THE ROLE OF URBAN AND PERI-URBAN AGRICULTURE FOR THE IMPROVEMENTS OF URBAN HOUSEHOLD FOOD SECURITY

The case of *Bishoftu* Town of the Oromia Region

By: Yohannes Eshetu

A thesis submitted to the School of Development Studies of Addis Ababa University in partial fulfillment of the requirements for the Degree of Masters of Science in Food Security Studies

June, 2011
Addis Ababa

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
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Title

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By
Yohannes Eshetu

Food Security

APPROVED BY THE BOARD OF EXAMINERS: SIGNATURE

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Abstract

Urban and peri-urban agriculture (UPA) is a dynamic concept that comprises a variety of livelihood systems ranging from subsistence production and processing at the household level to more commercialized agriculture.

The overall objective of the study was to analyze the contribution of UPA to urban household food security in Bishoftu town of the Oromia Regional State. The scope of this research is limited to investigating and explaining the contribution of cereal crop production (such as teff, wheat and pulses), Horticultural crops (like onion tomato, potato and others) poultry and livestock raising activities (dominantly dairy cow keeping) in Bishoftu town.

Both first hand and secondary data have been used to generate the required information for the study, some of the secondary data sources were books, journals, survey and personal observation. Simple descriptive statistical tools such as percentage, mean, and the like are used in describing the final result.

Most of the farmers engaged in UPA activities provide their products to the nearby market so as to generate income, specially young farmers who keeps dairy cows, poultry and vegetable producers practice UPA with the primary notion of income generation; on the contrary, those HH heads with many family members engaged in cereal crops production with the primary aim to cover their family consumption needs. While some of the farmers permanently engaged in UPA, the majority of them involved in other type of jobs and undertakes UPA as a part time work so as to diversify their income.

Although UPA make a good contribution in enhancing food security, employment opportunity and income at household level, the attention given by the local government bodies in Bishoftu town is minimal. In order to enhance its benefit, there is a need to work in a more coordinated way by urban farmers, local organizations, municipal authorities and an interdisciplinary researchers is required in identifying problems, potentials and planning for joint action in the future by all of the stakeholders in the sector.

Acknowledgments

Conducting M.Sc. research work under frenetic conditions can only be possible with the help and steady support from different group of people and I have experienced this help from many different individuals, friends and institutions at various levels. It is quite impossible to list all the contributors by name. However, I would like to take an opportunity to acknowledge a few of them who have made a continuous contribution in the course of this research work.

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Lastly, I want to thank all the respondents, data collectors, and *kebele* administrations for scarifying their time. Thanks to Tsega for her support and patience during my stay in the college of development studies.

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Acronyms

AAU	Addis Ababa University
ADLI	Agricultural Development Led Industrialization
CGIAR	Consultative Group on International Agricultural Research
CSA	Central Statistics Agency
DZARC	Debre Ziet Agricultural Research Center
EC	Ethiopian Calendar
ECA	Economic Commission for Africa
EARO	Ethiopian Agricultural Research Organization
FAO	Food and Agriculture Organization
HFIAS	Household Food Insecurity Access Scale
HH	Household
HIV	Human Immune Viral Disease
IFPRI	International Food Policy Research Institution
KG	Kilogram
MDGs	Millennium Development Goals
NGO	Non Governmental Organization
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
SDPRP	Sustainable Development and Poverty Reduction Program
SSA	Sub Saharan Africa
UN	United Nations
UNCHS	United Nations Center For Human Settlement-Habitat
UNDP	United Nations Development Programs
USAID	Aids of the People of United States
USD	Dollar of United States of America
USDA	United State Department of Agriculture
WFP	World Food Program
WHO	World Health Organization

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Dedication

This thesis is dedicated to my mother

Asnakech Haile

CHAPTER ONE

1. INTRODUCTION

With half the world's population now living in cities, and that figure expected to rise to two thirds in another 20 years, urban agriculture is increasingly being practiced around the world as a livelihood strategy for poor city dwellers. According to (Argenti, 2000 cited in FAO, 2007) reports, there were 800 million people working in urban agriculture in 1996, a majority of whom were minimum wage earners in developing countries. The contribution of urban agriculture to food security and healthy nutrition is probably its most important asset. Food production in the city is in many cases a response of the urban poor to inadequate, unreliable and irregular access to food, and the lack of purchasing power (UNDP, 1996).

In addition to production for their own consumption needs, large amounts of food are produced for other categories of the population. It is estimated (FAO, 1999) that 200 million urban residents provide food for the market and 800 million urban dwellers are actively engaged in UA in one way or another. Urban and peri-urban agriculture (UPA) supplies food to the city and income to those who farm. Above all, UPA make an important contribution to food security for those who do not have easy access. In essence, UA is the true realization of the statement that 'necessity is the mother of invention' (Mougeot, 2006).

Most cities in developing countries are not able to generate sufficient (formal or informal) income opportunities for the rapidly growing population. The World Bank (2000) estimates that approximately 50% of the poor live in urban areas (25% in 1988). In urban settings, lack of income translates more directly into lack of food than in a rural setting (cash is needed). The costs of supplying and distributing food from rural areas to the urban areas or to import food for the cities are rising continuously, and it is expected that urban food insecurity will increase in the upcoming time (FAO, 2008).

Moreover, the countries that are urbanizing most rapidly are the least prepared to satisfy their food needs and many precariously depend on food aid and imports (Mougeot, 2000). Whereas malnutrition is falling in some areas, it is rapidly rising in others and recent projections show that in the absence of concrete action, many millions will still suffer from food insecurity in the first several decades of the 21st century. Mougeot (2000) has argued that urban agriculture may be one way to bolster city food supplies while also increasing the incomes of the poor.

For decades, poverty, food insecurity and malnutrition in Africa were viewed as largely rural problems (Maxwell et al, 2000): however, the population of many African countries is becoming more urbanite. The urban population in Africa grew from 27 percent to 38 percent between 1980 and 2000, and is expected to reach nearly 50 percent by 2020 (De Zeeuw H. and M. Dubbeling (2009). Unfortunately, the urbanization of the continent does not mean economic opportunity and prosperity for the majority of Africans. On the contrary, global poverty is becoming more African and more urban. Fifty percent of the world's poor and 40 percent of Africa's poor live in urban areas (Fialor, S. 2002).

Against this backdrop, urban and peri-urban agriculture (UPA), or food production conducted in or around urban regions, seems to provide a realistic and pragmatic solution (Mougeot, 2001; 2005). For example, reports indicate that urban agriculture is an important source of food throughout developing countries food systems and a critical food security strategy for poor urban households. Urban agriculture may improve household nutrition as it provides a source of fresh, locally grown crops that increase the micronutrients in poor households' diets (Maxwell, 2001; FAO, 2001).

Urban agriculture may improve both food intake (improved access to a cheap source of proteins) and the quality of the food may improve (poor urban families involved in farming eat more fresh vegetables than other families in the same income category). In Harare, Zimbabwe, sixty percent of food consumed by low-income groups was self-produced (Maxwell, 2000). In Kampala, Uganda, children aged five years or less in low-income farming households were found to be significantly better-off nutritionally (less stunted) than counterparts in non-farming households (Maxwell, 1998).

In Addis Ababa, the capital of Ethiopia, where 35% of the population is estimated to be below poverty line (Schmidt and Kedir, 2009 cited in FAO, 2008), UA has played significant role in food security and generating household income.

The ability of UPA to continuously supply food for the urban poor depends on better planning based on accurate agro-ecological information, which is also a means to enhance sustainability of the system. UA's ability to do so in general and its sustainability in particular, however, is being threatened by population increase due to natural and rural-urban migration, coupled with urban sprawling and infrastructure developments that are competing with urban farming for available space and scarce resources such as water for irrigation (Gittleman, 2009).

1.1. Statement of the problem

Urban agriculture (UA) has long been considered as a fringe activity that has no place in cities; however its potential is beginning to be realized. In fact, UA is about food self reliance: it involves creating job opportunities and is a reaction to food insecurity, particularly for the poor. Contrary to what many believe, UA is found in every city, where it is sometimes hidden, sometimes obvious. If one looks carefully, few spaces in a major city are unused. Valuable vacant land rarely sits idle and is often taken over either formally, or informally and made productive (Mougeot, 2006; Van Veenhuizen, 2006).

The lack of proper attention from policy makers, urban planners and local authorities, stemmed from the shortage of information that substantiate UA's importance in the city sustainability, is also causing problem for urban farming in the city. Add to this, the lack of reliable data on the extent of urban areas being used for farming has also affected developing sustainable policies to manage urban farming in the city (Gittleman, 2009).

Many argue that urban agriculture in Ethiopia, like that of many African countries, has been viewed as informal household survival strategy. In such situations, the real potential of urban agriculture to satisfy the basic needs such as providing food, income, employment and environmental protection have not been well understood (Egziabher *et al.*, 1996; Foeken *et al.*, 2004). In general, in Ethiopia when compared to other Sub-Saharan African countries, research undertaken on UPA is insignificant. Because of this, data and information on the contribution of the sector towards urban household food security, income generation and creation of employment opportunity for urban dwellers is not known well.

Although a significant number of urban households are engaged in UPA activities in and around *Bishoftu* town, there is a lack of information with regard to the total number of households engaged in UPA activities, the total production/yield, UPA's contribution for household food security, creation of income and its role in enhancing employment opportunities for the inhabitants in *Bishoftu* town. This shows that the emphasis given to the sector by the local government bodies in *Bishoftu* is minimal.

1.2. Objectives of the Study

1.2.1. General Objective

- To assess the role of Urban and Peri-urban Agriculture (UPA) for the improvements of urban households food security condition in *Bishoftu* town of the Oromia Regional State.

1.2.1.1. Specific Objectives

- To evaluate the changes in the availability of food for households engaged in UPA activities.
- To assess the contribution of UPA for the enhancement of income of the HHs engaged in the activities.
- To identify the main challenges that hamper UPA activities in the concerned area.
- To assess the impact of UPA on the environment.

1.3. Research Questions

- Does urban and peri-urban agriculture (UPA) improve food security condition of the households engaged in the activity in the town of *Bishoftu*?
- Does UPA play a role in enhancing income for the households engaged in the sector in *Bishoftu*?
- What are the common challenges that constrain UPA in the town of *Bishoftu*?

1.4. Significance of the Study

Around the world. urban agriculture is part of a survival strategy for the urban poor. Its contribution to food security appears to be substantial in cities of many developing countries. Despite its significance and long history, urban agriculture receives significantly lesser recognition by authorities in the developing countries for example in Africa than in the developed world.

In Ethiopia, like in other African countries, although UA is significantly contributing for fulfilling the basic demands of the low income, it still lacks proper consideration and the right full place from policy makers, urban planners and authorities. Thus, there is a need to recognize the sector and develop deeper knowledge to have appropriate policies to improve the activities (Azeb Girmai, 2006).

A substantial amount of food items are now produced in the urban and peri-urban areas and a number of households are involved in urban and peri-urban agriculture. Most of these people primarily interested to cover the food consumption need of their families. Regardless of this, the amounts of food production by these groups are not properly registered in a coordinated manner in *Bishoftu*.

Government officials and other private organizations in *Bishoftu* town have given less attention to the impact of the sector, there is no clear policy framework regarding urban and peri-urban agriculture and the *Bishoftu* town's land use plan document lack allocation of plots for UPA activities. Therefore, unless planners and policy makers have adequate information about the sector they can not address the needs and constraints of urban and peri-urban agriculture.

Thus, the findings of this research will benefit local authorities, urban planners, and policy makers in *Bishoftu* town to have good understanding on the role of UPA for food security at HH level and hence, give due consideration for UPA and incorporate the sector in the future town's development plans.

1.5. Scope and Limitation of the Study

Urban and peri-urban agriculture (UPA) includes the cultivation of crops, horticulture, floriculture, dairy farming, keeping pigs, poultry and aquaculture in areas designated as urban. However, the scope of this research is limited to investigating and explaining the contribution of crop and vegetables cultivation, dairy and poultry production (laying hens) which are mostly practiced by households in the study area.

In the course of this research, some of the challenges encountered were lack of relevant secondary data sources on urban and peri-urban agricultural activities with particular emphasis on the town of *Bishoftu* and lack of research findings on UPA in the town was the other limitation faced.

Although urban and peri-urban agriculture practices are prevalent in and around the *Bishoftu* town, the municipality of the town has not assigned experts to follow up and give the necessary technical support for those farmers engaged in UPA in *Bishoftu*.

Reluctance by some of the households to give the right information on the total financial gains in the year was observed. Difficulty to obtain the right person (HH's head), due to busyness in the field and market activities was the other problem faced and this obliged to make a repeated back and forth move to residence area of the HHs.

1.6. Organization of the Thesis

This thesis is organized in to five chapters. The first chapter contains an overview of urban and peri-urban agriculture, statement of the problems, the research objectives, research questions, significance of the study, scope and limitations of the study and organization of the thesis.

The second chapter contain review of literature that includes the theoretical and empirical studies in particular to the contribution of UPA to the household food security, generation of income, and creation of employment opportunities.

The third chapter contains the study area and research method employed.

The fourth chapter contain major findings of the research and

The fifth chapter contains the conclusion and recommendations part.

CHAPTER TWO

2. REVIEW OF LITERATURE

2.1. Definition and Concepts

Urban and peri urban agriculture (UPA) forms part of the survival strategy of urban dwellers all over the world, and has historically been integral to urban areas (Mougeot 1994). The importance and prevalence of urban and peri urban agriculture will continue to grow as urban populations increase. Many scholars and organizations from all over the world with different educational background and interest have been defining UPA since the Second World War; some of the definition that could help for further understanding of the concept as follows:

Urban and peri-urban agriculture have been defined as agriculture in and around cities, which compete for resources (land, water, energy, labour) that could also serve to satisfy other requirements of the urban population (FAO 1996). Important sectors of UPA include horticulture (vegetables and root crops) livestock, fodder and milk production, aquaculture and forestry.

FAO (1999), also redefined the concept with slight modification of the previous in the following manner: Urban and peri-urban agriculture (UPA) occurs within and surrounding the boundaries of cities throughout the world and includes products from crop and livestock agriculture, fisheries and forestry in the urban and peri-urban areas. It also includes non-wood forest products, as well as ecological services provided by agriculture, fisheries and forestry. Often multiple farming and gardening systems exist in and near a single city.

Urban and peri-urban agriculture can be defined as "an industry that produces, processes and markets food and fuel, largely in response to daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and recycling natural resources and urban wastes, to yield a diversity of crops and livestock" (UNDP, 1996).

Scholars (*Ruaf, 2002,* Karanga and Njinga, 2006) have revised the definition of urban agriculture or intra and peri-urban agriculture in different times that urban agriculture may take place in locations inside the cities (intra-urban) or in the peri-urban areas. The activities may take place on the homestead (on-plot) or on land away from the residence (off-plot), on private land (owned, leased) or on public lands (parks, conservation areas, along roads, streams and railways), or semi-public land (school yards, grounds of schools and hospitals), or peri-urban farming where owners of plots which were formerly classified as rural, but after the extension of towns are now within the municipality or town administrative boundaries.

At the World Food Summit in 1996, food security was defined as: "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs, and food preferences for an active and healthy life. According to the "World Food Program, January 2009" the key components of the definition for the assessment of food security at household level are based on the following three pillars of food security: (i) Food availability, (ii) Food access, (iii) and Food utilization.

Food availability: Food availability is the physical presence of food in the area of concern through all forms of domestic production, commercial imports and food aid. Food availability might be aggregated at regional, national, district or community level.

Food access: Food access concerns a household's ability to acquire adequate amounts of food, through one or a combination of own home production and stocks, purchases, barter (exchange of items for food), gifts, borrowing and food aid.

Food may be available but not accessible to certain households if they cannot acquire a sufficient quantity or diversity of food through these mechanisms.

Food utilization: Food utilization refers to households' use of the food to which they have access, and individuals' ability to absorb and metabolize the nutrients, that is the conversion efficiency of the body (World Food Program, January 2009).

2.2. Urban Population Growth and Projected Trends

According to the United Nations, it is predicted that by 2030, the number of city dwellers will reach 60% of the world's population. Globally, as urban centers expand, they often engulf villages or formerly referred to as rural. Third world countries have been experiencing an accelerated urban growth since the last 20th century. According to Feldmen *et al.*, (1996), mega cities and large urban centers, especially in the third world, are experiencing unprecedented population increases.

Urban population growth will be most significant in low income countries, notably in Africa and Asia. East Africa will experience total and urban population growth rates significantly higher than the African average (UN- HABITAT, 2008).

2.3. Urbanization, Poverty and Food Insecurity

The rapid urbanization that is taking place goes together with a rapid increase in urban poverty and urban food insecurity. By 2020 the developing countries of Africa, Asia, and Latin America will be home to some 75% of all urban dwellers, and to eight of the anticipated nine mega-cities with populations in excess of 20 million. By the year 2020, 85% of the poor in Latin America, and about 40-45% of the poor in Africa and Asia will be concentrated in towns and cities. Rapid urbanization is causing fundamental social and environmental changes and posing new challenges, particularly in the developing world. In 1990, 45% of the world's population lived in urban areas; by the year 2025, this will have increased to 65%. Most cities in developing countries have great difficulties to cope with this development and are unable to create sufficient formal employment opportunities for the poor. They also have increasing problems with the disposal of urban wastes and waste water and maintaining air and river water quality (FAO 2006).

Urban growth combined with limited employment opportunities in cities is leading to a more rapid increase in poverty in urban areas than in rural areas. Some 43 % of African's urban population lives below the poverty line. In several SSA nations that share even exceeds 50 % and Africa's urban slum populations continue to grow (UN-HABITAT, 2008).

Rapid urban growth and growing urban poverty should raise concerns particularly about African urban food security, supply and distribution systems. The urban poor are particularly vulnerable to variations in food and fuel prices and in income since food (often over 60%) and fuel (often more then 10%) make up a large part of their household expenses. Variations in food prices and income directly translate into diminished purchasing power and rising rates of food insecurity, compromising dietary quantity and quality. It is estimated that the rise in food prices between 2007 and 2008 increased the number of people living in extreme poverty in urban areas in East and South Asia, the Middle East and Sub-Saharan Africa (SSA) by at least 1.5% (Baker, 2008).

High dependence on food imports, especially for low income countries with limited foreign exchange reserves means that any increase in import prices or decline in export earnings could force a decline in food imports, causing their food security to deteriorate further, hitting first and foremost the urban poor.

Nowadays, Africa is especially dependent on food imports, as well as on food aid receipts. In 2005-06, in 11 SSA countries, the import share of total grain supplies equaled 45% of consumption, while in seven countries the import share was in the range of 30-50% (USDA, 2009).

Table 1: Projected grain imports 2010-2020

Country	Commercial grain imports In 1,000 tons	
	2010	**2020**
Ethiopia	28	48
Kenya	1,629	1,771
Madagascar	256	276
Tanzania	949	1, 624
Uganda	271	439

United State Department of Agriculture, 2009

Furthermore, and with urban expansion, the overall cost of supplying, distributing and accessing food is likely to increase. As distances between food producers and

consumers grow, food becomes more expensive (transportation costs assuming a rapidly growing share of food prices; while post-harvest losses are further increased caused by inappropriate handling and packaging). Especially, low-income households, residing farther away from food markets, may face higher prices, time constraints and transport costs in accessing food (Argenti and Marocchino, 2005, UN-FAO, 2010).

In addition, development of dependable food infrastructure (production, transport, markets, industry) is not keeping pace with the rapid urban growth. The lack of infrastructure is especially a problem in terms of keeping cities supplied with perishable and fresh produce. Growing demand for processed foods, with lower nutritional qualities, high levels of fat and sugar, may put specifically the poorer sections of society at greater risk from under-nutrition and diet-related chronic diseases (Ambrose-Oji, 2009).

2.4. Why UPA is calling the attention of nations

Until recently poverty was synonymous with rural conditions, but rapid urbanization, also due to migration from extreme events (conflict, natural disasters...) in many developing countries has given birth to a large class of urban poor. It is estimated that about one-quarter of the developing world's poor live in urban areas, but also that poverty is becoming more urban and that the poor are urbanizing faster than the population as a whole. Some analyses have shown however, that urban poverty is not only growing rapidly, but has tended to be underestimated in the past. Figures on levels of urban poverty for nations or for particular cities are much lower than the proportion of people living in very poor quality housing, lacking basic infrastructure or services. Most authors on urban poverty agree that poverty is clearly becoming more urban (FAO 2008).

Poverty, hunger and food insecurity have human rights implications. Indeed, it is now widely accepted that poverty should not be seen only as a lack of income, but also as a deprivation of human rights and that hunger constitutes a violation of the human right to

food. Many urban poor have long practiced urban and peri-urban agriculture (UPA) as a livelihood and survival strategy UNDP (1996).

2.4.1. The role of UPA for food security and nutrition

Food production in the city is in many cases a response of the urban poor to inadequate, unreliable and irregular access to food, and the lack of purchasing power. Engagement in farming in urban areas has also been shown to be associated with greater dietary diversity in most countries (WHO, 2003). The contribution of urban agriculture to food security and healthy nutrition is probably its most important asset. Food production in the city is in many cases a response of the urban poor to inadequate, unreliable and irregular access to food, and the lack of purchasing power. Urban agriculture plays an important role in enhancing urban food security since the costs of supplying and distributing food to urban areas based on rural production and imports continue to increase, and do not satisfy the demand, especially of the poorer sectors of the population.

Urban agriculture to a large extent complements rural agriculture and increases the efficiency of the national food system in that it provides products that rural agriculture cannot supply easily (e.g. perishable products, products that require rapid delivery upon harvest), that can substitute for food imports and can release rural lands for export production of commodities (Argenti O. and C. Marocchino, 2005).

Urban households involved in UPA are generally more food secure and benefit from a more diverse diet. Studies reveal that in Nakuru, Morogoro and Mbeya (Tanzania) a HH's own urban agricultural production was among the most important food source for many poor (and even less poor) households (Foeken, 2008).

Urban and peri-urban food production also helps increase the availability of healthy and affordable food for a larger number of urban consumers. In many cities UPA meets a substantial part of the urban demand for vegetables (especially fresh leafy vegetables); alongside other products. The volume of crops and animal products of UPA often represents a substantial part of the overall urban food needs, e.g. in Nakuru 8% and

Kampala 40% (Aubry and Ramamonjisoa, 2007).

