AN ASSESSMENT OF THE IMPORTANCE OF WILD FOODS TO IMPROVE FOOD SECURITY AMONG HOUSEHOLDS AROUND KAPHUKA EXTENSION PLANNING AREA, DEDZA, DISTRICT.

MASTER OF SCIENCE (MSc)
ENVIRONMENTAL SCIENCE THESIS

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Submitted to the Faculty of Science, University of Malawi, in partial fulfillment of the requirements for Master of Science Degree in Environmental Sciences.

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DECLARATION

I declare that this thesis is a product of my own independent work, except where otherwise stated and this has been acknowledged by references. This thesis has never been accepted previously in substance of any degree and is not being concurrently submitted in candidature of any degree.

I hereby give consent for my thesis, if accepted, to be available for photocopying, and for inter-library loan, and for title and summary of results to be posted on the Internet and be made available to both local and international organizations.

Signature…… **Date …….**

Yunes Andrew Agabu.

We hereby declare that this thesis is the student's original work and where assistance has been sought this has been duly acknowledged. It is therefore submitted with our approval to the University of Malawi, as a fulfillment of the requirement for the degree of Master of Science in Environmental Sciences.

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DEDICATION

In memory of my late father Joas Simon Mvulaatera Chisale and my sisters Chrissie and Pelina. When I recall your love for me, I fall short of words and I always cry.

Special dedication to my son Andrew Junior. For two years, we studied, traveled and worked together. My son, this is not my product but OUR product.

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ABSTRACT

Malawi, like most countries in Sub –Saharan Africa, is chronically food insecure. While chronic poverty may be regarded as the major cause of food insecurity in Malawi, over- dependency on maize as the only staple food, ignoring other foods such as wild foods has also contributed to food insecurity in the country.

Wild foods in this thesis are defined as living things (plants and animals) that 'grow' in natural conditions without human interference and are eaten by human beings. These have been used as food by human beings for a long time dating back to the first generation.

Wild foods in Malawi, despite their abundance and varied potential beneficial values, they have not received much policy attention similar to domesticated foods and resulting decline in their availability. It was against this background that a study was designed and carried out in Kaphuka Extension Planning Area to identify and categorise available wild foods as well as assess their importance to improve food security among households in the area.

Data on common edible wild foods, human dependency on wild foods, availability, conservation strategies and domestication potential was collected using individual structured interviews with questionnaire and focus group discussions using Participatory Rural Appraisal (PRA) approach. Quantitative data was analysed using Statistical Package for Social Scientists (SPSS). Descriptive statistics (frequencies, cross tabulation and Chi-Square), data reduction (Factor Analysis), T-Tests, ANOVA and Regression Analysis (linear) were performed to establish associations, comparisons and relationships between variables and also to test effects of certain variables on gathering and consumption of wild foods in the study area.

The study recorded a total of 42 different species of wild foods, which are consumed by households around Kaphuka EPA. Most of these wild foods are commonly consumed during the hunger periods indicating that consumption of wild foods around Kaphuka EPA is not by choice but by need. Thirty of 42 species of wild foods fall into three categorises: typical wild famine foods, wild foods with famine-food components and wild-foods that attract additional consumer categories during food shortage periods. The results further reveal that tribe and household size have significant influence on household dependency on wild foods. Larger households appear to depend more on wild foods than smaller households. The Chewa people are less selective and appear to depend more on wild foods than the Yao people.

Wild foods around Kaphuka EPA are threatened by several factors among them deforestation, bushfires and over harvesting. Despite these threats, both at government as well as household level, very little is being done to conserve wild foods. Some widely eaten wild foods in the study area have shown domestication potential, but lack of scientific knowledge, skills and policy direction seem to hinder household efforts to domesticate these wild foods.

This study has shown that wild foods have great potential to contribute to food and nutritional security, therefore considering the fact that these edible wild plants and animals are becoming rare, this study strongly recommends that government initiates projects aimed at promoting the consumption and conservation of wild foods as part of food security strategy by households around Kaphuka EPA and in other parts of the country.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

ADDs	Agriculture Development Divisions
AIDS	Acquired Immunodeficiency Syndrome
CBNRM	Community Based Natural Resources Management
EPA	Extension Planning Area
FAO	Food and Agriculture Organisation
FEWNET	Famine Early Warning Systems Network
FEWS	Famine Early Warning Systems
FDGs	Focus Group Discussions
FRIM	Forestry Research Institute of Malawi
GDP	Gross Domestic Product
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
LADD	Lilongwe Agricultural Development Division
MDHS	Malawi Demographic Health Survey
NGOs	Non Governmental Organizations
NHBG	National Herbarium and Botanical Gardens
NRI	National Research Institute
PRA	Participatory Rural Appraisal
PTC	Peoples Trading Centre
RDP	Rural Development Programme
SPSS	Statistical Package for Social Scientists
UNDP	United Nations Development Programme
UNICEF	United Nations Children Fund
USAID	United States Agency for International Development
VAC	Vulnerability Assessment Committee
WESM	Wildlife and Environmental Society of Malawi
WFP	World Food Programme

CHAPTER 1: INTRODUCTION

1.1 An overview of the status of food security in Malawi

Although Malawi's documented first experience of food crisis occurred in 1949, the worst food crisis was experienced in 1991/92 and 2001/02 growing seasons. Since the 1991/92 growing season, food security issues have become the most important agenda items in many developmental discussions in Malawi (Mkoka, C. 2002). Another food crisis was experienced in the 2005/2006 growing season where it was estimated that about 4.9 million households faced severe food shortages (FEWSNET, 2005).

Malawi like most countries in Sub –Saharan African, is chronically food insecure. Causes of food insecurity are complex but they range from those induced by unpredictable weather patterns (floods, droughts) to those caused by demographic and socio- economic constraints (chronic poverty, low agricultural production, inappropriate economic policies and population pressure) (Mandala, E. 2003). These factors may have contributed seriously to food shortages in Malawi to the extent that the country could not feed its population from its domestic production (USAID, 2005).

The exact number of food insecure people in Malawi is a subject of debate; it is widely acknowledged that the numbers are significant each year especially in rural areas where food insecure households sometimes survive on wild seeds with very little nutritious value (Hoevring, P. 2002; FEWSNET, 2005). It is estimated that approximately two-thirds (66%) of Malawi's households do not meet their recommended daily requirements for calories (Malawi Government, 2004). National surveys indicate that 70% of households deplete their food stocks by December each year but the situation is worse in Machinga, Mzuzu, Ngabu and Salima Agriculture Development Divisions (ADDs) where 80% of the households run out of food by December each year (USAID, 2005).

While chronic poverty is regarded as the primary cause of food insecurity in Malawi, dependency on maize as the only staple food, ignoring other foods such as wild foods has also contributed to food insecurity in the country (Devereux, S. and Kennan, J. 2002). The

importance of wild foods as a fall back strategy in addressing food insecurity for the rural poor communities has been shown in other countries. In Malawi, a few documentations exits showing the importance of wild foods in sustaining livelihoods especially in times of famine. Several studies done in other countries have also shown that there is a strong positive link between wild foods and food security, where as in Malawi such linkages have been underestimated especially at household level.

1.2 Contribution of wild foods to food security

Pieces of information show that in many parts of the world, wild foods have contributed greatly to food security, economic and nutrition of rural poor. There is also evidence that wild foods have been used as a component of local response to increasing food insecurity (Scoones. I., et.al, 1992). In periods of limited food stress, wild foods may be eaten only occasionally and more often by children and poorer sectors of society. However, in periods of heightened food insecurity, wild foods may become widely consumed. In extreme cases, wild foods are the only food available and are eaten by all regardless of age and sex (Grivetti, L. E. and Ogle, B.M. 2000). In Blantyre for instance, people survived the 1949 famine by eating wild edible roots and tubers (Peters, 1994 and Vaughan, M. 1987). Another survey done in Phalombe district showed that people in Phaloni village ate small wild seeds with very little nutritious value in order to survive famine in 2001/2002 (Hoevring, P. 2002). Similar incidences were also reported in Mchinji (2001/2002) and Kasungu (2005/2006) where people were eating bamboo shoots, wild mushrooms, wild grass and wild yams as a famine coping strategy (Devereux, S. and Kennan, J. 2002).

Economically, wild foods are ready sources of income for cash stricken households (Cromwell, E., et.al, 1997). In Tanzania for example, it was calculated that the value of all wild plant resources to rural communities was more than 8% of agricultural Gross Domestic Product (GDP) (Cromwell, E., et.al, 1997). Sitaubi, L.A. and Meke, G.S.(2001) documented the possibility of commercializing wild edible mushrooms found in *Chikala* hills, Machinga district; a sign of how valuable wild edible mushrooms are and could be to rural societies especially during periods of food shortage.

