Graduate Program in Sustainability Science
Graduate School of Frontier Sciences
The University of Tokyo

2010 – 2011

Master's Thesis

Urban agriculture in Addis Ababa: the importance of producers' cooperatives to sustainability

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Submitted in August 2011

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Declaration

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As principal supervisor, I hereby approve that this thesis entitled "**URBAN AGRICULTURE IN ADDIS ABABA: THE IMPORTANCE OF PRODUCERS' COOPERATIVES TO SUSTAINABILITY**" is prepared and submitted by Dawit Ashenafi Ayalew in partial fulfillment of the requirements for the Master's degree in Sustainability Science.

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Acknowledgment

I would like to thank the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) for offering scholarship to my study in Japan. My deepest gratitude should also be extended to my principal supervisor Prof. Makoto Yokohari for his encouragements, support and keen advices throughout my study and research. Your academic and non academic insights were invaluable to me. I also thank my co-supervisor Prof. Masahide Horita for his suggestions and feedbacks in my research. Many thanks to the Environmental Formation (Keisei) Lab members for their feedback during my presentations throughout the two years study. I am also indebted to all staff members, professors, and students of the graduate program of Sustainability Science (GPSS) for their comments and feedbacks during student seminars.

Finally I thank the agriculture development agents in Addis Ababa for arranging me platforms to interview farmers and cooperative leaders in my survey. Special thanks go to cooperative leaders and individual farmers for their kind reply and sharing their experiences. The Addis Ababa city UA office staffs should also be thanked for their cooperation of giving me secondary data.

Table of Contents

List of Tables

List of Figures

List of Boxes

Abstract

Practiced by more than 800 million people in the world, urban agriculture (UA) is significantly contributing to the sustainability of cities and societies both in the developed and developing countries alike. However in developing countries, particularly in Africa, UA is considered as illegal and quintessentially rural activity that does not fit with the modern day urban setup. Many urban farmers are therefore struggling to survive and continue sustainably. Farmers are often constrained by insecure land tenure, low productivity, and lack of social/political acceptance due to alleged environmental externalities. Thus in this study the significance of urban farming cooperatives for addressing sustainability issues of urban agricultural phenomenon were investigated by taking the city of Addis Ababa as a case study. Data were collected from six cooperatives using a questionnaire comprising of several dimensions of sustainability. In order to have a clear picture ten non cooperative farming growers were also interviewed and contrasted against the cooperatives. Spatial change analysis of the cooperatives' farm land was performed, using aerial photos and satellite imagery of the period 1984 to 2008, for endurance or stability assessment of cooperative agriculture. Results revealed that cooperatively managed urban agriculture is highly productive (even fivefold higher than rural vegetable production) than individually managed ones due mainly to cooperatives' ability to procure inputs collectively. The land security and access constraints among farmers are comparatively lower in cooperatives than in individually farming groups. The Spatial analysis also showed that UA is not a short-lived or transitional phenomenon by the cooperatives; it is rather a stable and resilient practice. However, their informal nature and resulting lack of environmental orientation (particularly huge dependency on external inputs) should be addressed in order to make UA more comprehensively sustainable and appealable by authorities.

Key words: *Urban agriculture, cooperatives, sustainability, land security, Addis Ababa*

1. Introduction

1.1. Background

Urban Agriculture (UA) can generally be defined as the growing of plants and the raising of animals for food and other uses within and around cities and towns, and related activities such as the production and delivery of inputs, processing and marketing of products (FAO, 2007). For the purpose of this study UA is considered the production and marketing of horticultural crops in and near to a city.

UA is as old as towns and cities themselves, although it has only relatively recently been recognized by national and international bodies for its importance for the sustainability of cities and urban societies (Petts, 2005). It is a global phenomenon and is performed, studied, and described worldwide. It has become a topic of scientific research in recent years.

More than 800 million urban dwellers both in the global North and the South practice UA, though with some distinct objectives. In the north it is generally seen as a response to reducing long term environmental degradation, often related to specific areas of social deprivation (Petts, 2005). It is usually associated with recreation and aesthetic values, with different forms of farming including allotment gardens, community gardening and so on (Giradet, 2005). Apart from this in some cities of Northern America UA starts to be seen as a form of empowerment for underprivileged people (immigrants, homeless etc) in that it affords poor people an opportunity to increase control over their own nutritional intake and generate income (UNDP, 1996 p46).

In the South, it is relied upon by many households for their very existence (Petts, 2005). In fact UA is a significant economic activity, central to the lives of tens of millions of people throughout the developing world. In Asia around 60% of the urban population involved in urban agriculture (Bryld, 2003). In Africa up to 70 % of the urban population have become urban cultivators in the 1990s and benefiting economically and nutritionally (UNDP, 1996).

Recently the production and supply of perishable crops (vegetables and fruits) and dairy products to bigger metropolitans of many African countries is remarkably concentrated in Urban or Peri-urban Agriculture (UPA). In Accra and Dares salaam, for instance, 90 % of the vegetable consumption is met by urban agricultural production (FAO, 2007). In Addis Ababa and Dar es Salaam, 70% and 60%, respectively, of milk consumed in the city is produced in and around the cities (FAO, 2007; Tegegne et al., 2000).

Despite wider population participation and benefits obtained from UA, agriculture in the cities of most African countries is undervalued and resisted by generations of public officials (UNDP, 1996). Bryld (2003) also reports that UA, in a rapidly urbanizing Africa, is perceived as illegal and marginal activity which is a quintessentially rural activity that does not fit with the modern day urban setup. This situation results in several related problems for farmers in particular and the cities in general.

1.2. Problem statement

The fact that UA is perceived as illegal and informal in most African countries poses problems on urban agricultural phenomenon that restrains the sustainability of farming in the cities. The main sustainability constraints are majorly reflected in the prevalence of lower productivity (Bryl, 2003), lack of secure tenure (Lych et al, 2001), intensified environmental (water, soil etc) burden imposition (Mbiba 2000; Bryld, 2003). The sustainability of the urban agricultural phenomenon is therefore widely under question.

As a result of the legislative constraint cultivators in many parts of the continent chose different strategies to cope with problems (Bryld, 2003; Drechsel and Dongus, 2009). Some growers chose to produce vegetables that have a lower yield but mature faster in order to reduce the time of stature and, thus, the period where there is risk of eviction. Mostly growers will have to compromise productivity over secured harvest (Bryld, 2003). This risk-adverse production form provides the cultivators and in the end the city with less produce than could potentially have been produced.

The problem further extended to the lack of security to land tenure and hence farmers deploy very simple and moveable technologies that cannot improve productivity (Drechsel and Dongus, 2009). Fear of eviction leads cultivators to, as mentioned above, plant short-duration seasonal crops, which could reduce the ecological diversity. Furthermore, the cultivators can find little incentive in making investments to improve soil fertility and prevent erosion when they risk eviction (Bryld, 2003).

Farmers in general cope sustainability problems by adapting different strategies as mentioned above and these strategies are not sustainable (Bryld, 2003). Forming farmer's cooperatives and lobbying for security and survival is the other option (UNDP, 1996) that is relatively least studied. In this regard in Addis Ababa urban farmers form collectives in order to survive different challenges posed by unfavorable legislative conditions and physical city expansions (Axumite, 1994).

These cooperatives survived and functioned for several decades. Understanding these cooperatives would, therefore, add valuable knowledge how cooperatives respond to several challenges and help reduce production and other related risks and environmental burdens under non-conducive situation. Focus of this research, therefore, has been on urban farmer cooperatives in addressing production, marketing, and land tenure risks and in reducing environmental burdens.

1.3. Objectives

The study had the following two objectives:

- Investigate the function and importance of urban producers cooperatives to the sustainability of urban agriculture
- Investigate the spatial changes occurred as a result of city expansion pressure and assess the cooperative's ability to endure

1.4. Research questions

The study seeks to answer the following main question and sub questions based on the **hypothesis** that urban farming cooperatives play a major role in the sustainability of UA by improving productivity and marketing, reducing eviction risks and lobbying for acceptance.

Main research question:

What are the merits of urban farming cooperatives for sustainability of urban agriculture?

Sub questions

1. Do cooperatives help achieve productivity and improve market accessibility?
2. Do cooperatives reduce land eviction risk and improve access to land for their members?
3. Do cooperatives help members to reduce environmental impacts while meeting their objectives? and
4. Do cooperatives endure challenges posed by city expansion over time?

1.5. Significance of the study

The study will shed some light on urban farming cooperatives' contributions towards coping challenges faced by many urban farmers in unconducive and restrictive urban development policy in Africa. It also adds valuable knowledge about the role of urban producing cooperatives in achieving ownership, empowerment and sustainability of urban agricultural phenomenon.

The research will also add to the understanding of the type and nature of urban producer cooperatives for further planning, implementation and monitoring of core activities in line with strengthening the contribution of UA to future sustainability of cities that have similar socio-economic setup like Addis Ababa.

1.6. Structure of the thesis

This thesis is organized into five chapters. The first chapter deals with the background and justification of the research followed by the second chapter which is mainly reviewing literatures on urban agriculture in the global context and particularly discussing urban producer cooperatives. Chapter three of the thesis discusses the methods employed in the study and description of study site. Results and discussion is explained in chapter four. Finally the study will be concluded in chapter five.

2. Literature review

2.1. Dimensions of Urban Agriculture

Definition and scope of urban agriculture is under contention by many researchers (Baumgartner and Belevi, 2001). Instead of giving a single definition, Mougeot (2000), provides building blocks to look into UA. Mougeot puts six dimensions to define and investigate UA viz. types of location agriculture being practiced, types of products produced, product destination, types of areas where it is practiced, types of economic activities, types of production systems, and production scale.

The location dimension is one of the most contested and by far the most commonly used element to definitions (Baumgartner and Belevi, 2001; Mougeot, 2000; RUAF web site; Tinker, 1994). This literature review part therefore mainly focuses on locational dimension of UA.

2.1.1. Types of location

UA may take place in locations inside the cities (intra-urban) or in the peri-urban areas. Many authors recognize the need to differentiate peri-UA from intra-UA in that the opportunities and challenges farmers face also differs with the locations (Mougeot, 2000). For instance, the periurban area is one where the advantages of combining farm and non-farm work can be maximized by residents. On the contrary the peri urban agriculture, as located in the more unsettled urban fabric, tend to undergo, over a given period of time, more dramatic agricultural changes than do locations in more central and built-up (intra urban) parts of the city (Mougeot, 2000).

Intraurban agriculture is the less contested type of location based definition. Many authors differentiate intraurban agriculture from periurban one by population sizes, density thresholds (Tsubota, 2007), official city limits, municipal boundaries of the city, agricultural use of land zoned for other use, agriculture within the legal and regulatory scope of urban authorities

(Mougeot, 2000). Even within the intra urban a further classifications can go on with regard to the origin of agriculture itself. In some cases urban agriculture existed in the city long time ago in different forms while in other cases UA came to existence as a result of city expansion and urbanization (Tinker, 1994 p4; Wilbers et al, 2007; UNDP,1996).

Cities of the advanced countries, particularly in Europe and North America, as they are less densely populated and have more available lands for growing crops agriculture practiced in intraurban open spaces quite long time ago. The most common type of urban agriculture in Germany, the allotment garden, for instance existed in cities since the 19th century (UNDP, 1996).

On the contrary in most developing countries rural agriculture become part of the city and engulfed by expanding cities and urban sprawls and resulted in intra-urban agriculture (UNDP, 1996). Figure1 indicates the expansion of city and engulfing agriculture in Addis Ababa. Whereas, though an advanced country, Tsubota (2007) reports by illustrating examples of Tokyo (Nerima ward) that in Japan urban areas have expanded naturally to outward agricultural and forest areas and resulted in reminiscent of agriculture surrounded by city expansions.