UPA improves access to fresh and nutritious food for the urban poor not just by making it available at close proximity to cities but also by reducing its cost, as locally-produced food involves less intermediaries and less transport, cold storage, processing and packaging. The price differential between producer and final consumer (which may go up to 1:10 in rural agriculture) is lowered to 1:2 or 1:3 in UPA (Moustier and Danso, 2006).

2.4.2. The economic impacts of UPA

Growing your own food saves household expenditures on food; poor people in poor countries generally spend a substantial part of their income (50 – 70%) on food. Growing the relatively expensive vegetables therefore saves money as well as on bartering of produce. Selling produce (fresh or processed) brings in cash. Besides the economic benefits for the urban agricultural producers, urban agriculture stimulates the development of related micro-enterprises: the production of necessary agricultural inputs and the processing, packaging and marketing of outputs.

Input production and delivery may include activities like the collection and composting of urban wastes, production of organic pesticides, fabrication of tools, delivery of water, buying and bringing of chemical fertilizers, etc.) Transformation of foodstuffs may include the making of yoghurt from milk, or the frying of plantains or yams, chicken or eggs, etc. This might be done at the household level, to sell at the farm gate or in a local shop or market, and larger units to sell in supermarkets or even for export (RUAF, 2008).

Food production, processing and marketing also contributes to generating income and employment for many poor urban households. According to the World Bank (2007), intensive peri-urban horticultural and livestock rearing are extremely fast-growing sectors that employ many workers and produce high value-added products that yield reasonable incomes and returns.

2.4.3. Employment and Enterprise development

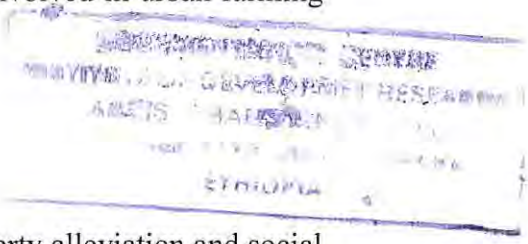
Worldwide urban agriculture involved 150 million people. Particularly, poor women and disadvantaged community group participated in the sector; it reduced poverty, increased community solidarity and enhanced business activities (Karanja and Njenga 2006).

Urban agriculture has a significant employment generating potential for urban areas in developing countries. Many studies (Tinker, 1994; Haight, 1999) revealed that, urban agriculture can create both full time employment for the household head and their spouse and part time employment for the children and other household members. It also reduces unemployment within the family and improves the overall level of family income. Other scholars also agree with that, urban agriculture is used as a means of employment for two categories of people: members of the farming households and hired laborers. With regard to the type of involvement in farming, for some of the people farming is a full time occupation, for others it is a part time job, and for few it is a leisure time activity (Foeken *et al.*, 2004).

Urban agriculture tends to be a livelihood strategy to supplement household's inadequate incomes by providing food on any available land (Mboganie and Foeken, 1996). Traditionally, in the third world societies, it is observed that people with low income level are involved in urban agriculture. Studies show that urban agriculture is no longer the activity of lower socio economic status but a wide range of people engaged in urban agriculture for a variety of economic, cultural, nutritional and social reason (Tinker, 1994 cited in Mwangi 1996).

Most urban farmers are poorly educated and low-income women with families possess only a few of the skills that are less valued in the market places (Feldman, 1996). Recently, urban agriculture is recognized in its benefits as food supply, income generation as well as employment. NGOs, national and city level offices relevant to the sector are promoting urban agriculture. People, particularly poor people, are required to participate in urban agriculture as a means of their livelihood (Azeb, 2006).

In Addis Ababa, Ethiopia, the city council allocated vacant land for gardens and involved poor men to produce vegetables for consumption and sale (Nelson, 1978 cited in Feldman and Cockram Mary, 1996). In recent times, the city council has taken urban agriculture as one of the economic activities and has allocated 7175 hectares of land (13% of the total land within the city) for urban agriculture and has included the issue of urban agriculture within the 10 years city structural plan 2001-2010 E.C. (ibid). Many urban households are involved in urban farming according to Wondimu, (2005) cited in Azeb, (2006), 69,518 households in Addis Ababa urban *kebeles* are involved in urban farming (Azeb, 2006).



2.4.4. UPA's role in constructing social networks

Urban agriculture may function as an important strategy for poverty alleviation and social integration. Several examples exist of municipalities or NGOs that have initiated urban agriculture projects that involve disadvantaged groups such as orphans, disabled people, women, recent immigrants without jobs, or elderly people, with the aim to integrate them more strongly into the urban network and to provide them with a decent livelihood. The participants in the project may feel enriched by the possibility of working constructively, building their community, working together and in addition producing food and other products for consumption and for sale.

UA provides a good buffer against political or economic shocks, thus providing a good social safety net (Nugent, 2000). In periods of crisis, households can start this activity with relatively few barriers and thereby provide additional food or income for the household.

Many city governments have realized that UA provides opportunities to involve specific vulnerable groups in the socio-economic city life (social inclusion) and an important strategy for poverty alleviation. They have therefore started UA projects, including the provision of access to municipal land, training, technical assistance and investment and marketing support for agricultural production and processing enterprises (Godfrey Hampwaye; Lutangu Ingombe, 2009).

A project in Brisbane, Australia involves unemployed youth who collect food wastes from restaurants within a half kilometer of an urban farm located on a roof in the city. After pulverization, the wastes are composted and fed to worms (vermiculture). The worms and liquid nutrients are again used to raise vegetables (hydroponics) and fish on rooftops. The produced vegetables, herbs, fish and crustaceans are subsequently fed to the same restaurants again (Wilson, 2002).

Community-based UA can make several contributions to community development. At the core it provides social interaction, which is a key attribute in building and re-building a community. Since food is basic to all the community members, it facilitates interaction. But food production is also an economic activity that links to other economic activities in a community, including credit, manufacturing and retailing. It also creates jobs, particularly for women, the elderly and youth, and may form the basis for wider processes of revitalizing and improving the whole neighborhood.

2.4.5. UPA and its contributions to urban ecology

Urban agriculture is part of the urban ecological system and can play an important role in the urban environmental management system (RUAF, 2008).

UPA helps cities to become more resilient through: Reducing the vulnerability of the most vulnerable urban groups and strengthening community- based adaptive management by (a) diversifying urban food sources, enhancing access to nutritious food, reducing the dependency on imported and rural food supply; (b) diversifying income opportunities and functioning as a safety net in times of economic crisis; and (c) being a source of innovation and learning about new technologies for high land and water efficient food production.

Maintaining green open spaces and enhancing vegetation cover in the city with important adaptive (and some mitigation) benefits by reducing impacts of high rainfall by storage of excess water, increased and increased infiltration in green open spaces; and maintaining biodiversity in the city, thus protecting a wider base of plant

(and animal) genetic diversity (Ssemwanga, M. A *et al*, 2002). Reducing energy use and green house gas emissions by producing fresh food close to the city (less transport, cooling, storage, processing and packaging)

UA and urban forestry may also positively impact on the greening of the city, improve the urban microclimate (wind breaks, dust and noise reduction, shade) and maintain biodiversity (Smith et al, 2000).

2.4.5.1. Associated health and environmental impacts of UPA

UA may contaminate local water sources if large amounts of chemical fertilizers and pesticides are used. Also, the excessive use of nitrate-rich manure, such as chicken or pig manure can contaminate groundwater. In particular, wastewater discharge from intensive poultry farms can carry heavy loads of micro-organisms and may contaminate drinking water supplies. Further, under certain situations, inappropriate farming practices may lead to reduction of vegetation and siltation of water bodies (Bowyer and Smith, 1996). Because of the undervaluation of UA and stiff competition for land, UA is often pushed back to marginal areas within the city, such as wetlands and hill slopes, where it may harm the fragile ecosystems if not properly guided. Many of these problems can be prevented by introducing agro-ecological farming practices and integrated pest management control.

2.5. Characterization of urban agriculture

Urban agriculture can be subdivided in to ***intra-urban*** and ***peri-urban agriculture.***
2.5.1. Intra-urban agriculture takes place within the inner city. Most cities and towns have vacant and under-utilized land areas that are or can be used for UA, including areas not suited for building (along streams, close to airports, etc.), public or private lands not being used (lands waiting for construction) that can have an interim use, community lands and household areas.

Various types of UPA can be observed; community gardens (formal and informal),

home gardens, institutional gardens (managed by schools, hospitals, prisons, factories), nurseries, roof top gardening, cultivation in cellars and barns (e.g. mushrooms, earthworms). Research data seem to indicate that intra-urban agriculture tends to be more small-scale and more subsistence-oriented than peri-urban agriculture, although exceptions can regularly be found (e.g. vegetable production and production of mushroom or ornamental plants).

2.5.2. Peri-urban agriculture

Takes place in the urban periphery. Peri-urban areas tend to undergo dramatic changes over a given period of time, there is an influx of people from both rural and urban areas, population density increases, land prices tend to go up and multiple land use emerges. Such changes effect the agricultural production systems, which tend to become smaller scale with more intensive production, and shift from staple crops towards more perishable crops and animal production (meat, eggs, milk) (Moustier and Danso, 2006). The peri-urban is characterized by strong urban influences and demands, easy access to markets, services, and other inputs, but relative to shortage of land and from risk of pollution and urban growth (Smith, 1999).

2.6. Constraints on urban and peri-urban farmers

Some of the literatures reviewed indicate that, like many other sectors, UPA also constrained by different problems. In general Blick and Boyer (1996) summarized the major urban agriculture problems in the following three aspects:

- ✓ **Physical constraint and potential:** This includes lack of land, shortage of water, poor soil condition (physical and chemical composition), lack of inputs and the potential for pollution;

- ✓ **Institutional and legal framework:** This includes absence of legal status of crop cultivation, tree growing and animal husbandry in urban centers, less attention to extension services for urban farmers, and urban related technical knowledge of these services, research institution and NGOs with less interest to support urban

farming and with less capacity to become involved in urban farming respectively. Less attention of urban councils and urban government bodies to urban agriculture, lack of incentives and disincentives for farming such as subsidies, provision of allotment, rules and regulation, taxes, etc.

- ✓ **Socio economic situations:** this includes limited knowledge of the dwellers on farming practices, lack of detailed knowledge of sources of livelihoods and the relative importance of urban agriculture, inadequate study in the contribution of urban farming to family nutrition, pattern of food availability from urban farming, impact of urban agriculture to the urban environment, organizational capacity and initiative taken by local groups with respect to urban farming.

2.7. UPA and Policies in Ethiopia

The reduction of hunger and poverty has been central concerns for Ethiopia since 1991. The country's Sustainable Development and Poverty Reduction Program (SDPRP) launched in 2002, gave major emphasis to the agricultural sector, recognizing its central position in the country's livelihood, and its potential to generate surplus to fuel growth in other sectors.

Plan for Accelerated and Sustained Development to End Poverty (PASDEP) also has focus on growth with particular emphasis on commercialization of agriculture, private sector development, and the scaling up of resources to achieve the MDGs.

The Agricultural Development Led Industrialization (ADLI) strategy has the following major objectives:

- o Strengthening of human resource capacity and its effective utilization
- o Ensuring prudent allocation and use of existing land
- o Adoption of development path compatible with different agro-ecological zones
- o Specialization, diversification and commercialization of agricultural production
- o Integrating development activities with other sectors
- o Establishment of an effective agricultural marketing system

However, it should be noted that these policies are centered on rural agriculture, and do not have any provisions for UPA (Nigussie, 2010).

2.8. Sustainability of UPA

A proper analysis of the sustainability of UPA would need improved data collection and monitoring of indicators during a prolonged period of time. The interactions with other urban activities should also be included. According to Fialor (2002), the sustainability of UPA 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.

Table 2: Sustainability of UPA in Accra and Kumasi (Ghana)

Indicators	Specific considerations for the sustainability of UPA in Accra and Kumasi
Increased productivity	Constant access to inputs (seeds, fertilizer, pesticides, irrigation water); access to finance; niche crops; intensification; demand fluctuations; organic production (and marketing).
Economical viability	Net income; niche crops; diversification; Combining various functions.
Social acceptance	Political recognition and support; consumer recognition; community acceptance and Involvement (by farmers, market women and Consumer associations).
Environmental protection	Frequency of wastewater application; time before marketing; Protective clothes
Alternative land use	Land value development; land availability; zoning; innovative tenure arrangements.

Source: Based on Danso *et al.*, 2003

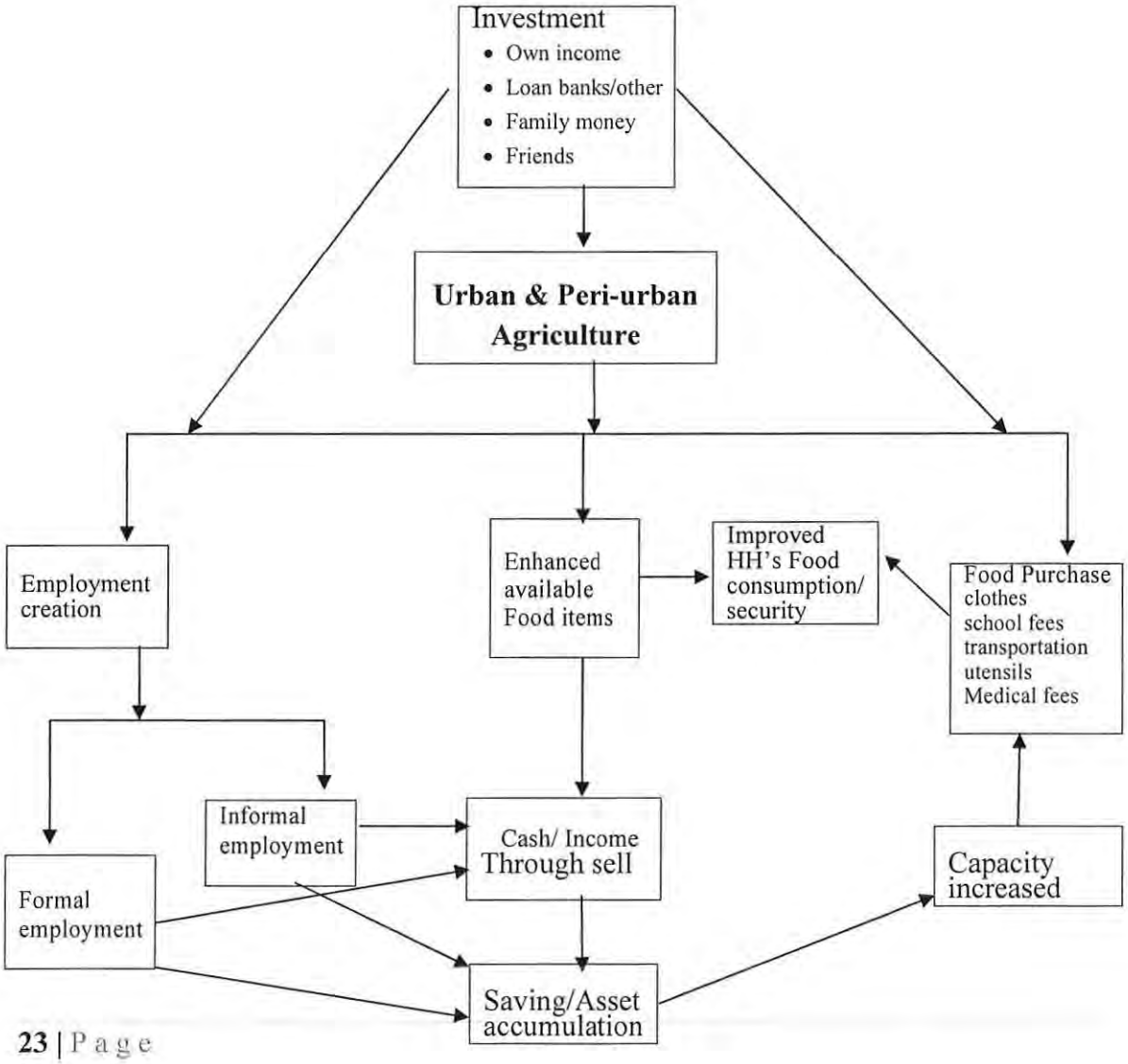
According to Foeken *et al.*, (2004), urban agriculture can only be sustainable if it does not disturb the urban environmental balance.

2.9. Conceptual Framework

Urban agriculture benefits the HHs directly through enhancing the *available food* through own production, *Income generation* at HHs level can be directly when part of the produce is sold, *Employment creation* at household level concerns the labor carried out by the household members as well the opportunity these households to hire other people to work in their farm and keeping *Urban environmental balance* in the area (Foeken *et al.*, 2004).

The following conceptual framework has been developed to show the role of UPP in job creation, income generation, enhancing food security condition at HH level.

Fig 1: Conceptual framework for the Urban and Peri-urban agricultural impact at HH level



CHAPTER THREE

3. STUDY AREA AND RESEARCH METHOD

3.1. Description of the Study Area

Bishoftu is the capital city of Ada'a *woreda,* which is located 45 kilometer from the city of Addis Ababa in south east direction following the main high way to Adama city in the Oromia region. *Bishoftu*, was established after Ethiopian-Djibouti railway had been operational in 1917 E.C. Following the range of reform program by the current government, Ada'a *wereda* administration is divided into two administrations: "*Bisheftu*" Urban Local Government and the Ada'a *Wereda* Rural Administration. Having administered fifteen *kebeles* for a long period of time, the administration has recently reduced the number of urban *kebeles* to nine which are categorized under four sub cities and also introduced 27 rural villages to put good governance in to effect.

The total area of the town is about 4,320 hectares. According to the strategic planning team of the town, the population of "*Bishoftu*" city is estimated at 137,413 of which 49% and 51% were males and females, respectively. The trends of population of *Bishoftu* shows in 1994 (73,372) and 2007 (137, 413), i.e. 13 years, the population has almost doubled (CSA, 1994; CSA, 2006). Apart from the common reasons for population growth, the rapid expansion of the urban boundary in the recent years contributed to the population increase. Furthermore, the town has encroached into the surrounding rural areas and the rural populations became part of the urban population as a result of administration decrees.

With regard to religion distribution Orthodox Christian comprises 88.64%, Protestant Christian 6.46%, Catholic 0.53%, Muslim 3.79%, others 0.26%, traditional believers 0.18% and not stated is 0.13% (CSA, 2006).

According to the key informants there are five lakes in the town namely: Bishoftu, Hora, Babogaya, Kuriftu and Cheleleka; while the first four are all season lakes, Lake Cheleleka dries in the dry season of the year. And some of the lakes like Cheleleka and

Babogaya are main sources of water for UPA farmers for crop and vegetable production on top of their recreational values like the others.

The town is generally characterized by semi humid agroecological zones. The town has an altitude of 1860 meters above sea level. The average daily temperature is between 8.9^0c and 24.3 ^{0}c. The main rainy season starts in June and ends in August, and the mean annual rainfall is 851 mm per year. The major soils are light soil (*Alfisol/Mollisols*), and black soil (*Vertisol*) (Ethiopian Agricultural Research Organization, 2010).

The high way crossing *Bishoftu* town has got a big benefit for the town in terms of enhancing accessibility. The town is considered as a center of many business firms, educational institutions, public and private establishments and facilities. It also has a number of governmental and non-governmental organizations, and agriculture oriented development agencies. In addition, the town serves as a base for different military forces.

In the year 2010, the town had two governmental hospitals (namely: *Bishoftu* and Air Force) and health centers, twelve private clinics, one malaria controlling center and two governmental pharmacies. The town has also 41 kindergartens, four elementary, two secondary schools and one preparatory school for higher education, and one technical and vocational school. There are also four colleges/universities: Veterinary school of Addis Ababa University, Defense Engineering College, Admas University College, and Rift Valley University College. Furthermore, there are many agriculture oriented organizations in the town. These are Debere Ziet Agricultural Research Center, Pan African Veterinary Vaccine Center, International Livestock Research Institute, and four big commercial agricultural farms (*Bishoftu*, 2007).

As per to the five years strategic plan of *Bishoftu* town (2007-2011), urban agriculture is the second intervention area of the town next to eco-tourism to be taken as a strategy to enhance food security situation and employment opportunities for the dwellers. The potential of the town for UPA motivates substantial number of inhabitants to involve in the sector; lack of formal employment is one of the main reasons especially for youngsters to involve in UPA activities.

3.2. Sampling Procedure

There are two groups of producers. The first groups are those who are undertaking UPA activities by themselves and the second groups are those formally organized by the Ada'a *woreda* Trade and Industry Office.

With regard to the first groups, there is no document as to the exact number of people engaged in the activities, their location and variety of the activities.

The second groups consist of the different small and micro enterprises producers organized by Ada'a *woreda* Trade and Industry Office based on their interest. According to the office head, there are 44 small and micro enterprises organized by the office. These groups are engaged in different UPA activities.

There are 357 group members (with 192 male and 165 female members); the office is responsible to make the required support with its experts including developing a by law that governs all the members. The total number of the members and diversity of the activities are well documented as long as they are organized by the office. The target group for this research is those groups organized by the Ada'a *Woreda* Trade and Industry Office.

Sub city selection was done purposively with the consultation of experts from Trade and Industry Office, representative of dairy cooperatives and an NGO working on urban agriculture. Accordingly, out of the total four ***sub cities,*** three ***sub cities*** purposively selected, these three ***sub cities*** are a place where most of the UPA farmers undertook their farming activities.

Then random sampling technique has been employed to select the respondent households from each of the three ***sub cities***. For this purpose a list of UPA farmers has been obtained from Ada'a *woreda* Trade and Industry Office.

Table 3: Urban farmers in the sub cities

Sub city	Total farming households			Sample households	%
	M	**F**	**Total**		
1	59	27	86	30	34.9
2	51	32	83	30	36.1
3	56	32	88	30	34
Total	**166**	**91**	**257**	**90**	**35**

Source: Trade and Industry Office. Sep, 2010

The above table contains a list of UPA farmers organized by the office. There are a total of 257 UPA farmers organized in to twelve groups, and these are the households used for this research as a respondent. Out of the total 257 households I have selected 90 HHs randomly on lottery bases. Taking this idea into consideration, this study has been based upon a questionnaires administered to 90 farm households in *Bishoftu* town.

3.3. Methods of Data Collection

3.3.1. Household Survey

In the collection of the required data and information, both primary and secondary data collection methods have been employed. Primary data were collected through semi-structured questionnaires from those households involved in urban and peri-urban agricultures. The survey questionnaires contained open and close ended questions. To conduct the survey, first the researcher made a pilot survey to see the detail of issues in the field to meet the objective to address these issues by the semi structured questions.