Nutritionally, wild foods also provide the best dietary supplement. Wild vegetables such as *Amaranthus lividus* L. (Amarant.) {*bonongwe}* and *Bidens pilosa* L. (Comp.){*chisoso* or *kazota*} have a very high nutritive value; they contain vitamin A, B, and C and minerals such as iron, calcium, phosphorus, iodine and fluorine in varying amounts but adequate for normal growth and health (Rubaihayo, E.B. 1994; Modi, M., et.al, 2004). Wild fruits and berries add crucial vitamins to the normally vitamin deficient diet, particularly for children. (FAO, 1999b and Harris, F.M. and Mahommend, S. 2003). Insects often contain more protein, fat, and carbohydrates than equal amounts of beef or fish, and a higher energy value than soybeans, maize, beef, fish, lentils, or other beans. Caterpillars of many species are rich in potassium, calcium, magnesium, zinc and iron as well as B-vitamins (Fromme, A. 2005).

1.3 Problem statement

Despite the abundance of these wild foods in Malawi and their potential but varied beneficial values, a few published studies are found to show the importance of wild foods in improving household food security. Little has been systematically documented and published on this subject.

While the Malawi Food and Nutrition Policy aims at achieving improved food security status of all households with special emphasis on resource poor households, current food security strategies and programmes employed to address the problem are mostly linked to increasing domestic agricultural production through agro- biodiversity (Malawi Government 1996 and 1997). Although the policy has outlined several objectives and strategies aimed at improving access and availability of food at household level in the country, none of them has targeted the issue of promoting some of the commonly eaten wild foods as one way of addressing food insecurity in the country. Further, the Malawi Food Guide has not adequately included most widely eaten wild foods and there are no specific national programmes and policies aimed at promoting the use of wild foods for improving household food and nutrition security in the country.

Like many parts of Malawi, Kaphuka EPA is experiencing a decrease in the availability of wild foods due to among other causes increased deforestation and environmental degradation. Like other natural resources, many commonly eaten species of wild foods like *Disa sp*. (Orchids.*)*

{*chikande}* and D*ioscorea sp*. (Dioscor.) *{mpama}* are being depleted to the point of facing local extinction. Most of the efforts being undertaken by both government and NGOs to conserve or promote wild foods are on an adhoc basis, and not based on well-established strong policies and strategies. If this trend continues, then most of the commonly eaten wild foods would disappear without being properly and systematically documented.

Some wild food plants like *Amaranthus lividus* L. (Amarant.) {*bonongwe}*, *Gynandrosis gynandra* Briq. (Capparid.){*luni*} and *Indigofera sp*. (Papil.) {*denje*} which freely germinate in home gardens and farmlands are usually not given much attention, yet can be consumed at any time like other cultivated crops and their nutritive value are comparable to most exotic vegetables. Although fewer of the known wild foods such as *Uapaca kirkiana* Muell.Arg. (Euphorb.*) {masuku}, Flacourtia indica* (Burn.f.) Merr.(Syn. *F. hirtiuscula* Oliv.){*nthudza}* and *Strychnos spinosa* Lam.(Logan.) *{maye}* are being domesticated in rural areas, many of them do not survive outside their natural setting (Malembo, L. 1998).

In general, empirical data on the importance of consuming wild foods and their dietary composition is limited. Therefore, it was on this basis that this study was initiated and undertaken to document the wild foods available around Kaphuka EPA, determine their importance to people's diets and food security and unravel the factors that hinder the full utilisation of wild foods in this area.

1.4 Objectives of the study

The main objective of the study was to assess the importance of wild foods to improve food security among rural households around Kaphuka EPA in Dedza District.

Specifically the objectives of the study were to:

1. Produce an inventory of commonly gathered and edible wild foods among households around Kaphuka EPA.
2. Assess the extent to which households around Kaphuka EPA depend on wild foods as a source of household food security and in daily diet.

3. Determine current availability of commonly gathered and edible wild foods around Kaphuka EPA.
4. Assess the current conservation status of commonly gathered and edible wild foods around Kaphuka EPA.
5. Explore domestication potential of commonly gathered and edible wild foods around Kaphuka EPA.

1.5 Justification for the study

Wild foods, especially plants represent inexpensive, locally available and versatile food sources capable of improving nutrition and quality of health of rural poor people. The inventory of commonly eaten wild foods (including determination of typical wild famine foods, wild foods with famine-food components and wild-foods that attract additional consumer categories during food shortage periods) around Kaphuka EPA would be a better tool for informing policy makers about the local wild foods available in the area for integration into food and nutrition security intervention programmes. Furthermore, the frequent research and monitoring activities would help to gauge which species are on the verge of extinction and require special conservation attention such as relocation. The findings of this study would not only benefit households around Kaphuka EPA, but even the whole country which is faced with frequent food shortages.

1.6 Organisation of the thesis

The thesis has been organized in five chapters. Chapter one highlights the problem statement and states the objectives of the study. Chapter two assesses the importance of wild foods at the international, regional and national levels and defines wild foods. It also explores their link to food and nutrition security. The chapter also covers current conservation strategies. Chapter three describes in detail the methodologies that have been used in sampling, data collection, entry and analysis. Chapter four presents key results and discusses the implications of the findings. Finally, chapter five outlines the conclusions, recommendations and suggested areas of future research.

CHAPTER 2: LITERATURE REVIEW

This chapter examines existing information on wild foods: concept of food security, definition, categories of wild foods. It further discusses the global and Malawi situation of wild foods, current conservation strategies, importance of wild foods in food/nutritional and socioeconomic security

2.1 The Concept of food security

Food security is a flexible but complex concept as reflected in the many attempts at definition in research and policy usage (Maxwell & Frankenberge, 1995). Food security as a concept originated only in the mid-1970s, in the discussions of international food problems at a time of global food crisis (Sen, 1989). The initial focus of attention was primarily on food supply problems - of assuring the availability. The food security concept later shifted from highly economic and quantitative considerations towards a more humanistic and qualitative direction with focus on the household based on the perception of means of access in relation to the household living standards and sustainability with reference to the environment (Sen, 1981; Maxwell & Frankenberge, 1995) These three words have been the key conceptual words in analysing and developing food security issues strategies respectively.

2.2 Defining wild foods

The term ‘wild-foods’ though commonly used, is misleading because it implies anything growing in the absence of human influence and management (Guinand, Y. and Lemmessa, D. 2001). In reality, people have indirectly shaped many of the wild foods especially plants and some have been largely domesticated in-home gardens and in the fields together with farmers’ cultivated food crops (Bell, J.1995).

Wild foods may be defined differently depending on circumstances and the nature of the study. In this study, wild foods have been defined as living things (plants and animals) that ‘grow’ in natural conditions without human interference and are harvested for their human food and nutritive value. (Scoones, I., et.al, 1992).

2.3 Categories of wild foods

Wild foods can be categorized into three categories depending on the time they are consumed-normal time versus period of severe food shortage. According to Guinand, Y. and Lemmessa, D. (2001), the first category of wild foods is that of **typical wild famine foods**. In this category, plant parts such as leaves, stalks, flowers, roots (tubers and corms and rhizomes) or barks although edible, they are not preferred wild foods in times of no famine but become life saving foods in times of food crisis (Guinand, Y. and Lemmessa, D. 2001). The first category reflects the concept of accessibility that access to food depends on the food security situation of the area or household (Sen, 1991). When the food security status is good certain wild foods, though available, may not be accessed by the people due to preference. Many of the wild famine-food plants in this category are drought tolerant and can survive in the soil for a long time which acts as natural storage and they can be gathered for food when the need is greatest like times of famine.

The second category is what Guinand, Y. and Lemmessa, D. (2001) calls wild foods **with famine-food components**. This category, contains wild plants or their parts or products that are used for food at different times of the year when they are available irrespective of status of food security, however, during food crisis they become main sources of food for food insecure households. In Malawi, young tender leaves of *Adansonia digitata* L.(Bombac.){*Malambe*} that are cooked as relish follow under this category (FAO, 2003).

The last category described by Guinand, Y. and Lemmessa, D. (2001) is **wild-foods that attract additional consumer categories during food shortage periods**. In this category, plants or fruits / berries are normally eaten by some categories of people e.g. children but not as a main source of food. However, when there is a food shortage additional category of people mainly adults gather and eat them to avert hunger. Guinand, Y. and Lemmessa, D.(2001) reported that children consume the fruits in normal times, but when food is in short supply, adults as an additional consumer category will collect and consume fruits from wild trees and bushes. The majority of wild edible fruits in Malawi such as *Uapaca kirkiana (masuku), Azanza garkeana (matowo), Flacourtia indica (nthudza),* and *Ximenia caffra{nthenjere}* including a series of semi-domesticated wild plants such as *bononGwe* (*amaranthus)* and *luni (Gynadropis gynandra)*

species as well as wild tubers like *Coleus esculentus* (N.E.Br.) G.Taylor. (Lab.){*buye*} and *Dioscorea spp.* {*chilazi}* belong to this category. These wilds foods are consumed in normal times but have also been semi-domesticated to serve the purpose of bridging food gaps in times of drought.