Figure 1 *Periurban Agriculture engulfed by city expansion 1994-2008 (Addis Ababa)*

Baumgartner and Belevi (2001) describe the features of periurban area as follows: The periurban area contains both rural and urban elements, but the resulting periurban systems may have

distinctive characteristics of their own. It is characterized by strong urban influences and demands, easy access to markets, services and other inputs, but a relative shortage of land, pollution risks and urban growth.

2.1.2. Types of areas

Besides the locational definition (intra and periurban agriculture) urban agriculture also typified based on the type of places agriculture is being practiced. UA takes place in many different places including on and around buildings, community lands and parks; areas allocated to use other purposes such as roads, and along rivers etc (UNDP, 1996; Mougeot, 2000).

2.1.3. Types of crops grown

Regarding the type of products UA includes food products, from different types of crops (grains, root crops, vegetables, mushrooms, fruits) and animals (poultry, rabbits, goats, sheep, cattle, pigs, guinea pigs, fish, etc.) as well as non-food products (like aromatic and medicinal herbs, ornamental plants, tree products, etc.) or combinations of these. Within food crops, definitions clearly stress the more perishable and relatively high-valued vegetable and animal products and by-products are favored (Mougeot, 2000).

Types of product is also used to distinguish, at least in developing countries, urban agriculture (particularly periurban) from the rural counterpart in that mostly perishable vegetables are produced using irrigations all year round by the former than grains or other staple foods once in a year (rain-fed) by the later (FAO,2007). Production units in urban agriculture in developing countries in general tend to be more specialized and the productivity and profitability of the activities is better than the rural agriculture.

2.2. Conditions that favor emergence of urban agriculture

Globally a large number of urban residents involved in agriculture due to several circumstances that can, according to Nugent (2000), arise suddenly or develop over time. The latter mostly occurred in the developed countries. In London, for instance, large residents who seek a greater community involvement, greening and fresh healthy food, become involved in community

gardening (Nugent, 2000). Community gardening has long tradition in North America and Europe reaching peak in the Second World War through 'victory gardens' (UNDP, 1996).

The conditions in which food production suddenly becomes important in a city are emergencies from civil, weather or macroeconomic upheaval, often combined with a high incidence of poverty, inaccessibility to adequate food supplies from rural areas or imports, and good growing conditions (Nugent, 2000). Tsubota (2007), reports that hardship and food shortages that hit postwar Japan for the first time made known to urban families the potential and importance of UA for their livelihood. Backyards, riverbank or even schoolyards were dug and planted with food crops.

The other example from Cuba shows that UA became important and apparently culture by many residents of Havana, after the socialist bloc disintegrated. The country lost access to cheap fossil fuels, direct food imports and agricultural inputs it was getting from Russia on which it so heavily depended for its export production. This situation as a result created crisis. Urban residents hence motivated to engage in UA and currently the city of Havana becomes self sufficient in vegetables (Novo and Murphy, 2005).

In most African countries, however, the structural adjustment programs implemented in the 1990s at the insistence of the World Bank have contributed to the large involvement of urban residents in informal agricultural activities as a survival strategy (Drakakis-Smith et al., 1995; Page, 2001; Sumberg, 1999).This structural adjustment has exerted huge pressure on the urban poor who have to survive largely in the cash economy. Many researchers report that UA has played a very important role in stabilizing the situation (Drakakis-Smith et al., 1995; Page, 2001; Sumberg, 1999).

In Ethiopia structural adjustment program was implemented from 1993 to 1997. Like many African countries the structural adjustment increased employment in the informal sector (Krishnan et al., 1998). Though research on the relation between structural adjustment and UA in the city is lacking, the number of urban farming cooperatives however, increased during that period from six to eleven (Araya et al., 2007; Axumite, 1994).

2.3. Urban agriculture and cooperatives

Cooperatives of farmers are usually formed to increase the sustainability of farming activities by reducing input cost and increasing profits, thus reducing risks. Urban producers' cooperatives, like their rural counterparts, can play an essential role in the development of safe and sustainable intra-urban and periurban farming, by training and educating their members, jointly procuring inputs, improving access to credit and marketing, lobbying and establishing strategic partnerships (UNDP,1996; Wilbers et al, 2007).

However, the challenges faced by cooperatives operating in an urban context are often bigger and more numerous than those of their rural counterparts. These include restrictive or even prohibitive policies on urban agriculture, and the subsequent absence of institutional support. A higher diversity of cooperative types and members also creates difficulty for organization (Wilbers et al, 2007).

Urban producers' cooperatives are very diverse. Some only supply specific services for their members (e.g. a credit and savings group, a lobbying group to defend or obtain land use rights) while others fulfill a whole benefits ranging from training to marketing. Wilbers et al (2007) classified urban producers associations based on their orientation as socially, economically, and politically oriented cooperatives. Socially oriented cooperatives include urban poor, women, youth and handicapped or elderly people. In advanced countries organizations of home and community gardeners who undertake gardening for leisure, health and/or community greening can be included.

Economically oriented urban cooperatives include organizations which are often more market oriented, have developed their internal organization and management and often have gained legal status. Politically oriented ones focus on the organization of urban farmers as a way to more effectively influence policy making, for instance to improve access to and security of resources or lobby for support of organic production (e.g. in Japan). Box1 illustrates one striking example of cooperative in Japan promoting organic production and fostering producer-consumer co partnership.

Box 1 *Case study of Teikei system of food production and distribution in Japan*

'Teikei' is one such type of cooperative, where consumers identified a need to transform both farming practices and the relations between farmers and consumers. It is a system of community-supported agriculture in Japan, where consumers purchase food directly from farmers. A general movement towards consumer-farmer partnerships in Japan in the late 1960s and early 1970s was driven by environmental issues caused due to massive industrialization and distrust of the quality of food in the conventional food system.

Teikei is an idea to create an alternative distribution system, not depending on the conventional market. Though the forms of teikei vary, it is basically a direct distribution system. The producer(s) and the consumer(s) have talks and contact to deepen their mutual understanding: both of them provide labor and capital to support their own delivery system. In this system they usually set delivery stations, where the nearest consumers of 3 to 10 families can get the delivered products (See chart 1).

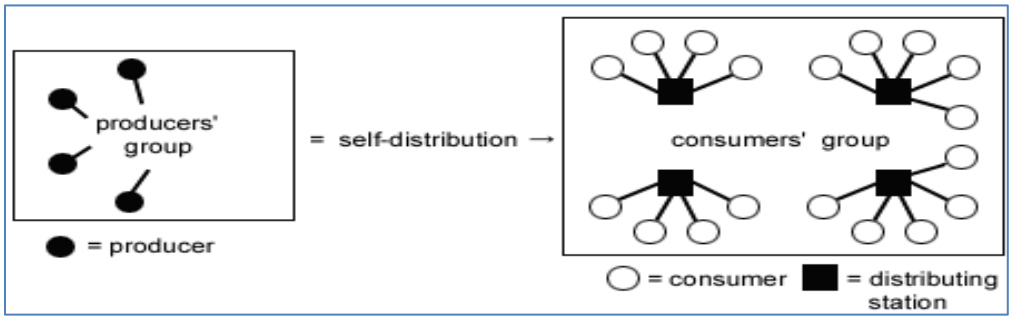

Chart 1.food distribution mechanism under the Teikei system
Source: JOAA (1993)

In the "teikei" system consumers (usually urban dwellers) are supposed to be supplied with a surplus amount of producers' crops and products (organically produced). In a sense they belong to one big family in each case. Consumers visit their producers to help on the farms, sharing the labor needed for the management. The frequency and quantity of their aid varies depending on the groups. A common merit is to understand better the people on the farm and what agriculture is like through their direct commitment to farming activities.

The delivery is made by themselves, producer or consumer. The producer will know who will eat their produce and the consumer will know who takes care of it. They will be familiarized with each other and get a better understanding of each other's way of life through conversation and working together. "Teikei" stands on the friendly relationship between producers and consumers.

Such system focused not only on exchanging products but also, perhaps more importantly, on creating an alternative community by establishing a relationship between farmers and consumers who have the same goals of conserving the environment and maintaining their community. Consumers can consist of agriculturist by training and from other professions as well.

2.4. UA sustainability and analysis framework

For any study on agricultural sustainability, the question arises as to how agricultural sustainability can be assessed and measured objectively. Sustainability in its essence refers to the ability of something to endure over time. Sustainability of UA basically implies its ability to continue in the future and operate at the current or increased levels (FAO, 2007). In order to be sustainable, UA should be economically viable, environmentally sound, socially just and culturally acceptable.

Different researchers use different approaches to assess the sustainability of UA in a given context. Fialor (2002) argues that the sustainability of UA hinges on the security of access to land, input use and availability, output levels obtained and the prices received per unit of output, as well as capacity to achieve these prices without significant negative environmental consequences. Failor essentially emphasizes that main factor for UA's sustainability seems to be security of land access.

Drechsel and Dongus (2009) also discuss the sustainability of UA in Tanzania in relation with spatio-temporal changes occurred on cultivated lands. They further explain that dynamics and resilience of the urban agricultural phenomenon can be depicted from their existence for longer years. The endurance of urban farming over decades or so seems to support the assumption that the system is sustainable in general.

Cofie (2009) on the other hand argues the sustainability of UA will be assured mainly by the economic sustainability, which is the ability of the farmer to continue his farming business, the capacity of the farm to generate sufficient cash to meet its financial requirement. Hence, Cofie adds, economic viability must be the main factor in assessing sustainability.

In the past most researchers use cost benefit analysis to assess the sustainability of UA and it has only recently been extended to environmental impacts (Nugent, 1999). The current research therefore investigates the sustainability of UA in Addis Ababa by taking into consideration of the following variables: access and security to land, improving productivity, ability to lessen impact

on environment, and acceptance by society. The indicators to measure sustainability are adapted from different literature as shown in table 1.

Table 1 *Literatures used for sustainability indicators identification*

Indicators	Literatures
Productivity	Dreschel and Dongus (2009); Dennery (1996); Cofie (2009)
Protection of environment	Angeles (2002); Burleigh and Blake (2001)
Acceptability (social, political)	Dreschel and Dongus (2009); Flynn-Dapaah (2002)
Land security	Flynn-Dapaah (2002); Drechsel et al. (1999)

Source: based on FAO (2007)

Economic sustainability was measured based on seven indicators improving productivity and market security. The premise behind these indicators is that if farmers can have higher productivity and good access to market they can sustain their farming practice. Land security and access is the second criterion to assess sustainability of UA and is estimated by four indicators. The principle behind these indicators is farmers being secured of the land they practice farming and the ability of farmers to negotiate with authorities regarding evictions can bring about sustainability of UA.

Regarding the environmental dimension of the framework, five indicators particularly focusing on less chemical utilization, soil conservation and waste utilization practices are considered as merit for reducing environmental burden. The societal acceptance and benefit of the sector was measured with three indicators particularly with job creation opportunity (employment opportunity is also indicator to equity (Rasul and Thapa, 2003)) and contribution to community development. The criteria and indicators are depicted in table 2.