Then three diploma holders' enumerators in the field of agriculture took orientation about the objective of the study and the questionnaires so as to be able to collect the required information, both the enumerators and researcher made sample survey on three households together for further clarity in the process of data collection. Finally, the enumerators with close follow-up of the researcher conducted interviewing.

A face to face interview with the targeted household's head or the person who is directly responsible for the urban agriculture activity was carried out.Each sample household was interviewed to get information on household demographic characteristics, contribution of urban agriculture to food supply, income and employment generation, and some environmental issues related to urban agriculture.

3.3.2. Focus group discussions

Focus group discussions have been made with two different UPA farmer groups who have a good knowledge in urban and peri-urban agricultural activities in the town of *Bishoftu*. Each of the group consisting of twelve and fifteen members, respectively. Out of the first group, four were female and eight members were male, and from the second group, five were female and ten members were male. Discussion was made with the male and female group members together in each of the group. For this purpose, a check list was used so as to collect the necessary information on the opinions, perceptions, attitudes and prospects in terms of expansion of UPA, availability of land and town development.

3.3.3. Key informant discussions

The focus of this research was on those UPA farmers organized by the Ada'a *woreda* Trade and Industry Office. Because of this, the detail information concerning the rules and regulations that govern all members of small and micro enterprise institution is well known by the different *woreda* concerned offices. Most of the key informants interviewed in this research were those who are responsible either for establishing and/or monitoring of the group members. Accordingly the following individuals have been used as key informants: the head of Trade and Industry Office Head of the town, Deputy Municipality Manager, Trade and Industry Office experts, Ada'a *Woreda* Agriculture and Rural Development Office head, members of dairy cooperatives in *Bishoftu* and commercial urban agriculture practitioners.

However in addition to these, elderly groups (both men and women) who had a deep knowledge regarding the UPA activities in the town of *Bishoftu* have been communicated

to enhance the reliability of the data collected. Moreover, discussion was held with four micro and small enterprises group leaders involved in UPA activities; these group leaders were delegated by the group members of the respective small and micro enterprises institutions. The discussion focused on different issues like type of farming, trends of the farming, problems and opportunities, effects of urban agriculture to food security, employment and income generation with particular emphasis on UPA activities in the town of *Bishoftu*.

The checklist prepared for these group include the land use planning in the town, the policy framework of urban agriculture now and in the future, the benefit of urban agriculture, the effect of urban food production on market price and food availability, the impact of collective action on cooperatives and micro and small enterprises, and the challenge in the sector.

3.3.4. Secondary data collection

Secondary data on UPA activities are scarce and disorganized in the town of *Bishoftu*. Because of this, data/ information that could be used as a bench mark could not be obtained. However, secondary data on UPA based on the practices from other parts of the country and that of the world have been collected from different sources. Some of data sources were published and unpublished reports of these organizations, magazines and journals. In addition, Addis Ababa University (AAU) and Debrezeit Agricultural Research Center (DARC) libraries were referred to obtain this data.

3.3.5. Data entry, Processing and Analysis

The HH survey was conducted for one month starting from February, 18 to March, 21 2011 G.C. The survey data were organized, coded, and then entered in to the computer using computer software SPSS 13.0 for Windows program to process and analyze. Interpretations of the results were made accordingly. The meaning of results was described by using the appropriate descriptive statistics such as percentages, tables, or cross tabulation and measure of central tendency.

CHAPTER FOUR

4. RESULTS AND DISSCUSSION

4.1. Sampled Households' Demographic and Socio Economic Conditions

The result and discussion part begins with explaining the demographic and socio-economic characteristics of the sampled HHs who are engaged in urban and peri-urban agricultural activities.

4.1.1. Sex and Age condition of the households

Table 4: Sex and age conditions of HH heads

S/n	Age category	Sex of HH heads		Total	%
		Male	Female		
1	18-30 Years	31	0	31	34.5
2	31-40 "	19	6	25	27.7
3	41-50 "	6	2	8	8.9
4	≥51 "	21	5	26	28.9
Total		77	13	**90**	**100**

Out of the total 90 HHs who responded to the questionnaires, 34.5% of them were in the age category between 18-30 years, 27.7% of them were in the age group 30-40 years, 8.9% of them were in the age group of 41-50 years and the remaining 28.9% of them were greater or equals to 51 years of age.

When it comes to the sex of the HH heads 6, 2 and 5 women headed HH were found in the 2nd, 3rd and 4th age groups with a total count of 13 women headed HH and their male counter parts in 1st, 2nd, 3rd and 4th age group were 31, 19, 6 and 21 respectively with a total count of 77 HH heads.

Based on this result, 14.4% and 85.6% of the total 90 HH heads in this study were female and male respectively. This shows that. the male group dominated the sector by taking the larger proportion that is, 85.5% the total farmers engaged in urban and peri-urban agriculture activities.

4.1.2. Marital, Religion and Educational status of the HH heads

Table 5: Marital, Religion and Educational status of HH heads

S/n	Marital status	Number of HH	%	Religion	Number of HH	%	Educational status	Number of HH	%
1	Married	62	68.9	Orthodox	79	87.8	Illiterate	11	12.2
2	Single	19	21.1	Muslim	1	1.1	Read & write	3	3.3
3	Divorced	5	5.6	Protestant	9	10.0	Elementary	18	20
4	Widowed	4	4.4	Other	1	1.1	Secondary	41	45.6
Total		**90**	**100**	**Total**	**90**	**100**	University	17	18.9
							Total	**90**	**100**

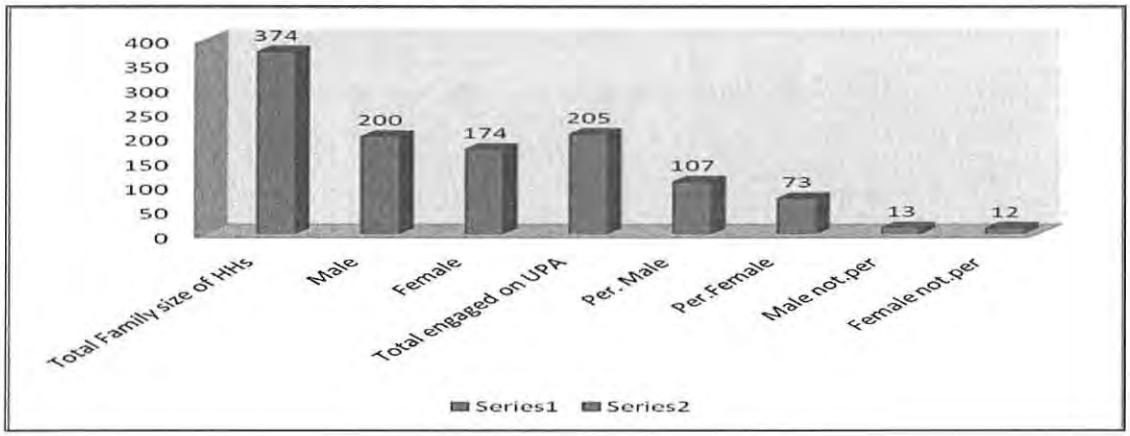
According to this research, 68.9% of the total HH heads are married, 21.1% of them are single, 5.6% of them are divorced and the remaining 4.4% them are widowed. The result also shows that the largest proportion of the HHs that is, 68.9% are already married and responsible to take care of their families, the second groups are single accounting for 21.1% and this group of farmers mainly undertakes UPA to generate income.

With regard to the religion, the great majority of the HH heads are Orthodox Christians accounts for 87.8% and Protestant accounting for 10%. Concerning educational status of the HH heads, 12.2% of them are illiterate, those completed elementary school are 20%, the great majority of the HH heads are in a secondary education level accounting for 45.6% and those attended college level education are about 19% the HHs.

4.1.3. Occupational Condition of the Households

It is estimated that 200 million urban residents provide food for the market and 800 million urban dwellers are actively engaged in urban and peri- urban agriculture in one way or another. These urban farmers produce substantial amounts of food for urban consumers (UNDP, 1996; FAO, 1999).

Figure 2: Occupation conditions of the HHs



With regard to the occupation, a total of 374 people of which 200 Male and 174 Female living under the 90 HH heads, in one or another way are benefiting from UPA. However, this does not mean that they all are participating in the activities. Those directly engaged in UPA on permanent base are 205 (107 Male and 73 Female) family members. On the contrary, the rest 25 family members (13 Male and 12 Female) are participating in a non permanent base. Some of the main reasons for involving impermanently by some of the family members are: 12.4% of them regularly employed in other business, 23% are self employed, 46.2% are students and the other 18.4% have mentioned different reasons.

4.2. Nature of Urban and Peri-urban Agriculture in the area

According to the respondents, on size of their farm plot 25.6% of them have up to 0.25 ha of land, 14.4% of them have a land size between 0.25 to 0.5 ha and the remaining 60% of the farmers have a land greater or equal to 0.5 ha.

Table 6: Nature of UPA in the area

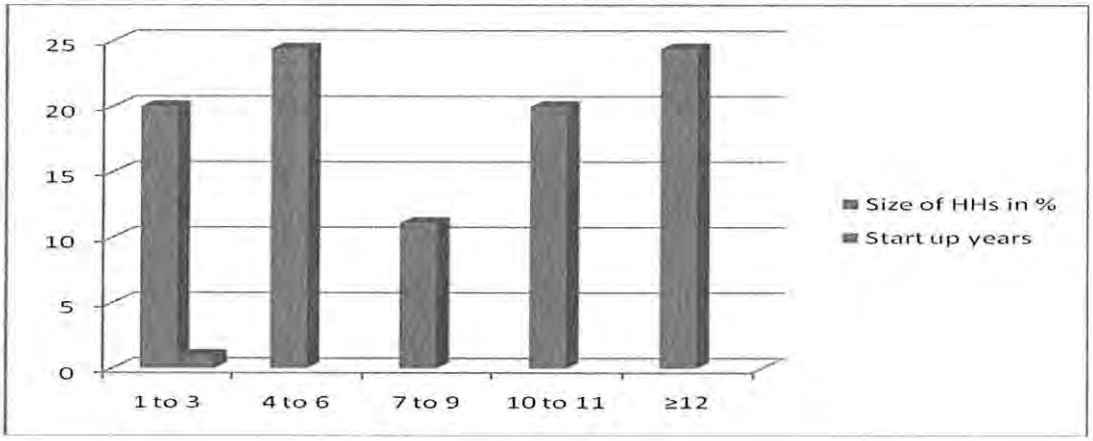
Land holding size of HHs	Frequency	%	Type of land tenure	Frequency	%	Location of farm plots	Frequency	%
Up to 0.25 ha	23	25.6	**Own land**	42	46.7	**Homestead**	28	31.1
(0.25 - 0.50) ha	13	14.4	**Family land**	14	15.6	**River side**	2	2.2
≥ 0.50ha	54	60.0	**Rented land**	34	37.8	**Peri -urban**	60	66.7
Total	**90**	**100**	**Total**	**90**	**100**	**Total**	90	100

Concerning land tenure condition of the HHs, 46.7% of them are undertaking UPA activities on their own land, 15.6% of them are carrying out the activities on family land and the rest 37.8% them are using rented land to undertake their UPA activities. With regard to location of their farming plot, 31.1% of them have their plot around the homestead, 2.2% of them have their farming plot in river side and the remaining 66.7% them are using land in the Peri-urban area.

Since 1970s, UA has been growing in the developing world as a result of rapid urbanization, crippled domestic food distribution systems, wage cuts, soaring inflation, unemployment, declining purchasing power, limited urban land use regulations, civil strife and natural disasters (Falve, 1999 and Smith, 1999).

For the question on the commencement of UPA, out of the total 90 HH heads 20% of them responded that they started UPA activities within 1 to 3 years, 24.4% practiced UPA for the last 4 to 6 years, 11.1% undertook the activities for 7 to 9 years, 20% them before 10 to 11 years and the remaining 24.4% of the HHs started UPA before 12 years.

Fig 3: Start up time of UPA by the HHs



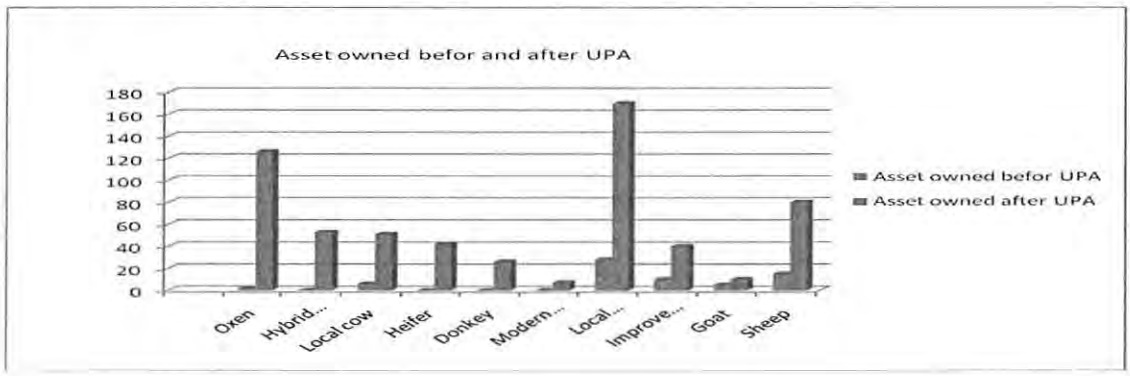
The choice of what to produce and how, is determined by a variety of social, economic and physical determinants. In most cities the predominant crops grown in UPA are a result of the food preference and consumption patterns, which are influenced by culture, climate, soil conditions, socio-economic circumstances, proportion of expatriate market and political economy (FAO, 2007).

The farming activities by the HHs mainly dominated by cereal crops production constituting 48.9% of the total produce, out of which teff, wheat and pulses are grown in a combination or as a mono cropping system in the individual HH farm plot, dairy cow and oxen raring 17.8%, vegetable production 5.6% and poultry production 2.2%. The second groups are undertaking a combination of two or more production activities with cereal and dairy production 1.1%, cereal and poultry production 4.4%, cereals, dairy and poultry production 6.7%, cereal and vegetable production 5.6%, dairy and poultry production 4.4% and others accounts for 3.3% out of the total 90 HH heads.

While teff, wheat and pulses are the three common cereal crops grown in the area as a mono cropping or a combinations of two or more, dairy cow, oxen fattening, and poultry production are the three common animals reared separately or in a combination of two or all the three by the urban and peri-urban farmers in the *Bishoftu* town.

With regards to the source of money for the start up of UPA, 31.1% of the total have received seed money from different sources and the rest 68.9% did not receive a seed money for the start up of their activity, with regard to the sources 11.1% the total 31.1% have used their own money to start their activity, 1.1% have borrowed money from bank, 10% borrowed money from relatives, 5.6% have used family money and the rest 3.3% have used different sources to obtain money for the start up of their farming activities.

Fig 4: Asset ownership before and after UPA



One of the mechanisms used to see the contribution of UPA for the improvements of food security condition of the HHs is comparison of the asset they own before and after

engagement in to UPA. With this regard, there is a significant improvement in the assets they own by almost all of the HHs onwards they started practicing UPA activities, when we see the assets they own before start up of UPA only a few HHs have insignificant number of assets as compared with the assets owned after engagement in UPA.

Table 7: Income earned from the sale of animals and their byproducts before and after UPA

S/n	Type of animals	Unit	Before UPA			After UPA		
			Quantity	Unit price	Total price	Quantity	Average Unit price	Total price
1	Oxen	Number	1	4008	4008	3	9406.7	28220
2	Non-ox cattle	Number	0		0	1	7200	7200
3	Small ruminants	Number	0		0	65	731	47520
6	Bee Colony	Number	0		0	0	0	0
7	Equines	Number	0		0	0	0	0
8	Milk of cow	Liter	0		0	192444	5	962220
9	Butter	KG	0		0	0	0	0
10	Honey	KG	0		0	560	25	14000
11	Poultry	Number	0		0	1200	30	36000
12	Egg	Number	0		0	15298	1	15298
Total					**4008**			**2588982**

As compared the income of HHs before and after UPA, there is a big improvement in the income after start up of UPA, while the total income obtained through the sell of animals before UPA was 4008 birr, the income generated from UPA activities by all the 90 HHs is 2,588,982 birr, and this shows there is 646% improvement in the income of the HHs.

Table 8: Food consumption pattern before and after UPA

Total quantity consumed				
S/n	**Type of animals/ by products**	**Unit**	**Before UPA**	**After UPA**
1	Oxen	Number	0	0
2	Non-ox cattle	Number	0	0
3	Small ruminants	Number	2	24
6	Milk of cow	Litter	0	18990
7	Butter	KG	0	124
8	Honey	KG	2.5	96
9	Egg	Number	0	11160
10	Poultry	Number	0	1200
Total			**20**	**31592**

When it comes to consumption patterns of the HHs before and after engagement in UPA activities, there is a big difference; only 2 small ruminant animals and 18 modern bee hives were owned and there were not consumed products by the families owning these bee colonies and small ruminant animals. On the contrary when it comes to the consumption patterns after engagement in UPA ownership of small ruminants and modern bee hives have increased to 24 and 122 respectively, milk consumption has increased from 0 to 18990 Litter per year, butter consumption has increased from 0 to 124 KG, honey bee consumption has increased from 0 to 96 KG, egg consumption has increased from 0 to 11,160 and poultry consumption has increased from 0 to 1200.

Table 9: Cereal crops produced, consumed and sold in the year

Types of crop	Produced (in Qt)	Consumed (in Qt)	Sold (in Birr)		
			Quantity (in Qt)	Average Unit price	Total price
Teff	719.5	305	414.5	628.1	260350
Wheat	1147	81	1066	380	405080
Maize	17	17	0	0	0
Sorghum	0	0	0	0	0
Barley	0	0	0	0	0
Millets	0	0	0	0	0
Oats	0	0	0	0	0
Rice	0	0	0	0	0
Pulses(beans, peas etc)	338	15.75	322.25	820.4	264380
Others(specify)	0	0	0	0	0
Total	**2221.5**	**418.75**	**1802.75**		**584730**

The main type of cereal crops produced in and around *Bishoftu* town includes: teff, wheat and different types of pulses. And with regards to the consumption and sell of the household production, 42.4% of the teff produced in the year has been consumed by the family and the rest 57.6% of the product has been sold with total cost of 260,350 Birr, concerning the total wheat yield obtained in the year, only 7% of the product has been consumed by the family and the rest 93% of the product has been sold in the local market with a total cost of 405,080 Birr, All of the maize produced by the farmers has been used for household consumption and from the total pulses produced in the year by the farmers only 4.6% of the produce has been used for household consumption and the rest 95.4% of

the produce has been sold in the local market with a total cost of 264380 Birr. According to this finding, the majority of the households mainly produce their agricultural products to generate income.

Table 10: Total horticultural crops produced, consumed and sold in the year

Types of crop	Produced (in Qt)	Consumed (in Qt)	Sold (in Birr)		
			Quantity (in Qt)	Average Unit price	Total price
Onion	147	1	146	319.5	46648
Potato	775.5	2.11	773.4	226.6	175274
Carrot	12	0	12	150	1800
Piper	0	0	0	0	0
Cabbage	185.5	0.4	185.1	166.1	30750
Others	0	0	0	0	0
Fruit crops					
Banana	0	0	0	0	0
Mango	0	0	0	0	0
Papaya	22.3	2.3	20	500	10000
Avocado	0	0	0	0	0
Others (specify)	0.15	0.15	0	0	0
Total	**1142.45**	**3.76**	**1138.69**		**255696.8**

As indicated in the above table out of the total onion produced in the year 99.3% has been sold with a total cost of 46648 Birr and only 0.7% of the total production consumed by the households, on the other hand 99.7% of the potato produced in the year has been sold with a total cost of 175274 Birr and the rest 0.3% of the product used for family consumption, when it comes to the carrot produced in the year 100% has been sold in the market and a total of 1800 Birr income has been generated , concerning the cabbage produced in the year only 0.2% of the total product used for consumption purpose by the households and the remaining vast majority of the product that is 99.8% has been sold in the local market.

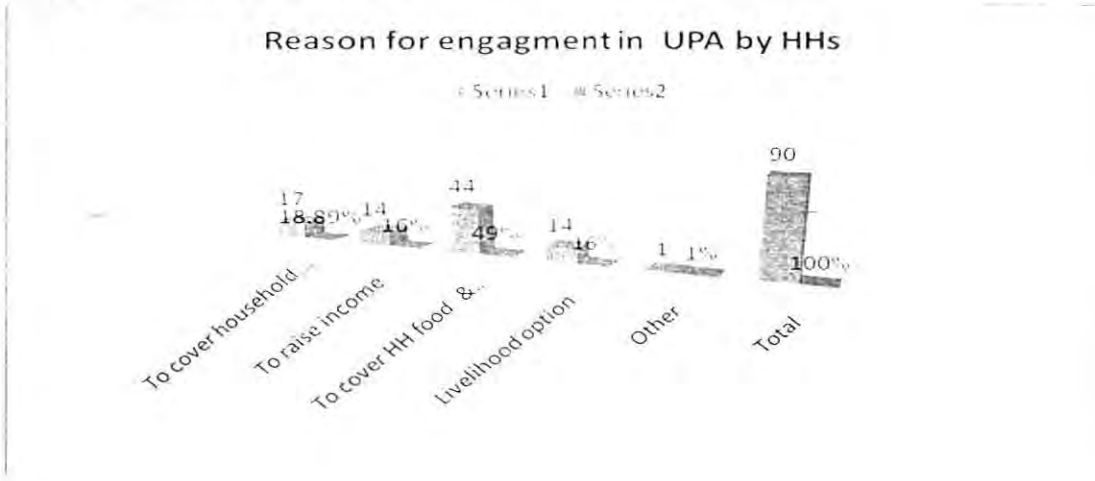
Some of the farmers in the area also engaged in the production of fruit crops; based on this out of the total 22.3 quintals produced in the year around 89.7% of the product has been sold in the market with a total cost of 10,000 Birr and the remaining 10.3% of the product used for family consumption. From this information it can be deduced that even

though the households larger proportion of output goes to the market in order generate financial income for the producers a good amount of their product has been used for consumption purpose of the family and this has a substantial role in improving the family nutrition condition and hence their food security.