2.4 Importance of wild foods

Wild foods have sustained human population throughout the world. About 7,000 species of plants and several thousand species of animals have been used for human food at one time or another (Scoones, I., et.al, 1992).The importance of wild foods may be traced to antiquity although systematic studies are recent (Grivetti, L. E. and Ogle, B.M (2000).

2.4.1 Food security

The consumption of wild foods especially fruits, roots and tubers is always more common and widespread in food insecure areas. For instance Grivetti, L.E and Ogle, B.M.(2000) found that in many parts of Southern Ethiopia, the consumption of wild-foods especially plants, is an important local survival strategy and that in periods of limited food stress, such foods may be eaten only occasionally and more often by children. However, in periods of extreme food shortages, wild foods are the only food available and are eaten by all, regardless of age and sex (ditto). Grivetti, L.E and Ogle, B.M. (2000) study findings is supportive of the conclusion made by Scoones, I., et.al, in1992 that wild foods are a critical emergency food source during seasonal food shortages.

In Malawi, although information on use of wild foods during famine is limited, there is evidence that in Blantyre, people survived the 1949 famine by eating wild edible roots and tubers (Peters, P. E. 1994 and Vaughan, M.1987). Another survey done in Phalombe district by Hoevring, P. in 2002 showed that people in Phaloni village ate small wild seeds with very little nutritious value in order to survive famine in 2001/2002. Similar incidences were also reported in Mchinji in 2001/2002 and Kasungu in 2005/2006 where people were eating bamboo shoots, wild mushrooms, wild grass and wild yams as famine coping strategies (Devereux, S. and Kennan, J. 2002).

2.4.2 Nutritional security

Wild foods have been shown to be nutritious, for example plants like *Gynandropis gynandra* {*luni}* and *Bidens pilosa* L.(Comp.) {*chisoso /kanzota}* and insects like *ngumbi (Termitidae)* and *mphalabungu* were found to be excellent supply of micronutrients necessary for proper body functioning (Modi, M., et.al, 2004). Fromme, A. (2005) found out that insects often contain more protein, fat, and carbohydrates than equal amounts of beef or fish, and a higher energy value than soybeans, maize, beef, fish, lentils, or other beans. FAO in 2003 also reported that caterpillars of many species are rich in potassium, calcium, magnesium, zinc and iron as well as B-vitamins and that in some African regions, children fight malnutrition just by eating flour made out of dried caterpillars. In Malawi, people around Kasungu National Park, cherish a delicacy of fried or stewed caterpillars such as *matondo* (especially the orange -spiked black-bodied *Gonimbrasia belina*, and the fleshy green *Gynanisa maia*) (Fromme, A. 2005).

A wide range of wild fruits and berries with a lot of micronutrients essential for body growth and development are also consumed in Malawi. These add crucial vitamins to the normally vitamin deficient diet, particularly in children (FAO, 1999b; Harris,F.M. and Mohammed, S. 2003). It has been documented that indigenous fruits of the *miombo* such as *Uapaca kirkiana* {*masuku*} *Parinari curatellifolia* Planch. ex Benth. (Rosac.){*maula*}, *Strychnos spinosa* {*mateme/maye}* and *Flacourtia indica* (Burn.f.) Merr.(Syn. *F. hirtiuscula* Oliv.){*nthudza}* are an important source of food for many rural communities in Malawi (FAO 20003; Saka J. and Msonthi, J. (1994). Further, it is also known that *Parinari curatellifolia* (*maula), Strychnos spinosa(mateme/ maye)* and *Azanza garkeana {matowo}* contain more than 30% fat and about 45% crude fibre and carbohydrates (Saka, J. and Msonthi, J. 1994).

2.4.3 Economical security

Economically, wild foods are ready sources of income for cash stricken households. (Cromwell, E., et.al, 1997). When gathered, they could be exchanged for food or money which could be used to buy other types of food during periods of food shortages. In Tanzania for example, in 1997 Cromwell and colleagues estimated the value of all wild plant resources in rural communities to be more than 8% of agricultural Gross Domestic Product (GDP). In Malawi, urban households have become lucrative market for wild foods as shown by the demand of these foods along the main roads and in urban markets in the country. Based on this observed demand and after seeing

how valuable wild edible mushrooms are and could be to rural societies especially during periods associated with food shortage in Malawi, Sitaubi, A. L. and Meke, G.S. in 2001 proposed the possibility of commercializing wild edible mushrooms found in *Chikala* hills, Machinga district.

Economic gains from wild foods were also reported by Fromme, A. (2005) in Kasungu district where approximately 170 people participated in the legal harvest of caterpillars in 1991 each gathering close to 1.85 kg which were sold at 2 to 7 US$ per kg and each person earned nearly 50 US$ from the sales. Wild birds such as guinea fowls are also good business and a bird can fetch as high as MK200 –MK300.00 (ibid). Guinea fowls are now increasingly being domesticated for food as well economic reasons.

Indigenous fruit trees of the *miombo* type are being used to generate income (both in cash and barter) through the sale of fruits and fruit products (Maghembe, J.A., et.al, 1995). Wildlife and Environmental Society of Malawi (WESM) is implementing a community-based project at *Kam'mwamba* in Mwanza district in which local communities make fruit juices from *Tamarindus indica* L. (Caesalp.)*{bwemba}* and *Adansonia digitata {malambe}* fruits and sell locally and through main shop outlets in urban areas (FAO, 2003).

2.4.4 Social security

Socially, in certain areas where wild foods are widely used and their potential role recognised, wild foods have proved to have a potential role in the mitigating HIV/AIDS impact, especially among the rural poor. In particular, they are relevant in three main concerns of HIV/AIDS affected households: improving food access, improving nutrition and health quality, and alleviating labour constrains related to food production. Where they have been used, studies have shown that, wild foods, especially plants represent inexpensive, locally available and versatile food sources capable of improving nutrition and health quality (Gari, J.A. 2003). Furthermore, studies have shown that wild foods often represent food sources with low labour requirements, to the extent that children, aged people and some less ill people can participate in their harvesting. Therefore wild foods represent a relevant social security and nutrition option for households suffering labour shortages, such as typically those affected by HIV/AIDS.

2.5 Global status of wild foods

The loss of wild foods is occurring at an alarming rate within and across countries (Harris, F.M. and Mohammed, S. 2003). This is partly due to changing tastes, growing world populations, severe forest degradation, privatization of formerly common lands and expanding markets for foreign goods resulting in rural economies becoming increasingly exposed to market forces. Land clearing and cultivating activities modified the existing ecosystems and eliminated some wild indigenous food trees, and other gathered foods such as insects, caterpillars, mushrooms and honey (Fromme, A. 2005). Currently, a large number of wild foods are no longer available for consumption because their habitats have been cleared for large-scale agriculture and settlement.

While focusing on a few staple crops of which cereals form a larger portion, strategies adopted to address the ongoing food insecurity and hunger, particularly in developing countries, continue to narrow the food supply base through technological options that neglect wild foods. Enormous resources have been invested globally in the fight against hunger and malnutrition but there is still hunger in the world mostly linked to lack of dietary diversity including consumption of wild foods (Grivetti, L.E. and Ogle, B.M. 2000).

2.6 Status of wild foods in Malawi

Malawi has its own native foods that include wild foods although many that we find now may not be the ones that were there about a hundred years ago. Various types of wild food plants and animals contributed important nutrients such as vitamins and proteins to the human body, unfortunately, many of these, especially wild foods are now hard to find (Nordin, S. 2005).

The availability and consumption of wild foods in Malawi is declining due to the effects of global changing tastes and expanding markets for foreign goods, which have also affected the consumption patterns of local foods including wild foods. Apart from changing global consumption patterns of local foods, there are a number of documented reasons why there is a decline in the status of most of the wild foods in Malawi: Among the notable ones are:

First: over emphasis on maize. In the past, people knew a wide range of plants and animals that could be eaten in every season (Nordin, S. 2005). Nowadays, if there is inadequate food in the

country or part of it, maize is brought in to make up for the shortfall. Thus, there is a lot of emphasis on maize as the staple and only food people can eat in times of good and bad harvests underestimating the significance and importance of other non- maize foods such as wild foods (Peters, P.E.1994). The system also encourages dependency on maize as stated by Nordin, S. in 2005, *"This system is allowing people to remain dependent on maize to fill their stomachs and they are not concerned with finding other foods such as wild foods that used to provide them with a variety of different nutrients*" (Nordin, S. 2005, p.41).