Table 2 *Criteria and indicator for sustainability analysis*

	Indicators
Improving productivity and market	1 multiple cropping pattern
	2 highest number of production per year
	3 highest number fertilizer application
	4 access to irrigation facility
	5 more than 1 form of market outlet
	6 get market information from central market
	7 storage facility
Land security and access	1 opportunities to expand land for production
	2 being secured of the land cultivating
	3 able to negotiate with authorities against land eviction
	4 less prone to change (no change of farm land in last 5 years)
Environmental burden reduction	1 less chemical fertilizer use (<2 times/year)
	2 more time organic fertilizer
	3 soil conserving structure
	4 composting facility
	5 cropping practice (fallowing and rotation)
Social acceptance and benefit	1creating job opportunity
	2 selling product by lower price for neighborhood
	3 community development contribution

3. Materials and method

3.1. Study site description

Addis Ababa is the largest and the capital city of Ethiopia with a total area of 540 square kilometers and population of more than 3 million (2007 census). It is populated by people from different regions of the country of different ethnics. The major ethnic groups living in the city are the Amharas (49% of the population), followed by Oromos (19%) and Gurages (16%) (CSA, 2007).

The city was founded in 1886. The city has shown a dramatic expansion from 1941 to 1960s after the Italian occupation. Unlike many other African capitals, Addis Ababa's founding, growth and development, is not rooted to colonization. Many African cities, founded in the 19th and early 20th century by colonial rulers who had concept of grandeur, percept of cleanliness and a firm intent to clearly distinguish themselves from the bush, discourages farming in cities (UNDP, 1996). In Addis Ababa, however, during both its foundation and in the period of huge expansion (1940-end of 1960s) agriculture woodlots and plot of cultivated lands were found on any vacant lot within and immediately surrounding the city (Horvath, 1969) (see also fig2).

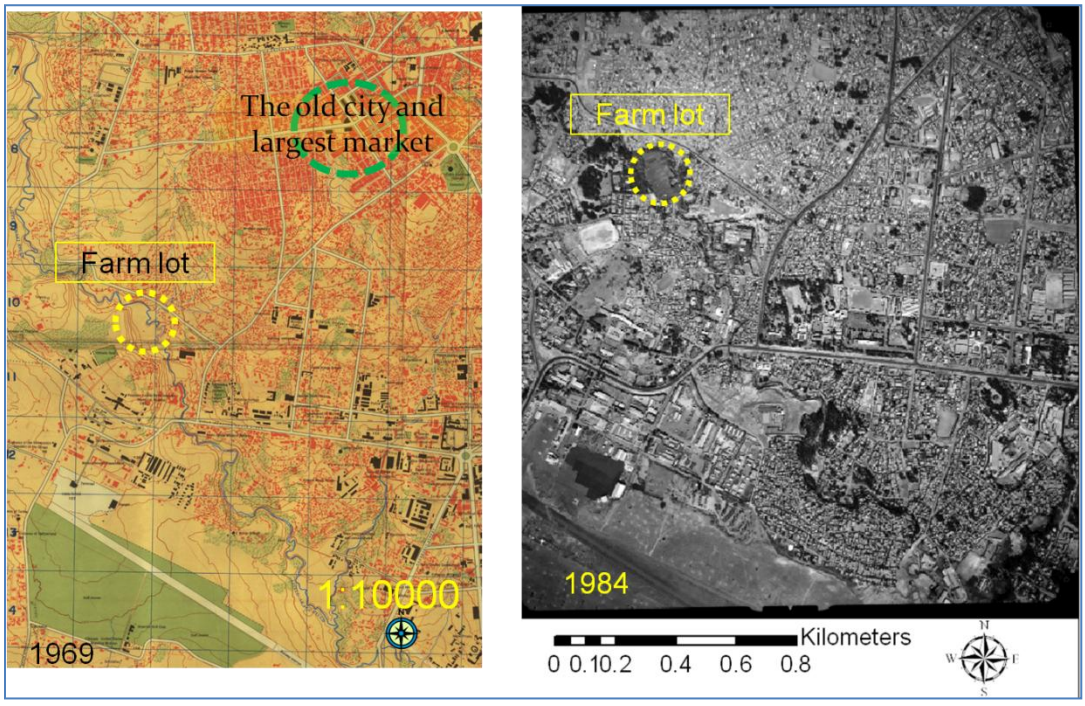

Figure 2 *Agriculture land in the older part of the city*
Source: Author's analysis

The city of Addis Ababa is divided into ten administrative sub-cities and which each sub city again subdivided into 116 *woredas* (similar to ward), the smallest administrative unit (Fig3). For the current research six cooperatives located in five sub-cities were considered.

Addis Ababa is suitable for farming due to its favorable climatic and soil conditions. It is located at an altitude range from 2400 to 3000 meter above sea level. Addis Ababa enjoys average annual rainfall of 1255 mm. The soil type, according to the FAO soil classification, is a nitisol, fertile tropical soils of high nutrient content and deep, permeable structure.

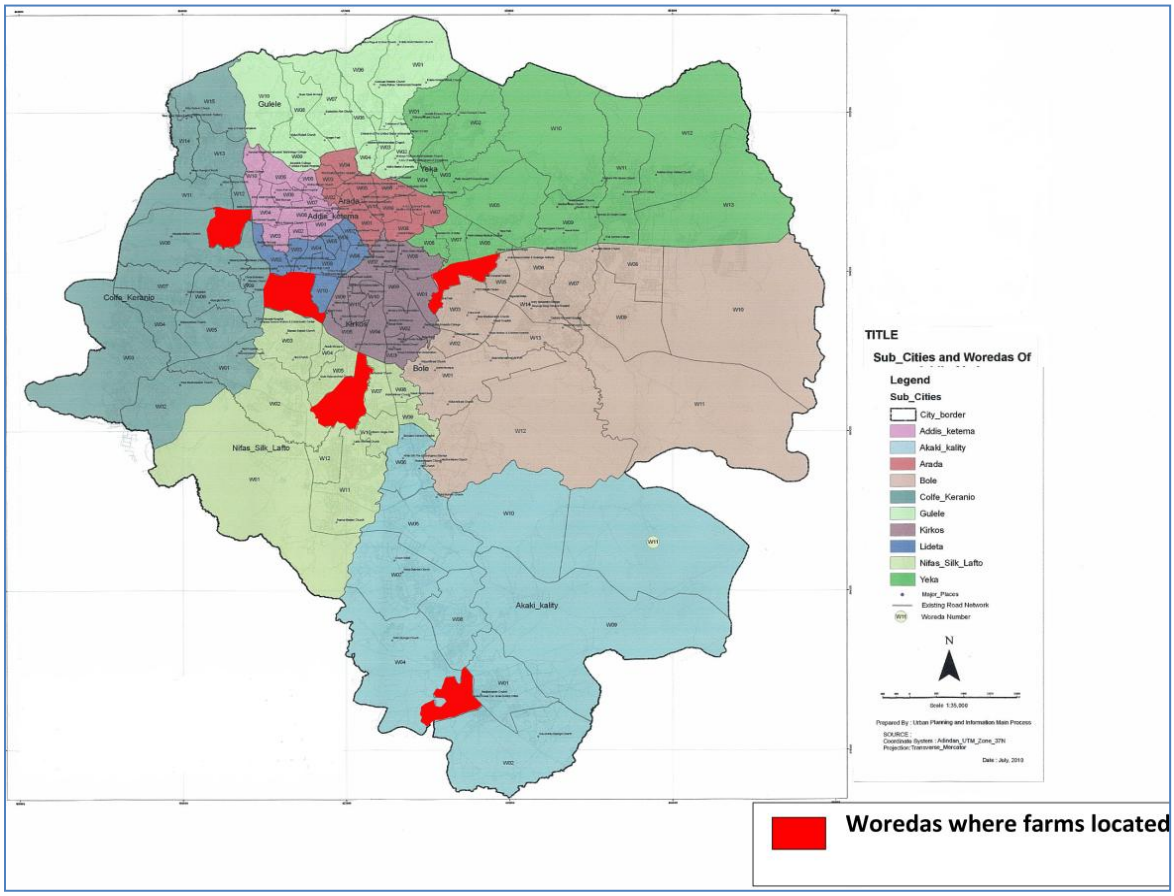

Figure 3 *Woredas and locations of selected cooperatives*
Adapted from: City planning office of Addis Ababa

3.2. Data collection and analysis

In order to have a clear picture of the importance of cooperatives to achieving sustainability, it was imperative to compare them with some individual (non cooperative member) urban farmers in the city. Therefore, a total of six cooperatives (out of the total twelve cooperatives) and ten

individually operating farmers were asked a range of questions concerning production and marketing, land security and access, environmental protection and social acceptance and equity (See Appendix I). The survey was conducted in 2010, from November to December.

Regarding the cooperatives the leading committee members (the chairman, the secretary and executive committee members) were interviewed. Here, the cooperative's leading committee members are taken as the main source of information as it is assumed that the committee members are in a position to know and consider all the relevant factors that affect cultivation and other decisions. The cooperatives were selected randomly but with a notion to include intraurban and periurban locations in to account.

Only individual growers who mainly produce for sell are contacted in this regard. This is to make the contrast against the cooperatives viable. All the interviews were made on the farm site and entirely conducted by the researcher alone.

In the respective sub cities, agriculture development agents were also interviewed regarding the situation of UA in the city. Discussion with experts in the urban agriculture office was also held in order to understand about the general focus of the city government to UA. Secondary data were also acquired from the Addis Ababa office of urban agriculture, the central statistics agency of Ethiopia and respective sub city agriculture bureaus.

A GPS device was used to identify the farms exact location. Aerial photos (taken in 1984 and 1994) of the sub cities where cooperatives are located were acquired from Ethiopian mapping Agency. Google imagery of the year 2000s, along with aerial photos were used to assess changes occurred in the last couple of decades regarding urban farming locations as a result of city expansion by making use of ArcGis 9.3.

3.3. Characteristics of cooperatives and individual farmers

The selected cooperatives comprised of 421 members of whom 41% are women (Table 3). The total area under cultivation by the cooperatives is 262.8 ha which accounts 38% of the total area cultivated in Addis Ababa.

Regarding the individuals those who practice on off-plot (not backyard) farming and who provide products to market were selected .Most of the individual farmers are residents of the city for more than 20 years (Table4) and it is consistent with the results reported in other developing countries as well (FAO, 2007; UNDP, 1996; Nugent R.2000). All men and women cultivators practice farming to increase their monthly income and for food security purposes. Women however entirely depend on the income generated from farming.

Table 3 ***C****haracteristics of the Surveyed cooperatives*

Cooperatives name	**Year of foundation**	**Sub city**		**No. of members***		**Area cultivated (ha)**
		Name	**Population density (per km^2)**	**Male**	**Female**	
Mekanisa Gofa Saris vegetable producers	1976	Nifas silk_Lafto	5486.24	100	103	150
Kolife Lideta vegetable producers	1977	Kolife_Keranio	4130.19	90	18	81.3
Shankla river vegetable producers	1978	Lideta	26915.73	11	3	3
Kebena and Bulbula producers	1979	Bole	2676.6	19	11	10
Mekana Biruh- Tesfa integrated farm	1994	Akaki_ kality	1555.75	14	30	14
Abat Turetegna vegetable producers	1995	Akaki_ kality	1555.75	14	8	4.5
Total				248	173	**262.8**
				421		

*Member is a household head that consists of several family members. The average household size of the city is 4.1

Table 4 *Characteristics of individual farmers*

Respondent	**Years living in the city**	**Years in farming**	**Sub city Name**	**Gender**	**Occupation other than farming**	**Land holding**
#1	50	5	Akaki_kality	Male	Retired	0.75ha
#2	14	10	Nifas silk_Lafto	Male	Non	0.14ha
#3	50	6	Bole	Male	Civil servant	100m^2
#4	43	35	Bole	Male	Guard	80m^2
#5	30	27	Bole	Male	Carpenter	110m^2
#6	30	5	Lideta	Female	Non	300m^2
#7	27	5	Lideta	Female	Non	200m^2
#8	43	6	Lideta	Male	retired	500m^2
#9	32	4	Lideta	Female	Non	300m^2
#10	30	6	Lideta	Female	Non	300m^2

4. Results and Discussion

Under this chapter the historical development of the cooperatives, the advantages and disadvantages of cooperatives and the sustainability of urban agriculture phenomenon will be discussed.