4.2.1. Reasons for the Engagement in UPA

Urban agriculture can be practiced for a variety of reasons. A study by Maxwell (1994) in Kampala indicated that there are at least two major categories of household logic to be engaged in urban agriculture which include commercial production and household food self-sufficiency.

Fig 5: Reason for engagement in UPA



According to the findings of Foeken (2006): 74% the total population in the survey of urban farmers in Nakuru of Kenya, main reason for keeping animals in town were food supply.

There are different reasons why people in and around *Bishoftu* town were engaged in UPA activities. Accordingly, some 18.89% of the respondents consider their farming activities as the main means to cover their household food consumption, the other 16% of the households engaged in UPA activity to raising income, the vast majority of the respondents, 49% of them are involved in UPA both for income generation and to cover

the consumption need of their HHs, about 16% the farmers started UPA activities for that it is the livelihood option for them.

The result of FGD also showed that most of the households engaged in UPA activities mainly to cover their households' food consumption need. In addition to that, they have mentioned that the sector has enhanced employment opportunities and hence income of their households, moreover, those individual working as a laborer are benefiting from the sector.

With regards to the different inputs used in the production season, around 83 % of the households have used different types of improved technologies for their farming activities and the rest 17% of the households have not used any kinds of improved technologies in the year. Accordingly, out of 83% of the households that used improved technologies 20% used fertilizers, 2.4% used agro-chemicals, 8.2% used improved seeds, 24.7% used both fertilizer and chemicals, 41.2% used a combination of all the three and the rest 9.4% used other technologies to maximize their yield.

Urban and preri-urban agriculture farmers have also been asked about their perception concerning the trend of UPA activities in and around the *Bishoftu* town. The respondents gave three different answers.

Some 86.7% of the HHs responded that the trends has shown increment, 8.9% of them have said that the trend shows decrement and the rest 4.4% of the households replayed that there is a similarity in the current and past trends.

4.3. The Main Constraints on UPA Farmers

Urban and peri-urban agricultural activities are constrained by a variety of factors, mainly emanated from negative attitudes regardless of its potential to enhance food security at household level. Some researchers in other countries argued that, if these constraints can be removed and attitudes changed, urban farming will become more competitive and efficient in providing food for millions of urban people (Smith *et al.*, 1999). The other critical constraints to urban agriculture in most developing countries include: lack of

access to land, credit and farming inputs (such as seeds, fertilizers, and equipment and hand tools) (Drescher *et al.*, 1999).

Table 11: Major challenges affecting the sector

Major challenges affecting UPA activities	**Number of UPA farmers**	**%**
Feed shortage	5	5.6
High cost of inputs	14	15.5
Lack of farm inputs	6	6.7
Lack of common rules	1	1.1
Lack of land out of town	16	17.8
Lack of land out of town & high costs of input	47	52.2
Conflict with neighbor /kebele/ town administration	1	1.1
Total	**90**	**100**

There are several problems to UPA farmers in and around *Bishoftu* town. As indicated in the above Table, 5.6 % of the respondents mentioned that the problem related to animal husbandry in the area was feed shortage which is critical to undertake the animal raring activities, 15.5% of the respondents mentioned they faced problem related to high cost of inputs such as lack of improved seeds, hand tools, and shortage of water, 6.7% of them mentioned problem related with lack of farm inputs, 17.8% of them encountered problems related to lack of land in the periphery of the town for expansion.

The larger proportion of respondents, 52.2% of the HHs reported facing problems of high cost of inputs and lack of land in the periphery of the town for expansion. According to the result from FGD, especially in these days due to rapid urbanization competition for open space in the town became immense.

They added that, the existing policies and the urban admistrative bodies in *Bishoftu* are primarily interested in attracting bigger investors with a good capacity. Few of them, 1.1% of the respondents have reported facing problems related with conflict with neighbors.

This happened when their livestock destructed crops and other properties of their neighbors and in some of the cases, when environmental pollution occur due to the lack

of proper waste management by the owner's of the animals and these animal waste include (faces and urine) which causes a bad smell in that particular locality.

4.3.1. Credit services and the main constraints

Out of the total 90 HHs, only 25 HHs have used credit services in order to purchase the necessary inputs in order to maximize their productivity. On the contrary, 62 HHs have not used credit services for a number of reasons.

Table 12: Reasons for not using credit service

Type of constraints	Number of HHs	%
I don't have interest	39	62.9
Lack of Knowledge	6	9.7
The amount is small	2	3.2
Late delivery	8	12.9
Lack of cash for down payment	5	8.1
High interest rate	2	3.2
Total	**62**	**100**

Out of those HHs who did not use credit service, 62.9% were not interested to utilize the service. 9.7%, 3.2%, 12.9%, 8.1% and 3.2% did not use the credit service due to lack of knowledge, the amount is too small, late delivery of credit, lack of cash for down payment and high interest rate, respectively. In the discussion held with the focus groups regardless of UPA's potential in contributing to HHs income generation, food security and its role for the reduction of environmental pollution, the sector did not get enough attention and recognition by the local government bodies in *Bishoftu* town.

4.4. UPA and Its role for Food Security

Different scholars and institutions agree that urban agriculture contributes to food security and poverty alleviation in the cities of the developing world. Because of its proximity to large human settlements, unlike rural agriculture, urban farming provides the low and middle income urban dwellers with low-price food items, agricultural jobs and cash income in the world. It provides the dwellers with fresh dairy products, vegetables, fruits, edible flowers, and grains (Smith, 1994; UNDP, 1996).

Concerning UPA's contribution to HHs food security and improvements in the overall livelihood condition, all of the respondents in *Bishoftu* were asked their perception. Out of the total 90 HHs around 71% of them have children attending schools and the rest 29% of them do not have children going to school. Out of the 71% having school children 45.5% of them explained that number of children going school has increased, 24.4% of them reported that number of children attending school remained the same, and it should be noted that most of the households in this group are single and yet do not have children to go to school.

Capacity to pay for medical services has shown improvement for some 88% of the HHs out of the 90 HHs, for 11% of the HHs the capacity remained the same and 1% of the HH capacity to pay for the medical service has deteriorated. Consequently, for those families capacity to pay for medical services and at the same time the number of children going to school in the family have shown progress, question on the reason behind for the improvements in both of the capacities have been raised; based on this, about 45 HHs responded that rise of income from UPA was the main reason for the improvements, the other 6 HHs reported that their capacities have shown improvement due to increase in income of the HHs and the remaining 39 HHs explained their capacity remained the same.

Table 13: Households Food Security situation before and after engagement on UPA

S/n	**Period/ Months of Food gaps**	**Before UPA**	**After UPA**
		Number of HHs	Number of HHs
	12 Month	43	90
1	9-12 Months	15	
2	6-9 Months	15	
3	3- 6 Months	10	
4	Less than 3 Months	7	
5	**Total**	**90**	**90**

As shown in the above table only 43 HHs could able to cover their food need for 12 months before engagement on UPA, 15 HHs could able to cover their food need for 9-12 months, 15 HHs could able to cover their food need for 6-9 months, 10 HHs could able to

cover their food need for 3-6 months and the rest 7 HHs could able to cover their food need for less than 3 months. However, after engagement on UPA all of the 90 household could able to cover their food need for 12 months. All of the HHs perceived that their UPA activities have contributed to their food security however when it comes to the consumption pattern, 76 HHs revealed that their food consumption have shown improvement and the rest 14 HHs reported that the pattern shows similarity. 55 HHs livestock possession have shown improvement, 34 HHs livestock possession remained the same and the possession of 1 HH has deteriorated.

Table 14: Changes observed as a result of UPA

S/n	Changes observed due to UPA	Income	Family health	Clothing	Saving	Variety of food
		Number of HHs	Number of HHs	Number of HHs	Number of HHs	Number of HHs
1	Improved	77	72	69	57	74
2	Same	13	15	21	33	15
3	Deteriorated	0	3	0	0	0
Total		**90**	**90**	**90**	**90**	**90**

According to the above result, income of 77 HHs showed improvement, 13 HHs family health condition remained the same and no deterioration in income has been observed after engagement on UPA. On the other hand 72 HHs family health condition has showed improvement, 15 HHs family health condition remained the same and 3 HHs family health situation reported has been deteriorated. Concerning family clothing 69 HHs condition has showed improvement, 21 HHs condition remained the same and no deterioration has been reported after engagement on UPA. The saving pattern of 57 HHs showed improvement, 33 HHs saving pattern remained the same and no deterioration has been observed with this regard and the variety of food consumed by the 74 HHs has shown improvement, 15 HHs consumption pattern of the variety of food remained the same and no deterioration has been reported.

4.4.1. The role of family labor in undertaking UPA

Most urban farmers in Kenya are women (56 percent), with the proportion of

heads engaged in urban farming, women form an even higher proportion (64 percent), where as men were the large majority among hired urban farm workers (82 percent) (IDRC.1994).

The source of labor for UPA activities in *Bishoftu* is contributed by all the family members. Accordingly, 17% of the labor share is contributed by the husbands, 19% of the labor share is contributed by the wives, and 19% of the labor share is contributed by all family members. 31% of the labor is contributed by both husband and wives. The rest 14% of the labor is contributed by HH heads.

Based on this result, even though the lion's share of the labor for UPA is contributed by husband and wives, all family members have their own role in undertaking UPA activities. On the other hand 58% of the households used hired labor for their production activities and the remaining 42% of the HHs have not used hired labor for their UPA activities. Out of the 58% HHs that have used hired labor, only 13% of them have used hired labor in a permanent base, the other 13% of the HHs have used hired labor at the peak of the production season. The larger majority of the HHs, (74%) have used hired labor when the labor is available in the market. From this result we can conclude that most of the HHs have used hired labor in impermanent bases for their UPA activities in *Bishoftu* town.

4.4.2. Support and Technical Assistance made by Government

According to the head of Trade and Industry Office, urban agriculture in *Bishoftu* town is ignored in the previous years, and a few individuals were exercise it at the household level to meet their own food consumption needs. However in recent years, experts of the Municipality of the town, Trade and Industry Office and other government officials started to give due attention to the sector.

In order to see the perception of the farmers with this regard, farmers were asked about their perception on the recognition of UPA by the government bodies, any assistance made to them in the year and whether there is any urban agriculture extension service delivered by the extension workers in *Bishoftu*.

4.4.2.1. Technical Assistance made to the farmers

Table 15: Technical assistance delivered and its source's

Did you receive technical assistance for UPA activity?	Frequency	%
Yes	32	35.6
No	58	64.4
Total	90	100
If yes, Source of advice received?		
Extension officer	21	65.6
Family members	1	9.4
Debrezeit Agricultural research center	5	15.6
Close friends	1	9.4
Total	**32**	**100**

Concerning the technical assistances, 64.4% of the HHs explained that they have not received technical assistance in the year either from governmental or non governmental bodies. The other 35.6% of the HHs reported have received technical assistance from different sources. Accordingly, Some 3.4% of the HHs have received technical assistance from close friends, 5.5% of the HHs have received technical assistance from Debrezeit Agricultural Research Center, 23.3% of the HHs have received the technical assistance from Extension Officer and the remaining 3.4% of the HHs have received technical assistance from their family members.

4.4.2.2. Support made by Government to the Sector

With regards to the support made to UPA farmers, almost 98% of the HHs explained that there were not supports made to them in the year. And only 0.1% of the HH has got support from financial institution and another 0.1% HH has got support from *kebele* administration.

For the question on the recognition of UPA by the government bodies in the town of *Bishoftu*, 37.8% of the HHs felt that the sector has got recognition, 50% of the HHs felt that there is a lack of recognition to the sector and the remaining 12.2% of the HHs reported that they did not know anything on this issue. In general, almost half of the respondents believe that urban agriculture is not well recognized by the government. According to this result, the support and technical assistance made for the sector shows

reported that they did not know anything on this issue. In general, almost half of the respondents believe that urban agriculture is not well recognized by the government. According to this result, the support and technical assistance made for the sector shows no difference. Almost 98 % of the sampled households were not visited by urban agriculture officers in the study year.

4.5. UPA and Environmental Issues

Generally, environmental issues associated with UPA are directly related to the way the farmers are utilizing the different agro-chemical inputs, the farming systems adopted by the farmers, the quality of water used for agriculture and the way they manage the different waste generated in the course of production activities.

For the question on environmental issues, 72.2% of the HHs reported that they did not face any kind of problem on the environment as a result of UPA, 22.2% of the HHs responded that problem of environmental pollution has been observed due to lack of proper waste management practices in the dairy and poultry farming activities. Some 3% of the HHs faced problem of communicable diseases mainly in dairy sector. 1.15% of the HH reported problem of natural resource degradation and the other 1.15% of the HH faced problem of contamination of water by agrochemicals. Around 94% of the households have used improved technologies and remaining 6% of the households reported did not use any kinds of improved technologies.

The following section discusses the farmers adopted practice to protect urban environment. Unlike to other studies in other African countries (Mlozi, 1997), urban agriculture practice, particularly the crop cultivation in homestead was environmental friendly. Only 1.1 % of the total respondents replayed that they disposed the waste generated, 13.5% of the households responded that they have used the waste generated as fertilizer, 13. 3% of the HHs have used the waste generated as a fuel.

The majority of the households 36.6% of the total have used the waste as a feed for their animals. Close to 8% of the HHs have sold their farm waste for other people, 13.3% of them responded that they use the waste as a fertilizer, fuel and as animals feed. And the

For questions in relation with sources and quality of water used for the production, 86.7% of the total households believed that the water used for production activities is not contaminated and the other 13.3% of the households do believe the water is contaminated by different chemicals.

With respect to the source of water, 8.9% of the households used river water, 7.8% of them used lake water, 28.9% used piped water, 37.8% of them used rain water for their production activities and the remaining 16.6% of the household have used a combination of rain and piped water.

To sum up around 83.3% the households used piped water, rain water and a combination of both piped and rain water; these sources of water are supposed to be free of contamination according to the respondents' information concerning contamination of water.

4.6. Sustainability of Urban and Peri-urban Agriculture

Secured access to land is usually considered essential for sustainable urban agriculture. Peoples willing to invest on urban agriculture is determined by clear right to work, and motivation of the producers (Yachkaschi, 1997 cited in Foeken *et al.* 2004).

All of the households have been asked as to what should be done in order to enhance sustainability of UPA in *Bishoftu*. Accordingly, 17.7% of them want agricultural extension service to be improved, 14% of the HHs wants the town administration to allocate land for UPA, 13% of them required training on agricultural practices, 21% of the households in tested in NGOs to make involvement and support the farmers through delivering different inputs and incentives and the remaining 34.3% reported that they did not know what should be done to enhance the sustainability of the sector.

Although UPA is contributing a lot to households income generation and improvements in food consumption the attention given to the sector by the different governmental institution in the town is minimal and some of the respondents and the head of trade and

institution in the town is minimal and some of the respondents and the head of trade and industry office disclosed that the expert who was assigned as urban agriculture officers moved to other office because his position has collapsed in the restructuring program so there is no responsible body in the town for UPA in *Bishoftu* during the study time.

4.7. Household Food Insecurity Access Scale (HFIAS) used to measure Food Insecurity Condition at HH level

In order to see the food insecurity condition at HH level, HFIAS model has been used as a tool to measure access of the households to food. This tool has nine generic questions and nine frequencies of occurrence questions. The nine frequency of occurrence questions help us to identify how often the problems have occurred in the last 30 days or a month. There are four options for the frequency of occurrence and these are:

1. Never 2. Rarely *(once or twice)* 3. Sometimes *(3-10 times) and*

4. Often *(more than 10 times)* in the last month.

Accordingly, all the 90 HHs were provided with the above questions and the result has been summarized in the following table

Table 16: Summery of the result obtained from HFIAS model

Questions	Never		Rarely		Sometimes		Often		Total	
	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Q1	74	82.2	15	16.7	1	1.1	0	0	90	100
Q2	74	82.2	12	13.3	4	4.5	0	0	90	100
Q3	77	85.6	12	13.3	1	1.1	0	0	90	100
Q4	84	93.3	5	5.6	1	1.1	0	0	90	100
Q5	86	95.6	3	3.3	1	1.1	0	0	90	100
Q6	88	97.8	1	1.1	1	1.1	0	0	90	100
Q7	90	100	0	0	0	0	0	0	90	100
Q8	90	100	0	0	0	0	0	0	90	100
Q9	90	100	0	0	0	0	0	0	90	100
Average %		**93**		**5.9**		**1.1**		**0**		**100**

- **Never:** Indicates the HH is food secured
- **Rarely:** Means the HH is mildly food in secured
- **Sometimes:** Indicates the HH is moderately food in secured
- **Often:** The HH is severely food in secured

From the Table 18 above, we can conclude that 93% of the households can be considered as food secured, some 6% of the households are in the category of mildly food insecured. About 1% of the household is considered to be moderately food insecured and none of the families are fallen in the category of severely food insecured. According to this result, the great majority of the households became food secured after they have started undertaking UPA activities.

Although the role of UPA in ensuring food security through enhancing the available food for HHs consumption need, income and employment opportunities, it should not be considered as the only panacea for the problems of urban HHs food insecurity in the town of *Bishoftu*.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Regardless of the presence of many commercial UPA producers in the town of *Bishoftu*, the target of this research was those small scale producers engaged in UPA in the town.

Although a substantial number of women have been undertaking UPA activities, the sector in *Bishoftu* is dominated by men counterparts. The labor contribution for UPA activities came from all the family members'. However, husbands and wives labor contribution is by far larger than the rest of the family members.

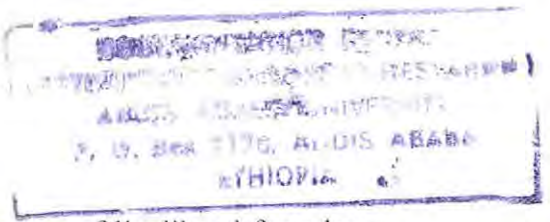
With regards to the role of UPA in ensuring food security at household level, our findings have demonstrated that UPA can contribute to HH food security through different ways as discussed below:

Those households engaged in UPA can increase the availability and supply of food for their families through growing different kinds of crops and raring of animals. Poor urban dwellers who often lack the purchasing capacity to acquire adequate amounts of food can have access to meet their consumption needs by producing for themselves. The urban farming activity enables the households in getting fresh and nutritious foods. This was observed in such a way that the self produced foods were mainly for income generation and household consumption. In addition, the amount of money invested on food purchase has been reduced so there is more money to invest on other household needs. UPA can enhance food security during times of inflation and in times of food insecurity due to various reasons.

UPA enhances overall nutrition security by diversifying the diet of the poor through the consumption of locally produced fresh and nutritious food (such as vegetables) and allows substantial savings on energy through local production with limited packaging, transport and storage requirements.

UPA enhances employment opportunities for urban dwellers for both men and women of different age groups. Most women undertook UPA as a part-time activity, and use the rest of their time for different household chores (Such as food production, child care and other household activities). The intensive horticultural and livestock production that thrives in urban and peri-urban areas employs workers and produces high value-added products.

UPA activities must be undertaken side by side with urban development and urban environmental protection. Although, most of the households have a good awareness on how to properly manage the waste generated from their UPA activities, there are a few HHs who disposes their agricultural waste products in open spaces and near to their fences and most of these groups are those who keep livestock.



5.2. Recommendations

Urban and Peri-urban Agricultural (UPA) is becoming a means of livelihood for a large number of people in the town of *Bishoftu*. Moreover, in recent years, the sector has been attracting a lot of people.

However the recognition given to the sector by local governmental bodies is minimal and this will have a bad effect on the sustainability of UPA in *Bishoftu*. In order to avert this condition and ensure the sustainability I forward my recommendations as follows:

First of all, the local governmental bodies and all the concerned stakeholders' needs to give full recognition to the sector, allocate separate farm land, and provide appropriate trainings on the management of agricultural waste for UPA farmers so as to minimize environmental pollution, land degradation and other effects in *Bishoftu* town.

Next to that, there is a lack of technical assistance (like extension services) and other problems such as high cost of farm inputs, lack of enough inputs in the market (like fertilizer, seeds, livestock feeds etc). lack of credit services and research done in the sector.

To address these issues, the Ada'a *woreda* Agricultural Bureaue, Cooperatives and other Financial Institutions located in *Bishoftu* need to work hand in hand in a more coordinated way to enhance supply of the different agricultural inputs(like fertilizer, seeds, livestock feeds etc), extension services to urban farmers in order to improve their productivity.

UPA farmers should be provided with loan to alleviate financial constraints so they can buy the different farm inputs at the right time from the local market to maximize their agricultural productivity.

One of the main problems to UPA in *Bishoftu* is lack of the presence of by- laws/ policies that could help and guide all the practitioners to undertake UPA with common understanding.

Developing an appropriate policy that governs the way how to undertake UPA in *Bishoftu* can play a fundamental role in ensuring sustainability of the sector and protecting the environment from pollution so the town administrators, planners and policy makers required to develop the necessary by-laws, rules and regulations as soon as possible and this will have a good benefit for both UPA farmers and to the income of the local government in *Bishoftu*.

Knowledge can be gained through experience sharing and to this effect, the *Bishoftu* town municipality and other concerned stakeholders better to arrange a field visit program to other towns or/and areas where UPA is more prevailed and undertaken in a more integrated way. And a good lesson can be drawn which contribute to enhance the knowledge and effectiveness of the farmers in *Bishoftu*.

Detailed baseline survey need to be conducted to know the level of contribution of UPA to food security both at household and community level, to have a clearer picture and understandings on the sector. In doing so, more benefits out of UPA can be made in the upcoming time by attracting potential investors to the sector in *Bishoftu*.

Eventually, to have a common consensus and understating on the issues of UPA workshop need to be arranged by the municipality of the *Bishoftu* town. The workshop will create a medium for discussion among the different stakeholders; in the discussion UPA farmers, the different governmental office representatives, researchers, adminstrative bodies, NGOs representatives and other concerned stakeholders need to be participated.