Secondly, there is unprecedented rate of habitat loss. As more and more land is cleared to grow maize and other cash crops, habitats for wild foods are also destroyed which negatively affects the ability to sustain their population leading to scarcity.

Thirdly, Malawi is losing much of her wild foods due to bush fires. Malawians have a habit of burning land every dry season in order not only to clear more land for farming but also to make it easier to hunt for mice or other small game (Nordin, S. 2005). Often these fires do not limit themselves to one area and they end up destroying large areas of trees, plants, and animals that are trying to live there and were used to be food for others.

Fourthly, wild foods are also declining due to influence of western diets and status. Humans often look at the foods of other cultures as 'exotic' or 'better' than the food that grow naturally around them (Nordin, S. 2005). Wild or locally produced foods are often seen as only for people who cannot afford to buy other foods. In Malawi, for example, people strive to afford foods like meat, oils, packed/ processed foods, sugar, processed drinks and other vegetables such as cabbage and lettuce. These foods are always lower in nutrients than local foods and some can be harmful if they make up a large part of the diet (ibid, p.42).

Lastly, Malawi is loosing most of the wild foods due to loss of knowledge. As the availability and consumption of wild foods declines, so too does knowledge of their utility (Turton, D.1977). As less and less people rely on a variety of local foods around them, the knowledge about how to use them is also declining and being lost. On the other hand and in most cases, only older women

are knowledgeable about the diversity of bush foods and how to prepare them. Yet, the generation of older women is also declining (Nordin, S. 2005).

2.7 Current conservation strategies of wild foods

Ensuring food security remains one of the biggest challenges faced by Malawi and other developing countries. The promotion of wild food source as one way of ensuring food security is yet another challenge (Gari, J.A. 2003). On an adhoc basis, and not based on strong policies and strategies, both government and NGOs have tried to promote and explore the domestication potential of wild fruit trees, vegetables and mushrooms. Malembo, L. (1998) identified 10 most preferred indigenous/wild fruits as having the potential of being domesticated (Table 1).

The government through agro-forestry initiatives embarked on programs to domesticate these most preferred indigenous fruit trees, but results have shown that due to ecological problems, only a few could successfully grow outside their natural environment (FAO,2003).

Table1: The top 10 priority species of indigenous fruits for possible domestication.

Rank	Local name	Scientific (specie) name	Count*
1	*Masuku*	*Uapaca kirkiana*	99
2	*Maula*	*Parinari curatellifollia*	70
3	*Mateme/maye*	*Strychnos spinosa*	41
4	*Nthudza*	*Flacourtia indica*	37
5	*Matowo*	*Azanza garkeana*	26
6	*Mapoza*	*Annona chrysophylla* Boj. (Annon.)	24
7	*Mziru*	*Vangueria tomentosa* Hochst.(Rubiac)	24
8	*Katope*	*Syzegium codartum* Hochst.ex.Sond.(Myrtac)	17
9	*Malambe*	*Adonsonia Digitata*	15
10	*Nkhuyu*	*Ficus sycomorus*	14

*The number of households out of the 128 sampled that included the species as one of their top priority.
Source: Malembo, et al 1998, in FAO Document Repository: Non-wood forest products in Malawi.

A long-term research project was also implemented at Bunda College of Agriculture to collect and catalogue indigenous vegetable germplasm and to develop production technologies for smallholder adoption. Among other things, the project's objectives were to improve the nutrition of the people through increased production and consumption of nutritionally rich indigenous vegetables and to conserve the diverse germplasm of these indigenous vegetables found in

Malawi. In all the three Agriculture Development Divisions (ADDs) -Karonga, Lilongwe and Mzuzu where the survey was conducted, the general results showed that there is great potential for promoting the seed and yield of most indigenous vegetables. But there was need for botanical identification and characterisation of most of the indigenous vegetables that showed some potential for possible domestication.

Through Community Based Natural Resources Management (CBNRM) government and NGOs are promoting the production of honey through modern beehives. A number of bee keeping clubs have been formed in Mzuzu, *Chimaliro* (Kasungu), and Blantyre and several beehives have been placed in woodlands of these areas (FAO, 2003).

Recognizing that bush meat is becoming scarce due to over hunting, efforts are also underway trying to domesticate 'wild birds' such as guinea fowls. (FAO, 2003).

There have been efforts to cultivate wild edible mushrooms at Forest Research Institute of Malawi (FRIM) in Zomba, Bvumbwe in Thyolo and Chancellor College in Zomba in order to increase productivity but with no success (FAO, 2003). However, efforts were undertaken to conduct ethno botanic experiments of indigenous edible mushrooms in Machinga, Blantyre, Mulanje and Zomba through a project called Domestication of Wild Edible Mushrooms funded by Department For International Development (DFID) through National Research Institute (NRI) (FAO, 2003) and the results showed that most species of wild mushrooms cannot be domesticated.

Sustainable harvesting of wild foods is one of the conservation endeavors taken by government to protect and promote wild food resources. In Kasungu National Park for example, in the early 1990s, the department of National Parks recognized that caterpillars inside the park could help give people a reason to value the park and its protection (Fromme, A. 2005) but felt that if not controlled, the park could lose all its valued caterpillars. Therefore, the department began sustainable-harvesting programmes (given specific amount per day), which they either eat or process and sell for additional income. The program has since expanded into other protected areas in Malawi where caterpillars are abundant (Fromme, A. 2005).

In summary, literature review shows that wild food sources in general remain particularly important especially for the rural poor people and are especially important during times of famine. On the other hand, urban households have shown to be lucrative market, as observed by the demand of these foods in urban markets. Unfortunately, due to changing tastes, expanding markets for foreign goods, severe forest degradation, loss of knowledge and western influence, the consumption of wild foods appears to be declining in many regions of the world including Malawi. Although efforts are being undertaken to reverse the situation through domestication and sustainable harvesting of some wild foods, without appropriate policies and strategies in place nothing or little can be achieved. The next chapter explores study methodology to identify and categorise available wild foods as well as assess their importance to improve food security among households around Kaphuka Extension Planning Area in Dedza District, Malawi.

CHAPTER 3: METHODOLOGY

This section describes the study area, tools and methods used in population sampling, data collection, data management, entry and analysis. The section further outlines the limitations of the study.

3.1 Description of study area and research subjects

The study was conducted in 25 villages around Kaphuka EPA which is located in Dedza district of the central region of Malawi. Traveling on the Lilongwe / Dedza road, the area is to the left, some 60 kilometers south of Lilongwe, Malawi's capital city and 20 kilometers north of Dedza District Assembly. Kaphuka EPA falls within Dedza Rural Development Programme (RDP) under Lilongwe Agriculture Development Division (LADD). In the absence of a conventional map detailing current geographical and physical features of the area, a Global Positioning System (GPS) was used to update these features on the ground and develop an up-to-date map of the study area (See figure 1, map of study area).

The whole Kaphuka EPA had a total population of 18,673 households, but the catchment area for the research covered 25 villages with a population of 1336 households of which 547 were male-headed and 779 female-headed. Average size of household was 5-6 people.

There are two main tribes around Kaphuka EPA: the Chewa are the majority and the Yao are the minority. The main livelihood strategy for both tribes is subsistence farming with maize, groundnuts, onions, Irish potatoes and cassava as main crops. Peaches and mangoes are the main domesticated fruits. Common domesticated birds include chickens, guinea fowls, and pigeons. Goats account for a larger percentage (approx.90%) of domesticated animals and others include cattle, sheep, pigs and rabbits.