4.1. Historical development of the cooperatives

Most of the urban agricultural producer cooperatives in Addis Ababa are formed during the socialist, commonly known as *Derg*, regime (1974-1991) following the egalitarian land reformation taken place in the 1975 that distributed land to the peasantry. Before the land reformation, lands in the city were owned and administered by feudal land lords, individual governors (*Mekonen*) and heads (*Ras*) of the monarchy. Four of the surveyed cooperatives therefore were formed in the wake of this land reformation.

Siding to the socialist block, the government implemented a soviet style of agricultural development that preferentially encourages collectives and state farms. Therefore the urban producer cooperatives in the city continue to be collective types. They pool all their lands and labors in common for communal production. A detailed analysis of the socialist notion collectives will be discussed in the next part

4.1.1. Socialistic nature of the cooperatives

When discussing the current agricultural collectives in Addis Ababa, it is imperative to asses them with the lens of socialist perspective that puts high consideration for equity than efficiency. Deininger (1995) puts some point of argument when assessing the former socialist oriented agricultural collectives against their capitalist counterpart. In this part therefore the potential advantage and disadvantage of collectives are explicitly discussed.

The presumed benefits of collective production are related to, equity among members, easy adoption of technologies, and provision of public goods. On the other hand collectives are criticized for their inability to utilize resources efficiently (lower productivity), failure to provide employment for non members, and tendency of under investment.

4.1.1.1. Merits of cooperative production

Equity

The main argument advanced to support cooperative forms of production has been related to the notion that can increase equity by either distributing an existing amount of resources more equitably or by insuring members against risks. Deininger (1995), however, cited several researches that proven the inability of collectives to achieve equity. The current survey in Addis Ababa provides evidence for prevalence of equity in agricultural collectives. Collective producers are better off by distributing profits from the cooperative on an equal basis based on the number of "points" the individual members had earned during the production season.

The second argument that collectives are merited for equity is the insurance that members are covered against any production risks. The evidence from the urban cooperatives in Addis Ababa also showed that, all the surveyed cooperatives adapt a profit sharing scheme that distributes 70% of the profit to members and saving the remaining 30% for future investment and insuring members against any production and market failure risks.

Adoption of technology

Deininger (1995) pointed out that collective agricultural production, if carried out under a highly hierarchical structure, is supposed to facilitate the rapid dissemination and adoption of new technologies. In Addis Ababa evidences showed that agriculture extension agents frequently visited to cooperatives than to individually farming residents. For instance among the six cooperatives interviewed all cooperatives responded that they have received a training on composting from agricultural extension agents as compared to only three out of ten interviewed individual farmers do. Agricultural extension agents also pointed out that addressing the cooperatives is easier than individuals as cooperatives are organized in a hierarchical (Figure4) and easy to communicate manner.

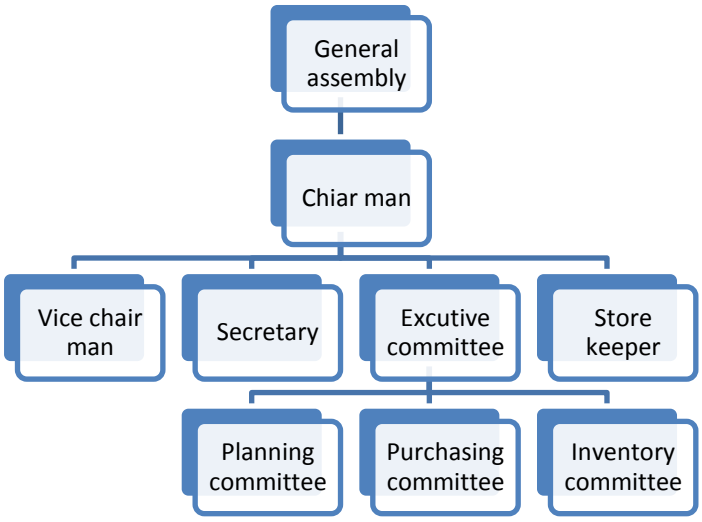

Figure4 *Structural organization of the cooperatives*

Provision of public goods

Provisions of public goods such as infrastructure, irrigation systems, health services, or settler education, are sometimes considered to be one of the main advantages of collectives (Ghose, 1985; Griffin and Hay, 1985). Deininger (1995) however argues that in most of the former socialist countries the cases advanced to support such arguments, there were either alternative institutional structures available which performed at least as well, or the collectives in question were highly subsidized, and actually provided public goods in a very inefficient way. In the case of the Addis Ababa's urban farming cooperatives the advantages working in collectives is reflected on having relatively easy access to irrigation facilities. Members work in group to maintain water dams and water flowing channels during their spare time. Even some individual growers located near to the cooperatives are able to make use of the irrigation facilities.

4.1.1.2. Demerits of cooperative production

The theoretical proposition of the potential disadvantage of collective form of production as mentioned earlier include lower efficiency, low employment to outside community, and free riding by members. We discuss each in some detail below.

Lower efficiency

The argument with inefficiency of collectives is if labor in agricultural collectives is not supervised or paid according to effort, workers do not have incentives to work hard, thus

reducing efficiency. In addition choosing the optimal level of supervision, which does not result prohibitive costs of monitoring that would also reduce the efficiency of production, is cumbersome particularly to implement on larger scale collective farms. Deininger (1995) points out that in Vietnam continuous difficulties in monitoring workers' efforts led to the degeneration of the originally envisaged workpoint systems finally into fixed wages that were paid regardless of the quality and amount performed by the individual.

To avoid such problem of inefficiency and improve the monitoring of workers' efforts the cooperatives in Addis Ababa, apart from implementing workpoint system, adopt a method of grouping members into different working teams that accomplish distinct tasks under the supervision of the executive committee. Members are assigned to a particular working team based on their abilities and willingness. Evidence from Cuba (Novo, 2007) also shows that an urban farming cooperative creates specialized teams within the cooperative that focus on different activities ranging from growing gardens and greenhouses to maintenance and services.

Low employment

An agricultural collective is presumed to generate less employment and produce less output than its capitalist counterpart (Deininger (1995). There were two reasons, regarding low employment opportunity, that many socialist countries did not allow employment outside the collective members. The main reason that hinders collective type of agriculture from creating more opportunity of employment was that if members of a successful collective have the opportunity of employing hired workers at the market wage, they will successively reduce membership until only one member is left and become a capitalist production firm (Deininger, 1995). The other reason was the highly preferentially subsidized and mechanized nature of collectives hindered the opportunity to hire labor outside the members.

However, in the case of urban farming collectives the situation is different. Empirical evidences from the Addis Ababa case have shown that a large opportunity of employment for non member laborers exists. Members in a cooperative can hire labor from outside that can cover their required duty in the collective activities. Urban farmers grow crops that are labor intensive and

high value horticultural crops that can substantiate the rationale to hire more labor and in addition there is little chance to fully mechanize the activities.

Underinvestment

The socialist oriented agricultural collectives are attributed to underinvestment and a preference for short-term over longer term investments. They are criticized for their likelihood of consuming whatever capital available to them if there are no legal restrictions explicitly preventing them from doing so (Deininger, 1995). Cooperative members will value liquidity higher than profitability of investments, i.e. prefer investments with low return but short playback period over projects with high return but long payback.

Even though the empirical evidence from urban farming cooperatives in Addis Ababa shows similar tendency of cooperatives not to invest on long return assets the reason however is not by seeking for short playback investments. As cooperatives are not secured of land tenure, they prefer to put their money in banks. They are also not also considered as legal entities for any bank loans. In Havana however, according to Novo (2007), urban farming cooperative invests on greenhouse structures for the production of fruit tree seedlings and other purpose with the objective of long term benefit of the members.

4.2. Location of cooperatives

Most of the lands the cooperatives cultivating now were once commercial vegetable growing areas started by different Europeans living in the city during the monarchy time during and after the brief Italian occupation of the country (Horvath, 1969). The Europeans developed modern production systems like irrigation facilities that some of the cooperatives are still making use of it. The vegetable farms were located along rivers (Fig5). These agricultural sites are valuable sites because growers cultivate three times per year.

It was found out that most of the cooperatives are the reminiscence of the former rural cooperatives, both in terms of location and internal structural organization. However, they were

distinctively urban oriented by the type of product they produced, mainly horticultural produces (Fig6).

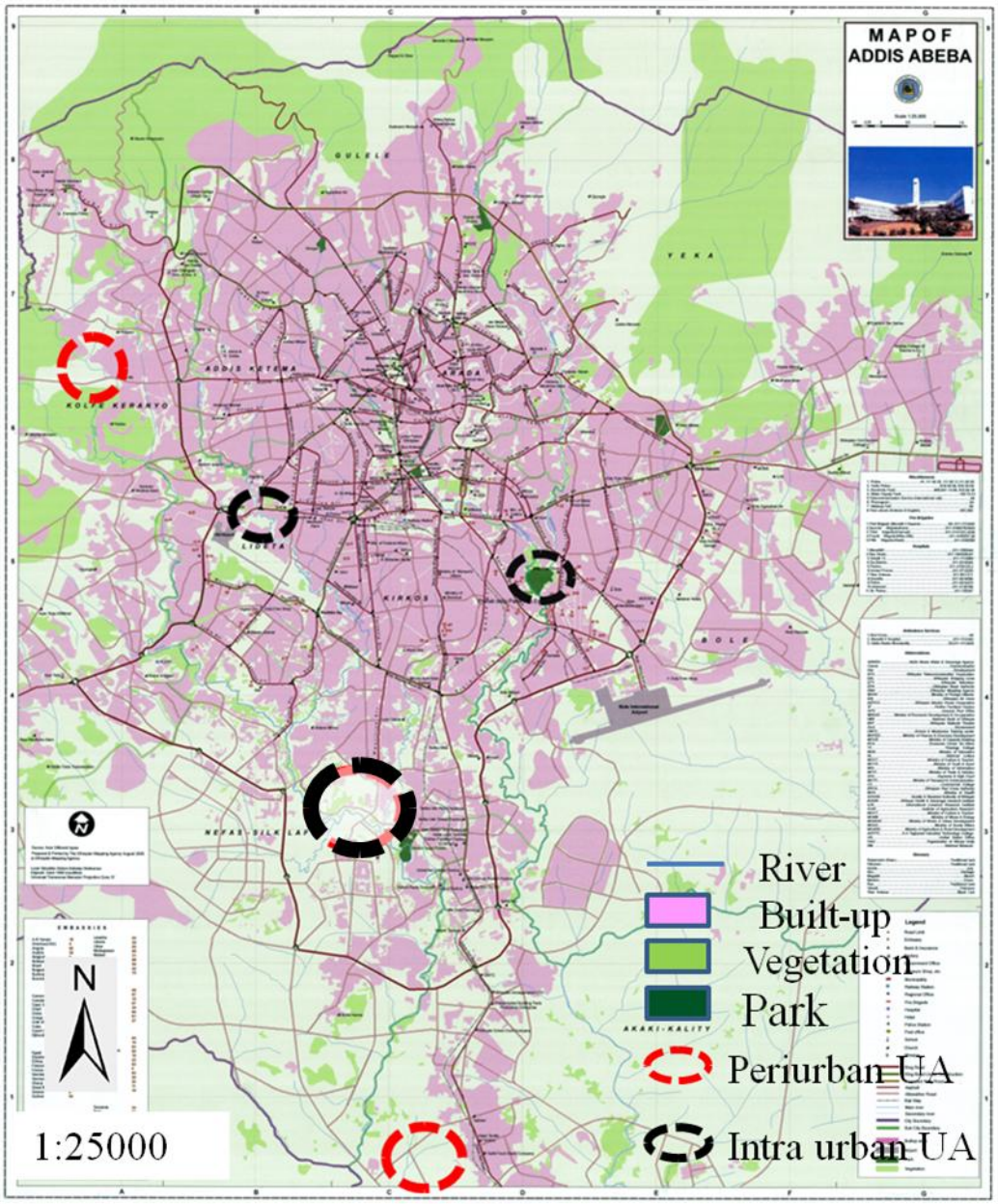

Figure 5 *Location of cooperatives farms in Addis Ababa*
Source: base map from Ethiopian Mapping Agency

Figure 6 *cooperatives distinctively different from rural agriculture by the type of product*
Source: Author's analysis

The cooperatives can also be classified into periurban and intraurban agriculture (See Figure4) according to Baumgartner and Belevi (2001) that periurban contains both rural and urban elements with strong influence of cities. The survey also revealed that landholding per head differs between intra and periurban areas. In the periurban areas the average landholding is 0.5ha while in the intra urban it is 0.2ha. Therefore the capacity and assets of cooperatives also varies based on the location of farms.