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Apendix-1

Household questionnaires

Part I: Demographic Data

1.1. Name Of HH Head:_____

1.2. Sex: 1. Male ☐ 2. Female ☐

1.3. Age: _____

1.4. Marital Status: 1: Married 2: Single 3: Divorced 4: Widowed 5: Other. /___/

1.5. Religion: 1: Orthodox Christian 2: Muslim; 3: Protestant 4: Catholic; 5: Other. /___/

1.6. Family Size (Put Their Numbers In The Box):

1: Male 2: Female

1.7. Particular Description Of HH Members (Use Codes Where Relevant).

S/n	List Names	Sex	Age	Educational Status	Family members working behavior			
					Engaged on UPA	Permanently engaged on UPA	Engaged on UPA(but not permanently)	Reasons for not engaged permanently
					Yes/No	Yes/No	Yes/No	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
Total								

Start From HH Head

Codes for Qn. Number 1.7

Educational Status

1. Illiterate

2. Read and write

3. Elementary education (1-6)

4. Secondary education (7-12)

5. College/university

Reasons for not engaged permanently

1. Regularly employed in government/NGOs

2. Self employed in other business

3. Temporally employed in other business/ area

4. Student

5. Do not have interest in UPA **6.** Other_____

Part II: Urban and Peri-urba Agriculture (UPA)

2.1. Land holding size of the Household (HH) /___/

1: Up to 0.25 ha 2: 0.25 ha to 0.50 ha. 3: ≥ 0.50ha.

2.2. Type of land tenure /ownership/ /___/

1: Own land 2: Government land 3: Family land

4: Investor land 5: Relative's land 6: Others (specify)

2.3. Where is the location of your farm plot? /___/

1: Homestead 2: Road side 3: River side 4: Peri -urban

5; Open space/ area 6: others_____

2.4. When did you start UPA? /___/

1: 1 to 3 year 2: 4 to 6 years 3: 7 to 9 years

4: 10 to 11 years 5: More than 12 years.

2.5. What farming activities do you carry out on your farm plot? /___/

1: Cereal growing 2: Vegetable growing

3: Dairy cow rearing 4: Fattening

5: Poultry production 6: Others (specify)

2.6. What are the three most commonly grown crops in your field? (For crop & vegetable grower)

S/n	Types of crops	Remark
1		
2		
3		

2.7. What are the three most common animals you raise? (For those who raise animals)

S/n	Types livestock	Remark
1		
2		
3		

2.8. Do you receive seed money to start crop cultivation and/or livestock rising? /___/

1: Yes 2: No

2.9. If yes, what is the source of the money received? /___/

1: Own money 2: Neighbor (borrowed)

3: From the bank (borrowed) 4: Relatives

5: Informal lending 6: Family member

7: Others (specify)

Asset Ownership of household (HH): Before and after engagement in to UPA. *Please, use the thick mark in the table as appropriate.*

2.10. Animal husbandry

No.	Item	Before engagement in to UPA (Number of assets owned)						After engagement in to UPA (Number of assets owned)					
		0	1	2	3	4	≥5	0	1	2	3	4	≥5
2	Ox												
3	Hybrid cow												
4	Local cow												
5	Heifer												
6	Calves												
7	Donkey												
8	Mule												
9	Horse												
10	Modern beehives												
11	Traditional beehives												
No.	**Item**	**<5**	**5-10**	**10-15**	**15-20**	**>20**		**<5**	**5-10**	**10-15**	**15-20**	**>20**	
1	Local poultry												
2	Improved poultry												
3	Goat												
4	Sheep												
5	Others(specify)												

2.11. Income earned from sale of livestock & their byproducts

S/n	Activity	Unit	Before UPA				After UPA			
			Total Quantity Consumed	Sold in the market			Total Quantity Consumed	Sold in the market		
				Total Quantity	Unit price (Birr)	Total Income (Birr)		Total Quantity	Unit price (Birr)	Total Income (Birr)
1	**Sale of livestock**									
1.1	Ox									
1.2	Non-ox cattle									
1.3	Small ruminants									
1.4	Poultry									
1.5	Bee Colony									
1.6	Equines									
2	**Sale of live stock by products**									
2.1	Milk of cow									
2.2	Butter									
2.3	Honey									
2.4	Traditional beehive									
2.5	Modern beehive									
2.6	Egg									
2.7	**Total**									

For crop producers only

2.12. Cereal crops production, consumption and income trends in the last 12 months

No.	Types of crops	Unit in (Quintal)	Total yields obtained	Used for HH consumption	Sold in the market		
			Quantity	Quantity	Total Quantity	Unit price (Birr)	Total Income (Birr)
1	Teff						
2	Wheat						
3	Maize						
4	Sorghum						
5	Barley						
6	Millets						
7	Oats						
8	Rice						
9	Pulses(beans, peas etc)						
10	Others(specify)						

2.13. Horticultural crops production, Consumption and Sell trends in the last 12 months.

No.	Activity	Unit (Quintal)	Total yields obtained	Used for HH consumption	Sold in the market		
					Total Quantity	Unit price (Birr)	Total Income (Birr)
1	**Vegetables**						
1.1	Onion						
1.2	Tomato						
1.3	Potato						
1.4	Carrot						
1.5	Piper						
1.6	Cabbage						
1.7	Others(specify)						
2	**Fruits**						
2.1	Banana						
2.2	Mango						
2.3	Papaya						
2.4	Avocado						
2.5	Others(specify)						

2.14. Why you engaged in to UPA? /___/

1: To cover household food consumption 2: To raise household income

3: It is my livelihood option 4: Other (specify)_____

2.15. Do you use improved technologies/ varieties for producing your crops? /___/

1: Yes; 2: No

2.16. If yes, what types of technologies: /___/

1: Fertilizers; 2: Agro chemicals 3: Seeds 4: All, 5: 1&2

2.17. Trend of UPA in the area shows: /___/

1: Increment 2: Decrement 3: Similarity.

2.18. What are the main challenges that affect UPA? **(Circle answers, multiple answers is possible)**

1	Lack of recognition	5	Lack of market for product
2	Lack of trust	6	Conflict with neighbor /kebele/ town administration
3	Lack of common rules	7	Shortage of feeds
4	Lack of farm inputs	8	Lack of land out of town
9	High water charge	10	Others (specify)

2.19. Do you have children going to school? /___/

1: Yes 2: No.

2.20. If yes (Put their #)

1: _____ Male 2:_____ Female.

2.21. Number of children going to school: /___/

1: Increased 2: Remained the same 3: Decreased

2.22. Capacity to pay for medical services: /___/

1: Improved 2: Remained the same 3: Deteriorated

2.23. If both are increased, why? /___/

1: My income has been increased 2: My awareness has been raised

3: Rise of income from UPA 4: Others (specify).

Part III: perception of HHs on their food security condition

3.1. How many months do you cover your food shortage before practicing UPA? /___/

1: 12 Months 2: 9-12 Months 3: 6-9 Months 4: 3-6 Months 5: ≤ 3 Months.

3.2. What about after engagement in to UPA? /___/

1: 12 Months 2: 9-12 Months 3: 6-9 Months 4: 3-6 Months 5: ≤ 3 Months.

3.3. Do you perceive that your urban agriculture contributed to food security? /___/

1. Yes 2. No

3.4. If yes, how do you evaluate change in the following situations due to UPA,

No.	Parameter	Deteriorated (0)	Improved (1)	Same (2)	Don't know (3)
1	Food consumption				
2	Live stock possession				
3	Change in income				
4	Schooling				
5	Family health				
6	Clothing				
7	Saving				

3.5. Variety of feed (component) as compared to the previous time? /___/

1: Improved; 2: Remained the same 3: Deteriorated

3.6. Who is more involved in urban agriculture activities from the household members? (Rank the answers)

S/n	HH Members			Rank
1	Husband	4	High school drop out	a.
2	Wife	5	Dependants	b.
3	School children	6	Others (specify)	c.

3.7. Have you used hired labor for your urban farming in the year 2010/2011? /___/

1. Yes 2.No

If yes, when do you often hired the labor? (Circle the answers, multiple answers is possible)

1	At peak production time	3	When engaged in off farm activities
2	When labor is available	4	Permanently

3.8. Did you receive any technical assistance from the following organizations and/or agents for your crop / livestock production activities? (Circle and rank the answers) **(If no skip to the next question)**

S/n	Organizations/ Agents			Rank
1	Extension officer	5	Agricultural research center	a.
2	Family members	6	NGOs	b.
3	Close Friends	7	Others(specify)	c.
4	Neighbor relative			d.

3.9. Is there any support by the following local organizations for your production activities? (Circle and rank the answers) **(If no skip to the next question)**

S/n	Local organizations			Rank
1	kebele administration	5	Financial institutions	a.
2	Urban agriculture office	6	NGO's	b.
3	Rural development and agriculture office	7	Urban development office	c.
4	Agricultural research center	8	Others (specify)	d.

3.10. Is there available credit services for your urban farming? /___/

1. Yes 2. No

*If No, what are the main constraints in obtaining credit from formal institutions? /___/

1:Lack of Knowledge 2:Lack of cash for down payment 3: High interest rate

4:Late delivery 5: Others (specify)

3.11. Do you believe that urban farming is well recognized by the government? /___/

1. Yes 2. No 3. Do not know

Part IV: UPA and Environmental issues

4.1. What are the main impacts/ problems on the environment as a result of UPA?

S/n	Problems on the environment	Rank
1	Environmental pollution as a result of waste generated	
2	Prevalence of communicable diseases from animals to human	
3	Natural resources degradation	
4	Contamination of surface water (Rivers, ponds, lakes and others)	
5	Traffic accidents on the high ways due to free ranging animals	
6	6. Others(Specify)	

4.2. What is the source of water for your farming activities? /___/

1: Spring 2: River 3: Water well
4: Piped water 5: Lake 6: Other (specify) _____

4.3. Do you think that the available water for your farm is contaminated by chemicals? /___/
1: Yes 2: No

4.4. Do you use agrochemical or veterinary medicines for your farm? /___/
1: Yes 2: No

4.5. How do utilize the waste generated from your farm? /___/
1: Use it as fuel 2: Sale it 3: Use it as fertilizer
4: Dispose as waste like other house hold waste 5: Use it for animals feed
6: Others (specify) _____

Part V: HH Food Access indicator questions used to measure FS at HH level

S/n	QUESTION	RESPONSE OPTIONS			
1	Did you worry that your HH would not have enough food?	0	1	2	3
2	Were you or any HH member not able to eat the kinds of foods you preferred because of a lack of resources?	0	1	2	3
3	Did you or any household member eat just a few kinds of food day after day due to a lack of resources?	0	1	2	3
4	Did you or any HH member eat food that you preferred not to eat because of a lack of resources to obtain other types of food?	0	1	2	3
5	Did you or any household member eat a smaller meal than you felt you needed because there was not enough food?	0	1	2	3
6	Did you or any other household member eat fewer meals in a day because there was not enough food?	0	1	2	3
7	Was there ever no food at all in your household because there were not resources to get more?	0	1	2	3
8	Did you or any household member go to sleep at night hungry because there was not enough food?	0	1	2	3
9	Did you or any household member go a whole day without eating anything because there was not enough food?	0	1	2	3

Apendix-2

Checklists for Key informants groups

- Does your office participate in promoting UPA?
- If yes, how is its involvement?
- Does the current government policy encourage UPA?
- What does the extension support for UPA look like?
- Do you see any change in extension support to UPA?
- What does the perception of the people look like regarding UPA?
- What are some of the institutions & organizations involved in promoting UPA?
- What are their major roles?
- Who involved more?
- What does the trend of UPA look like (such as area covered, productivity, yield, etc)?
- What is the level of adopting UPA in the area?
- What factors affect the adoption rate of UPA by households?
- Among the crops you cultivate, to which one do farmers give more attention and why?
- What does the current situation of food security of households look like?
- How was the situation before UPA?
- What are the effects observed on livelihoods of households due to UPA?
- Is it due to only UPA or others? Please, justify it.
- What are the prospects of cultivating or promoting UPA in the area?
- Does the nearby market opportunity encourage UPA? Justify?
- What are the major constraints and challenges to UPA?
- What are the possible mechanisms to solve these problems locally?

Checklists for Focus Group Discussion

- Acceptance of UPA as a source of livelihoods or food security to people of the area,
- The status of UPA in the area,
- The factors for practicing and not practicing UPA in the area,
- The multiple uses of UPA in the area,
- The institutions & organizations involved in promoting UPA in the area,
- The role of different institutions & organizations for practicing UPA,
- Marketing opportunities and market price for a out puts,
- The situation of extension services,
- Frequency and sufficiency of extension services,
- Development agents and Woreda experts' support,
- Access to credit and market,
- Importance of these to cultivating and promoting UPA,
- Type of support from the government and other stakeholders to farmers in the area,
- The major challenges and constraints farmers of the area face.
- Possible solutions in overcoming the problems encountered by farmers of the area
- The impact of practicing UPA on education & health of households,
- The ability of paying to education and medical fees due to UPA.

Checklists for Woreda Administrative Staffs'

- What was the role of your institution in promoting UPA?
- What is the impact of UPA on the livelihood or food security of the people of the area?
- What are the main problems in promoting and practicing UPA in the area?
- What are the policies in favor of promoting UPA in the area?
- Are there policies formulated concerning UPA? If so, how do you evaluate their impact?
- What will be the future plan of the government in order to increase the impact of UPA on livelihood of the community in the area?

DECLARATION

The under signed declare to the school of graduate studies of Addis Ababa University, that the thesis is my original work, has not been presented in any other university and that all the sources of material used for the thesis have been duly acknowledged.

Declared by:

Name: Yohannes Eshetu

Signature: _____

People and Biodiversity Conservation in Maze National Park

Bereket Zeleke

A Thesis Submitted to

The Department of Environment and Development Studies

Presented in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Environment and Development Studies

Addis Ababa University

Addis Ababa, Ethiopia

June 2012

Addis Ababa University

School Of Graduate Studies

This is to certify that the thesis prepared by Bereket Zeleke entitled: *People and Biodiversity Conservation in Maze National Park,* and submitted in partial fulfillment of Degree of Master of Art (Environment and Development) complies with the regulations of the University and meets the standards with respect to originality and quality.

Signed by the Examining Committee:

Examiner Gemedo Dalle Signature _____ Date 04/07/12

Examiner Yohannes Abe Signature _____ Date 03/07/12

Advisor Feyera Senbeta Signature _____ Date 03/07/12

Advisor _____ Signature _____ Date _____

_____

Chare of Department or Graduate Program Coordinator

DECLARATION

I declare that this thesis is my original work and has not been presented for a degree in any other University, and that all sources of material used for the thesis have been duly acknowledged.

Declared by:

Bereket Zeleke

Candidate

June 1, 2012

Confirmed by:

Dr. Feyera Senbeta

Advisor

June 1, 2012

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Dedication

I dedicate this paper for those who lost their means of livelihood by the strict conservation approach.

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First and foremost, I would like to thank my research advisor Feyera Senbata (PhD) for his valuable comments, guidance and technical support in the entire process of this study.

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Above and beyond all of these, the glory and praise is owed to my Lord JESUS CHRIST, who helped me in all my ways.

Acronyms

EWCO	Ethiopian Wildlife Conservation Organization
Ha	Hectare
IBC	Institute of Biodiversity Conservation
IBCR	Institute of Biodiversity Conservation and Research
IPCC	Intergovernmental Panel on Climate Change
Km^2	Square Kilometer
MEA	Millennium Ecosystem Assessment
MzNP	Maze National Park
NBSAP	National Biodiversity Strategy and Action Plan
NCS	National Conservation Strategy
NGOs	Non-Governmental Organizations
PAs	Protected Areas
PGRC	Plant Genetic Resource Center
RCS	Regional Conservation Strategy
SNNPRS	South Nations Nationality and Peoples Regional State
UNCBD	United Nation Convention on Biological Diversity
VIF	Variance Inflation Factor

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Abstract

The study was made to describe the nexus between people and biodiversity conservation in Maze National Park. Structured questionnaires, focus group discussions and field observations are the main techniques used to collect the data. About 107 sample households were selected from four study kebeles for the survey. Demographic and socioeconomic characteristics of the households, their reliance on biodiversity of the park and the effects of park management on their villages were assessed in depth. Both quantitative and qualitative methods were used. Likert scale was employed to assess the anthropogenic threats of biodiversities and the socio-economic and ecological effects of conservation. Frequency and percentage were also used to reveal demographic and socio-economic characteristics of the respondents. In addition, binary logistic regression was used to identify the factors that determinant the exploitation of biotic resource. Qualitative analysis was also employed for data collected through discussions. Biodiversity conservation has inevitable socio-economic and ecological impacts. Based on the idea that human activities are unsuited with biodiversities, measures of biodiversity conservations keep local people out and give a little concern to the living conditions of indigenous people around the park. These in turn, has an anticipated ecological effects on the ambient environment. An excessive reliance on flora of the park for household energy and illegal hunting were also found to be the major reasons for biodiversity loss in the parks. The results of binary logistic regression results indicate that certain demographic and socio-economic factors such as family size and access to public health services have statistically a significant implication on the destruction of forests and wildlife via firewood extraction and hunting. This study proposes community based approaches of biodiversity conservation or *biodiversity protection by, for, and with local communities.*

Chapter One

Introduction

1.1. Background

Our planet supports a vast majority of living things. Although there is a difference in estimation among scholars, according to (Miller 2006) as many as 13 million species of animals and plants have estimated to inhabit in the earth. The variation in species and habitats is therefore referred to as biological diversity or biodiversity.

Biological resources are not only important for their contribution to economic growth and cultural diversity but they also help as a protector from natural calamities like drought and flood. Our vulnerability to natural hazards such as droughts and flood is strongly dependent on biodiversity (Brackett et al 2004). Biological and cultural diversity also show remarkable similarity. Countries with diverse biological resources are often countries that have diverse cultures (Brown and Mitchell 2000).

But nowadays, these prized resources have been threatened mainly due to merciless exploitation. Pressures from population growth, poverty, unsustainable economic activities and social practices have contributed for the degradation of habitat, displacement of species and extinction of biodiversity worldwide. Unless appropriate remedial measures are carried out, clearly the earth will be a hell without its biodiversity. This will, in return, threaten our food supplies, opportunities for recreation, and economic growth as every action we undertake that affects biodiversity also affects our lives either negatively or positively (Miller 2006).

Recognizing these issues, the United Nations Convention on Biological Diversity (UNCBD) reached to a consensus to realize a significant reduction of the current rate of biodiversity loss by 2010 (Vira and Kontoleon 2010). Biodiversity conservation, therefore, becomes a matter of global concern for safeguarding this valuable resource upon which the health and well-being of the entire planet depends.

Therefore, in the past few decades a substantial progress in biodiversity conservation and land under protection for biodiversity conservation has been attained particularly in developing countries (Barrow 2005). For instance, in Ethiopia, the area allocated for biodiversity conservation reached more than 168,000Km^2 or 16% of the total land of the country. The substantial portion of these protected areas is found in Southern Nations Nationality and Peoples Regional State (SNNPRS) of Ethiopia (Girma 2009).

1.2. Statement of the Problem

SNNPRS is blessed with a great variation in biological resources due to its geographical position, range of altitude, rainfall pattern and soil variability. More than 150 species of mammals and about 600 species of birds are sheltered in National Parks, Wildlife Reserves, Controlled Hunting Areas and Important Bird Areas. These Wildlife-Protected Areas cover about 24% of the total land area of the region which is about 27232 km^2 (Girma 2009).

However, the tragedy in the region is that most protected areas are established in the concept of '*people free park*' and they are working at high social and economic costs with less local community integration in the system. Large numbers of inhabitants were expelled from the vicinity and inside the park during establishment and subsequently. They also lost their right to land, water point, grazing land and forests. This alleged forceful action by the National Parks has violated the human rights of the affected indigenous community and worsened impoverishment in the area.

Protected areas are the homeland of indigenous people whose means of livelihoods and cultural values are highly depends on the biotic resources of the protected areas. Likewise, people are an integral part of the natural communities of Maze National Park. They have enjoyed, interacted with and utilized biological resources of the park for many years. However, they are excluded from the conservation systems. Therefore, it is impossible to think about the effective conservation in the area without the good-will and active participation of these people.

While the threats to various components of biodiversity and its conservation vary according to region, the principal underlying threats in many parks (especially in developing countries) are related with human activities such as deforestation, illegal hunting, forest fires, illegal human settlements and overgrazing.

Like other parks in Ethiopia, Maze National Park is highly influenced by the local people living in and around the park. The study aims to analysis how human are interact with the biodiversity conservation in the park and to link social dimensions with biotic resource conservation. This will help to develop and enforce socially sound biodiversity conservation measures in the area.

1.3. Research Objectives

The general objective of the study is to assess the interaction between people and biodiversity conservation in Maze National Park. The specific objectives are;

- ✓ To assess the socio-economic and ecological effect of biodiversity conservation in and around Maze National Park;
- ✓ To identify the major anthropogenic threats of biodiversity conservation in Maze National Park and
- ✓ To identify the main demographic and socio-economic factor that affects the predominant anthropogenic threats of the park biota.

1.4. Research Questions

- What are the socio-economic and ecological effects of biodiversity conservation in Maze National Park
- What are the principal anthropogenic threats for conservation of biotic resources in the park?
- Which demographic and socio-economic variables mostly affect the principal anthropogenic threats in the park?

1.5 Significances of the Study

Since the study tries to reveal the relationship between people and biodiversity conservation in Maze National Park it is believed to have the following significances

- The research may find out the problem and provide an insight for practical actions.
- It may contribute to formulation of efficient conservation or community based biodiversity conservation strategies.
- It could also encourage others for further investigation.

1.6 Limitations of the Study

This study might have the following limitations

- Due to lack of documents in Maze Park, studies carried out in other areas, particularly developing countries, were used as the reference.
- Only 5% of total households were selected from each Kebeles for household survey.
- Various demographic and socio-economic variables were included in this paper. However, some important variables like income and agro-ecology were still missing.

1.7 Organization of the Study

This paper has five chapters. Chapter one mainly deals with research problem, the objectives and research questions. Chapter two is about the review of related literatures. The third chapter is concerned with methodology. Chapter four treats the results and discussion. Chapter five includes conclusion and recommendation of the study. Finally, list of references and paper containing important information like maps and photos were annexed in the appendices.

1.8 Delimitation of the Study

This study was undertaken in four Kebeles (Morka, Kodowono, Doma and Daccume) from two adjacent Woreda (Qucha and Daramalo) for Maze National Park. The study focuses on the relation between people and biodiversity conservations in the park.

Chapter Two

Literature Review

2.1. The Concept of Biodiversity

Biodiversity can be defined as the full variety of the biosphere or all the species of living organisms including plants, animals and micro-organisms. It also includes genetic variety within species and the ecosystem in which they interact. Thus, biodiversity is not merely a list of species rather it is the function of number of species, genetic diversity and interaction between or among species and their physical environment (MEA 2005).

