of state land ownership (Desalgne and Taye, 2006).

Figure 4. . Map of the location of Ethiopia in East Africa and location of SNNPRS in Ethiopia

Regarding gender issues, Ethiopia has ratified multiple international policies; the Universal declaration of Human Rights and the United Nations Millennium Development Goals, which have been accepted as a framework for measuring development progress. Also Ethiopia has ratified the Convention on the

Elimination of All forms of Discrimination Against Women (CEDAW), and African Charter on Human and Peoples' Rights. All of these documents outline a variety of political, social, economic, and legislative issues that are supposed to create equality between men and women (Pitamber 2004). Although women are given equality in international conventions and national legislation, rural women are still the most disadvantaged and vulnerable group in society, and their role in rural development is invisible (Desalgne and Taye, 2006; Torkelsson, 2008a, b).

About 29% of Ethiopians live in absolute poverty, meaning that they are severely deprived of basic needs including food, safe drinking water, sanitation facilities, health, shelter, education and information (UNDP, 2015a). Close to 15 million people live in Qolla (lowland) drought-prone areas and about half of them are chronically food-insecure and rely on food aid even in years with sufficient rainfall (UNDP, 2015a). Since 2005, the government has started a relief-development strategy known as the Productive Safety Net Program (PSNP). The program primarily targets people who are chronically food-insecure. Currently, it is estimated that over eight million people receive food aid under the PSNP to cover their seasonal food shortages (Gilligan et al., 2009). However, the PSNP has had no effect on smallholder agricultural input use or productivity and only limited impact on smallholder agricultural investment (Gilligan et al., 2009; Hoddinott et al., 2012).

Shortage of farmland, deforestation and land degradation are critical obstacles for improving rural livelihoods in the Ethiopian highlands (e.g. Gebrehiwot et al. 2015). In the lowlands, extremely high temperatures, increased rainfall variability, shortage of water, loss of dry-season pastures and degradation of natural resources undermine rural livelihoods. The vulnerability of rural people is further exacerbated by climate change, and by weak governance and institutional arrangements; limited access to financial assets, markets, infrastructure and technology; natural disasters; and armed conflicts (Lemenih and Kassa, 2014). Little has been made to address the root causes of food insecurity, and even less has been done to improve the natural resource base in Ethiopia. Relief-oriented, top-down and short-term planning have not contributed effectively to improve the resilience of socio-ecological systems, and may have contributed to the dependency of both vulnerable rural communities and local and regional governments on aid donations.

Ethiopia is one of the ten top coffee growing countries in the world and an exporting member of International Coffee Organization (ICO). Arabica coffee is originated from Sothern Ethiopia and it is the most important traditional cash crop that supports the livelihoods of the rural farming communities. Domestic annual household consumption of coffee is 24.5 kg and the average per capita

consumption is 4.5 kg (Gemech and Struthers, 2007). The harvested wild and semi-wild population of coffee in the southern part of the country and coffee produced by smallholder farmers are the main sources of coffee for the local and the export markets. Smallholder farmers grow 95% of the coffee in Ethiopia (Gemech and Struthers, 2007). Following the global coffee crises, average coffee exports from Ethiopia dropped from 70 to 35% of total export income (Gessesse and Kinlund, 2008). Thus, smallholder farmers in the country have been the most negatively affected by the global coffee crises of the 1990s (Gemech and Struthers, 2007).

Approximately 85% of the Ethiopian population depends on self-subsistence production of crops, livestock and trees to meet daily needs, and 48% of farmers own landholdings less than the area required to meet the minimum food requirement given the existing level of technology and input use. Farmers use different types of agricultural practices and strategies for the management and production of diversified products for their food and livelihood security. The traditional agricultural practices depend on altitude, rainfall, temperature, soil and the culture of food habits of the local people (Admasu and Struik, 2001; Admasu and Struik, 2002b; Almaz et al., 2002; Almaz and Nieho, 2004).

4.1.2 The Sidama zone as a case study at the regional level

The Sidama zone (hereafter Sidama) in Southern Nations Nationalities' and Peoples' Regional State (SNNPRS) was chosen as a case study area for the in-depth studies. SNNPRS is one of the federal states of Ethiopia located in the south and southwestern parts of the country. Sidama (5º 45' - 6º 45' N; 38º 15' - 39º E) is 6538 km^2 (Figure 5) in area with a human population of 3.4 million (CSA, 2011) Hawassa, which is located in the northern tip of Sidama, is the regional capital and located at a distance of 273 km south of Addis Ababa (the capital city of Ethiopia). In SNNPRS about 53% of land is occupied by agroforestry homegarden with coffee and enset, fruits, trees, vegetables, root and tuber crops and pulses (BoFED, 2008).

Sidama is the most densely populated area in southern Ethiopia with average population density of 520 persons per km^2 (CSA, 2011). Sidama is divided into 19 administrative Weredas (i.e., sub-districts), and 532 kebele associations (KAs) (i.e., village administrations). More than 89 % of the population is rural and depend predominantly on different forms of agroforestry practices, including the traditional agroforestry homegardens.

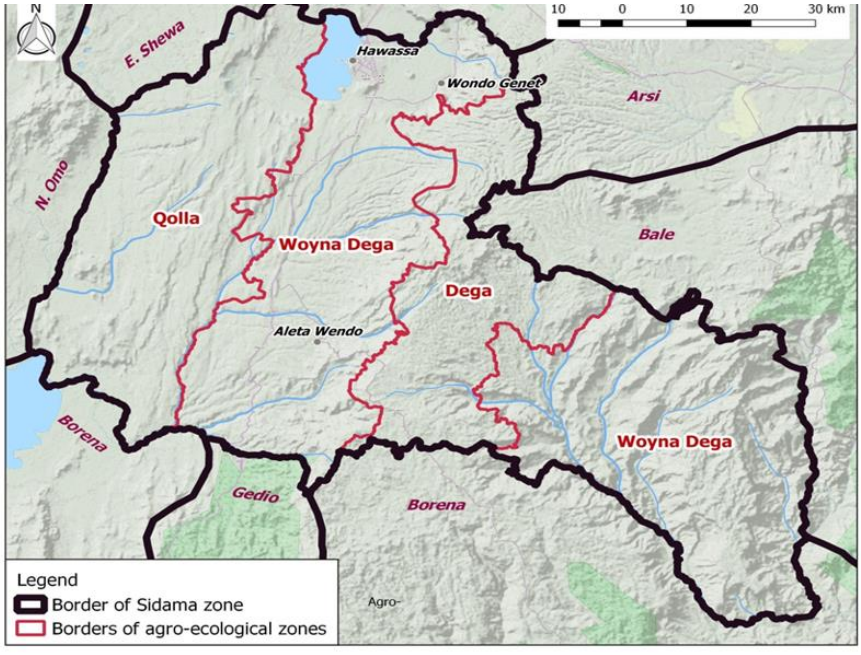

Figure 5. The Sidama zone the study area

The diverse climatic conditions range from hot and dry desert in the lowland areas to cold and humid highlands. Sidama has three agro-ecological zones with different climates linked to altitude, rainfall and temperature (Table 1 & Figure 6). The first is the Dega agro-ecological zone (high lands) with a wet and cool temperate climate, where farmers mainly practice silvo-pastoral agroforestry with enset, cereals such as barley and wheat, as well as coffee and vegetables as the main agricultural products. The second is the Woyna Dega agro-ecological zone (semi-highland) with moist to humid, warm subtropical climate, where the traditional agroforestry systems as homegardens and shade grown coffee are the common practices. Enset is the dominant crop growing both in the Woyna Dega and the Dega agro-ecological zone with differences in its spatial arrangement (Figure 7). The third is the Qolla agro-ecological zone (low land) with dry and hot tropical climate; here agriculture is dominated by annual crops such as maize, sorghum and haricot bean, but pastoralism is also an important economic activity (Tesfaye, 2005). The natural vegetation ranges from the evergreen Afromontane forests (1500 to 2600 m.a.s.l,) via transitional rainforest (500-1500 m.a.s.l.) to the dry semi-deciduous forest (450 to 600m.a.s.l.) (Tadesse et al., 2014). Afromontane forests is the natural habitat for the wild coffee (*Coffee arabica*), which makes this forest type important for conserving both the genetic diversity of coffee and the livelihoods of the rural people who depend on the

subsistence production of coffee (Senbeta and Denich, 2006; Silvestrini et al., 2007; Tadesse et al., 2014). The increasing flooding and sedimentation related to deforestation and land degradation seriously affect water and soil resources of the study area. For example, one of the main reasons for the drying-out of Lake Cheleleka is the deforestation of the Sidama watershed that increased sedimentation.