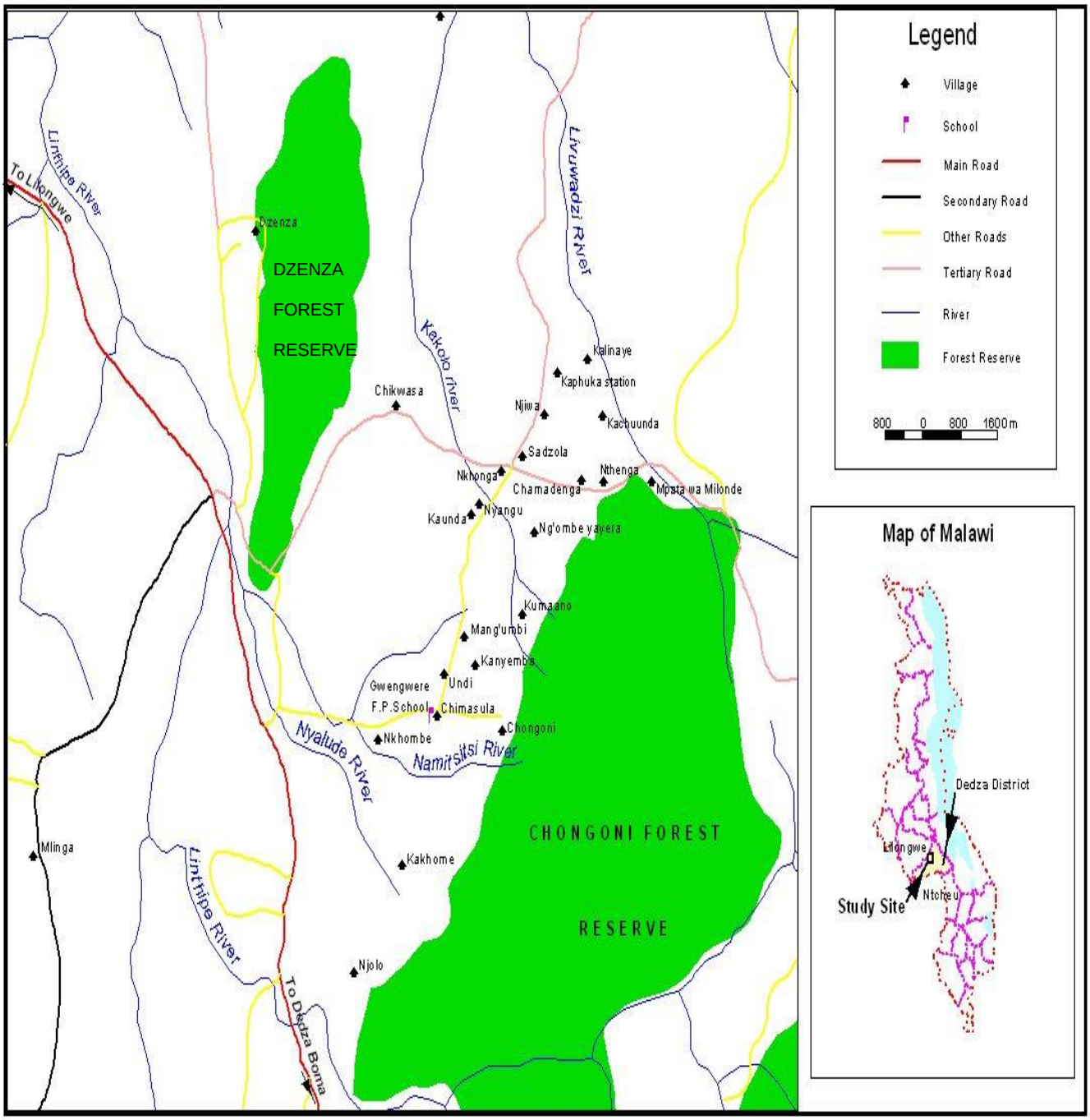

Figure 1: Map of Part of Kaphuka EPA showing Chongoni Forest and the surrounding villages.

3.2 Choice of study area

The choice of the study area and sampling methods were largely guided by accessibility, availability and sustainability of wild foods in the area. Kaphuka EPA was chosen firstly because of its closeness to Chongoni forest reserve, a natural forest reserve where households under study access most of the edible wild foods. Although the forest reserve had undergone some ecological modification due to deforestation, human encroachment and grazing, several types of wild foods still exist. Secondly, Kaphuka EPA, like other places in Malawi has been affected by the major food crises the country experienced in 1949, 1991/92, 2001/02 and the recent one in 2005/06 (according the information given by the Agriculture Extension and Development Officer for Kaphuka EPA and also USAID in 2005). Therefore the area provided a good opportunity for assessing whether eating wild foods forms part of survival strategies during periods of food shortage among the households in the study area.

3.3 Sampling methods and sample size

The population of interest for this study were adult people in households in villages around Kaphuka EPA. The population that was accessible to the study consisted of persons in households registered with Kaphuka EPA and only those in villages close to the Chongoni forest reserve.

The sampling frame was obtained from records of the Kaphuka EPA. Because of the large number of households registered with the EPA, only households from 25 villages close to the forest reserve were selected for the study. Since there were 1336 households in these villages, stratification was done by village and a simple random sample of 8 households in each village was chosen for inclusion in a sample size of 200 households.

The households were systematically stratified by household head where only household heads (regardless of gender) were chosen to participate in the study. All chosen household heads were further categorized by age; <50 and ≥ 50 where any body aged below 50 years was categorized as young generation and $50 \geq$ years as old generation.

The age range of the study participants was 22 to 75 years and 55.6% were illiterate while 80.3% depended on subsistence farming and only 19.7% were either employed, involved in causal labour or small business. The majority of participants (62.6%) were female. Most of them were married (71.9%) and (28.1%) were never married, divorced, not yet married or widowed. The majority of the study participants were the Chewa 89.3% and only 10.7% were Yao.

3.4 Data collection tools and methods

3.4.1 Literature search

A thorough literature search was conducted on relevant existing data about the role of wild foods in food security, study methodologies and analysis. The search included reading through journals, books, food security reports, policy documents, State of Environment Reports and State of Food Security Reports. Internet search supplemented the search for information considered relevant for the purposes of this study. The vast literature search was done to explore what has already been done (known) on the subject and other related subjects so that reference and identification of research gaps could be made from them. In general, the literature consulted especially for Malawi, indicated that there was little information on the importance of wild foods in food security.

3.4. 2 Structured interviews

Beside literature search and a pilot visit to the study area, field data was collected using several tools, the main key ones were: topographic maps, Global Positioning System (GPS), Questionnaire, Participatory Rural Appraisal (PRA) tools (focus group discussions and in depth household surveys). Structured and open questions were also utilised for collecting information on household social and demographic characteristics, dependency issues on conventional foods, availability and conservation strategies of wild foods in the study area.

Prior to conducting the actual survey, a pilot visit was done to the study area for the purposes of identifying the opinion leaders who were of value when it came to dealing with historical information. The pilot visit was also necessary for gathering social and demographic baseline information, which was important in developing research tools.

3.4.3 Individual household interviews

Information on common wild foods was collected using a structured questionnaire. Although there is a large range of types of questionnaires, there is a simple rule; the larger the size of sample, the more structured, closed and numerical the questionnaire may have to be (Cohen, L., et.al, 2001). Therefore, a more structured, closed and numerical questionnaire was designed and pre-tested before the actual data collection to ensure that the questions were clear and that they captured the objectives of the study (Appendix 1). The questionnaire was designed in English, translated into *Chichewa and* back into English.

For easy administration, the questionnaires were administered to the participants in *Chichewa* by trained research assistants. All the completed questionnaires were transcribed into English before data entry and analysis. Notes were taken during and or after each discussion. By responding to the questionnaire, respondents were expected to provide data on commonly used wild foods in the study area, availability, household dependency on wild foods, current conservation strategies and domestication potential of some of the widely eaten wild foods in the study area.

3.4.4 Focus group discussions

Information from individual household interviews was supplemented by data collected through Focus group discussions with guiding questions covering thematic areas similar to those covered in structured questionnaire (See Appendix 4 for Guiding Questions). Information was also collected or verified through discussions with some key informants such as traditional leaders (chiefs), group village heads and opinion leaders (See figure 2).

Collected information included past famine history of the area and how people copied up with the famine, different types of wild foods and their availability in the area, places where people access or used to access them, and if they are scarce, the reasons for scarcity..

Figure 2: Some of the Key informants consulted during field work

3.4.5 Consultation with experts

For technical and professional information, technical experts and professional staff from specific institutions such as University of Malawi, Chancellor College, Bunda College of Agriculture, Forestry Research Institute of Malawi (FRIM), Museums of Malawi, the National Herbarium and Botanical Gardens (NHBG) and Ministry of Agriculture and Food Security.

3.4.6 Transect walks and personal observations

The bulk of information on the availability and conservation status was obtained through transect walks and field observations. Guided by Forestry Extension Staff and local people, the transect walks were conducted through western parts of Chongoni forest reserve especially in areas where people gather or used to gather wild foods. All species of wild foods (plants and animals) encountered were recorded. Recorded information included vernacular and where possible scientific names, category of wild foods, part eaten and period (month) when available. Samples were collected for any specie of wild food which the team was unable to identify in the field and if not identified by people consulted in the research area, the samples were referred to National Herbarium and Botanical Gardens (NHBG), Forest Research Institute of Malawi (FRIM), Museums of Malawi and Chancellor College for scientific identification and naming. Data on evidence of anthropogenic pressure such as digging (mice hunting), deforestation, grazing and hunters trails was also observed and recorded. Anthropogenic data was useful when analysing threats to wild foods in the study area. In the field (during transect walks), free and open discussions were held with opinion leaders, women and children. Where possible, digital photographs of some species of wild foods such as those shown in figure 3 below, were also collected.

Figure 3: A purple flowering *Orchid (chikande)* and a flowering *Anzanza gaerkena (matowo)*.