Biodiversity is, therefore, widely understood to refer to ***three-dimensions*** within which variability occurs: ***genetic***, meaning the variation of genes within a species, sub-species or population; ***population/species***, meaning the variation between living species and their component populations at different spatial scales (local, regional or global); and ***community/ecosystem***, meaning the variation within ecological complexes of which species are a part (Vira and Kontoleon 2010).

2.2. Approaches of Protected Area Management

The worst thing, that currently happening at the globe, is not energy depilation, economic crisis, conventional conflict and expansion of autocratic governments as these catastrophes can be repaired within few generations. But the one process now going on that will take millions of years to correct is the loss of biological resources. Thus, appropriate conservation measures should be implemented before our planet becomes some other place (Primack 1995).

However, the application of proper approaches of park management remained as one of the obstacles to design and implement socio-economically sound conservation strategy. The advocates of traditional approach or *'people-free park'* or *people exclusive* model suggest that protected areas work if they are strictly protected. They believe that to diminish human effect on biodiversity is to leave it alone or exclude the people in and around the protected areas. Based on this belief, managers of many National Parks prioritized keeping the local people out of the system. The displacement of local people from Nechasar National park and Omo National Park is the best example of this approach (Alvarez 2008; Abiyot 2009).

In other hand, the main ideology of community based or *'people and park'* approaches is that conservation plans will have little hope of success unless the local people are involved in the preparation and implementation of the conservation actions. The participation of local people, who are expected to be affected by the activities, helps to develop the sense of ownership among community. Thus, since 1980s, the whole conservation paradigm had changed to feature social inclusion rather than exclusion at least on the paper. Subsequently, many conservation authorities agreed to work with the existing social, political and economic systems and to involve local people and gain their support. Moreover, attempts were made to ensure that local

people are protected from troubles and dangerous species and whenever possible to offer livelihood opportunities associated with conservation (Barrow 2005)

Most of the local people living adjacent to the protected areas are poor and vulnerable to wildlife damage. The animals create disaster by damaging agricultural crops, livestock and human lives. On the other side, the local communities have been creating pressure on the park to collect forest resources and graze for their livestock inside the park. Overtime management has now focused more on meeting people's basic needs and security so that resource exploitation on protected areas could be diminished (Ferraro et al. 2010).

Community-based conservation reverses top-down, centre-driven conservation by focusing on the people who bear the costs of conservation. In the broadest sense, then, community-based conservation includes biodiversity protection by, for, and with local communities. This bottom-up model brings individuals and organizations together to work towards achieving desired environmental goals. Formation and institutionalization of different community based organizations in buffer zone is a stepping stone toward empowering and involving people in resource management.

2.3. International Campaigns to Expand Protected Areas

Attempts to conserve biodiversity have been concentrated on areas of high mixtures of biodiversity components or biodiversity hotspots (Brackett et al. 2004). However, this approach has also been criticized because it excludes areas with lower species richness. In fact, areas with fewer components of biodiversity are amazingly dependent on the goods and services provided by the biodiversity components. Indeed, in areas with less richness in biodiversity components there is perhaps even greater threat to ecological functions since there is more chance that

biodiversity loss will eliminate essential services. Keeping in mind that ecosystem services are crucial even in areas of low diversity, we should recognize that biodiversity conservation measures should take place everywhere in the world (Brackett et al. 2004).

Based on this concepts international campaign to expand the coverage of protected areas was started in 1982 World Parks Congress (WPC). During this period consensus emerged that all nations strive to place 10% of their lands under protection. As Barrow, 2005 there was also an agreement to address local communities' concerns with development. Protected areas including national parks are charged with conserving the wellbeing, culture and security of the local people along with biodiversity conservation (Barrow 2005).

2.4. Biodiversity Conservation in Protected Areas

To achieve greater progress towards conservation of biodiversity response options that are designed with the conservation and sustainable use of biodiversity as the main goal need to be developed. A response with a primary goal of conservation that has been partly successful and could be further strengthened is protected areas. Protected areas, including National Parks make important contribution to human society and environment by conserving natural and cultural heritage for recreations and aiding ecological balance especially in environments where biodiversity is sensitive to threats (MEA 2005; Stolton and Dudley 2010).

Protected area systems are most successful if they are designed and managed in the context of '*Dual Sustainability*' approach, with due regard to the importance of ecosystem and human wellbeing (Cernea and Soltau 2003). Thus, PAs need to be better located, designed, and managed to deal with problems like impacts of human activities on biodiversity within protected areas and vulnerability of local community. In all cases, better policy and institutional options

are needed to promote socially and economically friendly biodiversity conservation measures (MEA 2005).

However, success of PAs mainly depends on adequate legislation and management, sufficient resources, better integration with the wider region surrounding protected areas, and expanded stakeholder engagement. As a result, maintaining National Parks requires substantial human and financial resources, particularly difficult for developing countries. Thus, many National Parks are inadequately protected, unmercifully exploited, misused and polluted (Child 2004).

2.5. Why is Biodiversity in Crisis?

Biodiversity and its sustainable use have been impeded by many obstacles. The impediments can be generally categorized into two groups (MEA 2005). These are direct and indirect threats. Thus, some major challenges of biodiversity and its use in sustainable manner, among many, are selected and discussed below.

2.5.1. Direct Threats of Biodiversity

Habitat Degradation and Fragmentation

Habitat refers to the range of resources that a species needs to maintain a viable population including sufficient territory, necessary food and water, and required physical features such as tree cover, rocky hills or deep pools, as well as the organisms and ecosystem disturbances that must be present for it to complete its life cycle (Towensend et al. 2008).

As population number, markets, and infrastructure have grown in Africa, land use adjacent to many national parks has changed rapidly. Grasslands and forested lands that historically surrounded protected areas in the continent have been converted to other land use types. Thus,

habitat loss and fragmentation is the major current cause of biodiversity loss in Africa and that is likely to remain true for the coming era (Newmark 2008).

The expansion of human activities into the protected areas, manifested by settlement, recreation, urbanization and agriculture, results in increasing uniformity in landscapes and consequential reduction, fragmentation or isolation of habitats and landscapes. It is evident that the increasing exploitation of land for human use greatly reduces the area of each wildlife habitat and prevent living organisms making use of their normal ways to flee their habitat (MEA 2005).

Likewise, the division of continuous landscape into smaller pieces which are partly or fully disconnected from one another by infrastructure, agricultural fields or human settlements so called '*Habitat-Fragmentation*' can have similar outcomes for biodiversity as outright habitat losses for two reasons (Miller 2006).

Overexploitation of Resources

If biological resources are harvested at a rate greater than their regeneration capacity, it is said to be overexploited. Fundamental ecosystem changes can also occur when natural capital is declined too far. Then recovery to undamaged ecosystem service delivery potential may become very slow or impossible, and degradation is said to have occurred. Total consumption is a factor of per capita consumption, population, and efficiency of resource use. Slowing biodiversity loss requires that the combined effect of these factors to be reduced (Cunningham and Mary 2007).

Overharvesting of biotic resources is a problem in many localities. For example, rangelands are grazed by domestic livestock at unsustainable rate. The fish stocks in many lakes and rivers show classic symptoms and risks of overfishing. Likewise, easy access to machine guns

increased the frequency and intensity of increased hunting in many National Parks of Southern Ethiopia (Jacobs and Schloeder 2001).

Environmental Crisis

Unpredictable change in environmental factors such as flood, drought, fire, storms and climate changes directly affect biodiversity. Species with small population is more likely than large one to be reduced by adverse conditions to zero or number so low that recovery is impossible (Towensend et al. 2008).

Among many environmental calamities, climate change is projected to exacerbate the loss of biodiversity and increase the risk of extinction for many species, especially those already at risk due to factors such as low population numbers, restricted or patchy habitats, and limited climatic ranges. By the end of the century, climate change and its impacts suspected to be the dominant direct driver of biodiversity loss and changes in ecosystem services. The scenario developed by the Intergovernmental Panel on Climate Change (IPCC) anticipate substantial rise in global mean surface temperature, increased incidence of floods and droughts, and a rise in sea level between 1990 and 2100. Nonetheless, there will be a significant net harmful impact on ecosystem and its components worldwide if global mean surface temperature increases more than 2 degree Celsius above preindustrial levels or at rates greater than 0.2 degree Celsius per decade (MEA 2005).

Introduction of Exotic Species

Introduction of exotic species is another direct challenge to biological resources and its use in development. The invasion of exotic species into new geographic area sometimes occurs naturally and without human agency. However, human caused introductions such as transport, new agricultural products and recreations have worsened the risk. Many introduced species are assimilated into communities without much obvious effect while some have been responsible for dramatic changes to native species and natural communities (Towensend et al. 2008).

However, some aggressive exotic species have hampered endemic species both in their population dynamics and in the position of their trophic levels. At the same time, in many cases the importations has opted for changing ecosystem and drastically reduce the population of animals and create ecological hazard for the population of all native animals and plants. Consequently such ecosystem gets changed or "altered" (Newmark 2008).

2.5.2. Indirect Threats/ Challenges of Biodiversity Conservation

Population Growth and Increasing Demand for Biological Resources

The current environmental policies of many countries face a difficult challenge due to the world's population of above 6 billion people with an annual growth rate of 1.2% and projected to grow to 8-9 billion people by 2050 (MEA 2005). The present growth rate is considered as unsustainably high by many people. Human population, very roughly, had taken 1000 years to double in size before agricultural revolution of the 18th century. The most recent doubling time is only 39 years. In addition, population density in many biodiversity areas is also significantly higher. This implies that to meet the increasing demand for food and energy, more land would

be converted to agriculture. This process in turn places growing pressure on natural resources, thereby promoting biodiversity loss (Hunter and Gibbs 2007).

However, the relationship between numbers of people and degrees of environmental degradations is not as simple as Malthus has said it. As optimists such as Bosurp and Simon, with more people new and different ways of using and managing resource may be developed and population growth does not to be a problem at all.

As a result, the study of the impacts of population growth on natural resource should consider socio-economic statements of the local people like family affairs and tradition, and their education systems behind the number.

Institutional Gaps and Coordination Failure

At least two conditions must be fulfilled if a country has to achieve or at least make significant progresses towards the targets of realizing biodiversity use in sustainable development. One relates to the need to mainstream the conservation and sustainable use of biological resources across all sectors of the national economy, the society and the policy-making framework. This will mean cooperation with many different actors, such as regional bodies and organizations. And the second relates to the capacity of the country to implement policies and programs effectively (ISP 2004).

However, in most developing countries, biodiversity conservation authorities suffered shortage of capital, lack of transparency and accountability. Likewise, there is poor coordination among various organizations involved in natural resources management. This lack of coordination, transparency and accountability makes institutions not conducive to biodiversity conservation.

It is, therefore, essential that the developing countries take necessary steps to establish good governance, including rule of law and improvement in the economic and social management capacity to conserve their biotic resources (Amare 2005).

People's Attitude towards Conservation

In some cases, protected areas have negative impacts on the livelihoods and cultures of local people regardless of their significant advantages for biodiversity conservation. This is because, the designation of many protected areas has been associated with forced displacement and loss of access to natural resources for the people living in and around them, with no or inadequate compensation. As a result, protected areas have often considered as one factor for chronic poverty amongst the poor (Roe undated).

Consequently, efforts to protect biodiversity may be considered by local community as a threat to their livelihood. Similarly, most people are unaware of the importance of biodiversity conservation since the revenue from biodiversity conservation is hardly of a direct benefit to rural population surrounding these areas. And this in turn, may have something to do with the reduced appreciation for the biodiversity and its conservation.

Moreover, the local people are not allowed to hunt in the protected areas, but the wildlife can move out of these areas and damage the land that remains to the people. This further hardens the people's attitude towards the wildlife and protected areas and has forced the rural people to engage in the illegal hunting (UNEP 2004).

The attitude people have towards other organisms and its conservation also vary from person to person and it is mainly subjective to culture, education, occupation, gender and age. Human

being is considered as the center of the universe and more important than other species. However, many conservation biologists believe that this kind of valuation affects biological diversity. If we are to maintain the earth biota, we need to major shift in human valuation. They emphasize on the need to move from anthropocentric/human centered valuation into being bio-centric or believing that all life are center of the universe (Hunter and Gibbs 2007).

Poverty

Even though, many argue that wealth is a greater threat to biological resources, there are ways in which poverty hamper biodiversity conservation. People living close to the national parks are extremely poor in many developing countries. Their people extract as much as possible from the areas in order to satisfy their immediate needs, without considering the long term benefits of environmental security. In addition, eviction and restriction on harvesting of biotic resource from the traditional lands exacerbates poverty drive them to destroy fragile ecosystems. As a result, vicious cycle happens, meaning the level of impoverishment along local people increases and further environmental degradation occurs.

Furthermore, protected areas are expensive and need knowledge to establish, maintain and implement sound conservation strategy. Unfortunately, international conservation flows of revenue from sources such as the eco-tourism, the World Bank and international NGOs only meet a small percentage of the costs of maintaining protected areas in poor countries. Lack o f knowledge and capacity are the main obstacles of poverty for protected area management (Child 2004).

2.6 Biodiversity Management in Ethiopia

Like many countries, Ethiopia is dependent upon its rich biological resources for socio-economic development. Diverse agro-ecology has facilitated the existence of various flora and fauna in the country. For generation people have relied on biological resources for their food, clothing, shelter, energy and recreational requirements. Many of plants and animals are also medicinal and generations of people have dependent on them to treat and ward off physical and mental diseases. And yet, these precious resources are seriously threatened due to pressures from various dimensions including natural disasters (drought, climate change and flood) and human interferences (IBC 2005).

However, Ethiopia has been showing substantial progresses in conserving biodiversity by setting clear national policy directives on conservation of biological resources. In the past, conservation efforts focused on plant genetic resources and priority was given to field crops. But, currently, ecosystem management is recognized as one of the areas to be given top priority. The progress demonstrated in Ethiopia in the past decades interims of institutional, legal and policy frameworks are discussed below.

2.6.1 Institutional Set-up

It is now recognized that biodiversity conservation is an important issue for socio economic advancement. Various institutions have been established and a range of endeavors in favor of biodiversity conservation and management. The Plant Genetic Resource Center (PGRC/E), the focal institution engaged in ex-situ conservation, was initially established in May 1976 through a bilateral technical cooperation agreement between the governments of Ethiopia and Germany focused on the conservation of plant genetic resources. It has been active in collection,

evaluation, documentation and scientific study of crop germplasm in Ethiopia since 1976 (Shibru and Martha 1998).

Later on in 1998, the Institute of Biodiversity Conservation and Research (IBCR) replaced the former PGRC/E broadening its mandate and duties. A new key component, the research mandate, was a step forward in the progress of the Institute. The name of the Institute was further changed to IBC reflecting the focus of its mandates. Since 1998, the Institute was given a wider mandate of conservation and sustainable utilization of all forms of biological resources including plants, animals and microbial genetic resources. The Institute, on the basis of national legislation, has also, the responsibility and duty to implement international conventions, treaties and agreements on biodiversity to which Ethiopia is a party (IBC 2005).

Meanwhile, the institutions of higher education's particularly Addis Ababa University, Haramaya University of Agriculture and the institute of agricultural research contributed highly to biodiversity through research and development. The Ethiopian wildlife conservation organization (EWCO) was also mandated for the conservation of wildlife resources. Its broad objectives are conservation of the wildlife including their habitat. EWCO has made considerable headway in setting up conservation areas to preserve wildlife (Shibru and Martha 1998).

Moreover, the Federal and Regional governments are some of the most important stakeholders with overall responsibility for providing an adequate policy and legal framework, enforcing regulations, building capacity and providing incentives and funds for the conservation of biodiversity. The Federal Ministries (Ministry of Agriculture and Rural Development; Finance and Economic Development, the Ethiopian Science and Technology Commission) and Regional

Bureaus addressing Agriculture, Livestock, Forestry, Wildlife, and Fisheries among others are crucial to the conservation and sustainable use of biological diversity (IBC 2005).

2.6.2 Policy Initiatives and Legal Instruments for Conservation

An appropriate legal and policy framework is essential for biodiversity conservation. Without it conservation and sustainable use of biodiversity is not viable. Ethiopia has been making a substantial effort to conserve natural resources in general and biodiversity in particular for many decades. For instance, a National Conservation Strategy (NCS 1997) that takes a holistic view of natural resources encompassing all sectors relay on the environment, including agriculture, forest, wildlife, fisheries, soil, water, and minerals has been served as an umbrella strategy for all sectors. In addition, there were policies and strategies in place that address biodiversity conservation directly such as Federal Environmental Policy (1997), the National Biodiversity Conservation and Research Policy (Approved in 1998) and Regional Conservation Strategies (RCSs) specific to the regions (Shibru and Martha 1998; IBC 2005).

However, they are clearly not detailed enough to address in a deeper and more comprehensive way the issues relating to the depletion of biodiversity in Ethiopia. The current NBSAP will fill this void and give direction and set out an action program for conserving the nation's biodiversity.

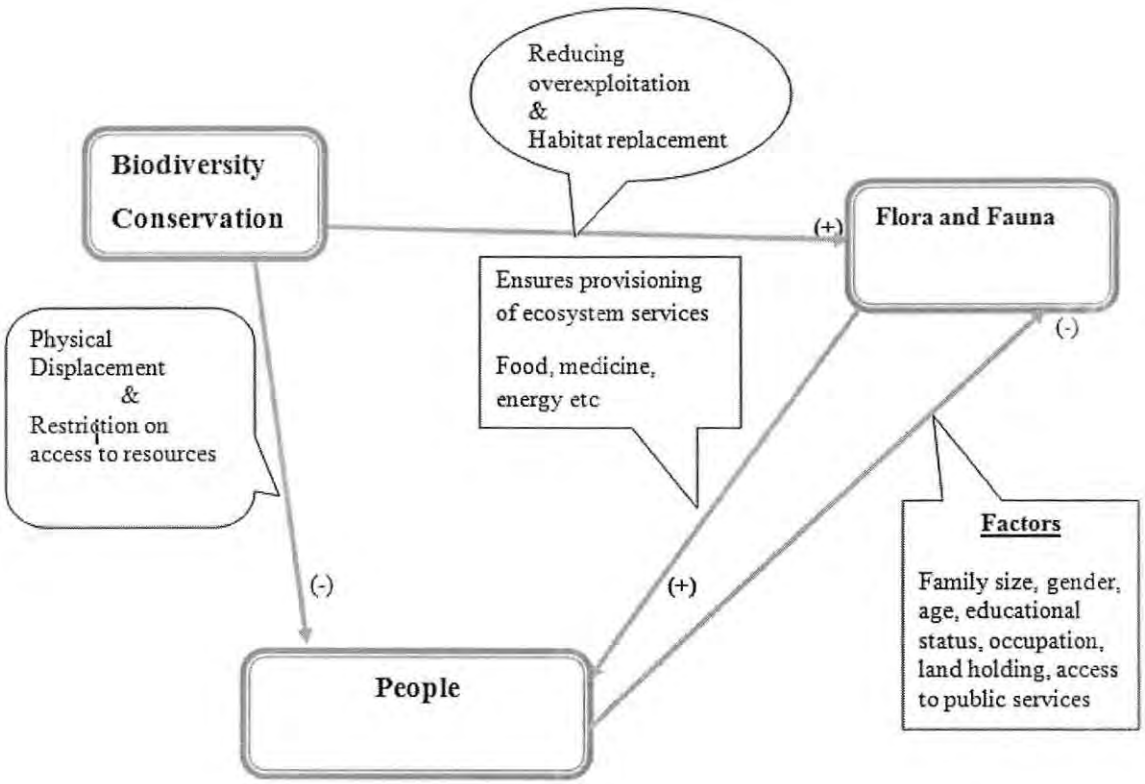
Currently, as a signatory to the CBD, Ethiopia has endorsed the global priority accorded to biodiversity conservation and sustainable use and designed National Biodiversity Strategy and Action Plan (NBSAP). Through this Biodiversity Strategy and Action Plan, Ethiopia is developing its own strategy for containing the erosion of biological diversity and ensuring its conservation for the benefit of present and future generations.

The overall goal of the Ethiopia's Biodiversity Strategy and Action Plan is, therefore, ensuring the conservation and sustainable use of Ethiopia's biodiversity, that provide for the equitable sharing of the costs and benefits arising from, and that contribute to the well-being and security of the nation. Its priority areas are the conservation of ecosystem level biodiversity through protected area networks and through sustainable use and management systems (IBC 2005).

2.7The Conceptual Framework

Biodiversity conservation imposes both positive and negative effects on the local communities and biotic components of ambient environment (Coad, 2008). Biotic resources (flora and fauna) recover due to reduction in overexploitation and rehabilitation of their habitats resulted from conservation. This leads people to enjoy or ensure the ecosystem services. On the other side, conservation measures may affect the wellbeing of the community by displacing and restricting their accessibility for resources. This in turn, entails residual or indirect impacts on the ambient environment. Various socio-economic factors like access to public services and educational status and demographic factors such as age, sex and family size affects the destruction of components of biodiversity.

Diagram1. Conceptual Framework



Source, own survey results

Chapter Three

Research Methodology

3.1 The Description of Study Area

Location

Maze National Park is one of the youngest parks in Southern Nations Nationalities and Peoples Regional State (SNNPRS) established in 2005. Maze Park is the smallest park which covers an area of 2,020 ha. It is located in Gamo-Gofa Zone around 460km and 235 south west of Addis Ababa and Hawassa, respectively and found between $06^0$03'N/ $37^0$40'E (Girma 2009).

Flora and Fauna

The Park is covered by savannah grassland and vegetations like *Terminalia brownie, Combetum adengonium, Rhus natalensis* and *Cordia gharaf. Balanites aegyptiaca Trichilia dregeana Tamarindus indica Pilostigma thonningi* and *Carissa edulis* are common and used by many people as supplementary diet.

Maze National Park is an important habitat for various species of wild animal. The existence of important wild mammals and bird species makes the park potential site for tourism. Dominant species of wild animals are endemic Swayne's Hartebeest's, Buffalo, Lion, Leopard Orbi, Bohor Red buck and others. Maze National Park also supports bird species like Bats, Froncolin, Helemeted guineafowl and African fish eagle.