Table 1. *Description of three agro-ecological zones in Sidama (Source: Tesfaye 2005)*

No	Agro-ecological zone	Altitude	Annual rainfall, mm	Annual temperature, C°	Area coverage, %
I	Dega	2500-3500	1200-1800	10 - 15	16
II	Woyna Dega	1500-2500	1000-1800	15 - 20	54
III	Qolla	500-1500	400-800	20-25	30

Figure 6. Examples of landscapes of the three agro-ecological zones

Sidama people constitute about 20% of the population in SNNPRS and belong to the Cushitic linguistic group who speaks Sidamo/ Sidamigna (Cerulli, 1956), which is the working language of the administrative zone. The population of the Sidama zone is composed of ethnic groups such as Sidama, Welayeta, Kambatta, Hadiya, Amhara, Gurage and Tigre with distinct differences in culture, language and religion. Christianity is the dominant religion in the Sidama, Muslims, and few people with traditional beliefs (Tesfaye, 2005). Patriarchal kin and family relationship dominate in Sidama, especially in rural areas. Descent is traced dominantly through the father's families; it is a tradition for a child to take the father's first name as his or her last name. Villages are often composed of kin groups that offer support during difficult times. The kin groups are responsible for settling disputes within a kin group or clan. Elders, who are only men, are respected, and are regarded as the source of a lineage (Cerulli, 1956).

Figure 7. Enset farm arrangement in Dega (left) and Woyna Dega (right). Photo – Mersha Gebrehiwot

The agroforestry homegarden is the dominant land management system in Sidama. It is an old traditional practice that evolved through opening up of gaps in the natural forest for shelter/house, grazing and growing few perennials in association with annuals and livestock for household income (Gebrehiwot, 2013; Gebrehiwot et al., 2016; Tesfaye et al., 2006). The two native major perennials are enset and coffee (Tesfaye, 2005), which are grown in association with food crops, trees and livestock. Enset constitutes the principal staple food that produces a relatively large amount of food per unit area and is important to household's food security (Admasu and Struik, 2001, 2002a; Almaz et al., 2002; Almaz and Nieho, 2004; Lim et al., 2007). Sidama is one of the known coffee export regions in Ethiopia. Furthermore enset is the symbol of Sidama people that represent their identity and culture. Currently traditional agroforestry homegardens are affected by the present transition to khat monoculture production (Gebrehiwot, 2013; Tesfaye, 2013).

4.2 Methods

4.2.1 Structured interviews

Different methods were used to collect and analyze data (Table 2). Structured interviews are often orally administered questionnaires with a list of predetermined questions to be answered (Bryman, 2006). In order to identify natural and semi-natural areas that are important for the wellbeing of rural and urban inhabitants in Ethiopia, I participated in the development of the questionnaire and tested it, first, in Sweden, 100 respondents were interviewed face-to-face by me together with my supervisor. This step was important for my

fieldwork in Ethiopia because I gained an experience in making structured interviews. The questionnaire was developed using the Survey Monkey software (www.surveymonkey.com) and consisted of three blocks of questions. In the first block respondents were asked to select ES important for their personal wellbeing from the predetermined list of ES using four options: *important, slightly important, not important, and don't know*. We did not explain what the term 'wellbeing' meant in order to give full freedom to each respondent to interpret this themselves. The list of ES was based on the four categories of ES used in the MA (2005), (i.e., provisioning ES, cultural ES, regulating ES, and supporting ES). To avoid confusion, especially concerning regulating and supporting ES, the meaning of each ES was clearly introduced to respondents with explanations and examples.

A total of 400 structured face-to-face interviews were conducted from December 2015 to July 2016 in Sidama adapting the methodological approach that has been tested and used in Sweden. The respondents were selected using a multi-stage cluster sampling method with a probability sampling method at each stage (Bryman, 2006). In order to represent both rural and urban respondents, and to capture the spatial variability of land covers in the study area, I first stratified the human population by the type of agro-ecological zone in which they are living. Accordingly, three rural population sampling strata were identified with Dega as stratum RUR-I; Woyna Dega as stratum RUR-II, and Qolla as stratum RUR-III. The fourth URBAN stratum was represented by people living in ten randomly selected municipal centers of the study area, including Hawassa, the regional capital. The interviews were evenly distributed among the defined strata. The respondents were randomly approached, and their gender and age were balanced during the process of data collection.

Table 2. *Methods that were applied to collect and analyse data*

Method		Paper
Literature review		All
Analysis of policy documents		All
Structural interviews	400 respondents in Sweden	I
Structural interviews (ES & land cover)	400 respondents in Ethiopia	II
Structural interviews on household assets	218	III
Focus group discussions	8 with 47 participants	IV & V
Key informant interviews	24	IV & V
Semi structured interviews	60	IV & V
Analysis of remote sensing data		I & II

Perceptions of different land covers for personal wellbeing depend on a wide range of factors, such as age, gender, place of residence and experiences (Mell, 2010). Hence, the second block of questions took up the respondent's personal data, including place of residence, education, occupation, rural/urban area, type

of property owned by the respondent, age, time length of residency in the specific location, and gender. In the third block we employed a visual preference survey using photographs of the dominant land cover types in the local area in order to identify and examine how different respondents interpret the usage and values of various land covers in relation to ES important for their personal wellbeing and to gain a better understanding of the links between the land cover types and its actual uses. All photos were captured in the study area in December 2016. The respondents´ interpretation of visual aids such as photos is impregnated with a set of layered attitudes and meanings related directly to people's lives, knowledge and experiences in relation to a specific landscape or location (Mell, 2010). In total 25 A4-size photographs that represented the different land covers of the study area were presented to each respondent. The photographs captured a gradient of land covers from natural old growth forest, different agroforestry systems to aquatic objects and built infrastructure across the three agro-ecological zones.

Respondents were asked to choose up to eight land cover photos from the 25 alternatives that they perceived as most important for their personal wellbeing. After respondents selected the photos they were asked to describe what benefits each selected land cover provided for their personal wellbeing (Figure 8). Their answers were transformed into the ES categories and filled in the questionnaire. Finally, respondents were asked to select one photo of the most unwanted land cover and explain reasons for this selection (Figure 8). All valuable comments provided by respondents were recorded. The sample of respondents consisted of 47% of women and 53% men. Respondents were from urban (45%) and rural (55%) areas. Their age ranged from 18 to 77 years. In total 30% of the respondents were employed, 53% self-employed, 6% unemployed 8% students and 3% were retired. The education level of respondents ranged from no education to doctoral degrees from universities.

To study household livelihood assets and outcomes delivered by the traditional agroforestry homegardens, a questionnaire was developed using the Survey Monkey software. This questionnaire was filled by the same rural respondents, of the photo-aided interviews who depend on agriculture activities. The questionnaire consists of what respondents: (1) produce for household consumption, (2) produce for marketing, (3) buy from market to supplement the household's food and nutrition, (4) the dominant crops/products on a farm plot, (5) main sources of income, and (6) main household's expenditures. The predetermined list of crops/products of agroforestry homegardens that were grouped in seven categories (annual, perennial crops, vegetables, fruits, spices, medicinal plants and dairy products) was included in each block of questions. One option called 'Others' was also included in order to capture those answers

that were not pre-determined. In total 218 farmers were interviewed in 2016. The individual interviews, took (30 to 90 minutes).

Figure 8. One example of an interview with a respondent. Photo – Marine Elbakidze

4.2.2 Semi-structured household interviews

Qualitative semi-structured household interviews were conducted with 60 respondents (31 women and 29 men) in 40 individual households. The households were proportionally selected to represent poor, medium and rich wealth categories of households. The wealth status derived from in a disaggregated list of each of the selected kebeles (Archive of KAs 2011). Each household interview was conducted at the respondent's home. Open-ended questions related to the key issues of our study allowed the interviewees to go deeper into topics they deemed important. The questions included personal history of individual households, total and average farm size; ownership rights; household's production; the major changes in land use; the causes and drivers of the changes; how the decisions on land use were made in each household; when and why the decision to change land use was made; and how farmers perceived their decisions and the changes that occurred; role of men and women in the traditional agroforestry homegarden; the impact of the change on the gender division of labor and the position of men and women in having access to household products and resources, family income and its distribution. The

interviews followed a clear structure, but also allowed for flexibility, e.g. between thematic and dynamic dimensions (Kvale and Brinkmann, 2009). In most cases, husbands and wives were interviewed separately to capture individual understandings of land use changes and their proximate causes. The semi-structured interviews lasted on average 60 to 90 minutes.