3.5 Data analysis

Coded data was entered into a computer using Statistical Package for Social Scientists (SPSS) version 9.0 for analysis.. Descriptive statistics (frequencies, cross tabulation and Chi- Square), Data reduction (Factor Analysis), Regression analysis (linear), T- tests and ANOVA) were conducted to establish associations, comparisons and relationships between subjects and also to test effects of certain variables on gathering and consumption of wild foods in the study area. In view of this, the data was subjected to four different tests as follows:

First, Factor Analysis was conducted to identify and categorise the most widely eaten wild foods out of the 42-recorded species. The technique of factor analysis enables one to create and use a reduced set of variables, which are called *principal components or principal factors* (Jolliffe, I. 1996). The reduced but key components are much easier to analyze and interpret than the original wide and complex range of variables (Vidal, R., et.al 2003). In this case, the 42 wild foods were reduced to three principal components with a total of 30 species of wild foods.

Prior to performing Factor Analysis, three conditions for the suitability of data for factor analysis were assessed. a) inspection of the correlation matrix revealed the presence of many correlation coefficients of 0.3 and above (Vidal, R., et.al 2003); b) Kaiser-Meyer-Olkin (KMO) value was 0.843 exceeding the recommended value of 0.60 and c) the Bartlett's Test of Spherity reached statistical significance (0.000) supporting the suitability of data for Factor Analysis (See Appendix 2).

Secondly, Chi- square test (Continuity correction) was done to test whether there is significant association in the consumption of wild foods between men and women. Continuity correction (also known as Yates's correction) was chosen because Chi-Square (X^2) is only applicable when at least 80% of the expected values (within the four cells) are not less than 5. When this rule has been violated and in situations where there is only one degree of freedom, continuity correction is advisable (Watts, S. and Halliwell, 1996). Results of sex of respondent cross tabulation showed that the Chi-Square (X^2) assumption concerning minimum expected cell frequency of 5 was violated by having 2 cells with expected cell count of less than 5 (Refer Table 5,Chapter 4). Therefore the analysis was based on continuity correction.

Thirdly, Independent Samples T- test also computed using SPSS version 9.0 was done to compare mean responses for males and females in terms of valuing the importance of wild foods in reducing hunger in the study area.

Lastly, linear regression analysis was also conducted to assess the effect of social and demographic characteristics of respondents on household dependency on wild foods. Chauluka, C. M (2002) indicated that linear regression analysis has the ability to measure the significance level of the effect of the independent variables on the dependent variable. The partial analysis of the independent variables allows for further separation of the effect due to each individual's influence as opposed to the multiple effects of all the independent variables as given by the Analysis of Variance (ANOVA). In the analysis, dependency on wild foods was a function of age, sex, tribe, education level, marital status, household size and occupation of respondents. The equation used was:

$DoWFs = f\beta_0 + \beta_1 AGE + \beta_2 \quad EDUCA + \beta_3 H/HOLD\ SIZE + \beta_4 MARITAL\ STAT + \beta_5 OCCUP + \beta_6 SEX + \beta_7 TRIBE$

Where

DoWFs is household dependency on Wild Foods either in times of famine or during normal times.

β_0	is a constant
$\beta_1, \beta_2, \beta_3 \ldots \beta_7$	are coefficients
AGE	Age of respondent where AGE = 1 if the respondents were between 20- 49 years (young) and AGE = 0 otherwise {50+ years (old)}.
EDUCA	Education of respondent where EDUCA = 1 if respondent had education {1= Primary, 2 =Secondary +(secondary, technical and University)} and EDUCA = 0 if respondent had no education.
H/HOLD SIZE	Household size of respondent where H/HOLDSIZE = 1 if the number of people in the household was ≤ 5 and H/HOLD SIZE = 0 if the number of people in the household was >5.
MARITAL STAT	Marital Status where MARITAL STAT =1 if is married and MARITAL STAT = 0 otherwise (single, widow, widower, divorced or separated).
OCCUP	Occupation of household head where OCCUP =1 if respondent is a

	subsistence farmer and OCCUP = 0 otherwise (regular labourer, casual labourer, businessman/trader).
SEX	Sex of respondent where SEX = 1 if the respondent is male and SEX = 0 if the respondent is female.
TRIBE	Tribe of respondent where TRIBE = 1 if the respondent is a Chewa and TRIBE = 0 if the respondent is a Yao.

In this equation, it is assumed that household dependency on wild foods is a function of several factors (age, education, household size, marital status, occupation, sex and tribe). It is also assumed and expected that some of these variables will have noticeable significant influence on household dependency on wild foods while others may not have significant influence on household dependency on wild foods. Variables such as age, sex, education, occupation and marital status were expected to have negative association or no significant effect on household dependency on wild foods because it is assumed that everybody regardless of age, sex, education, occupation and marital status consumes wild foods.

On the other hand, it is expected that tribe and household size will have noticeable significant effect or positive association because larger families are likely to consume more of the wild foods than smaller households, therefore depend more on them than smaller households. Likewise tribe is likely to have a noticeable influence on the dependency on wild foods since the Yao and the Chewa are different in terms of wild food consumption habits. By culture and religion, the Yao do not eat certain wild foods, which may include insects, caterpillars and mammals such as *nguluwe* (wild pigs); while the Chewa are less selective. Therefore the two are likely to differ in their dependency on wild foods with the Chewa having positive association and the Yao negative association.

3.6 Quality assurance

To ensure quality of results, several sampling procedures and data collection tools were used. In the field, the researcher worked with at least two trained research assistants, and extension workers. Where possible, community or opinion leaders acted as field guides. Professional experts such as staff from University of Malawi (Geography Department), National Herbarium and Botanical Gardens (NHBG) and Forest Research Institute of Malawi (FRIM) were consulted on specific

professional areas such as production of study area map and identification of wild plants and animals. All interviews and Focus Group Discussions were conducted in local language, *Chichewa* and transcription was done in English while as much as possible preserving the local meanings of wild foods by leaving the words that have no equivalent meaning in their original form. After each interview, questionnaires were crosschecked to ensure that each question had been adequately answered.

3.7 Ethical considerations

A letter of introduction from the University of Malawi, Chancellor College, was presented to village heads and opinion leaders in each of the villages under study. The village heads and opinion leaders informed the subjects in advance of the study to ensure the purpose of the study as well as to clear any misconceptions and suspicions arising from the communities. Verbal consent was sought from all respondents before commencing each interview (Appendix 3).

3.8 Limitations of the study

First, for the past ten years or so, food insecurity issues have become sensitive issues in the country. Therefore undertaking a food security survey in an area that has been hit by the 2005/6 famines was a challenge. At first, people were very willing to give information hoping that after the interviews they would get food as they were used to free food. When they realized that the survey was not about free food, they become reluctant and it was difficult to convince them that the survey was not for food aid and some household heads declined to be interviewed.

Secondly, the inventory of wild foods was incomplete in many ways. For most species, only local names were available. Furthermore, for some wild-food species, especially seasonal herbs that were not in season by the time of the field surveys, only oral description could be collected from key informants. Except for mushrooms, many plant/animal species could neither be collected nor photographed because the specimens were out of season.

Thirdly, resources (financial, human and material resources) required for the administration of the whole study were limited. Price of things (fuel, and stationary) kept on changing throughout the study period. This negatively affected the budget of the research. Social and environmental

eventualities such as sickness, bad weather and funerals delayed some of the processes during the research project especially field data collection.

Lastly, where ages did not appear in the village register, the researcher met resistance when requesting for ages from household heads especially those aged ≥ 50 years who did not know their exact birth dates.

CHAPTER 4: RESULTS AND DISCUSSION

This chapter presents the results of the study. The results are presented in four sub-categories each corresponding to the specific objective of the study. However, in order to put the results into perspective, social and demographic characteristics of Kaphuka EPA households are presented first, followed by results and discussion of the whole study.

4.1 Social and demographic characteristics of households

Social and demographic characteristics of the households around Kaphuka EPA are presented in table 2 below, which shows that two main tribes dominate Kaphuka area; the Chewa (89.3%). the Yao (10.7%).

Table 2: Social and demographic characteristics of Respondents (n=178)

Characteristic	**N**	**%**
Tribe:		
Chewa	159	89.3
Yao	19	10.7
Age:		
20 –49 years (young)	111	62.4
50 + years (old)	67	37.6
Sex:		
Male	66	37.1
Female	112	62.9
Marital Status		
Married	77	71.9
Otherwise (never married, divorced, not yet married, widowed).	101	28.1
H/hold size		
≤ 5	105	59.0
> 5	73	41.0
Education level:		
Educated	79	44.4
No education	99	55.6
Occupation		
Farmer	143	80.3
Otherwise (casual labourer, businessman, formal employee).	35	19.7

The study has also shown that among the respondents, there were more female-headed households (62.9%) as compared to 37.1% male household heads. Three factors might have contributed to this. First, culturally, Kaphuka area is a matrilineal community and due to unstable

marriages, men tend to have multiple marriages as a result they leave the responsibility of heading the households to the former wives. Secondly, the large numbers of female household heads may also be explained by anecdote evidence that during the 1991/92 famine, more men than women died of hunger related diseases leaving women to head households. Lastly, around Kaphuka area the main means of livelihood is subsistence farming (80.3%) whose economic returns has declined over the years, therefore more men migrate to urban centers and tobacco estates in search of formal employment leaving women to head families.