Landscape

Besides flora and fauna, the landscape of park is amazing and important for eco-tourism development. Its altitude ranges from 1000 to 1200 meters above sea level. Maze Park is surrounded by interesting high mountains, escarpment, and small hills. Mountain Gughe, altitude above 4000 meters above sea level is found at the edge of the park. The park is also fortunate in possessing rivers and streams like Domba, Zage, Daho and Lemase. The name of the park is derived from the Maze River that crosses the park and ultimately drains to Omo River. The Bilbo hot spring is also one of the main attractions (Girma 2009).

Economic system

Agriculture is the basic means of livelihoods for the large portion of the local people. The inhabitants widely practice mixed farming (both crop production and animal husbandry). The main staple crops grown in the area are Maize, Sorghum and Teff where as cash crops are Cotton, Groundnut and fruits like banana and mango. Local people also rear livestock to meet their food need and subsidize their income.

Population

There are two major ethnic groups in the study area. These are *Gamo* and *Goffa*. *Malles* also constitute a considerable portion of the population even though they were evicted from the area now due to strict park management. Small number of *Wolaita*, *Dawuro* and *Amahara* are also living in the area. Most common religions in the area are Protestant Evangelical Christianity and Ethiopian Orthodox Christianity.

3.2. Methodology

3.2.1. Sources and Techniques of Data Collection

In order to have a brief overview about the study area in line with the problem under discussion and methods to be used, field observation and discussion with officials were made. Both primary and secondary data was also used in the study. Therefore, four main techniques of data gathering employed in this paper were described as follow.

Structured Questionnaires; Two different questionnaires were designed for the survey. The first questionnaire was distributed for twenty experts randomly selected from Park staffs, Woreda Agriculture and Rural Development office, Woreda Culture and Tourism offices, Development Agents and Keble Administration to identify human activities that adversely affect the biotic resources of the park.

Subsequently, household survey questionnaire was developed to get the demographic and socio-economic characters of the households to assess the major determinant factors on the destruction of the biodiversity.

Focus Group Discussion; Discussions were conducted at each sample kebeles with selected community leaders, elders of the villages, women and representatives of informal institutions like institution of collective livestock herding based on their reliance on park resources and the effects of park establishment on their wellbeing.

Direct Field Observations; Field observations were conducted to investigate the economic activities in and around the park.

Secondary Data Sources; In addition, secondary data/ information was gathered from study documents, books, research reports and other relevant literatures.

3.2.2. Sampling Techniques

Two stage random sampling techniques were employed to identify sample households. Maze National Park is surrounded by 15 Kebeles from five *Woredas* such as Qucha, Daramalo, Zala, Demba-Gofa and Kamba. Four kebeles were randomly selected from these at the first stage.

Secondly, as indicated in the Table1, 107 sample households (5% of the total households from each sample kebeles) were selected randomly. Heads of households were selected for questionnaires because they decide extraction of biotic resources on behalf of household members. Total household number of four sample kebeles (Masha, kodowono, Dacume and Domma) was obtained from their Woreda Agricultural and Rural Development Offices.

Table1. Selection of sample household heads

Sample Kebeles	**Total household**	**Sample household heads**
Morka	820	41
Kodowono	563	28
Dacume	321	16
Doma	441	22
Total	***2146***	***107***

3.2.3. Method of Data Analysis

The research method employed both descriptive and inferential statistics. Likert scale was used to identify major anthropogenic threats of biotic resources in the park on the preliminary study. This technique was also used to rank the socio-economic and ecological effects of biodiversity conservation. The rating was based on five points (very low, low, Medium, high and very high). Additionally, Frequency and percentage were used to reveal the demographic and socioeconomic characters of the respondents.

As assessed during the preliminary survey, chopping of trees for firewood and slaughtering of wild animals for different purposes were the major threats of the biodiversity conservation and results the depletion of biodiversity. Therefore, binary logistic regression was used to analyze the determinant factors affecting firewood extraction and killing wild animals. The model goodness of fit and multi-collinarity effects was tested well and annexed at the appendix part. The independent variables are sex, age, family size, access to basic social services like health, veterinary and electricity, educational status, occupation, landholding and distance from park office. The collected data was analyzed by using SPSS16 version. Furthermore, data collected through discussion were also analyzed qualitatively.

Chapter Four

Results and Discussions

4.1. Demographic and Socio- Economic Characteristics of the Respondents

Age and Sex Structure

The age and sex of the sample respondents were illustrated in Table2. Accordingly, the age of the largest shares of the respondents (61.7%) was between 26-45 years. This indicates that the largest proportions of the respondents were under productive age category. Likewise, the vast majority of the household heads (90.7%) were male while female constituted the remaining proportion (9.3%).

Table2. Descriptions of Demographic Variables of the Respondents

Variables	Category	Frequency	Percent
Sex	Female	10	9.3
	Male	97	90.7
	Total	***107***	***100***
Adjusted Age Category	≤25	13	12.1
	26-45	66	61.7
	>45	28	26.2
	Total	***107***	***100***
Adjusted Family Size	<7	66	61.7
	≥7	41	38.3
	Total	***107***	***100***

(Source; field survey, 2012)

Family Size

The size of household members ranges from 1 to 13. The mean family size was about 7. As indicated in the Table2, 61.7% of the households had low family size that is below the mean (7) while more than 38.3% constituted large family size which is greater or equals to seven.

Table3. Description of Some Socio-Economic Variables of the Respondents

Variable	Category	Frequency	Percentage
Main income source	Farming	82	76.6
	Others	25	23.4
	Total	***107***	***100***
Adjusted education	Illiterate	31	29
	Literate	76	71
	Total	107	100
Distance from park office	Near	41	38.3
	Far	66	61.7
	Total	***107***	***100***
Land holding size	<1ha	59	55.1
	1-2ha	43	40.2
	>2ha	5	4.7
	Total	***107***	***100***

(Source, field survey, 2012)

Main Economic Activities

As illustrated in Table3, the largest proportions 76.6% of the respondents were farmers while the remaining 23.4% were engaged in non-farm activities such as small scale trade, day labor and government employment.

Educational Status

Likewise, sample household heads were requested to respond about their educational background. Accordingly, nearly 29% of the respondents were without any formal education or illiterate while the largest portions 71% have followed any formal education or literate. This is a good opportunity to introduce new technologies in the community since significant amount have followed at least primary education.

Distance from Park Office

Four kebeles were randomly selected for this study. These are Morka, Kodowono, Dacume and Doma. Morka is the nearest kebele to the park office for the office is located in Morka. The remaining kebeles are located nearly at 20km distance from the park office. As presented in the Table3, almost 38.3% of the respondents were found near to the office while the remaining 61.7% were far away from the park office.

Landholding

The landholding of respondents in the study area varied from 0ha (landless) to 4ha with an average land size 1.3ha per household head. The large part of the respondents 55.1% had below 1ha.

Access to Basic Social Services

Health, veterinary and electricity are the three basic public services assumed to have implications on the sustainable exploitation of biodiversity. Health Posts are the common health infrastructures in the study areas. However, the restricted duties of health posts on protective measures than medicinal activities coupled with insufficient numbers of qualified health workers and insufficient supplies of medical materials and equipments led the local people to relay on the wild animals and plants having medicinal values.

Table4 Respondent's Access to Basic Public Services

Variable	Category	Frequency	Percentage
Access for Health service	No	64	59.8
	Yes	43	40.2
	Total	***107***	***100***
Access to Veterinary	No	65	60.7
	Yes	42	39.3
	Total	***107***	***100***
Access to Electricity	No	77	72
	Yes	30	28
	Total	***107***	***100***

(Source; field survey, 2012)

As demonstrated in Table4, almost 60% of the sample household heads lack access to basic health services. Likewise, about 61% of the respondents were not accessed to veterinary services. There is a substantial increase in interest to expand rural electrification in Ethiopia though not yet reached the rural communities of the study area. Only 28% were connected to electricity. Morka kebele is the only electricity connected Kebele in the study area.

4.2. Socio-Economic and Ecological Effects of Biodiversity Conservations in Maze National Park

Biodiversity conservation efforts inevitably entails both positive and negative impacts especially in places where formerly occupied by people (Coad 2008). Development of infrastructures, creation of additional job opportunities and reduction of deforestation are the most common benefits of biodiversity conservation while costs are involuntary displacement, restriction on access, human wildlife conflict and aggravating environmental degradations in unprotected areas

Therefore, biodiversity conservations have a potential either to reduce or exacerbate poverty and environmental degradation. In fact, genuine sustainability is both social and ecological. So, achievement of '*double sustainability*' should be the motives of any biodiversity conservation measure through reducing costs and broadening social and ecological benefits (Cernea and Soltau 2003).

Sample respondents were requested to rank the prevalence of positive and adverse impacts of the biodiversity conservation actions on their villages. Accordingly, 105 respondents ranked the changes. The rating was based on five point Likert type scale 1=very low, 2=low, 3=medium, 4=high and 5=very high. Subsequently, the approximated mean is used to see the prevalence of conservations effects in the study area based on this rank.

Table5 Prevalence of Conservations Effects in the Study Area

Major changes	N	V. low (1)	Low (2)	Medium (3)	High (4)	V. high (5)	App. Mean
Job Opportunity	105	61(58%)	10(9.5%)	24(23%)	10(9.5%)	-	2
Infrastructural Development	105	60(57%)	27(25.7%)	12(11.5%)	6(5.7%)	-	1
Increase In Forest Resource	105	20(19%)	23(22.2%)	32(30.5%)	26(24.5%)	4(3.8%)	3
Increase In Wild Animals	105	2(2%)	5(4.8%)	21(20%)	42(40%)	35(33.2%)	4
Increase In Wild Animal Attack	105	4(3.8%)	6(5.7%)	13(12.5%)	12(11.5%)	70(66.5%)	4
Restriction on Access to Park Resources	105	4(3.8%)	21(20%)	28(26.7%)	24(22.9)	28(26.5)	3
Physical Displacement	105	15(14.3%)	22(21%)	35(33.3%)	18(17%)	15(14.4%)	3

(Source; field survey, 2012)

4.2.1. The Role of Biodiversity Conservations for Employment and Infrastructural Development

Biodiversity conservation is often carried out for socio-economic wellbeing of local communities besides their substantial role to ecological values. It is supposed to contribute for poverty alleviation measures by the development of infrastructures and reduction of unemployment through revenues linked to park management and tourism activities such as local hotels, guides, security force, transport facilities and other services.

However, the level of employment created and development of infrastructures in local community resulted by the activity was poor. As presented in Table5, the approximated mean of the change both in creation of job opportunity and expansions of urbanization attributed with biodiversity conservation was 2. This denotes that local people received low benefits or revenues from conservation due to the disproportional growth of ecotourism and low development fund.

4.2.2. Human and Wildlife Conflict

The disturbance and loss of habitat attributed with expansion of human settlement, agricultural encroachment and other economic activities are generally considered as the prominent reasons for human wildlife conflicts (Muruthi 2005). But, the recovery of wildlife due to rehabilitation of species habitats and protection from overexploitation related with park management has resulted in a new dimension of human-wildlife conflicts in the area.

Table5 also indicates that, there was high occurrence of wildlife attacks in the area. The approximated mean is 4. This attack was prominent on the crops and livestock where wildlife numbers are growing and often penetrating into adjacent cultivated fields and grazing areas. As discovered by focus group discussion, the most reported crop raiders are *Buffalo*, *Baboons* and *Birds* while *Lions*, *Leopards* and *Hayne* are the main prey species upon livestock. Accordingly, many livestock such as goats and cattle are eaten by the wild animals at each sample kebeles since the park establishment. However, there was no report in human death and physical injury due to wild animal attack.

Moreover, loss of sleep due to noise pollution and fear of wild animals and indirect costs like the school and working time of the villagers spent on guarding their crop were additional adverse impacts of biodiversity conservation measures reported on focus group discussion. However, no significant measure was undertaken to protect, mitigate or compensate local people. As a result, they assert as their wellbeing was affected through destruction and damage of safety and properties such as agricultural crops and livestock. This often changes the attitude of the resident people towards biodiversity and its conservation. The farmers perceive forests

and wild animals as a threat for their livelihood. This makes them to undertake ecologically unsustainable protective measures like hunting and setting illegal fire.

4.2.3. Displacement and Human Right Violation

Forced exclusion of local communities from certain land has long been used as a definition of displacement (Coad et al. 2008). This definition now tends to include displacement from resources without physical movement. Maze National Park is the homelands of many people whose daily livelihood depends on biotic resources of the park. But, the park management hardly considers the economic and socio-cultural conditions of indigenous and local communities.

As illustrated in Table5, the approximated mean of physical displacement is 3. However, as reported during focus group discussions, the demarcation of Maze National Park made more than 200 inhabitants and users homeless and landless. As indicated in Domma Kebele about 1.5ha cultivated land has been taken in average from the villagers. In addition to the eviction, they have also faced restrictions on access to land for farming, collection of construction wood and others without any replacement assets or sources of livelihood. An approximated mean of restriction on access to the natural resources of the park is also 3. Lack of local people participation in the conservation process coupled with insufficient financial support has worsened the costs of biodiversity conservation.

Most of the conservation refuges were *Malle* people. They are nomadic and their predominant economic activities were hunting, gathering and cattle rearing. This ethnic group was arrived to the Domma kebele few years back following the footsteps of their cattle along Maze River. The

fertile soil, wide grazing land and rivers of the park led them to change their economic base into sedentary farming.

Furthermore, Maze National Park, like that of Omo and Nechsare National Parks, is bypassing accepted international standards for adequate compensation and livelihood reconstruction. The local community complains the park for their rights forgone to respect the rights of wildlife. Local communities were not properly consulted during the demarcation of Maze National Park. More than 200 residents were unlawfully arrested in kebeles and woreda police stations and many of the villagers' crops and temporary houses in their farm lands were burned and agricultural tools were confiscated by the park wardens. This makes the park a threat for the welfare of the local people instead of being an opportunity.

4.2.4. Indirect Ecological Impacts of Biodiversity Conservations

Conservations measures need to achieve a considerable recovery in forests and wild animals. Table5 also indicates the rise of area covered by forests and wild animals in the study area. Focus group discussions indicate that, this was achieved primarily by controlling timber production, agricultural encroachments and human settlements in the park lands.

However, the indirect adverse ecological impacts of the socially unsuitable biodiversity conservations were too little understood or ignored by the conservation authorities. The protective system of conservations often backfire long term biodiversity conservation. The removal of people and critical restriction on access to park resources brings unanticipated risks to the environment itself.

Restrictions on access particularly on construction wood collection inside the park exacerbated destruction of forests environmental and degradations around the settlements. People are forced to overexploit the forests near to their settlements since cutting of trees within the park is generally banned. Thus, increased pressure on natural resources in fragile ecosystem out of the park boundary aggravates biodiversity destructions around the park. Focus group discussion results also show that, most of the displaced people were forced to migrate into outskirts of nearby towns like Wacha, Sawulla, Arbaminch and Soddo. Few others are returned to exploit their formerly degraded farmland. This study is in harmony with Pimbert and Pretty 1995. According to them conservation refuges often reside and work in more risk-prone and fragile ecosystems such as urban-fringes and erosion or flood prone areas. This in turn aggravates the pressures on biotic resources and environmental pollution on receiving areas.

The negative attitude of local people towards the park and wildlife itself is the current challenge for biodiversity conservation. Instead of being seen as an asset, wild animals are viewed by local people as a threat to their livelihoods for high wildlife attacks. Killing of these animals is therefore taken as a way to prevent the damage. Poisoning of wild animals by using toxic chemicals and a traditional tool called as *Prya* (Soundless Instrument) are common ways to revenge the predators in the study area. Such human-induced mortality affects the number of threatened species like Swayne's Heartbeats and ecosystem health and there by exacerbates environmental depilation. In most causes species most exposed to conflict are also prone to human induced injury and deaths.

Appendix C indicates that, uncontrolled wildfire is one of the threats of biodiversity conservation in the area. People set bushfire as a revenge for the land and other resources they lost due to conservation. This destroys the recovered forest areas at short period and forces the wildlife to migrate. The designation of socially unfriendly national parks even exacerbates habitat destruction by frustrating local people.

4.3. Major Anthropogenic Threats to Biodiversity Conservation

Maze National Park has forest along the main roots of rivers and scattered deciduous broad leaved trees. Local people use this forest as source of fuel wood and food. Yet Maze Park is also the base for gathering of traditional medicines since the area is the source of many life saving drugs. The vast woodlands and grassland of the park is also the main source of precious wild animals and birds that are used as source of food and traditional medicines for the local community.

However, these precious resources of the park face many challenges related with human activities. Questionnaires were distributed for twenty respondents selected from Park Staffs, Development Agents, Kebel Administration, experts from Woreda Agriculture and Rural Development and Woreda Culture and Tourism Offices to identify the major human activities that depilate biodiversity of park. Fifteen human activities undertaken by the people nearby the park were ranked by the respondents.

Hunting and cutting of trees are completely banned by the park, but, the park management couldn't control them due to lack of energy diversification in the area and people use soundless traditional equipment to kill wild animals. Therefore, as shown in Appendix C, excessive reliance of local people on the forests of the park for household energy and murdering wildlife

were the top two anthropogenic challenges of conservation and destruct or devastate biological stocks of the park.

Thus, hunting experience of the respondents in the last five years and the level of firewood consumption were assessed in detail. Additionally, various demographic and socio-economic variables that are assumed to have an implication on hunting and cutting trees for energy were analyzed by using binary logistic regression model.

4.3.1. Firewood Collection

Fuel wood gathering from reverian forests, woodlands and shrub lands is the major source of household energy in the study area. Survey results show that, almost all respondents collect firewood to meet their energy demand. The respondents were also requested about place of firewood extraction. Accordingly, 78.5% of sample household heads indicated that they extract from inside the park while the remaining 21.5 percents get fuel wood mainly from their farm land and woodland at outskirts of the park. The household consumption level of fuel wood varies from 1 to 21 bundles per week with mean of 4.8 bundles. Each bundle ranges in weight from 10 to 30 Kg.

Table6 Firewood Extraction and Hunting Experience of the Respondents

Activities	Category	Frequency	Percentage
Fuel wood collection	No	-	-
	Yes	107	100
	Total	**107**	**100**
Bundle of wood	Low	72	67.3
	High	35	32.7
	Total	**107**	**100**
Place of extraction	Inside the park	84	78.5
	Outside the park	23	21.5
	Total	**107**	**100**
Hunting	No	44	41
	Yes	63	59
	Total	**107**	**100**
Frequency	One times	26	41.3
	Twice	24	38
	Three times	11	17.5
	Four times	2	3.2
	Total	**63**	**100**
Reasons for hunting	Medicines	6	9.5
	Food	25	39.7
	Honor	15	23.8
	Defense	17	27
	Total	**63**	**100**
Hunting Place	Inside the park	40	63.5
	Outside the park	23	36.5
	Total	**63**	**100**

(Source, field survey, 2012)

About 1.4 billion people (20%) of the world's population have no access to electricity. The large majority around 85% of electricity-deprived people live in rural areas of the developing countries like Ethiopia (Bast and Krishnaswamy 2011). There is also no diversification of energy consumption in the study area. The low income characteristics of the area and inflammable traditional house structures made up of wood and grass make rural electrification more difficult and hinder their fuel diversification. Moreover, focus group discussion shows that, all household heads connected with electricity use firewood for heating and preparing food. Electricity helps merely for lightening purpose.

4.3.2. Hunting Wild Animals

Hunting of wild animals has long been the culture of the resident people in and around the park. As indicated in Table6, 59% of the respondents believed that they have engaged in hunting practices in the last five years. Regarding the frequency of hunting 41% of them undertook once in the past five years while 38% hunted twice. The remaining 17.5 and 3.2 percents had slaughtered wild animals for three and four times respectively.

Even if there may be an overlap on the motives of hunting, respondents reflected about the main reason of hunting. Accordingly, the first and most important driving rationale of many hunters was satisfaction of food demands. As demonstrated in the Table6, nearly 40% of the hunters believed that the core driving force for hunting is seeking of food. As presented on focus group discussions, wild animals preferred by the local people due to their rich protein content are *Buffalo, Hartebeest, Waterbuck and Bush pig* as demonstrated in appendix D. The result of focus group discussion also indicates that, dry season is the common hunting period in the local area. This shows that meat harvested by killing wild animals, commonly called as bush-meat, is

a critical contingent source of food for many people in times of food shortage and drought before the main crop harvesting time. People also use these wild animals as food source during the celebration of festivals and holidays.

In addition, hunting of wild animals is also attributed with social values behind supplementary diets. As shown in the Table6, about 24% of the slaughter of the wild animals said that killing wild animals was mainly to get honor and respect from the society. Slaughtering large predators like *Lion*, *Wolf* and *Leopard* for social values have been practiced commonly in the area for the long time. A person who killed them gets admiration and privilege from the community.

Likewise, about 27% of the slaughters kill wild animals to protect their properties like crop and livestock against these predators. As discovered by focus group discussion, *Baboons, Ape*, *Waterbuck* and *Birds* are the most common raiders of crops (mainly Maize, Teff, cotton and Banana) while *Lions*, *Leopards, Wolf* and *Hayne* are the main prey species upon livestock.

Moreover, some wild species like *Bush pig*, *Porcupine* and *Warthog* are butchered by the local people mainly for medicinal purpose. About 10% of butchers of wild animals believed that the main reason for hunting is seek of medicines. In addition to wild animals, birds like *Egyptian Goose*, *Bats* and *African Fish Eagle* are also murdered for medicinal purpose. Species of wildlife hunted for many reasons are annexed in appendix D.

One of the major challenges to control illegal hunting is the place where hunting is carried out. Local people do not necessarily travel in to the midlands of the park to slaughter wild animals since these species are available in adjacent settlements and farmlands. As indicated in Table6

about 64% of them undertake hunting at the outskirts of park while the remaining 36 percents walk in to parkland to murder wild species that rarely arrives in to the adjacent settlements.

4.4. Determinant Factors Affecting Principal Threats to Biodiversity Conservation

There may be many factors that affect the principal challenges of biotic resources and its conservation such as chopping of forests for fuel and slaughtering of wildlife. Demographic variable like age, sex and family size and such socio-economic variables as educational status, land holding, income source, distance from park office and access to public services like electricity, health care and veterinary services were identified for this study by assuming important to affect the hunting and level of firewood extraction.

4.4.1. Model Goodness of Fit and Multi-Collinearity Effect

With respect to goodness of fit of the model, there are many ways to assess the extent to which the model fit the data. One way of assessing how well the model fit the data is the Hosmer & Lemeshow goodness of fit test. Insignificant value of this test shows the goodness of the model. As presented in appendix E, the model fits for all p. values are larger than 0.05.