4.2.3 Key informant interviews

The purpose of the key informant interviews was to collect their views on changes in the agroforestry homegardens. I selected key informants recommended by kebele administration (KA) representatives and local agricultural development offices. In the study region, these governmental employees served as contact persons to reach communities in their respective KAs. First I presented the aim of the study and discussed with the KA representatives the kind of local knowledge and expertise sought; the selected key informants were (i) elders who had experience and traditional knowledge, (ii) former members of the selected KAs, who actively participated in land distribution/redistribution in 1975 and 1986; (iii) the present members of the KAs involved in the on-going land registration and certification processes, and (iv) women from local households. The semi-structured interview manual contained the following questions: Are there any changes in the traditional agroforestry homegardens? When did the major changes occur in the region? Why and who made the decision on change? What were the main reasons of changes? How have households been affected by the changes? How does the change affect the local communities? In total 24 key informant interviews were conducted, twelve of which were done on farms where the changes in the traditional agroforestry homegardens had occurred, in order to aid discussion with hands-on demonstrations.

4.2.4 Focus group discussions

Eight focus group discussions were conducted; the members were randomly selected from the KA members. Separation of the gender groups provided equal opportunity for women and men to elicit, confront, and mutually check perceptions and opinions on the causes of changes in the traditional land use system. The change in the agroforestry homegardens and its causes identified during the household and key informant interviews were brought up to initiate the discussion. All interviewees were informed about the purpose, subjects, and reasons of the research, and their participation was voluntary. The presence of kebele managers and local agricultural development agents facilitated the

discussions and communication between researchers and respondents. I moderated the discussion in order to give all participants the same space to articulate their opinions. Each focus group discussion lasted 1-2 hours.

4.2.5 Analysis of policy documents

To outline formal institutions that deal with gender relations I identified relevant international, national and regional legal documents. It includes international policies and conventions related with human rights and rights of women and men, the National Constitution, laws and proclamations that are specific to gender rights related to land use, inheritance, and marriage in Ethiopia. In total, 22 legal documents were selected and analyzed to understand formal institutions regarding rights and the positions of men and women in general and specifically in agricultural system (Table 3).

Table 3. *Data sources used for the analysis of international and national legal documents*

Formal legal documents	Provisioning examples
International level	
Convention on the Elimination of All Forms of Discrimination against Women Adopted (34/180 of 18 December 1979)	To modify the traditional and social and cultural patterns of conduct of men and women, with a goal of achieving the elimination of prejudices and customary discriminations and all other practices, which are based on the idea of the inferiority or the superiority of either of the sexes or on stereotyped roles for men and women
Millennium development & Sustainable Development Goals, (MDG & SDG) Meant to repeat?	Achieve gender equity and empower women and girls
Convention on the Elimination of All Forms of Discrimination Against Women (1995) (CEDAW)	All countries have to work on eliminating discrimination against women and create equality between men and women to promote a gender equitable development.
African Charter on Human and Peoples‘ Rights (1981)	African State shall ensure the elimination of every discrimination against women and also ensure the protection of the rights of the woman and the child as stipulated in international declarations and conventions.

Formal legal documents	Provisioning examples
The Protocol to the African Charter on Human and People's Rights (ACHPR) on the Rights of Women in Africa (2003)	Women should participate at all levels in the determination of cultural policies. It is important to have a regional instrument that adequately protects the rights of women taking into account the cultural specificity of Africa and the special needs of African women, which may not be adequately addressed by the CEDAW.
The African Plan of Action to Accelerate the Implementation of the Dakar and Beijing Platforms for Action for the Advancement of Women (1999)	Adopt a rights' based approach to development through evidence based decision–making and the use of gender-disaggregated data and performance indicators for the achievement of gender equality and women's empowerment in Africa.
The Solemn declaration on gender equality in Africa (2004)	The full and effective participation and representation of women in peace processes including the prevention, resolution, management of conflicts and post-conflict reconstruction in Africa as stipulated in UN Resolution 1325 (2000) and to also appoint women as Special Envoys and Special Representatives of the African Union.
National level	
National Action Plan for Gender Equality (NAP- (NAP-GE) 2006-2010.	Promote women's participation in developing economic policies and enhancing rural women's equal access to and control over productive resources and services.
National policy of women ('Women's Policy') (1993)	Provides a framework within which the Ethiopian government will advance its commitment to gender equality, employing the gender mainstreaming approach.
Proclamation of the Constitution of the Federal Democratic Republic of Ethiopia No. 1/1995.	Women have the right to acquire, administer, control, use and transfer property.
The Revised Constitution of Sothern Nations Nationalities and Peoples Regional State (SNNPRS) Proclamation NO. (35, 2001)	All persons have the right to equal and effective protection from the law without discrimination on grounds or race, nation, nationality, color, sex, language, religion, political opinion, social origin, wealth, birth or other status

Formal legal documents	Provisioning examples
Rural Land Administration and Land Use Proclamation of the Federal Democratic Republic of Ethiopia. Proclamation No. 456/2005	Women who want to engage in agriculture shall have the right to acquire and use rural land.
Rural Land Administration and Utilization Proclamation. The Southern Nations', Nationalities' and People's Regional State (SNNPRS) No. 110/2007	A husband and wife have equal use rights to their shared land holdings. They do not lose their land holdings because of marriage that they possessed individually before. Female house hold heads shall have full user rights to their land holdings. Women whose husbands are engaged in government services or in any other activities, shall have the right to use his/their rural lands.
The revised Amhara National Regional State Rural Land Administration and Use Proclamation No. 133/2006.	In accordance to the Federal land administration, free assignment of equal land holding rights for women and men. The provisions of this proclamation set out in the masculine gender shall also equally apply to the feminine gender.
Oromia Rural Land Use and Administration Proclamation of 70/2003,103/2005	In accordance to the Federal land administration free assignment of equal land holding rights for women and men
Tigray Rural Land Use and Administration Proclamation No. 136/2000	In accordance to the Federal land administration free assignment of equal land holding rights for women and men
The Revised Family Code Proclamation No. 213/2000 of Ethiopia.	Article 1-3 state the various forms of marriage: marriage concluded before an officer of civil status; marriage concluded in accordance with their religion or the religion of one of them; marriage concluded by the custom of the community of the to which they belong or one of them belongs
Proclamation to ratify the revised Constitution, of the SNNPRS land and family rights (2001)	Property which the spouses possess on the day of their marriage, or which they acquire after marriage by succession or donation shall remain their personal property
Policy and Legal Framework Protecting the Rights of Women and Girls in Ethiopia & Reducing their Vulnerability to HIV/AIDS	Enhancing political participation of women, confronting harmful traditional practices, reducing women's workload and strengthening the legal environment.

Formal legal documents	Provisioning examples
National Cultural Policy of Ethiopia (2005)	Women's participation in cultural sectors and their right to equal share of benefits shall be promoted
Environmental policy of Ethiopia. Ethiopian Environment and Forest Research Institute Council of minister's regulation 327/2014.	To ensure a complete empowerment of women, especially to enable their full participation in reproduction and environmental decision making, resource ownership and management, and to promote on-farm of-farm income generation which aim at the alleviation of poverty.
Agriculture, Growth and Poverty Reduction in Ethiopia: Policy Processes Around the New PRSP (PASDEP) Policy Brief 005/2006	Women's role is important in agricultural growth and poverty reduction

5 Results and Discussion

5.1 Natural and semi-natural areas for human wellbeing

The methodological approach which my colleagues and I developed and tested (**Paper I**) in Sweden was used to identify the priority natural and semi-natural areas, or land covers, that are perceived by urban and rural inhabitants as important for the personal wellbeing in Sidama, my case study area in Ethiopia (**Paper II**). My study shows that there are, in total, eight natural and semi-natural land covers were selected by most urban respondents, seven of them represent natural/semi-natural areas, and one was related to built infrastructure. The selected natural/semi-natural areas cover both natural ecosystems, including both terrestrial and aquatic areas, and cultural landscapes. The seven natural and semi-natural priority land covers are: agroforestry homegardens, agroforestry shade grown coffee, fresh water lakes, rivers, natural old growth forests, Afromontane forests and rural households. In contract the majority of rural respondents selected only two land covers, agroforestry homegardens and agroforestry shade grown coffee, as the most important for their personal wellbeing (Figure 9).

The results (**Paper II**) revealed that each selected land cover is associated with multiple ES important for the wellbeing of respondents. Agroforestry homegardens and agroforestry shade grown coffee were associated by rural respondents with 21and 18 ES and by urban residents with 20 and 13 ES respectively, belonging to all the four categories of ES. The majority of respondents associated these land covers with provisioning ES, mainly for subsistence food and commercial products. Freshwater lakes and rivers were associated with 13 and 11 ES respectively, with fish as the most often mentioned ES. Climate regulation, air quality regulation and habitat for species were the prominent ES associated with Afromontane forests and natural old-growth

forests. Provisioning ES, mainly food subsistence and food commercial, were associated with rural households. The results also show that urban respondents selected more diverse natural and semi-natural areas with a broader spectrum of ES than rural residents. This could be explained by the fact that urban dwellers are often more educated, better informed and demand more diverse ES to satisfy their multiple needs. Rural residents are focused on the most crucial ES that are urgently needed to meet their daily needs, like food, fodder, and cultural identity.