4.3. Who are the farmers?

Urban farming is a traditional practice in Ethiopia according to Axumite (1994). The Urban based population is used to keeping cattle, sheep, and chickens, or growing rain-fed crops such as maize and vegetables, on plots adjacent to their houses mainly for subsistence use.

In Addis Ababa more than 90% of the farmers in the cooperatives are from one ethnic group, called *Gurage* (Jemal, 2002 unpublished). Horvath (1969) also describes that the vegetables in Addis Ababa are produced almost exclusively by Gurage horticulturists. This issue is further discussed in the next section (see section 4.3.1.).

Most of the growers are residents of the city for more than 30 years. The *Mekana-Biruhtesfa* cooperative members however are living in the city since 1992 and are war displaced during the overthrow of the Military regime. The *Abat Turetegna* vegetable producers are retired civil servants who are fully engaged in urban farming. In general all members in the cooperatives are entirely dependent on the income from farming activities.

4.3.1. UA and ethnicity in the city

The practice of urban farming is related to factors like ethnicity and immigrants and/ or migrants in Africa or even in some parts of North America (Sawio, 1994; Wekerle, 2001). A study in Dar es Salaam indicated that most of urban farmers are from regions that are close to the city and rich in agriculture and most migrated to the city due to political reasons (Sawio, 1994).

The situation in Addis Ababa is a bit different in that most of the farmers are dominantly from one ethnic group called Gurage (comprised 17% of city population). However the association of this group in the urban agriculture is seen as a privilege that most of the members in the cooperatives considered it as a historical coincidence that they had during the land reform in 1975. Horvath (1968) also noted that farming in the city was considered as ignoble status, that the dominant ethnic groups (the Amhara and Oromo), declined to practice it. This situation helped the Gurage to exploit the chance and work with some Europeans who were running vegetable farms at the time. See figure7 for events happened in the city.

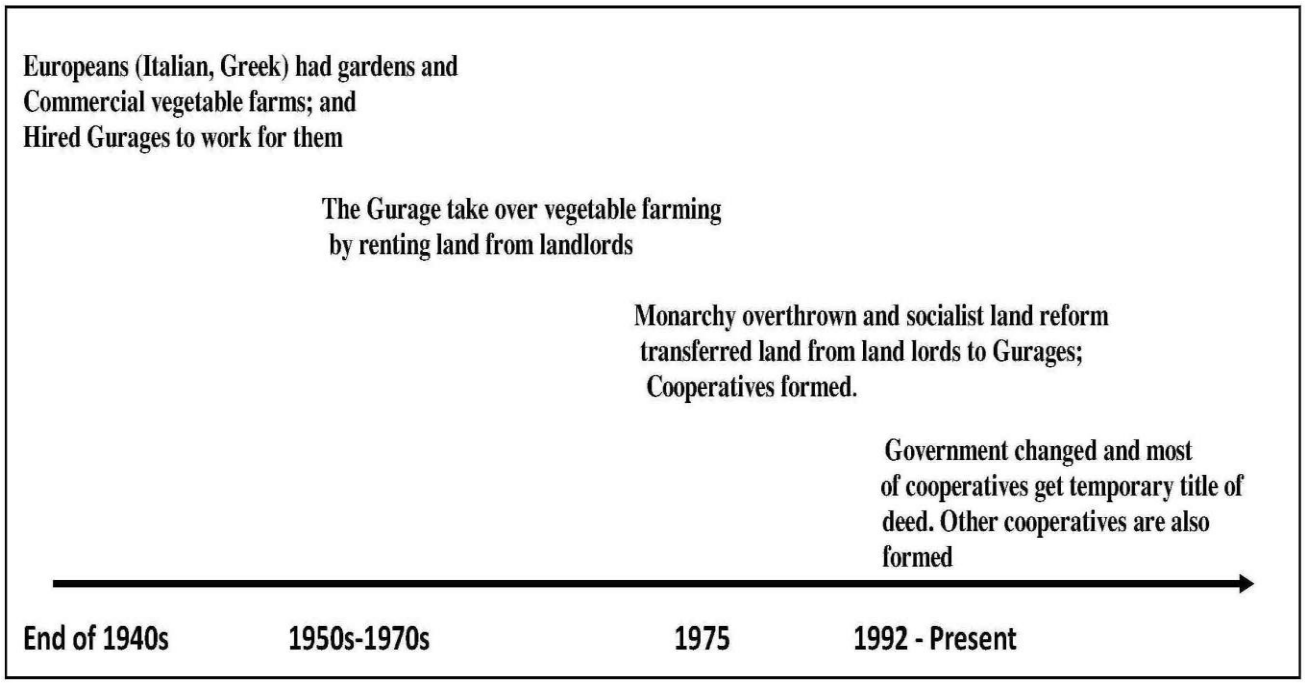

Figure 7 *Timeline of events relating to urban agriculture cooperatives in Addis Ababa*
(Created by the Author)

At the time of land reform (1975), therefore, most agriculture lands in and around the city were distributed to Gurage people as they were the dominant groups working on the lands (first occupier). After having land concession the Gurage maintained dominancy by forming cooperatives among themselves, with the exception of few cooperatives, and tried to exclude others. Bryld (2003) explains such kind of exclusion of newcomers from having access to land or other equipment for cultivation as a 'gate keeping' phenomenon. Getting access to land requires social and political information about where land is available, what the ownership is, and what risks there are from cultivating.

One of the characteristics associated with the involvement of specific group of population involving in UA results in production of specialized crops that have values for the group. In USA, immigrants use UA as a source of culturally significant foods that are not available in typical grocery stores. Chinese immigrant community in Canada, for instance, often put their gardens to productive use for growing ethno-specific vegetables and herbs (Wekerle, 2001). In Addis Ababa as well the Gurage cultivators produce crops that are apparently associated with them viz. Ethiopian Kale (indigenous vegetable) and Enset (*E. ventricosum*) commonly called false banana.

The Ethiopian Kale is highly demanded by most local restaurants that serve *Kitfo* (a traditional Gurage cuisine) that also utilizes products from the Enset plant. Most of the cooperatives responded that Kale is highly demanded by both the Gurage and other ethnic group of the resident of the city. As a result they dedicate quite large amount (average 14% of the cultivated land) of their land for its cultivation.

The environmental protection issue with respect to crop choice is also reflected in the Gurage community in that they planted Enset, a perennial plant that can help to anchor the soil, along the river banks as a prevention of soil erosion.

4.4. Sustainability analysis of urban agricultural phenomenon

Under this section the sustainability of urban agriculture is explained by contrasting cooperatives against a number of individual farmers. The frame work to analyze sustainability of agricultural phenomenon was adopted from Drechsel and Dongus (2009), Cofie (2009) and others (See Table1 and Table 2).

i.Productivity and Marketing

All urban farmers in the city produce annual vegetables such as Swiss chard, lettuce, cabbages, Ethiopian kale, potato, tomato, beet root etc.

Productivity is measured by yield per unit of area and the number of productions per year. When we compare cooperatives with individual farming households, the yield per unit of area by cooperatives is much higher than the individuals. Average yield of vegetables produced by cooperatives is 165 quintal per hectare compared with an average of 42 quintal per hectare by individual farmers. This result can be explained from the fact that all the cooperatives are able to produce more than twice per year as opposed to only two out of the ten interviewed individually operating farmers (Table 5).

Furthermore facilities such as irrigation available to farmers have contributed to the difference in productivity and number of productions per year between the cooperatives and individuals. Only two of the surveyed individual farmers have the access to irrigation as opposed to all cooperatives do. And also profits are highest in the dry season when supply from the rural agriculture is reduced. The major constraint pointed out by almost all individuals, when asked to prioritize problems, was inaccessibility to year round water. No cooperative prioritized access to water to be a major constraint.

Since they are also producing leafy vegetables using irrigation water like Swiss chard and lettuce which can be harvested every 15 days for almost three months once they are planted, their productivity is enhanced and their income improved. The average monthly income of members of cooperatives is estimated to be 700 Ethiopian Birr which is above the average of the city's household income (635 Birr) (Bigsten and Makonnen, 2000).

Lee et al (2010) however reported a different scenario in Vietnam. From their case study in Hanoi they have revealed that a transfer of agricultural production from cooperative to individual production after the liberalization of the Vietnamese economy has resulted to diversification in agricultural production and a notable shift towards higher yielding and more valuable market-orientated crops. But they also reported that it increased the transportation and resulted traffic congestion, pollution and time spent on transporting and selling produce.

Table 5 *Productivity and marketing sustainability comparison*

Improving productivity and market insurance	**Number of responses**	
	Cooperatives (n=6)	**Individuals (n=10)**
1. Highest number of production per year	6	3
2. Access to irrigation facility	6	2
3. Highest number of fertilizer application	3	2
4. Mixed cropping pattern	4	3
5. More than 1 form of market outlet	6	1
6. Get market information from central market	5	4
7. Storage facility	4	0

The productivity of the urban vegetable producing cooperatives is also fivefold higher than the rural vegetable productions (Figure8). A major determinant of this difference is that cooperatives

are better positioned to have preferential access to improved seeds and fertilizers due to their proximity to the city than rural counterparts. Devereux et al (2005) also report that income per unit of land of farmers in areas near to a town is 62% higher than those located 20 km away from a town with similar resource endowment and distribution.