Demographically, Kaphuka EPA is dominated by a relatively young generation, i.e. those between 20– 49 years of age are the majority (Table 2). This is consistent with national population composition that has more than 60% of the Malawian population comprising the young generation (NSO, 2004). Although few in numbers and required probing for information, older people especially women, were more informative than the youth in recalling some of the commonly eaten wild foods in the study area. Though the results of the study show that the majority of the respondents (55.6%) had no formal education at all, still more (44.4 %) had at least attended primary school up to standard four.

The results also revealed that many of the respondents (56.7 %) were single (never and or not yet married, separated, divorced or widowed). Household size ranged from 3 members to 10 members per household (Table 2 above). From the study, it was also observed that the majority of the respondents earn their living by farming (80.3%), meaning that they spend most of their time in the field also evidenced from the absence of formal employment in the area. This may also have an implication on the consumption of wild foods.

4.2 An inventory of wild foods around Kaphuka EPA

A list of wild foods recorded around Kaphuka EPA is presented in Table 3. The results show that a wide range of wild foods (a total of 42 wild foods) is gathered and eaten around Kaphuka EPA. Of these 6 are wild fruits, 7 wild vegetables, 4 roots and tubers, 9 mushrooms, 4 mammals, 3 birds and 5 insects (winged) and 4 caterpillars.

Table 3: An inventory of some of the commonly consumed wild foods in Kaphuka EPA (n=178)

FRUITS[1] (Local name)	**Scientific name**	**Who gathers:** Men Women Childr. All	**Frequency ofresponse N=178**	**Who eats** Men Women Childr. All	**Frequency of response N=178**	**Utilisation** Eating Sale Both	**Availability**
Masuku	*Uapaca kirkiana*	All	175	All	164	Eating	Oct-Dec
Nthudza	*Flacourtia indica*	All	169	All	157	Eating	Oct -Dec
Nthenjere	*Ximenia caffra*	All	155	All	143	Eating	Jan-Marc
Matowo	*Azanza garkeana*	All	139	All	128	Eating	Jul-Sept
Maye	*Strychnos spinosa*	All	138	All	129	Eating	Oct -Dec
Maula	*Parinari curatellifollia*	All	123	All	119	Eating	Oct -Dec
VEGETABL.[2]							
Mlozi	*Adenia cissampeloides*	Women	165	All	152	Eating	Oct-Dec
Mlombwe	*Thunbergia lancifolia* T. Anders.	Women	161	All	146	Eating	Oct-Dec
Chansungwi	*Commelina* sp. (Commel.)	Women	150	All	161	Eating	Oct-Dec
Luni	*Gynadropis gynandra*	Women	137	All	126	Eating	Whole year
Bonongwe	*Amaranthus lividus*	Women	133	All	128	Eating	Jan –March
Njerenjedza	*Cleome monophylla* L. (Capparid.)	Women	91	All	85	Eating	Jan – March
Mphwimphwi	*Coccinia palmate* (Sond.) Cogn. (Cucurbit.)	Women	91	All	105	Eating	August –Dec
TUBERS[3]							
Buye	*Coleus esculentus*	Chil/wom	152	All	170	Eating	March –May
Chilazi	*Dioscorea* spp.	Men	124	All	176	Eating	Jan –March
Mpama	*Dioscorea* sp.	Men	66	All	172	Eating	Oct –Dec
Chikande	*Satyrium* sp. Orchid.	Women	175	All	161	Eat/ sell	May- June
MUSHROOM[4]							
Chamsuku	*Amanita tanzanica*	Women	175	All	164	Eat/ sell	Jan- March
Katsobola	*Russulacompressa*	Women	152	All	143	Eat/ sell	Jan- March
Chipindi	*Lactarius edulis*	Women	148	All	135	Eat/ sell	Jan- March
Kammapepa	*Amanita phalloides*	Women	136	All	127	Eat/ sell	Jan- March
Kamuvi	*Termitomyces eurrhizus*	Women	128	All	135	Eating	Jan- March
Nyonjwe	*Termitomyces tyleranus*	Women	110	All	109	Eating	Jan- March
Namathwe	*Auricularia polytricha*	Women	139	All	105	Eating	Jan- March
Katerera	*Polyporus moluccensis*	Women	157	All	151	Eat/ sell	Jan- March

[1] Scientific names for all wild fruits were sourced from Forest Research Institute of Malawi, Zomba, Malawi

[2] Scientific names for all wild vegetables were sourced from Williamson, J, 1972, 'Useful Plants of Malawi', Government Printer, Zomba, Malawi

[3] Scientific names for all wild roots and tubers were sourced from Williamson, J, 1972, 'Useful Plants of Malawi', Government Printer, Zomba, Malawi

Utale	*Termitomyces letestui*	All	148	All	135	Eat/ sell	Jan- March
MAMMALS[5]							
Kalulu	*Lepus spp*	Men	166	All	157	Eating	Oct- Dec
Nsanasana	*Eidolon spp*	Men	147	All	136	Eat/sell	Jan- March
Nguluwe	*Phacochoerus aethiopicus*	Men	137	All	126	Eat/sell	Oct- Dec
Ntchenzi	*Not available*	Men	137	All	126	Eat/sell	Jul- Sept
BIRDS[6]							
Nkhwali	*Not available*	Men	150	All	141	Eat/sell	Oct- Dec
Njiwa	*Vinago spp.*	Men	145	All	138	Eat/sell	Oct- Dec
Nkhanga	*Numida spp*	Men	161	All	154	Eating/sell	Oct- Dec
INSECTS (winged)[7]							
Inswa/ngumbi	*Termitidae*	Men	175	All	162	Eating/sell	Jan- March
Nyenje	*Munza latidavia*	Children	155	All	162	Eating	Sept –Oct
Mafulufute	*Cicadidie*	All	149	All	140	Eating	Nov- Dec
Nsensenya	*Pentatomidae coccinellidae*	All	148	All	137	Eating/sell	April- June
Ziwala	*Schistocerca spp.*	Children	140	All	145	Eating	Aug- Oct
Caterpillars							
Malasa nkhuli	*Not available*	All	91	All	87	Eating	Jan- March
Makolo a imvi	*Not available*		130	All	122	Eating	Jan- March
Mphalabungu	*Not available*	All	113	All	107	Eat/sell	Jan- March
Achamkhobo	*Not available*	All	123	All	119	Eating	Jan- March

[4] Scientific names for mushrooms have been adapted from "Tanzanian Mushrooms" by Marja Häkönen,Tuomo Niemelä and Leornard Mwasumbi ,Botanical Museum, University of Helsinki,2003.

[5] Scientific names for all wild birds were sourced from Food Composition Table for use in Africa.

[6] Scientific names for all wild mammals were sourced from Chancellor College, Biology Department.

[7] Scientific names for all winged insects were sourced from Chancellor College, Biology Department.

It is clear from the high frequencies in Table 3 above, that among the wild fruits eaten, *Uapaca kirkiana (masuku), Flacourtia indica (nthudza*), *Ximenia caffra (nthenjere*), *Azanza garkeana (matowo*), *Strychnos spinosa(maye*) and *Parinari curatellifollia (maula*) are among the most widely eaten wild fruits. Except for *Uapaca kirkiana (masuku)* which are gathered for both consumption and sell, most of these fruits are gathered mainly for home consumption. This observation supports the findings of Guinand, Y. and Lemmessa, D. (2001) that in addition to being source of income, fruits are usually considered as an addition to daily food consumption pattern.

Dioscorea sp (M*pama), Dioscorea* spp. (*chilazi),* and *Coleus esculentus(buye)* are the common wild roots and tubers that are gathered and eaten by people mostly during times of food shortage. *Dioscorea* sp (M*pama)* is rarely eaten during non famine periods due to its poisonous nature that

requires special cooking procedures to reduce the chances of poisoning - the tuber is boiled over a long period, while draining off and adding more water. *Satyrium* sp. Orchid *(chikande)*, on the other hand, is eaten both during normal times as well as during famine times but it is now rarely eaten due to limited availability. Natural habitats for orchids have all been degraded due to winter cultivation and grazing.

A wide variety of wild edible mushrooms are also gathered both for consumption and sale which supports proposal by Sitaubi L.A. and Meke, G.S. (2001) to consider commercializing wild edible mushrooms such as those found in *Chikala* hills, Machinga district.