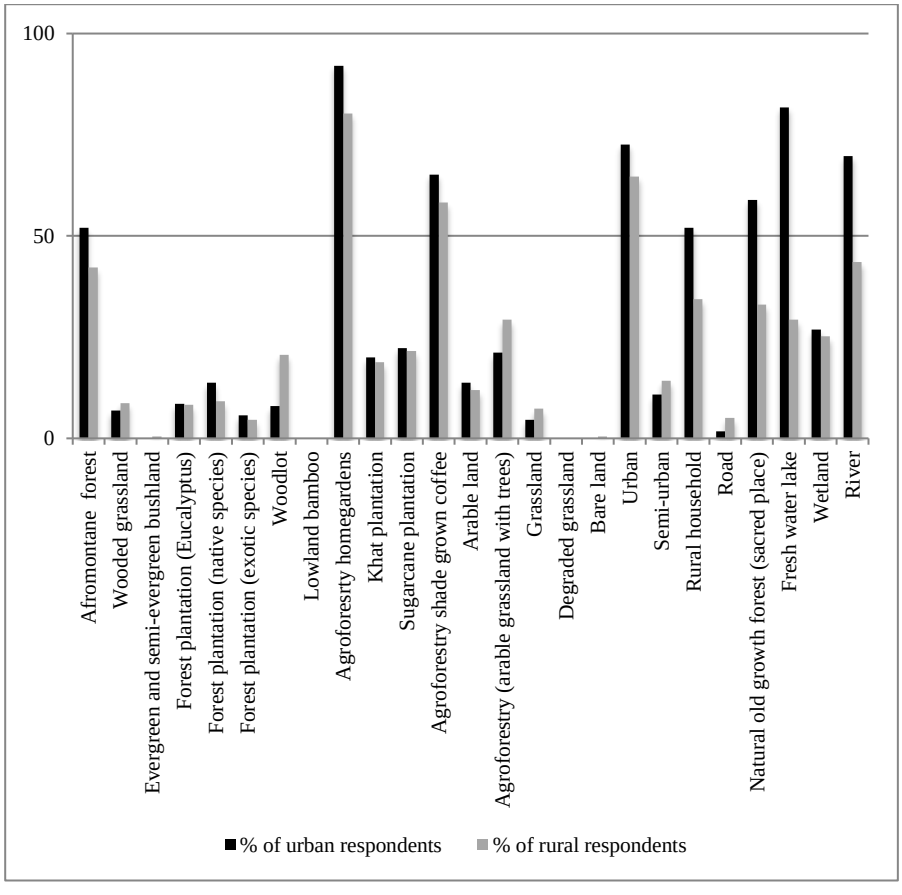

Figure 9. The preferences for natural and semi-natural land covers and built-up areas of urban and rural respondents

These results from my Ethiopian case study are similar to the results related to the preferences of rural inhabitants in the Swedish case study (**Paper I**). In Sweden a majority of urban respondents prefer natural areas; while rural dwellers associate their wellbeing with the presence of the same natural areas as

urban residents, they also prefer semi-natural areas that are connected to traditional agroforestry.

The most unwanted land cover identified by the majority of both rural and urban respondents was degraded land. Over 90% of both rural and urban respondents perceived it as unproductive and basically waste land.

The proportions and distribution of the priority areas are different across the study area. For example, rural households occupied 31% of the study area, while fresh water lakes covered less than 2%. There is a clear difference among the agro-ecological zones regarding the total area of priority land covers. The most wanted land covers are mainly represented in the Woyna Dega agro-ecological zone with a total area proportion between 61% to 70% and 21% to 30% for urban and rural respondents respectively. Degraded land, which was perceived the most unwanted land cover, occupies approximately 4% of total study area, and occurred mainly in the Qolla agro-ecological zone (Figures 10 & 11).

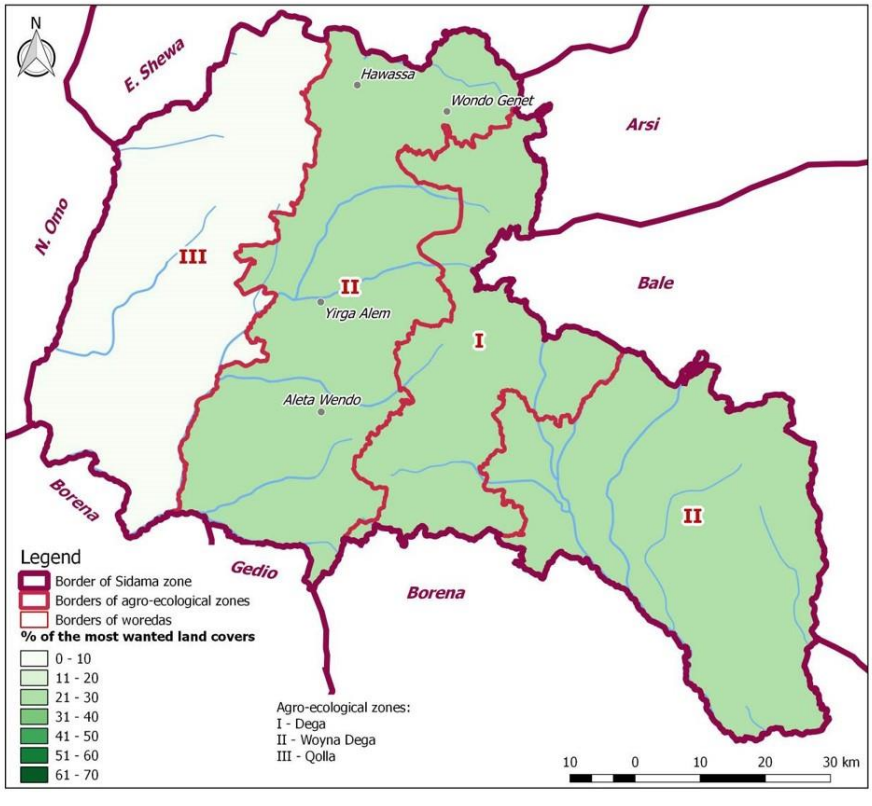

Figure 10. Area proportion of all priority land covers for rural respondents in the different agro-ecological zones.

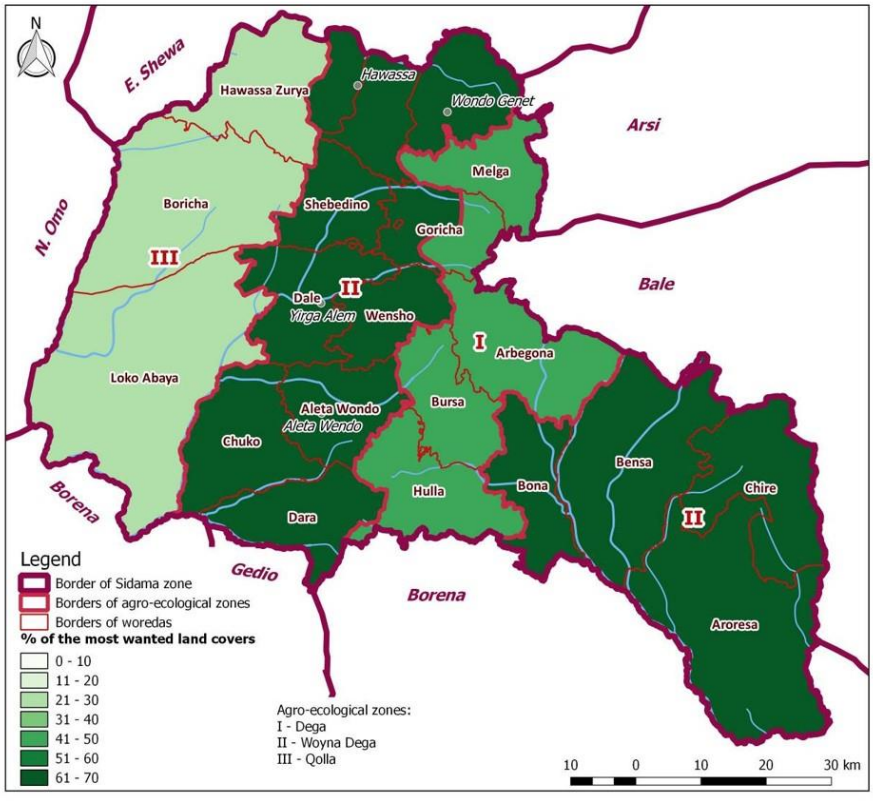

Figure 11. Area proportion of all priority land covers for urban responders in the different agro-ecological zones.