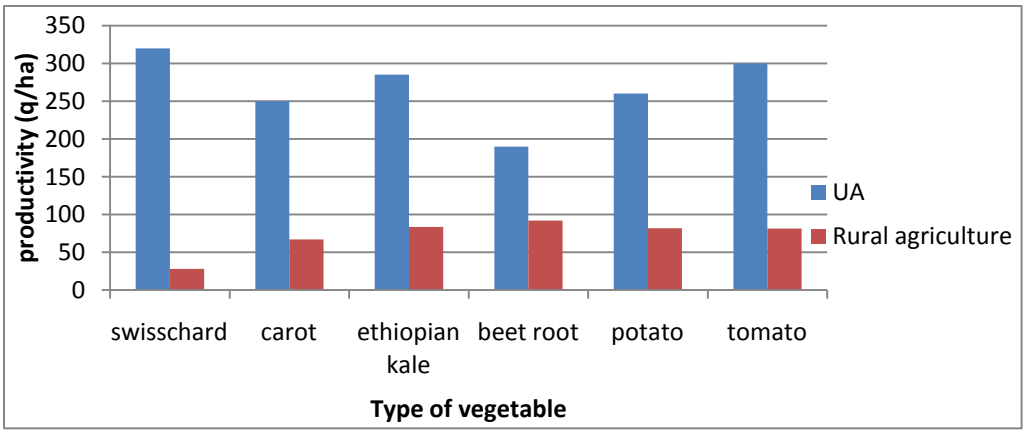

Figure 8 *Comparison of productivity of urban and rural agriculture*
Source: Calculated based on data from CSA (2010) and current survey

Availability and affordability of inputs is also a determinant factor in agricultural productivity in particular and sustainability of the sector in general (Fialor, 2002). The position to have constant access to inputs such as fertilizers (both organic and inorganic), seeds and herbicides or insecticides helps to improve productivity. With this regard all the cooperatives and two individually cultivating farmers use inorganic fertilizers to improve their productivity.

Even though both groups have the access to the fertilizer market the rate and number of fertilizer application varies based on their ability to afford the high price of fertilizers. Cooperatives benefit from bulk purchasing of inputs (economy of scale) as a result they apply more than twice per year per unit of land (half of the surveyed cooperatives) as compared to only two of the interviewed individuals do.

Individual growers responded that they sometimes skip applying chemical fertilizers due to high cost when buying in piecemeal basis from retailers is not affordable. Regarding insecticides neither of the group report any type of chemicals used for plant protection.

Marketing

According to Fialor (2002) and Cofie (2009) apart from the output levels obtained the prices received per unit of output has also big contribution to sustainability of urban agriculture. In general, urban agricultural products are distributed through short marketing chains (FAO, 2007). The result from the current survey also reveals that the agricultural product marketing outlet in Addis Ababa, follow more or less short market channel, can be grouped in to three, namely farm gate, direct sell at central market and proxy local markets (Figure 9).

Much of the surveyed individual producers sell their products at the farm gate directly to consumers or sometimes to restaurant owners and retailers. Even only few of the cultivators sell their product to proxy local markets. On the other hand only 2 of the surveyed cooperatives responded selling their product at farm gate. The cooperatives have a versatile way of market outlet as a result they are better off in gaining better price per unit of output than individually cultivating farmers.

The most significant difference lies on the ability to store products and wait for better market prices. Regarding this situation four of the six interviewed cooperatives have their own storage facilities near to the central market. However, individuals sell all products at farm gate at prices most of the time determined by buyers. And it is generally agreed that direct involvement of the urban producer in selling products and negotiating prices would increase profits, though it sometimes results fragmentation of products (Moustier and Danso, 2006).

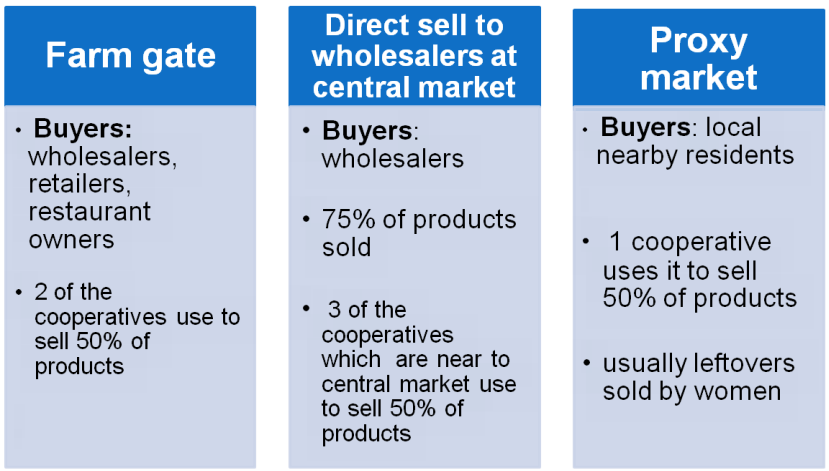

Figure 9 *Major Market outlet used by the cooperatives*

The other striking result from the survey reveals that most of the cooperatives practice mixed cropping pattern (producing two or more vegetables at the same time per unit of area e.g. Lettuce between Swiss chard etc) as a mechanism to rescue from a price fall of specific crops. Having more diverse crop production per unit area can increase the resilience of farmers against market demand dwindling. When the price of a specific crop drops, due to several economic and social reasons, the loss incurred by farmers will be compensated by the other rescuing crop grown as an intercrop.

In general urban farming cooperatives in Addis Ababa are functioning as both service and producer cooperative. As a service cooperative they provide inputs and facilitate marketing activities to the members and as a producer cooperative they work as collectives by pooling all their resources and labors achieving economy of scales.

ii.Land access and security and sustainability

Before analyzing the situation of land access and security by farmers in the city it is imperative to describe the land tenure situation in the country in general and city in particular.

Three different periods revealed different land ownership and tenure arrangements in the country. During the feudalistic monarchy period (1930-1974) land in the city of Addis Ababa was owned by landlords and government officials. The 1975 land reform abolished this feudalistic tenure system and nationalized all lands in the country. The reform eliminated private land ownership.

Again the 1995 Ethiopian constitution asserts state ownership of land; there are no private property rights in land in the country (Belachew, 2010). Proclamation No 80/1993 states that all urban land is public property and transfer will only be carried out through the lease system. The lease system allocates land to landholders for varied years from 50 years (commercial) to 99 years (for house construction) depending on the purpose of land acquisition.

The point especially important with UA is that the government can reclaim any land that is deemed to be used for other public or private purposes. The Lands UA is being practiced can be reclaimed by an individual investor or by the government when ever is needed. The result from the current survey also revealed that some agricultural land has been reclaimed by both government and individual investors (See Figure10).

Farmers are afraid to invest on their land because of the possible expropriation. The same result is reported in Ghana by Flynn-Dapaah (2002) that farmers do not invest in farm infrastructures due tenure insecurity. Some of the cooperatives in Addis Ababa, however, responded they are using very old and traditional irrigation system (see Figure11) because on one hand they are afraid to invest without land tenure security and with the current small amount of compensation on the other hand they cannot get credits for investment as they are not legitimate for credit service.

Figure 10 A *new building confronting the Kebena cooperative agricultural land*
Source: Author's survey

Figure 11 *Farmers use simple iron sheet to divert water into the farms*

The lack of secure tenure and access to suitable land is a major issue in the sustainability of UA. Several researches conducted in most African cities indicated that majority of urban farmers cultivate lands which are not owned by the farmers themselves. Usually cultivations found in public lands like parks, conservation areas, along roads, streams and railways. Therefore their tenure security is highly at stake.

The result from the current survey revealed that individual farmers are relatively prone to change their farmlands as compared to the cooperatives and hence are less stable (Table 6). Most of the individually farming cultivators acquire land either through rent from other land owner or by occupying open public spaces for temporary cultivation. Among the ten interviewed individually farming half of them are renting lands from other landowners and these are mostly vulnerable to change farm lands. On the contrary only one cooperative has changed farm land in the last five years.

Perceptions of land tenure security by the farmers are also varying between the cooperatives and individuals. Only two out of the ten interviewed individual farmers perceive secured land tenure as compared to five out six interviewed cooperatives. The concern of eviction is less prevalent in cooperative farms, though all cooperatives understand their land tenure is at the goodwill of the city administration. Vélez-Guerra (2007) also reported a research result, conducted in Bamako, Mali, that members of a cooperative have higher perceptions of land tenure security and risks of evictions are less common among the members of a cooperative which existed for 30 years.

Table 6 *Land security comparison*

Land access and security indicator	**Number of responses**	
	Cooperatives (n=6)	**Individuals (n=10)**
1. Being secured of the land cultivating	5	2
2. Difficulty to acquire land for production	2	3
3. Able to negotiate with authorities against land eviction	5	1
4. Less prone to change (never change land in last 5 years)	5	5

The cooperatives, in Addis Ababa, have the advantage to negotiate and lobby against any threat on their landholdings. Results show that five of the cooperatives replied they are able to negotiate with authorities regarding evictions. The *Kebena- Bulbula* cooperative, for instance, has won one case of eviction threat posed from individual investor by taking it to a court. The *Shankla Rive*r cooperative also gained a compensation for lands it has lost to housing construction.

Overall among the surveyed cooperatives, only one cooperative lost significant amount of agricultural land owing to infrastructural development in the last three decades. Figure12 and figure13 show the stability and spatial change of some of the cooperatives. Table 7 also depicts percentage of change of cooperative's landholdings. All cooperatives agreed that if they were not organized in cooperatives they would have lost all their lands to individual developers or sometimes to government demand.

Table 7 *Spatial change of cooperatives as a result of city expansion pressure*

Cooperative name	Amount of converted land (Ha)	Reason of change
Shankla river cooperative	2 (20%)*	condominium building
Kolife Lideta cooperative	2.8 (3%)	New road
Abat turetegna cooperative	0.5 (8.3%)	Road expansion

* Number in bracket indicate percent of the converted land as opposed to total land

Spatial changes and cooperatives

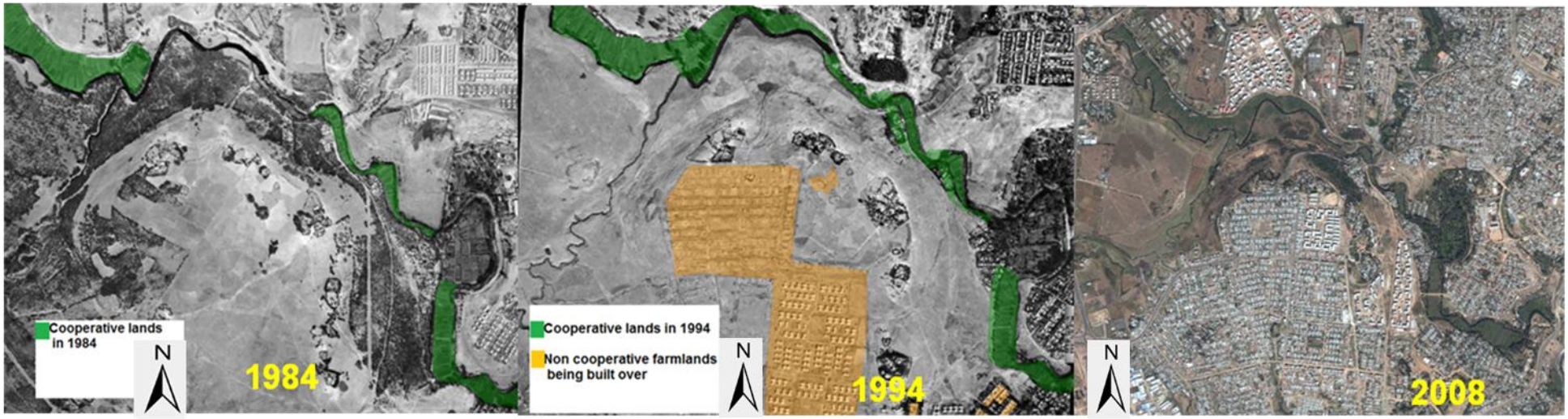

Figure 12 *Aerial photos showing stable landholdings of cooperative (Mekanisa gofa saris)*