In fitting regression models, the most important thing to be done is to examine the existence of inter-correlation among explanatory variables. The existence of this effect in the models can be checked by using tolerance or Variance Inflation Factor (VIF). The higher the inter-correlation of the independents, the more the tolerance will approach zero. Generally, less than 0.2 tolerance is taken as the indicator of higher inter-correlation (multi-collinearity effect). As presented on the appendix F for all models tolerance is highly greater than 0.2. Thus, the multi-collinearity effects do not influence the model.

Likewise, the VIF, which is simply the reciprocal of tolerances shows whether the explanatory variables are related with each other. If there is multicollinearity effect, the VIF becomes higher. Four is generally taken as the common cut-off criterion to indicate the existence of inter-correlation between/among independent variables. However, as presented on the appendix F in all the VIF is below 4.

4.4.2. Multivariate Analysis of Factors Affecting Firewood Consumption

Excessive dependence on forests for energy is a risk for the conservation of park biota. The result in Table7 shows that, numerous demographic factors generally have no significant implication on the level of firewood extraction. Amongst these factors only family size has statistically significant ($p<.05$) effects on the level of fuel wood extraction. The results demonstrate that, households with large family size (≥ 7) were 4.74 times more likely to utilize large bundle of fuel wood than those households with low family members or the reference category.

Socio-economic factors such as educational status, income source, distance from park office and access to public services also have statistically insignificant effects on the of fire wood extraction level. This is not surprising, since the availability of public services like health and veterinary services has no role to reduce the consumption of firewood even theoretically. The most astonishing issue however, is that the availability of electricity needs to contribute for the reduction of firewood consumption. Despite of this fact, household connection to electricity has statistically insignificant effect on the chopping of trees for fuel in the area. As indicated on the focus group discussion, they use electricity for lighting purpose alone. The existence of electricity reduces the cost of kerosene or candle rather than firewood extraction.

Table7 Binary Logistic Regression of Firewood Consumption with Selected Characteristics in the Study Area, 2012

Variable	Category	B	S.E.	Sig.	Exp(B)	95.0%C.I. for Exp(B)	
						Lower	upper
Sex	Female				1.00		
	Male	1.392	.935	.136	4.025	.644	25.135
Adjusted age category	≤25			.073			
	26-45	1.644	1.151	.153	5.176	.543	49.366
	>45	.508	1.271	.689	1.662	.138	20.082
Adjusted family size	Low				1.00		
	High	1.513	.537	.005	4.539	1.583	13.014
Health services	No				1.00		
	Yes	.572	.532	.282	1.772	.625	5.022
Veterinary services	No				1.00		
	Yes	-.034	.512	.947	.967	.355	2.635
Electricity	No				1.00		
	Yes	-.600	.835	.473	.549	.107	2.819
Adjusted education	Illiterate				1.00		
	Literate	-.671	.601	.265	.511	.157	1.661
Adjusted income	Farm				1.00		
	Off farm	.762	.719	.289	2.142	.523	8.767
Adjusted land holding	Low			.844			
	Medium	.234	.554	.673	1.263	.427	3.742
	High	.543	1.128	.630	1.722	.189	15.695
Distance from park office	Near				1.00		
	Far	-1.051	.807	.193	.350	.072	1.701
	Constant	-3.008	1.811	.097	.049		

Source; field survey, 2012

4.4.2. Multivariate Analysis of Factors Affecting Hunting Practices

Table8 shows that, sex has statistically no significant effect on butchering wild animals where as family size and age category are important demographic variables that affect the hunting practices. As expected, family size is significantly related with the slaughtering of wild animals. The odds ratio indicates that household heads with large family size were about 5.1 times more likely to hunt wild animals than the reference category.

Likewise, the overall age category has statistically significant association with practicing hunting. The second age group (26-45 years) is not significantly various with the reference category (≤25 years). The third age group (>45 years) is significantly varies from the reference category. The odds ratio of undertaking hunting for household heads in the third age group was about 12. The household heads above 45 years have 12 times more chance to engage in the hunting wild animals in comparison with the first age group (reference category).

Amongst the socio-economic variables occupational status, educational background and access to health services have negative and statistically significant effect on the slaughtering of wild animals. As expected, occupation and slaughter of wild animals were negatively related. The finding in Table 4.6 reveals that household heads engaged in off farm activities have 85% times less chance to hunt than farmers.

Surprisingly, education was also found to be negative and statistically significant predictor of slaughtering of wild animals at p. value at less than 0.05. As presented on the table, the odds ratio indicates that educated households were less likely to hunt wild animals. Educated household heads were about 96% times less likely to butcher wild animals when compared to household heads with no formal education.

Likewise, access to health services was also found to be an important socio-economic factor that negatively influences the illegal hunting practices. The odds ratio of health access was 0.213. This means that the households accessed to basic health services to be nearly 79% times less likely to engage in hunting when compared with not access for the services.

Table8 Binary Logistic Regression of Hunting Wildlife with Selected Characteristics in the Study Area, 2012							
Variable	**Category**	**B**	**S.E.**	**Sig.**	**Exp(B)**	**95.0%C.I. for Exp(B)**	
						Lower	upper
Sex	Female				1.00		
	Male	-1.228	.968	.205	.293	.044	1.952
Adjusted age category				.015			
	26-45	-.932	.892	.297	.394	.069	2.265
	>45	2.498	1.317	.048	12.155	.919	160.696
Adjusted family size	Low				1.00		
	High	1.628	.757	.031	5.091	1.155	22.433
Health services	No				1.00		
	Yes	-1.548	.714	.030	.213	.052	.863
Veterinary services	No				1.00		
	Yes	-.831	.680	.222	.436	.115	1.653
Electricity	No				1.00		
	Yes	1.439	1.355	.288	4.215	.296	60.036
Adjusted education	Illiterate				1.00		
	Literate	-3.254	1.150	.005	.039	.004	.368
Adjusted income	Farm				1.00		
	Off farm	-1.899	.910	.037	.150	.025	.891
Adjusted land holding				.947			
	Medium	-.240	.756	.751	.787	.179	3.461
	High	.033	1.536	.983	1.034	.051	21.004
Distance from park office	Near				1.00		
	Far	.367	1.271	.773	1.443	.120	17.416
	Constant	4.814	2.212	.030	123.219		

(Source, field survey, 2012)

Chapter Five

Conclusion and Recommendation

Conclusions

Biodiversity conservation measures inflict costs and benefits on local communities and ambient environment. Considerable recovery of floras and fauna of the park and creation of job opportunity for local people are the socio-economic and ecological importance of conservation. Besides, the process of biodiversity conservations has restricted traditional access to these resources and has even resulted in the displacement of many people from their ancestors land and so on. There is an imbalance between the costs and benefits of the conservation.

These in turn, develop a negative attitude among communities towards conservations and undermine long term conservation efforts. The excessive extraction of woods for household energy and hunting for wild animals are the prominent challenges of the biodiversity and its conservation in the study area.

Among various demographic variables family size significantly affect firewood consumption level and hunting of wildlife in last five years. Households with large family size were more likely to slaughter wild animals and consume large stock of fuel wood than its counterpart.

Socio-economic variables like occupational status, educational background and access to basic health services have negative and statistically significant relation with slaughtering wild animals in the last five years. Respondents who have followed formal education, engaged in off-farm activities and accessed to basic health services were less likely to hunt wild animals than their counter parts.

Recommendations

The need for public consultation; Conservation measures should not be implemented without the free, prior and informed consent of the affected people. It is the right of people to participate in any development interventions. Public hearings and consult must be conducted before its commencement

The need for appropriate compensation; Physical displacement and restriction on access to natural resources resulting from strict conservations affects the well-being of local people and aggravates rural poverty. Poor people often have little choice but degrade or over-exploit any available natural resources. This in turn, worsens the vicious circle of poverty and biodiversity loss. Therefore, in order to break this cycle, there is a need to protect rural livelihoods, reduce their vulnerability, and counterbalance losses with benefits and foster community-based conservation. Diversifying livelihood activities reduce their vulnerability for improvements. Eco-tourism development is the main means to compensate the people and diversify their livelihoods.

The need for Conservation education; Environmental education is a holistic approach to improve the attitudes of people towards the park and its resources and to attain an ecologically and socially sustainable. Creating awareness among local people on the essential roles of biodiversity in the ecosystem functioning and its ethical and economic value, as well as its recreational and aesthetic importance would promote their commitment towards conservation.

Educating local people in practical skills would help them to diversify their means of livelihood and deal with dangerous wild animal species and to acquire and develop ecologically suitable

techniques for defending their crops and livestock. Environmental educations can be given at different levels. For instance in school, traditional institutions such as *Equibe* and *Idir*.

The need for land use planning and zoning; Many of the wild animals wander in the areas of human settlements and farmlands beyond the boundaries of the park. People also extract forests, grass and wildlife of the park for different purposes. Therefore, zoning biodiversity hot spots will help to reduce human wildlife conflicts and land use conflicts.

The need for family planning; Rapid population growth is the main challenge of biodiversity and its conservation. Respondents with large family size affect the biotic resources of park with extraction of firewood and hunting wild animals. Thus, appropriate family planning program need to be implemented.

The need for provision of basic public services; People use traditional medicines from wild animals. Access to basic health services reduces the reliance of local people on the biotic resources for traditional medicines. In addition, provision of health services indirectly contributes for biodiversity conservation via introduction family planning programs.

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Appendix A Questioner A

Addis Abba University

College of development studies

Department of environment and development study

To be filled by park staffs, development agents, kebele administrations, experts agriculture and rural development bureau

a. Main areas of the dependence of people on biodiversity of the park

Rank the following activities starting from 1(very low) to 5(very high)

1 = very low 2 = low 3 = medium

4 = high 5= very high

No.	Activities	Rank				
		1	2	3	4	5
1	Bush meet					
2	Charcoal					
3	Construction wood					
4	Firewood collection					
5	Fishing					
6	Grass collection					
7	Grazing on park land					
8	Timber production					
9	Traditional medicine extraction					
10	Wild fruit					

Appendix B Questioner B

Addis Abba University

College of development studies

Department of environment and development study

Head of the household is requested to fill these questionnaires

I General Background

1. Name of the kebele _____
2. Location _____
3. Sex of the household head a. female b. male
4. Age of the household head

a.	Below 15	d.	36-45
b.	15-25	e.	46-55
c.	56-35	f.	Above 55

5. Marital status

a.	Married	c.	Divorced
b.	Single	d.	Widowed

6. Educational background

a. Illiterate
b. Primary education (1-8)
c. Secondary education (9-12)
d. Tertiary education (college/university)

7. The size of family

a. Male_____ b. Female_____

c. Total _____

8. Primary means of livelihood

a. Farming
b. Livestock production
c. Labor
d. Sales of honey
e. Government worker
f. Trade

II Access to public services and properties

9. Do you have an access to basic health care services

a. Yes b. No

10. Do you have an access to veterinary services

a. Yes b. No

11. Do have an access to electricity

a. Yes b. No

12. Do you have livestock?

a. Yes b. No

13. If your answer is "yes" fill the following table please

Types of livestock	Total number
Ox	
Cow	
Poultry	
Goat	
Sheep	
Others	

14. Do you have land?

a. Yes b. No

15. If your answer is 'yes' how many 'Timade' do you have_____?

16. If you own land please specify its allocation according to the following table

Allocation	Measurement (Timade)
Crop production	
Grazing	
Forestation	
If specify others	

III Association between people and biodiversity of the park

A. Firewood collection

17. Do you use fire wood for household energy?

a. Yes b. No

18. If you use fuel wood, how many bundle of wood do you use per week_____?

19. Where is the common area to collect fuel wood?

a. Outside the park b. Within the park

20. Please specify plant species commonly you use for fuel

a. _____ d. _____

b. _____ e. _____

c. _____ f. _____

B. Consumption of traditional medicines

21. Do you use any traditional medicine from living things/ biotic resources?

a. Yes b. No

22. If your answer is yes please fill the following table

No	Traditional medicines	Types disease	Victims
1			
2			
3			
4			
5			
6			
7			
8			
9			

23. If you use biodiversity as medicine why do you use?

a. high accessibility for traditional medicines
b. inaccessibility of health centers
c. low cost when compared with modern medicine
d. traditional medicines highly heal than modern medicines
e. no interest to go to health centers
f. other_____

24. Where is the common area to collect these medicines?

a. Outside the park b. Within the park

25. Is there any traditional medicine that lost now?

a. Yes c. Unknown
b. No

26. If you answered 'yes' Please specify species that lost now

a. _____ c. _____
b. _____ d. _____

26. What do you think is the reason for the extinction of them

a. Over consumption
b. Bushfire
c. Fragmentation of their habitat

d. Introduction of exotic species

e. Others _____

C. Consumption of wild edible plants as food source

27. Do you use wild edible fruits for food?

a. Yes b. No

28. If your answer is ***"Yes"*** please fill the following table by writing the name of the plant and (X) sign on the edible parts of the plant.

No	Name of the plant	Edible part of the plant		
		Fruit	Leafs	roots
1				
2				
3				
4				
5				
6				

D. Hunting wild animals

29. Have you hunted wild animals in last five years?

a. Yes b. No

30. If you said 'Yes' how many times you slaughtered wild animals in last five years_____

31. If you answered 'Yes' what is your main reason to undertake hunting?

a. Seeking medicine

b. Seeking food

c. For the seek-of honor and respect

d. To defend properties

e. To exchange products of wild animals

f. Others_____

32. If you hunt wild animals, where is the common place you hunt them

a. Inside the park b. Outside the park

33. What are the wild animals commonly you slaughter?

a. _____ d. _____

b. _____ e. _____

c. _____ f. _____

E. Changes resulted after park management

34. Is there any change in your kebele which is emanated by the park management?

a. Yes c. Unknown

b. No

35. If your answer is yes please rank the following conditions starting from one to five

No	Observed changes	Rank				
		1	2	3	4	5
1	Creation of job opportunity					
2	Urban expansion					
3	Forest growth					
4	Increase in wild animals					
5	Increase in attacks of wild animals					
6	Reducing access to resources					
7	Physical displacement					

Ranks

1= very low 2=low 3=medium

4=high 5=very high

Appendix C Major challenges of biodiversity conservations in the park

No	Activities	V. low	Low	Medium	High	V. high	App. Mean
1	***Illegal Hunting***	-	-	***7(35%)***	***10(50%)***	***3(15%)***	***4***
2	***Firewood***		***2(10%)***	***6(30%)***	***7(35%)***	***5(25%)***	***4***
3	Illegal Fire	1(5%)	4(20%)	5(25%)	10(50%)	-	3
4	Transportation		7(35%)	8(40%)	5(25%)	-	3
5	Grazing	1(5%)	14(70%)	5(25%)	-	-	2
6	Fodder Collection	4(20%)	11(55%)	5(25%)	-	-	2
7	Sand Mining	9(45%)	7(35%)	3(15%)	1(5%)	-	2
8	Construction Wood	5(25%)	8(40%)	2(10%)	4(20%)	1(5%)	2
9	Agricultural Encroachment	9(45%)	7(35%)	3(15%)	1(5%)	-	2
10	Charcoal Production	9(45%)	6(30%)	2(10%)	2(10%)	1(5%)	2
11	Human Settlement	8(40%)	9(45%)	2(10%)	1(5%)	-	2
12	Wild Fruit Extraction	4(20%)	9(45%)	5(25%)	1(5%)	1(5%)	2
13	Timber Production	8(40%)	10(50%)	1(5%)	1(5%)	-	2
14	Urban Expansion	11(55%)	6(30%)	2(10%)	1(5%)	-	2
15	Fishing	12(60%)	7(35%)	1(5%)	-	-	1

(Source; field survey, 2012)

Appendix D List of Wildlife Slaughtered for Many Reasons In/Around Maze Park

No	Verinacular name		Common name	Scientific name	Reasons for hunting
	Gamotho	Amharic			
A, Birds	Barbada	Dirchite	Quelea	*Quelea quelea*	Food
	Golle	Nesire	African Fish eagle	*Haliaetus vocifer*	Medicine
	Kuracho	Koke	Francolin	*Francolinus Spp*	Food
	Salla	Jegra	Helemeted guineafowl	*Numida meleagirs*	Food
B, Wild animals	Chofosho	Deferssa	Waterbuck	*Kobus ellipsiprymnus*	Food
	Gamo	Anbesa	Lion	*Panther leo*	Privilege/ defense
	Gara	Dikula	Bushbuck	*Tragelaphus scriptus*	Food
	Gasho	Kerkero	Warthog	*p. aethicpicus*	Medicine
	Gella	Agazen	Greater kudu	*Tragelaphus strepsiceros*	Food
	Genessa	Midako	Red dicker	*c. natalensis*	Food
	Godare	Jib	Hyena	*Crocuta crocuta*	Defense
	Gudunta	Assama	Bush pig	*p. porcus*	Medicine
	Holle	Dakiye	Egyptian Goose	*Alopochen aegyptiaca*	Medicine
	Karebanto	Boher	Reedbuck	*Redunca redunca*	Defense
	Kutarsa	Jerte	Porcupine	*Histrix cristata*	Medicine
	Mahe	Nebir	Leopard	*Panthera pardus*	Defense/privilege
	Menta	Gosh	Buffalo	*Synoerus caffer*	
	Qama kaffo	Yelelit wofe			Medicine
	Qorke	Korke	Hartebeest	*Alcelophus buselaphus*	Food
	Sute	Tekula	Wolf		Defense

Source; field survey, 2012

Appendix E Measures of Models Goodness of Fit

E.1 Hosmer and Lemeshow Test of Firewood Extraction

Chi-square	Sig
9.45	0.360

Source field survey, 2012

E.2 Hosmer and Lemeshow Test of Hunting Wild Animals

Chi-square	Sig
5.428	0.711

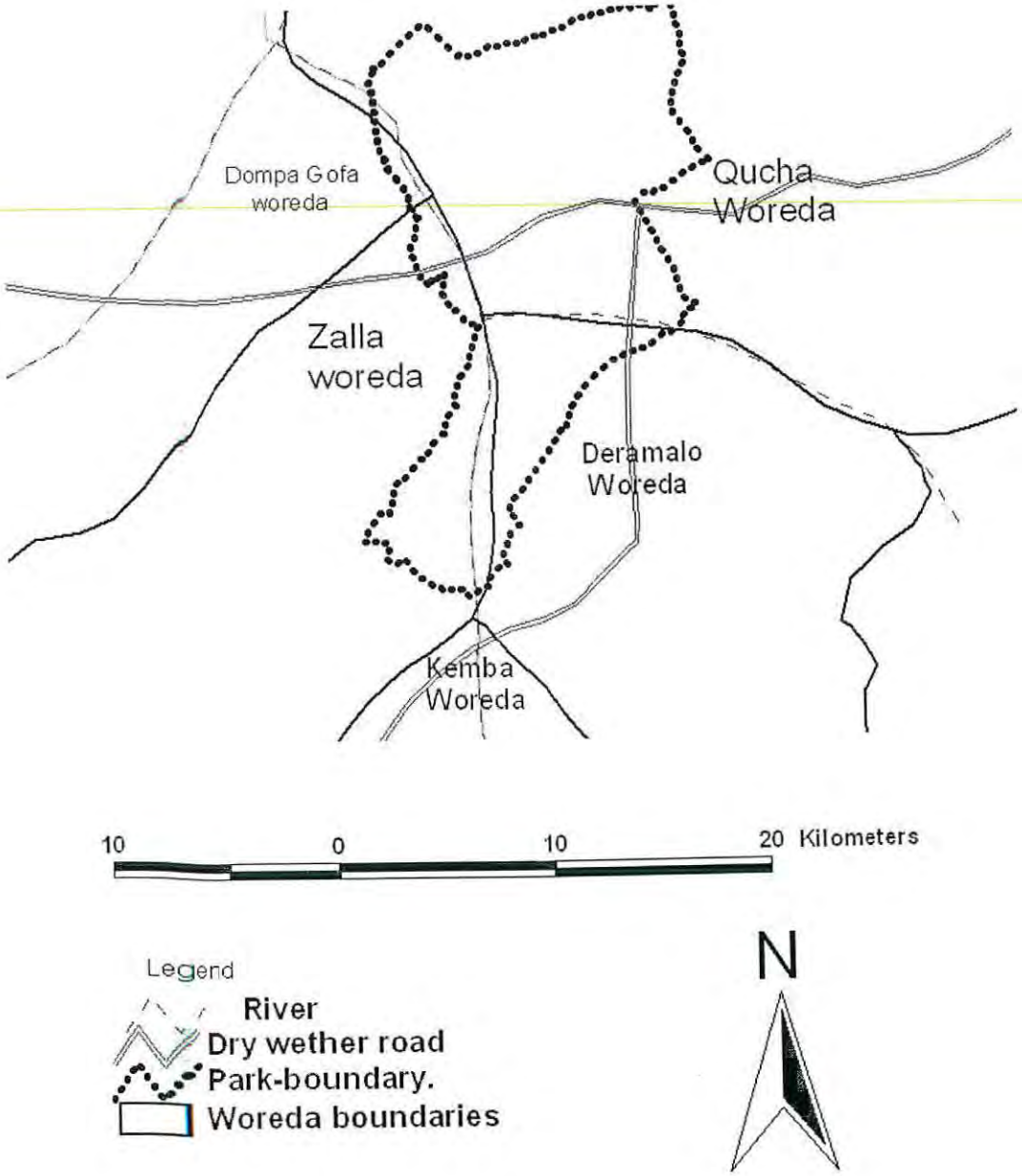
Source field survey, 2012

Appendix F Multi-Collinearity Effect

Variables	Category	Collinearity statistics	
		Tolerance	VIF
Sex	Female	.975	1.026
	Male		
Health	No	.799	1.252
	Yes		
Veterinary services	No	.898	1.114
	Yes		
Electricity	No	.348	2.875
	Yes		
Adjusted education	Illiterate	.771	1.298
	Literate		
Adjusted income	Farm	.650	1.538
	Off farm		
Adjusted family size	Low	.850	1.177
	High		
Adjusted age category	≤25	.756	1.323
	26-45		
	>45		
Adjusted land holding	Low	.798	1.253
	Medium		
	High		
Distance from park office	Near	.326	3.069
	Far		

Source, field survey, 2012

Figure : Map of Maze National Park and the surrounding woredas



Source; (Girma 2009)