The agroforestry homegardens and agroforestry shade coffee have been identified among the most preferred land covers and have been associated with a wide spectrum of ES important for human wellbeing. Similar experiences of the high ranking of traditional agroforestry have been reported about the European oak wood pastures (Garrido et al., 2017a; Garrido et al., 2017b) and in Sweden (**Paper I)**. Multiple provisioning ES (wood, dairy products, food crops, including vegetables and fruits) provided by agroforestry homegardens in the study area are important for household nutrition, income and food security. Traditional agroforestry is characterized by a large diversity of plant species, and involves the multi-purpose management of trees and shrubs in intimate association with annual and perennial agricultural crops (Fernandes and Nair, 1986; Kumar and Naira, 2004; Peyer et al., 2006; Wiersum, 2006). It often is combined with livestock within the compounds of individual houses (Wiersum, 2006), which helps farmers to diversify their household production, and financial income (Kumar and Naira, 2004). Furthermore, the growing number of

small local cafés in villages and towns that supports small-scale traders, mainly women, indicates the importance of coffee as a traditional cash crop for viability of rural households practicing traditional agroforestry at the local level, and for consumers at multiple levels.

My study shows that many ES, which are essential for the wellbeing of the population, are coproduced because of human-nature interactions. These interactions occur between ecological functions and rural communities' societal traditional practices. For example, multiple ES that the respondents associated with agroforestry homegardens, are actually social-ecological services rather than pure ES. Soemarwoto and Conway (1992) described agroforestry homegardens as part of an agro-socio-ecological landscape combining natural and domesticated plants, domestic animals and people. The composition of plants and animals, including the unique arrangement of perennials and annual crops under different canopy layers, have been adapted as a livelihood strategy by individual households. Andersson et al. (2015) considered agricultural landscapes as a physical manifestation of agro-ecological systems resulting from the interaction of present and past cultural land use and natural factors. My study in Sweden also shows that semi-natural areas that are important for wellbeing of both rural and urban residents are the outcomes of traditional agroforestry and villages as social-ecological systems with traditional farming (**Paper I**). The supporting potential of population densities of over 500 persons/ km^2 in the homegarden areas of southern Ethiopia and the rich species diversity, shows its importance for simultaneous and combined biodiversity conservation, livelihood and food security (Admasu and Struik, 2001; Almaz and Nieho, 2004; Gebrehiwot et al., 2016; Tesfaye, 2013). I argue that in a country like Ethiopia where deforestation, land degradation, shortage of farmland, recurrent drought and food shortage are critical problems, traditional agroforestry practices are important to conserve the multiple products and reduce vulnerability of rural communities.

5.2 Agroforestry homegardens for rural livelihoods

I applied the SLA for analysis of the livelihood assets and the important outcomes of agroforestry homegardens in Ethiopia (**Paper III**). My study shows that a total of 38 varieties of products are grown by the respondents. However, the majority (>50%) of the respondents grow only 16 different types of products for household consumption and market (Figure 12). Over 80% of the respondents in the Woyna Dega part of Sidama primarily grow enset and maize. Enset, coffee, banana, eucalyptus for construction and fuel, avocado, papaya and trees are the main perennials, while maize, potatoes, Abyssinian cabbage,

cabbage, rye, sweet basil are the major annuals grown by more than 50% of the respondents.

These diverse products, including dairy products, give farmers a continuous supply of food and income to support their household livelihoods. Over 50% of the respondents use coffee, wood for construction, banana, papaya, avocado and butter for marketing, whilst only 25% of the respondents who grow enset sell this product. The respondents acknowledged enset as a main crop that provides food for humans and fodder for animals. Admasu and Struik (2001) reported that farmers acknowledged enset as the enemy of hunger, crucial for the life of people and livestock in south and south-west Ethiopia, thus many farmers who had initially shifted from enset to cash crops to increase financial income started to grow enset again recently. Enset is an ideal crop and staple food that overcomes drought-induced food shortages in the southern part of the country due to its multi-annual production and flexible harvesting time (Dessalegn, 1995).

Over 50% of the respondents reported that they generate their household financial income mainly from coffee, while less than 50% used eucalyptus, fruits, food crops, khat and dairy products as their sources of income (Figure 12). Financing children's education, supplying clothing and supplementing missing food items are the major household expenses reported by most respondents (Figure 13). Income from farm products is used for covering these household expenses. Agroforestry homegardens enhance smallholder's resilience through providing food for household consumption and to sell surplus food products to supply other needed items (Mbow et al., 2014; Millat-E-Mustafa et al., 2002). Respondents acknowledged that agroforestry homegardens provide important livelihood outcomes (food, cloth and education). Hence, this farming practice enhances and maintains human capital (health and education) for the rural community. It accomplishes this through continuous production and supply of food, nutrition, and financial income. According to Morse et al. (2009) livelihood outcomes include: more stable income, increased human wellbeing, improved food security and sustainability.

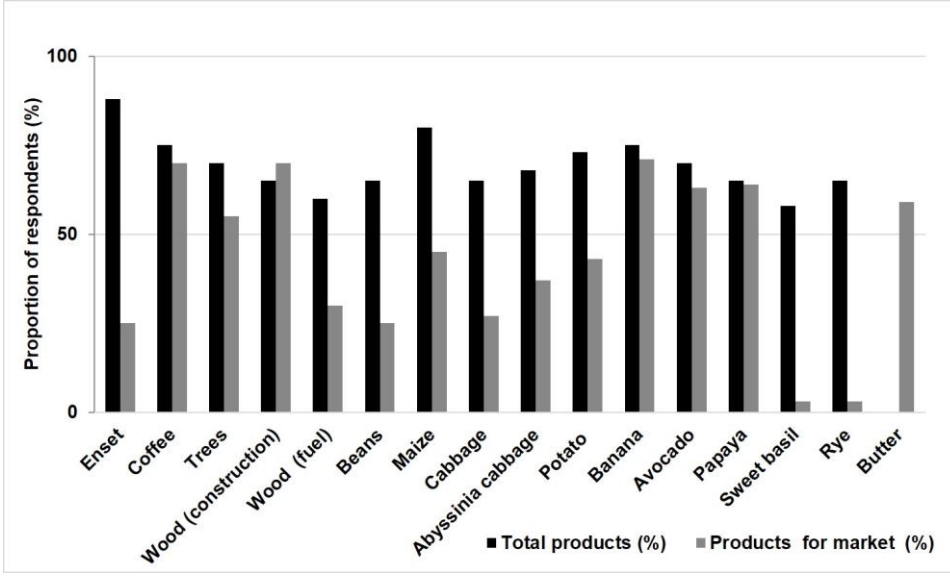

Figure 12. Proportion of respondents producing different agroforestry homegarden products for household consumption and market

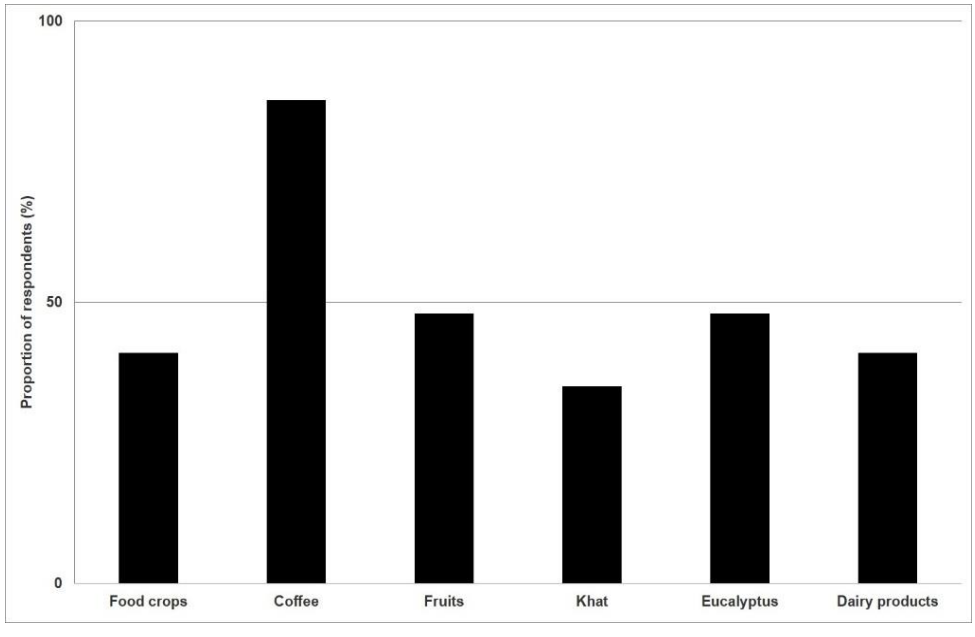

Figure 13. Agroforestry homegarden products that are used as a source of household income