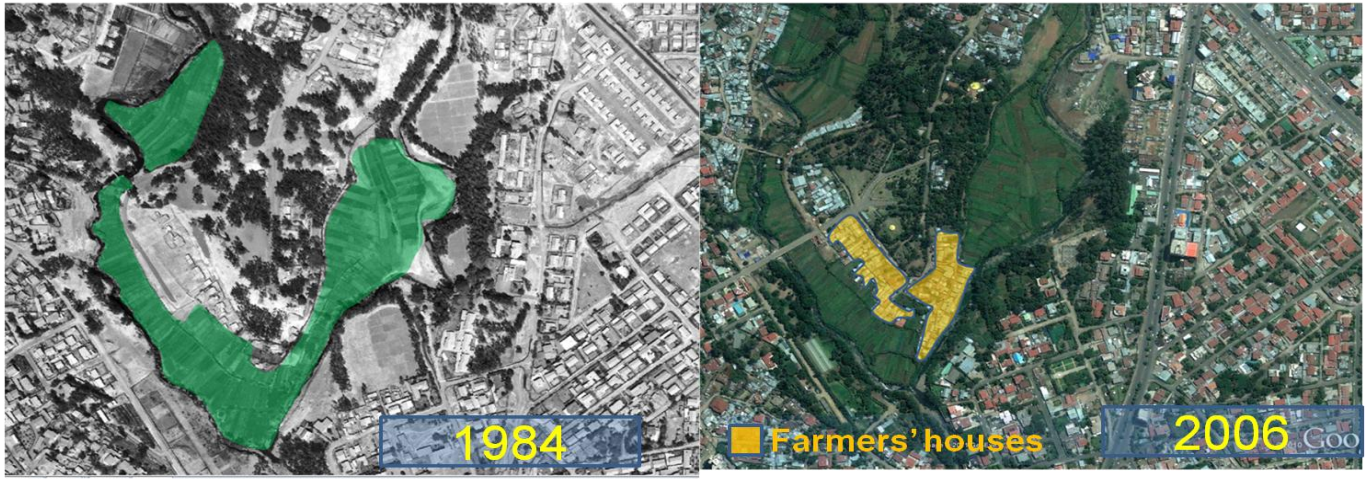

Figure 13 *A stable landholding by the cooperatives in the commercial zone of the Bole sub-city*

***iii.*Environmental burden reduction**

Environmental sustainability is measured based on indicators namely less dependent on chemical (external) inputs, higher application of organic fertilizers, ability to protect soils from erosion and practicing agriculture techniques namely crop rotation and fallowing that could enhance soil condition (Table8).

Vegetables production is the dominant type of land-use in both the cooperatives and individuals. In this regard annual vegetable crop production requires inputs to boost productivity. All the cooperatives use external input (chemical fertilizer) as main source of nutrient for their production. And they apply more than twice per year with a blanket application regime. Individual growers, however, are less dependent on the external inputs as only three out of ten interviewed farmers apply chemical fertilizer more than twice in a year (Table8).

Table 8 *Environmental protection comparison*

Environmental burden reduction indicators	**Number of responses**	
	Cooperatives (n=6)	**Individuals (n=10)**
1 less chemical fertilizer use (<2 times/year)	1	7
2 more time organic fertilizer	1	7
3 soil conserving structure	5	2
4 composting facility	1	4
5 cropping practice (fallowing and rotation)	6	3

Many individually farming farmers use organic fertilizers (compost and farm yard manure) to improve the soil fertility. Cooperatives on the contrary do not use any organic fertilizers except the Kolife_Lideta cooperative. This cooperative, however uses compost prepared from wastes collected from grain milling, dairy companies, and household wastes. The main reason given by the cooperatives not to use organic fertilizers is that they have large farm land and using compost to the farms is expensive. They also pointed out that unavailability of compost materials and lack of space for composting facilities are other constraints that hinder application of organic fertilizers.

One of the virtues of UA that many proponents put forward is the potential that UA can serve as a sink for urban wastes. In Addis Ababa despite the city's huge municipal waste 1,000 tons per day, of which more than 90% is organic waste, the urban agriculture is not utilizing it to the extent that can foster waste management. In this regard on one hand the sustainability of UA by being less external input dependent is diminished on the other hand the contribution of it to city sustainability is also undermined.

What makes it worse is that all the cooperatives apply chemical fertilizers at least three times in a year with a blanket application rate. Even if a detailed study of the effect of nutrients leaching from farms to the water bodies in the city needs to be done, from the current survey it is apparent that more cooperatives are putting environmental burden instead of reducing it.

The need for continuous cropping on the same plots makes many urban farmers specialists in soil conservation according to Drechsel and Dongus (2009). In particular irrigated vegetable production provides a protective soil cover throughout the year and contributes to urban greening and biodiversity. The same phenomenon observed in Addis Ababa that cooperatives, which have year round access to irrigation water, cover the farm land almost year to year. This helps to protect the soil from erosion. They have also planted perennial trees (bamboos, Enset and other indigenous trees) in order to prevent soil erosion. Individually cultivating farmers

The most critical issue in the city's UA is the untreated waste water usage. Almost all cooperatives use rivers flowing in the city namely Akaki and kebena rivers. These rivers are very dirty and smell very offensive. Some researches on the Akaki river also revealed that the river has some concentration of contamination with bacteria like E .coli (Gebre and Van Rooijen, 2009; Itana, 2002). Discharge of untreated effluent from industries, solid wastes and wastewater from households and institutions, are the major sources of pollution of the rivers flowing through the city.

*iv.*Social /political acceptance

In order to be socially and politically acceptable UA must provide benefits to the society in terms of food supply, job opportunity and other community development activities.

Both the individually farming and cooperatives supply more than 75% of their products to market and in this regard both are supplying food to the society. Regarding the creation of job opportunity for the outside community the cooperatives (hiring 15 man powers per hectare per season) are by far better than individually cultivating farmers (Table9). Only one individual farmer is able to hire labor from market as compared to all the six cooperatives do. On one hand individually farming cultivators replied that labor is very expensive to afford and hence they tend to use their family labor to some extent. Yi-Zhang and Zhangen (2000) stated that labor shortage is the major factor that can limit the sustainability of UA, in addition to land and other input shortages.

Table 9 *Social acceptability comparison*

	Number of responses	
Social acceptance and benefit indicators	Cooperatives (n=6)	Individuals (n=10)
1Creating job opportunity	6	1
2 Selling product by lower price for neighbor	3	5
3 Community development contribution	5	2

Cooperatives replied that they hire large number of labor from market particularly during land preparation, planting and weeding activities. On average one cooperative hires 10 to 15 man power per season per hectare of land. The workers receive free breakfast, lunch and drinks.

The benefits of the cooperative to the society range from selling products at lower price to creating job opportunities to unemployed citizens. Half of the cooperatives interviewed responded they sell products to the neighboring society lower than the market price. In this regard individually growing farmers are also selling products relatively lower price for the neighborhood. The social impact of the cooperative is not only felt in the creation of jobs they also contributed financially in developments including road construction and school rehabilitation programs.

Regarding the political acceptability, both groups replied they have no big problem of acceptance by the city administrations except one cooperative. This cooperative responded that once it was facing big problem related to irrigation water use. The water this cooperative was using reported to be polluted and journalists in the city announced not to eat products from this farm. Due to these happenings the cooperative was faced with market loss. Drechsel and Dongus (2009) also reported that in Accra in some cases, one ministry might support urban farmers with extension services, while another arrests them for using polluted irrigation water thus creating political vacuum.

In general with regard to social and political acceptance both groups (cooperatives and individually farming cultivators) have the same status. When it comes to access to extension services, however, cooperatives are more close to agriculture extension agents. All cooperatives, for instance received trainings on compost preparation, and other cultivation practice as opposed to only three of the ten interviewed individual farmers do.

However the reason most of farmers gave for not having problem with the city authorities is that they (the authorities) have tolerated the activities of the farmers for so long. Such laissez-faire attitude keeps urban farming in a political vacuum, which does not help to address some of its major problems, such as lack of suitable land, low tenure security, and access to low-cost but safe water etc.

Only recently the city planning office has assigned locations (basically of lands along the rivers) for specific agricultural practices (See Appendix II) and currently is in the process of formulating its first policy on urban agriculture development (Personal communication with personnel in the urban agriculture office). There is a growing awareness from different authorities in the city about the importance of UA. Therefore the city's UA office has envisioned improving agricultural productivity of UPA and hence to improve food security at household and individual level. According to the city urban agriculture officer, the focus is more on less land demanding production types for example mushroom cultivation.

Therefore when the ability to offer jobs for the society, affordability to hire labor in the market and the easy access to extension services is taken into account the cooperatives clearly appear to be better off than individually farming farmers regarding with social and political acceptance. On top of that almost all of the cooperatives but the *Mekana -Biruhtesfa* have certificate of recognition (temporary title of deed) from the respective sub cities so that they can practice farming.

4.5. Summary

Major findings of the study are summarized in table 10. Even if cooperatives have played great roles in achieving sustainability of urban agricultural phenomenon there are some conflicts that has to be challenged.

Table 10 *Synergy and conflicts in urban agriculture sustainability*

Dimension of sustainability of UA				
	Environmental	**Productivity**	**Social/political**	**Land security**
Synergy	Soil conserving structures; year round soil cover	increased access to chemical input; access to irrigation water	Job creation; provide food source to society	Ability to averse eviction risks;
Conflict	High chemical input; very limited resource recycling; untreated water use	Impose environmental burden	Vacuum in recognition by some authorities	Still UA is considered as informal land use pattern

5. Conclusion

The current study provided empirical evidence on the importance of cooperative in sustainability of urban agricultural phenomenon particularly towards achieving better agricultural productivity, securing land access, reducing environmental burden and fostering social and political acceptance.

Through a collective action of procuring inputs (particularly fertilizers), by specialization of crop production, and maintaining irrigation facilities urban farming cooperatives help achieve productivity. The choice of crops that most cooperatives produced reflected on the productivity. Since they are also producing leafy vegetables like Swiss chard and lettuce which can be harvested every 15 days for almost three months once it is planted, their productivity is enhanced and their income improved.

It was also pointed out that the productivity of urban vegetable producing cooperatives is also fivefold higher than the rural vegetable productions. This is explained on one hand due to the proximity of intra/periurban farms to cities where in developing countries access to inputs is concentrated on. The further one away goes from cities the more difficult it gets for access to inputs and other technologies.

Cooperatives also play major role in securing sustained market outlet and fetching better prices through a direct negotiation with whole dealers. Acting as a group with structurally well organized manner cooperatives were able to negotiate with market players at different levels. Their organizational structure helps promote diffusion of technologies (some cultivation techniques) and foster connection with extension agents in a more concerted manner. The study also revealed that cooperatives with a special arrangement of profit sharing, which distributes 70% of the profit to members and saving the remaining 30%, are able to reverse production and marketing risks of their members.

In a city where UA considered as informal activity that does not merit any sort of land acquisition pattern cooperatives help maintain land ownership for so long particularly through

the ability to lobby and negotiate. On the other hand boosting productivity motivates members to stay in the farming sector and maintain their land covered by crops year round than being abandoned. This situation keeps land developers and city authorities away from contemplating to develop the land into other land use form.

Having succeeded in acquiring access to land does not itself secure sustainability especially because of the absence of other supports from government and financial institutions. The current result also revealed that all cooperatives have a stable access to land and temporary title of deed for cultivation but they lack support from governments and financial loan from any institution which results in lack of investment on sustainable land use.

The study also revealed that cooperatives, providing an average employment rate of 15 man power per hectare of land per season, are contributing huge job opportunity for neighboring community and hence are more acceptable by societies. Politically cooperatives are tolerated by city authorities as they are offering both jobs and food supplies to the society remarkably.