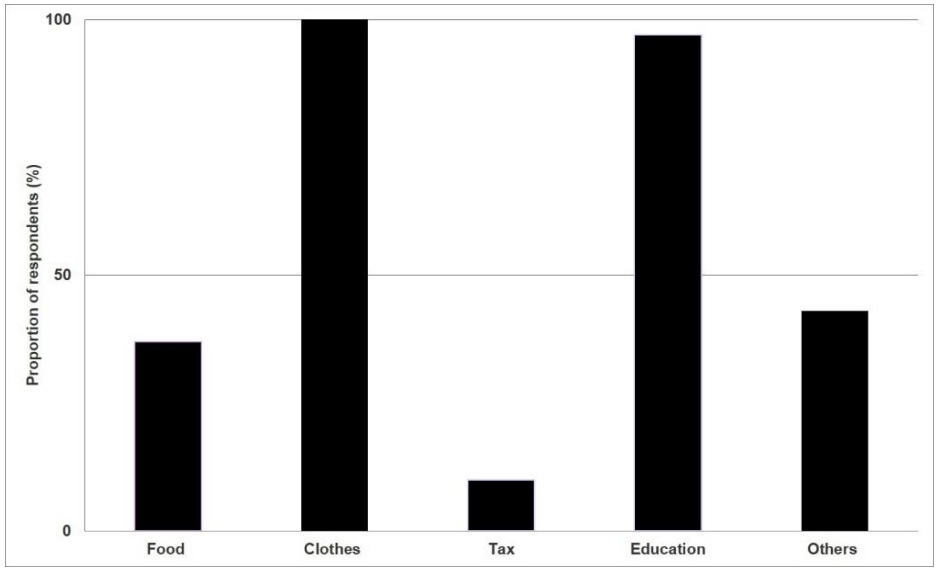

Figure 14. Main household expenses of farmers practicing agroforestry homegardens

Thus, agroforestry homegardens are used to produce all livelihood assets that generate and deliver multiple benefits for livelihood of the rural people. Agricultural land as a natural asset is the primary means of enhancing and improving livelihoods for the overwhelming majority of the rural population (Holden and Yohannes, 2002). Large numbers of rural inhabitants in the study area depend on this natural capital for generating diverse products. Furthermore, agroforestry homegardens have important ecological values for maintaining the areas' biodiversity and ES through the perennial and annual crop composition. For example, several scholars Nair (2011); Ramachandran Nair et al. (2009); Lemessa et al. (2013); Oelbermann et al. (2004); Roshetko et al. (2006); Tola et al. (2014) emphasize that tree growing on farm and grazing fields, is a promising farmers livelihood strategy, because it provides environmental services through climate change mitigation, biodiversity conservation and carbon sequestration.

Regarding the 38 different products that respondents in the case study area grow and produce in their agroforestry homegardens, these products are harvested at different time of the year according to their seasons (**Paper III**). This variability in the life cycles of the multifunctional annual and perennial crops, along with the presence of dairy products, make food and nutrients available year-round. These garden products meet the household food needs and contributes to local market demands. Similar experience was reported by Wiersum (2006) that homegardens in Indonesia provide a continuous supply of food products to meet the daily need of the rural households. A study made by Buchmann (2009) in Cuba confirmed that farmers used agroforestry

homegardens as a strategy to ensure food security and increase resilience during economic and political crises to mitigate the recurring food shortage and malnutrition.

Food production through agroforestry homegardens is considered a major strategy in mitigating the adverse effect of global food shocks and the increasing food prices and instability (Galhena et al., 2013b). Many scholars reported (Kalaba 2010; Kumar and Naira 2004; Maroyi 2009; Montagnini 2006) the achievements of sustainable livelihoods by the diverse productions from homegardens. Thus, homegarden agroforestry in different parts of the world, including the Global South, is an essential livelihood strategy employed to mitigate the global food crisis and the volatile market prices of food. Agroforestry systems reduce the rates of conversion of natural habitats by providing a more productive, sustainable alternative to traditional agricultural systems; this may involve creating natural-like wild habitats and providing connectivity through protecting corridors between habitats which support the integrity of the old-growth forests' remnants and conserves area-sensitive floral and faunal (Jose, 2009; Jose and Bardhan, 2012).

The production, processing and management of agroforestry homegardens in the tropical countries, including my case study area, are based on household labor of women and men. The household labor is an important human capital for the management of agroforestry homegardens using the indigenous knowledge, skills and abilities of the farming community. The agroforestry homegarden is an important occupation for rural people with an average labor investment of 48 hours per family per month (Maroyi, 2009). The production, harvesting and processing of cash crops (khat, sugarcane and eucalyptus) provides local employment for poor farmers and teenagers, predominantly men. Marketing and trading of food crops and dairy products provides opportunities for women who depend on trading for their livelihoods. Livelihood assets such as land and product diversity are key indicators of a household's wellbeing as they can generate income and cope with, and respond to, stress and shocks (Doss et al., 2014). Therefore, I argue that the homegarden agroforestry in Sidama provides at least four livelihood assets (natural, human, social and financial) important for the wellbeing of the rural community. When livelihood assets are assessed in terms of their contribution, it is important to consider vulnerability to shock and stress. Examples of such occurrences include: change of livelihood capital over time, drought impact upon natural capitals and outcomes, including policy and institutions in which the assets exist (Morse et al., 2009).

The results show that agroforestry homegardens in Sidama are under pressure of diverse drives related mainly with population growth and land fragmentation that challenge the effectiveness and efficiency of agroforestry homegardens in

the study area. The analysis of farm size (**Paper III**) shows that respondents with less than 0.25 ha of farmland are the most vulnerable group, which has small and limited production of trees, food crops and livestock for household consumption and marketing. Comparatively they generate less income and have less opportunity to cover their expenses for education, supplementary food and other miscellaneous expenses. Thus adoption of new strategy to meet the demand of the poor growing population and the related declining farm size became important objectives among smallholder farmers to meet their daily household need. Variation in livelihood strategy is important to meet the basic need and to ensure self-sufficiency, thus the cause of livelihood change is mainly related to a household demographic size and access to livelihood assets (Malmberg and Tegenu, 2007).

5.3 Trajectories and driving forces of change

I used the framework of (Geist and Lambin, 2002; Geist et al., 2004) to analyze complex interactions among emerging proximate causes, and underlying forces of change in traditional agroforestry homegardens (**Paper IV**). The result shows that homegarden agroforestry is changing due to diverse drivers towards monoculture production of mainly khat. The change was an opportunity as it increased household financial income and challenge as it decreased household and local market supply of food (Gebrehiwot et al., 2016). Market, institutional and policy, livelihood shock and trends can provide constraints or opportunities to households (Malmberg and Tegenu, 2007). I distinguished three main trajectories of changes that was considered by smallholder farmers as a livelihood strategies (**Paper IV**). The first is a transition from agroforestry homegardens towards khat monoculture since the 1990s. More farmland has been allocated to khat monoculture replacing traditional food and cash crops, mainly the staple food (enset) or the traditional cash crop (coffee). A report in 2011 from land registration and certification in the selected kebeles showed that, on average, khat covered more than 50% of homegardens. Thus, the dominant components such as enset, maize, beans, roots, tuber, fruit trees, shade trees (*Cordia africana, Albizia gummifera and Millettia ferruginea*.) and coffee have been gradually declining at the expanse of khat. Shrinking areas allocated for traditional food crops and grazing land for dairy production has resulted in decreasing food availability and nutritional status in local communities.

The second trajectory of change is the adaptation of the traditional agroforestry homegardens to new socio-economic conditions through intensification. For example, although most household interviewees' characterized khat as a crop that could not be grown together with other crops,

one respondent demonstrated his successful experience of intercropping khat with subsistence food crops; he also included beekeeping to diversify and increase the economic benefits from his farm. Other farmers had also successfully combined khat cultivation with other crops in different combinations. However, most of the household respondents confirmed that because of the limited association of khat with other crops and the small farm size, they felt that a khat monoculture is more effective.

The third trajectory is a return to traditional homegardens after practicing khat monoculture. Key informants confirmed that there are some farmers who are replacing their khat with enset, food crops and trees. This has also been confirmed by focus group discussions. However, the risk of limited household food supply during the transition back to traditional farming practice prohibited some farmers from this activity.

Changes in the agroforestry homegardens are the results of multiple proximate factors. Factors provoking the changes in the traditional farming are (1) higher financial income for households from khat than from traditional cash crops, (2) farm size declining due to farm land redistribution and division, (3) favorable market conditions for khat, (4) access to irrigation important for khat production, (5) limited supply of farm inputs (fertilizer and seeds) for food crop production, (6) positive experience of others in getting high financial income from khat trading, and (7) increasing losses of food crops due to theft and wildlife (Figure 15).

Farmers in Sidama began growing khat as a mono-crop since the 1990s to meet the increasing market demand, and because of the higher return from khat in comparison with the decreasing market value of coffee, the traditional cash crop, and food crops (Gebrehiwot et al., 2016; Tesfaye, 2013). The export of khat has increased sharply since the 1990s as its market and economic importance became greater than any other annual and perennial food and cash crops in Ethiopia (Ezekiel, 2008; Gessesse, 2013a). Following the global coffee crises, average coffee export from Ethiopia dropped from 70 to 35% of total export earnings in 2000, while the official total export income from khat increased by 13% (Gessesse and Kinlund, 2008). In south Ethiopia, the price of khat in the local market increased 500% (from Birr 9 to Birr 45) between 1991 and 2000, which led to the establishment of 20 new khat markets within a 300 km radius (Gessesse and Kinlund, 2008). The demand for khat in the Horn of Africa and Arabian Peninsula countries has driven up both price and khat production levels (Klein et al., 2009; Klein and Metaal, 2010; Klein et al., 2012). Increasing local and foreign market demands have thus contributed to widespread production of khat (Guesh, 2012). The development of khat cultivation in Ethiopia also coincides with governmental policy in favor of a

market economy in 1995 (Belwal and Teshome, 2011). The policy broke the government control over sale of agricultural products and facilitated farmers' free access to markets and the number of markets for khat increased.

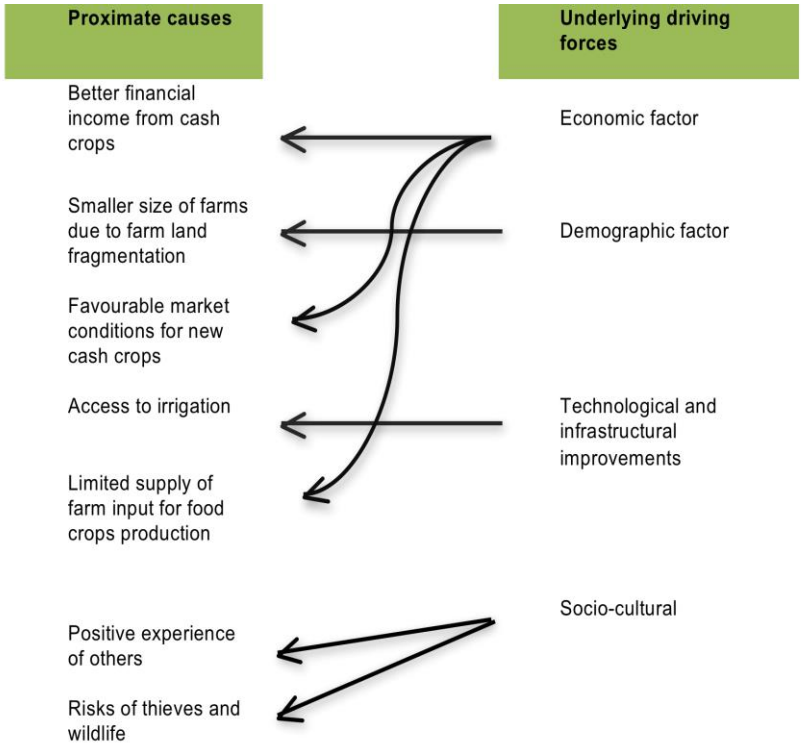

Figure 15. Interaction among proximate causes and underlying driving forces of changes in traditional agroforestry homegardens in the study area

Furthermore, the Ethiopian government has encouraged the export of khat, which has increasingly become a nationally important export product. Since the 1990s, besides the income generated from tax, the export earnings from khat have increased from US $413 million in 2003/04 to US$7.4 billion in 2009 (Gessesse, 2013b). The Ethiopian government has honored khat traders for their contribution in government tax revenue and for securing foreign currency (Gessesse, 2013). Thus, farmers in Ethiopia consider khat production as a livelihood strategy to compensate for declining household income from coffee and food crops (Gebrehiwot et al., 2016). Unlike coffee, for which shade trees are necessary, khat in Sidama grows strictly as a mono-crop without being combined with other crops (Figure 16 & 17).

Figure 16. An agroforestry homegardens (right) and cultivation of khat monoculture (left) at the landscape level. Photo – Marine Elbakidze

Figure 17. An agroforestry homegarden (right) and part of the same farm with new khat monoculture (left) at household level. Photo – Mersha Gebrehiwot

Although the financial income from khat is increasing, it is not adequate to meet the household food nutrition needs in most the study area's rural households due to: 1) the increasing local and global food crises, 2) the unfair and unequal distribution of household income from khat among family members (as khat income is controlled by men), and (3) the seasonal fluctuation of khat markets and prices. The current rises in food prices put food security issue at the top of the global agenda and the long term effect of this crisis will be manifested by high food prices (Anderson et al., 2011).

Land fragmentation and declining farm size is a critical problem that smallholder farmers are facing for maintaining the traditional farming practices in Ethiopia (Headey et al., 2014). A study made by Torquebiau and Penot (2006) concluded that economic and market pressures are the main factors that triggered the development of intensive agriculture leading to increased commercialization of homegardens. Population growth as a source of the study area's declining land size was recognized by smallholder farmers as a limiting factor in continuing the traditional land distribution among family members. They emphasized that the increasing number of landless farmers is related to the increasing number of

inhabitants. Rural people living in Sub-Sahara Africa are experiencing rapid population growth and declining farm size, thus population growth has a large impact on the livelihood of smallholder farmers (Josephson et al., 2014).

The socio-cultural changes of the study area's rural community also contributed to the transition from traditional agroforestry homegardens to production of new monoculture cash crop. The expansion of khat steadily increases the number of consumers, and consumption of khat. Farmers cultivating khat and those involved in processing and trading, including rural teenagers-boys employed in the harvesting, processing and bundling khat, became khat consumers (Figure 18). In a few decades, khat has evolved from consumption within limited social groups for religious and cultural occasions to a visible and pervasive social habit distributed over all social groups in Ethiopia (Ezekiel, 2010; Gebrehiwot, 2013; Gebrehiwot et al., 2016).

Figure 18. Men collecting and processing khat for trading in Sidama zone. Photo – Marine Elbakidze

There is an urgent need for addressing the population pressure and the declining farm size that is threatening the livelihoods of smallholder farmers in Sidama. Introduction of high-yielding crop varieties, increasing productivity and profitability of coffee and other cash crops, including khat, and use of modern irrigation technology are some opportunities to improve productivity in the case study area.

The FDRE has recognized the importance of slowing down rural population growth and promoting sustainable agricultural development through national and regional strategic plans. However, this has not been effective in the rural part of Sidama. For example, the National Population Policy was undertaken as a major way forward to balance population growth, available resource and economic development in the country (NPP, 1993). However, the problem with population growth and land management systems to address rural livelihood and

food security, is not effectively addressed in many parts of rural Ethiopia. Thus, further study on how to address the challenges of the increasing population pressure, agricultural intensification and productivity of smallholder farmers, and off-farm employment of landless rural population are crucial.

5.4 Gender relations in rural Ethiopia

In many rural part of Ethiopia, including Sidama, local customary institutions restrict women's access to land, markets and decision-making processes at the household and community levels (**Paper V**). The main research questions are: how gender relations are affected by the change in agroforestry homegardens, and how the existing institutional framework support women's rights against discriminatory practices. The agroforestry homegarden is based on the labor force of both women and men in the household, however, they hold unequal rights concerning access and control over land and farm products. Women are actively involved in the production and processing of food and make a significant contribution to household livelihoods and food security, however, their level of participation and benefits are constrained by customary norms and practices (Kiptot and Franzel, 2011; Kiptot et al., 2014).

My study revealed that only 10% of women in the study area have user right to land. Land user rights are passed from father to son, and women get access to land through their marriages and labor. Hence, the superior position of men starts at the setting of the new household, as land and house are brought to the marriage in by the husband. In this respect, my study supports observations from other rural areas in Ethiopia reported by other scholars (Askale, 2005; Fafchamps and Quisumbing, 2005; Torkelsson, 2007, 2008b) showing that women's inequalities and discrepancies begin at the initial establishment of the family in the rural communities and persist over a life cycle affecting their individual status and agency.

Figure 19. A rural woman in the Sidama zone. Photo – Marine Elbakidze

Women in the case study area have limited rights in decision making at the household and community levels. The decision about the transition from production of diverse food and traditional cash crops to khat monoculture has been made predominantly by men as the head of the household without consulting and involving their wives (Gebrehiwot et al., 2016). Although khat production increased financial income in many households, the traditionally maintained fair distribution of income among family members and gender power relationships have been shifted and threatened. Thus, women in rural households are the societal group who are most negatively affected by the recent transition towards mono-crop production in the study region.