Urban cultivation will not be sustainable if steps are not taken to introduce recycling systems and create environmental awareness among agriculturist. Though most of the cooperatives are aware of the importance of soil and water conservation they are not helping members to utilize resources by nutrient recycling e.g. compost making and utilization. Only one cooperative utilizes organic fertilizers. There is, therefore, a need, to promote resource recycling and increasing awareness among farmers to be environmentally sustainable. Furthermore institutional support to address possible externalities affecting the environment and health is crucial.

Finally, as this study has been done in one cross section data it might be imperative to do more detailed, repeated researches with a quantitative measurement based on the findings of this current study in order to further understand the cooperatives and their role towards achieving UA sustainability. A detailed study on the land politics and policy dimension of UA might also improve the picture of sustainability analysis.

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Appendix I. Questionnaire used for the survey

This research is conducted by Dawit Ashenafi Ayalew, currently studying Master in sustainability science in the University of Tokyo, Japan, under the supervision of Prof. Yokohari Makoto. The purpose of this research is to promote urban farming in the city of Addis Ababa by investigating its significance for the sustainability of the city. The research will also envisage looking into the difference between cooperatively managed urban farms and individual urban farms. Your responses will never be disclosed in any form by which you will be identified.

A. **Household demographic data**

Name of farmer_____

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11
Age	Sex M/F	**Education level**	**Ethnicity**	**Religion**	**Years living in the city**	**Household head (M/F)**	**Family size (No.)**	**Land size (ha)**	**Nonfarm activity (civil servant, shop, etc)**	**Income other than farming (ETB)**

Specific only to cooperative members

A12. When did you join this cooperative? _____

A13Why did you join? _____

_____

A14. What benefit do you get from the cooperative? _____

a. Market insurance b. input supply c. farming tools d. training e. credit access

f. others_____

A15. What demerits you think cooperative has? _____

B. Economic variable

Hypothesis: Cooperative farms can increase land productivity than individual farms by providing inputs and other technologies to the farmer

For both cooperative and individual farmers

B1.When did you start urban farming? _____

B2.before starting farming what was your main occupation? _____

B3. Type of crops you produced?

Perennial crops _____

Annual_____

B4. Production Pattern

a. Single cropping b. intercropping c. mixed farming (crop + animal husbandry)

B5. If the pattern is intercropping or mixed farming what combination do you use?_____

B6. Number of production per year?_____

B7. Yield per hectare per year? ____

B8. Who decide the crop type and production pattern (in the case of cooperative both on the communal land and on private land)?_____
B9. How much of the produce consumed at home?
a. 0-25% b. 25-50% c. 50-75% d. 100%
B10. How much of the produce is for sell?
a. 0-25% b. 25-50% c. 50-75% d. 100%
B11. What determines the proportion of the consumption or sell?
a. Market demand b. Family needs c. cooperative leader d. lack of storage facility
B12. Total annual revenue per ha (Birr) _____

C. Input

C1.Type of seeds used?
a. Improved variety b. local variety
C2. Where do you get seeds?
a. Extension office b. market c. own source d. other_____
C3. Type of fertilizers used.
a. Organic fertilizers b. inorganic fertilizers c. both d. no fertilizer
C4. If you use organic fertilizer, what type of it you use?
a. Compost b. animal manure c. Orga^{TM} d. other____
C5. Do you use insecticide or herbicide? a. Yes b. No
C6. If yes for C5, what type of chemicals and how much you apply?_____
C7. How often you apply organic fertilizer in your land?
a. Once every year b. twice c. three times
C8. How often you apply chemical fertilizer in your land?
a. Once every year b. twice c. three times d. other____
C9. How much amount (kg) of organic fertilizer you apply per ha? _____
C10. Where do you get the organic inputs?
a. buy from market b. from agriculture extension c. prepare yourself d. others_____

D. Marketing variable

Hypothesis: Cooperatives assist members to fetch comparatively high price and provide market insurance than individuals.

D1. How do you sell your produce?
a. Farm gate b. Proxy local market c. Supply to whole seller d. supply to retailer
e. other _____
D2. If you sell your products to markets other than at farm gate, what mode of transportation you use?
a. Animal back (donkey) b. cart c.travel on foot d. car e. other_____
D3. Who take care of marketing?
a. Women b. men c. other_____
D4. How do you set product price?
a. Based on current market price b. based on your production cost c. negotiating with wholesalers e. set by cooperative leader f. other _____

D5. How do you get market information?

a. Friend b. call to retailer or wholesaler c. cooperative d. others_____

D6. How long (minute) you have to travel to market? _____

E. Social variable

Hypothesis: Cooperative farms contribute to community development and are acceptable by the society

E1. Do you use family labor? A. Yes b. No

E2. How many of your family member participates in farming? _____

E3. Do you employ labor from the market? A. Yes b. No.

E4. If yes, how many persons you employ in a season?_____

E5. Which activity requires you more labor?

a.Land preparation b. planting c. Harvesting d. transporting to market e. other_____

E6. Do you sell products to your neighbors in lower price? a. Yes b. No

E7. What is the opinion of the neighborhood society about your farm?

a.They accept it b. they complain about it

E8. If they do, usually about what complain?

a. Using fertilizer (chemicals) b. products are not healthy c. noise or disturbance d.other_____

E9. What about the sub-city authorities? _____

E10. Are you a member in any social groups of the community? a. yes b. no

E11. If yes, what role you have in the group?

F. Environmental variable

Hypothesis: Cooperatives are able to minimize impact on the environment by making use of different land management practices and organic inputs

F1.Do you have modern irrigation facility? a. Yes b. No; if yes mention the type

F2. If you use irrigation what source of water you have?

a. Rain harvesting b. river c. ground water d. tap water e. other_____

F3. If river what is the name of the river? _____

F4. Do you have composting facility? a. Yes b. No

F5. If yes, where do you collect wastes for composting?

a. Only home garbage b. from neighbor c. collect far from neighborhood d. other_____

F6. Do you have soil conservation structure like terracing on your farmland? _____

F7. Do you use crop rotation? a. Yes b. No

F8. If No for F7, why? _____

F9. Have you ever received any training of composting or crop residue use? a. Yes b. No

F10. What do you do with the crop residue?

a. incorporate to the soil b. burn c. make compost out of it d. other_____

G. Security and access to land

Hypothesis: cooperative is a solution to lobby for necessary government recognition and improve land tenure security and access

G1. Where do you grow the crops?

a. backyards b. In open space c. roadsides d. other

G3. How long you travel from home (minute)? _____

G4.Who owns the land you currently cultivating on?

a. Private b. government c. other individuals d. other

G5. How long you cultivate the land? _____ (years)

G6.Have you got additional land for cultivation in the last 5 years? a. Yes b. No

G7. If yes to Q2, how much area in ha? _____

G8. How did you acquire the land?

a. Rent from individual b. usufruct c. inherited from relative d. from municipality e. other_____

G9. Who own the land?

a. Family member's b. government c. Friends d. other_____

G10. Have you ever changed your farm land in the last 5 years? a. Yes b. No

G11. If yes for Q6, how many times did you change? _____

G12. Why did you change? _____

G13. If the authorities want your land for development and ask you to leave, how will you negotiate with them?

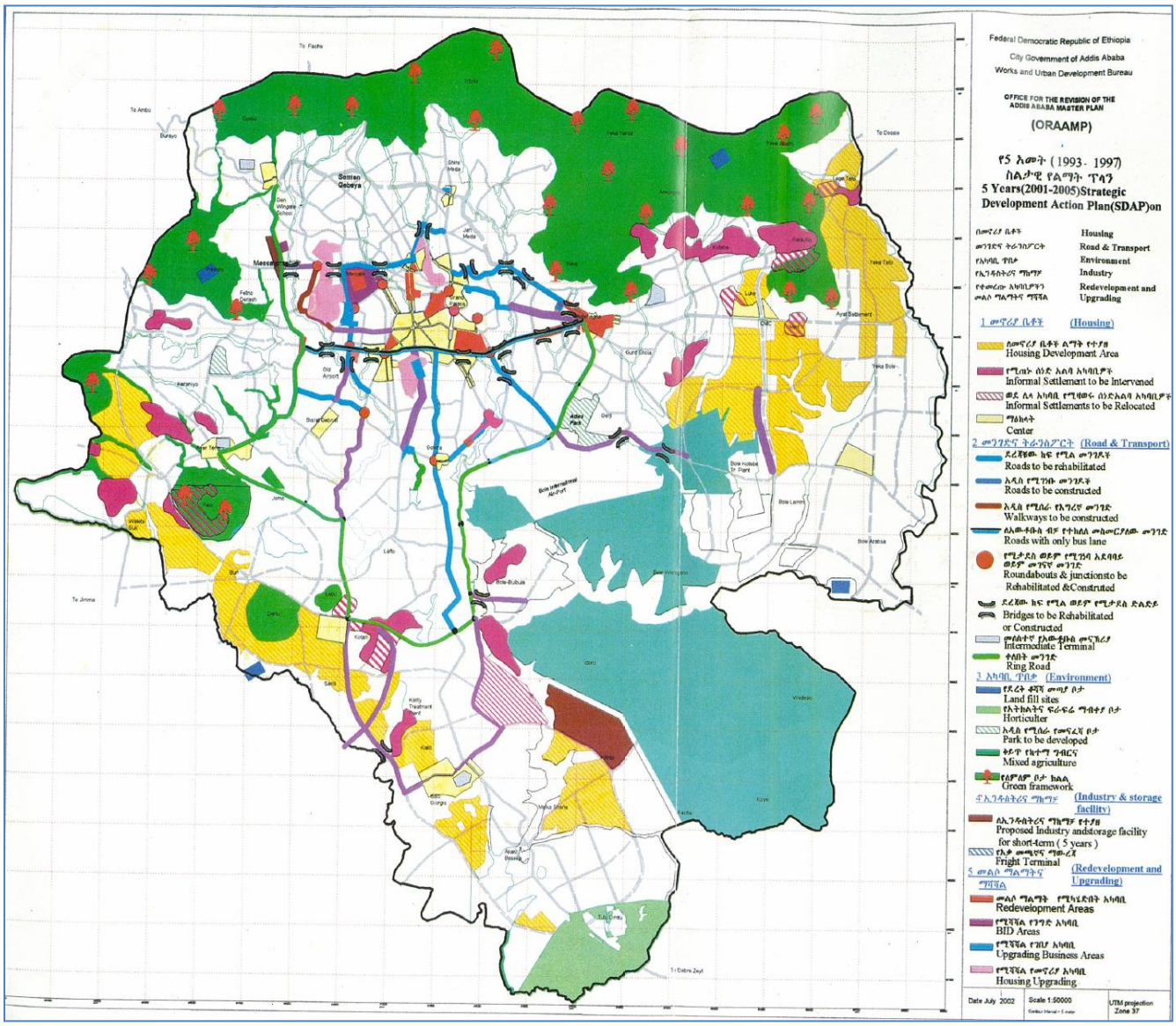
a. through the cooperative leaders b. by yourself c. by hiring lawyer d. other

Challenges of production

What challenges do you face for future production? Make a right mark

Access to land	**eviction**	**input access**	**Extension service**	**Watering facility**	**Lack of storage**	**transportation**	**Labor**	**Conflict from society**	**Lack of recognition from authorities**

Appendix II. Strategic plan of the city of Addis Ababa showing area allocated for urban agriculture in light green( )



Source: Office for the Revision of the Addis Ababa Master Plan (2001-2005)