In the traditional division of labor, women are involved in production and processing and trading of most food crops including dairy products. For example, many scholars (Admasu and Struik, 2001, 2002a; Almaz et al., 2002; Almaz and Nieho, 2004) reported that women in enset-growing regions of Ethiopia are actively involved in the selection of varieties of the enset for cultivation and they are the only ones involved in the tedious work of its harvesting and processing. The men are mainly involved in cultivating land, livestock herding and cash crop production, including its harvesting processing

and treading (Gebrehiwot, 2013; Zerihun and Birehanu, 2015) (Figure 20 & 21). Thus, the new transition to cash crop production of khat, which is mainly controlled by men, exclude women from access and control over of farm resources.

As the income from khat trading is primarily controlled by men in the household the financial income is often spent outside the family to meet men's personal interests in towns for food, drink and social activities, including new engagements (Gebrehiwot, 2013; Gebrehiwot et al., 2016). For example, during our interviews we came across a widow whose husband has moved to Hawassa and established a new family. There are also responsible man who try to share the khat income among family members, it is often inadequate to meet the increasing food prices. The current global food crises that increased the price of food coupled with the decreasing food stock of the smallholder farmers in the developing countries reduced access to food for the poor (UN, 2008).

Figure 20. Women involved in harvesting, processing and trading of enset products. Photo – Mersha Gebrehiwot

Figure 21. Men involved in harvesting, processing and trading of khat. Photo – Mersha Gebrehiwot

My study shows that although women's equal right is strongly supported by the formal, *de jure*, systems, the customary, *de facto*, institutions mostly suppress women's legal rights in Sidama. For example, men who are heading households are able to be a member of KAs that allows them to secure land user rights; while women who have limited opportunity for heading households are excluded from participation in the KAs and have no land user rights. Joireman (2001, 2008) demonstrates the importance of being a household head in rural Ethiopia, as it is a requirement for membership in the local KAs, which is a way for farmers to secure land rights. The limited or altogether missing participation of women in KAs prohibits them from exercising their legal rights and negatively affects their position and agency during divorce and death of their husbands (Agarwal, 2001; Agarwal, 2009; Cornwall, 2003). The insufficient attention of legal formal rights to gender power relations in rural communities and its implications for women, who are not well positioned and represented in local level power structures, is significant in many African countries (Whitehead and Tsikata, 2003). The customary institutions in the study area contain discriminatory norms and rules that restrict and exclude women from access to resources and decision-making. Thus, formal institutions exist only *de jure*, while customary institutions actually operate *de fact* at the household and community level. Furthermore, the market driven production of khat threatened the successful implementation of the national legislation related to women's access right to farm resources.

I conclude that sustainable rural development in Ethiopia can't be materialized without the inclusion of women, who constitute half of the rural society. Therefore, policy and decision making bodies need to ensure that both women and men are well informed and aware of equal gender rights. Further, equal representation of women in decision making and rural development projects is essential for sustainable rural development. Hence, the implementing bodies, mainly the local formal institutions, need to find appropriate strategies for securing equal opportunities for both women and men to secure sustainable rural development. This requires critical evaluation of the existing gap between policies, programs and their implementation and impacts for designing better opportunities and scenarios for their assess to diverse livelihood assets, and fair distribution of households' outcomes. Customary rules and norms and its practice are still strong and have a significant role behind gender inequalities as they are challenging the legal rights of the rural women. Therefore, it is equally important to understand these traditional norms and local customary rules in order to work towards equal opportunities for women and men through integrating formal and informal rules to minimize the misfit between formal and informal institutions.

6 Conclusions

Agroforestry homegardens are acknowledged by both rural and urban populations as one of the most important semi-natural land covers associated with multiple essential ecosystem services important for human wellbeing of south Ethiopian population. Traditional agroforestry homegarden is the main livelihood strategy of smallholder farmers that balances and maintains the natural, financial, human, social and physical livelihood assets and delivers essential livelihood outcomes for the livelihood of the rural community in the case study area. This livelihood strategy reduces vulnerability, keeps livelihood and food security while maintaining a viable natural environment.

However, the efficiency and capability of traditional agroforestry homegarden is challenged by varied external and internal drivers. The main trajectory of changes in this traditional land use is towards monoculture production of new cash crops. Hence the long traditionally maintained balances between the five livelihood assets and the related livelihood outcomes are declined. The underlying drivers of the transition are: economic and market demand, population pressure, farmland fragmentation and degradation, institutional and cultural changes of the rural communities and technological development. The transition to mainly commodity production, for example, khat (*Catha edulis*) mono-cropping is a livelihood strategy considered by smallholder households to meet their basic livelihood needs and to ensure self-sufficiency (Fig. 22).

Women are the most affected by the transition towards monoculture production of new cash crops. Although national legal institutions recognize women's contribution and rights, in practice women in rural Ethiopia are still disadvantaged, and their role in rural development is overlooked. The local customary institutions restrict women's access to land, market and trading, decision-making at household and community levels. The conflicting difference between the formal and customary institutional practices compounded with the land use change challenged household gender relationship and contested

women's right in Ethiopia. Thus reconciling customary law and gender equity by demonstrating common challenges and possible paths towards minimizing the tension between formal and informal institutions is crucial to guarantee women's equal right in rural Ethiopia.

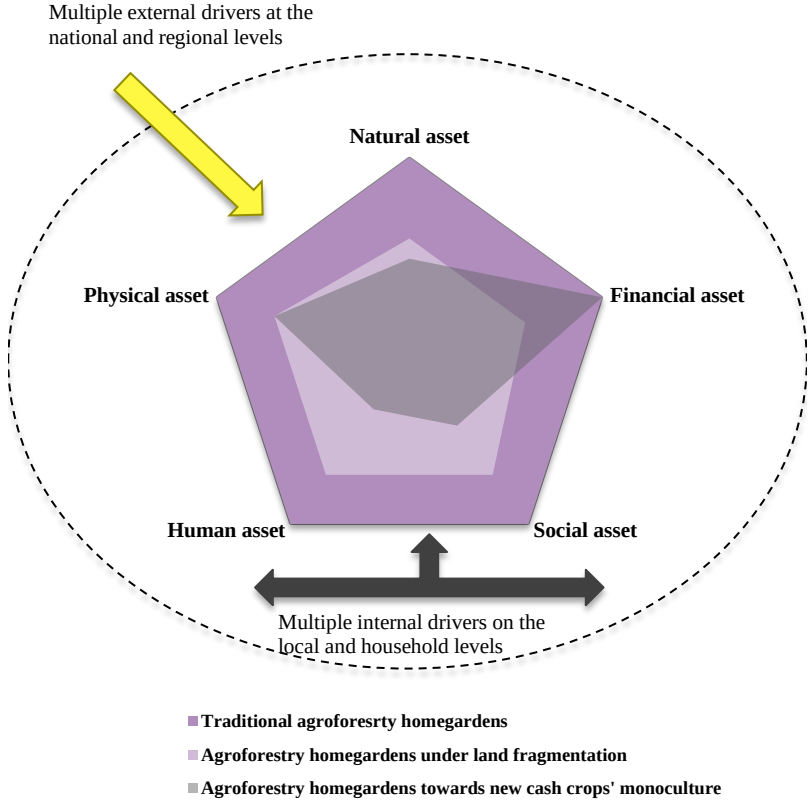

Figure 22. Schematic proportions of all five assets at the household level under different trajectories of agroforestry homegardens' in transition

Introduction and integration of high-yielding crops to increase farm productivity, and to create opportunities of non-farm employment in order to support the increasing population of landless farmers are essential. Improvement of value-added production from food and traditional cash crops is crucial. Policy makers and rural development projects together with the local communities should consider scenarios and opportunities on how to reconcile the declining farm size with the increasing rural population and landless farmers. Furthermore

participatory and action research is crucial to develop viable livelihood opportunities that centred the need of the rural community.

From a research perspectives there are knowledge gaps remain in the SLA that I would like to address in my future studies. The one gap concerns the lack of comprehensive comparative empirical assessments of rural livelihoods assets in different social-ecological contexts (Allison and Horemans, 2006; Scoones, 2009; Scoones and Wolmer, 2003). The sustainability of a community or household can be assessed in terms of an aggregate configuration of all of its assets. Another gap is related to a lack of knowledge on the aggregate influence of assets at multiple spatial and governance levels on rural sustainability. This gap extends to include missing knowledge regarding how assets interact and/or are integrated in sustainable livelihood strategies compared with unsustainable strategies in different contexts. Additionally, whilst many studies have focused on short-term adaptation and coping strategies based on vulnerability analysis (e.g., Scoones 2009), there remains a lack of evidence-based knowledge regarding how livelihoods respond to global changes, including climate change or globalization. Empirical research is therefore required in order to better understand how the elements of the SLA are interconnected in place, space, and time, and to understand the potential systemic implications of these interconnections for the long-term viability of rural populations in vulnerable contexts such as Ethiopia.

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