Like wild mushrooms, wild leafy vegetables are also gathered both for consumption and sale. The study revealed that these wild leafy vegetables are mostly gathered for home consumption though not liked by many family members. Most of these wild leafy vegetables are not preserved (dried) for future use because they are not liked by many family members especially men. During focus group discussions one male respondent commented: "*izi sizikoma, timangodyera mavuto"* (meaning that wild vegetables are not good, we eat because of problems). The study also learnt that occasionally, wild foods may be exchanged for other goods and foodstuff (barter) and if traded for money, the gatherers take them to local markets (*misika ya kumudzi*). Sometimes local traders buy wild vegetables especially *Gynadropis gynandra (luni*) and *Amaranthus lividus (bonongwe*) to re-sell in towns. Further investigation will be necessary to evaluate the economic value of such wild vegetables and any other that may also attract the market such as *Adenia cissampeloides (mlozi)* which is one of the widely eaten wild vegetable.

The commonly hunted animals are *Lepus spp (kalulu*). Hunting is mainly done by men and mainly for home consumption. Surplus meat is sometimes sold. Mammals like *Phacochoerus aethiopicus (nguluwe)* are mostly spotted between January and March when they search for green maize and pumpkins, but they are not frequently hunted during these months as they easily hide in thickets. Like other mammals, they are also hunted in the dry months of September and October. *Eidolon spp.* (*sanasana)* is also popular and also most hunted and eaten by the Chewa. *Eidolon spp.* (*sanasana)* is common between January and March and fetches a lot of money on the market. For example, respondents reported that during the 2005/2006 season one *nsanasana*

was fetching between MK7.00 and MK10.00. Among the most hunted wild birds around Kaphuka EPA are *Numida spp.* (*nkhanga), (Vinago spp. (njiwa*) and *nkhwali.* These birds are hunted all year round but the intensity of hunting them increases in the dry season..

Most widely eaten winged insects in this area are *nyenje (Munza latidavia), Cicadidie -family level (mafulufute), Schistocerca spp.(ziwala), Pentatomidae coccinellidae (nsensenya)* and *Termitidae (inswa/ngumbi).* Results of the study showed that because of religious constraints and cultural beliefs, these insects are mostly gathered and eaten by the Chewa except for *Termitidae (inswa/ngumbi),* which is also eaten by the Yao.

Caterpillars are also widely eaten by households around Kaphuka EPA. The common caterpillars are *makoloamvi, achamkhobo, mphalabungu and malasankhuli (*no scientific names identified). Like winged insects, the caterpillars are gathered and eaten by the Chewas. However, availability of these caterpillars is declining due to disappearing of their habitats as commented by one of the respondents during focus group discussions *"Masiku ano makulaaimvi sapezeka pezeka chifukwa mitengo yachilengedwe yatha m'mindamu*" (meaning that nowadays caterpillars are rarely found due to depletion of indigenous trees that formed natural habitat for them).

4.3 Gathering and consumption of wild foods around Kaphuka EPA

In this study, the results have shown that around Kaphuka EPA the main gatherers of most wild foods were children (55.1%) and women (33.7%) (Table 4 below).

Table 4: Frequency of gatherers of wild foods

	Frequency	**Percent**
Valid men	8	4.49
Women*	60	33.7
Children*	98	55.1
All	11	6.2
N Valid	177	
Missing	1	
Total	178	100

Studies conducted in Ethiopia (Guinand, Y. and Lemmessa, D. 2001) also show that mostly children collect and consume wild fruits, while other wild foods in general are collected by both children and women and prepared by the latter. Gari, J.A (2003) also noted that rural women are

the principal actors around wild food plants because they hold substantial knowledge on their localisation, seasonal availability, properties, preservation practices, and culinary uses. Thus, the results of this study are entirely supported by the findings of Guinand, Y. and Lemmessa, D. (2001) and Gari, J.A (2003).

Focus group discussions revealed that in most cases, men usually migrate for daily labour opportunities elsewhere, and women are left behind to manage the homes. It was reported that women frequently collect wild foods when they are on their way to fetch water, to collect firewood, and when walking home from fields. However, there was consensus that everyone consumes wild foods.

Since the results of the study indicated that women and children were the main gatherers of wild foods and that in most cases, men usually migrate for daily labour opportunities elsewhere, leaving behind women to manage the homes, Chi-Square (Continuity correction) was used to test whether there is any significant difference between males and females in the consumption of wild foods.

Table 5: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.109[b]	1	.292		
Continuity Correction[a]	.388	1	.533		
Likelihood Ratio	1.248	1	.264		
Fisher's Exact Test				.415	.277
Linear-by-Linear Association	1.103	1	.294		
N of Valid Cases	178				

a. Computed only for a 2x2 table

b. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.22.

Chi- Square results in Table 5 above clearly showed that in this area there was no difference between women and men in consumption of wild foods. Thus despite women being the majority in this study area, statistically there is no significant difference between males and females in the consumption of wild foods. The proportion of males who eat wild foods is not significantly

different from that of women (p-value 0.533). The explanation for these results may be that food is prepared for every member of the family without specifications. Therefore it can be concluded that women and children are the main actors concerning the collection and preparation of wild foods respectively, but every member of the household consumes wild foods.

4.4 Categories of widely eaten wild foods around Kaphuka EPA

In order to identify the most commonly eaten wild food species around Kaphuka EPA, the 42-recorded species of wild foods were subjected to Factor Analysis using SPSS version 9. Results of the Factor Analysis, revealed 3 principal components comprising 30 species out of 42 wild foods that respondents indicated as commonly eaten. This analysis also revealed that in terms of wild foods eating habits, the Chewa are less selective than the Yao. Out of the 30 widely eaten wild foods, the Chewa eat almost all while the Yao do not eat 7 of the wild foods mainly mammals and insects (Table 6 below).

Table 6: Categories of wild foods widely eaten by households around Kaphuka EPA (n=178).

Category	Type of wild food	Actual name	Freq. Of gatherers %	Freq. of eaters%	Eaten by Chewa only	Eaten by Yao only	Eaten by both
Category 1	Tuber	Mpama	95.5	87.9	no	No	yes
	Tuber	Chilazi	96.6	96.0	no	No	yes
	Tuber	Buye	98.8	89.3	no	No	yes
Category2							
	Insect	Nyenje	91.0	78.9	yes	No	no
	Insect	Achamkhobo	76.9	70.6	yes	No	no
	Insect	Mafulufute	78.6	64.0	no	No	yes
	Animal	Nsanasana	79.2	78.1	yes	No	no
	Insect	Makolo aimvi	81.4	50.6	yes	No	no
	Insect	Ngumbi	87.1	80.3	no	No	yes
Category 3							
	Fruit	Matowo	78.1	71.9	no	No	yes
	Fruit	Masuku	98.3	92.1	no	No	yes
	Vegetable	Bonongwe	73.0	71.9	no	No	yes
	Mushroom	Chipindi	96.8	80.3	no	No	yes
	Vegetable	Luni	87.0	70.7	no	No	yes
	Fruit	Maula	69.1	66.8	no	No	yes
	Animal	Ntchenzi	73.6	70.8	yes	No	no
	Fruit	Maye	77.5	72.4	no	No	yes
	Mushroom	Katsobola	85.3	80.3	no	No	yes
	Mushroom	Katerera	87.6	85.3	no	No	yes
	Vegetable	Chamsungwi	97.1	90.4	no	No	yes

	Animal	Nguluwe	74.1	73.0	yes	No	no
	Animal	Kalulu	89.3	88.2	no	No	yes
	Fruit	Nthenjere	87.1	80.3	no	No	yes
	Mushroom	Utale	83.1	75.8	no	No	yes
	Insect	Ziwala	81.4	50.6	no	No	yes
	Insect	Nsensenya	76.9	70.6	yes	No	no
	Bird	Nkhwali	79.2	78.1	no	No	yes
	Bird	Nkhanga	86.5	85.3	no	No	yes
	Fruit	Nthudza	94.9	88.2	no	No	yes

The Factor Analysis showed that the three selected principal components corresponded to the three categories of wild foods as described in Chapter 2 (Literature Review). Category 1 comprises typical famine -foods that are rarely consumed by the people during normal times. Guinand, Y. and Lemmessa, D. (2001) indicated that for typical famine -food plants are roots (tubers and corms and rhizomes) or barks that are drought tolerant and can stay in the soil for a long time. Therefore, they can only be collected when the need is greatest.

Wild foods in category 2 represent wild foods that could be eaten at different times of the year (normal times) and at different stages of food shortages). However, wild foods presented in this category are mostly mammals and insects, typical of the wild foods that the Yao do not consume (Table 6 above). These results agree with what respondents indicated during field survey, that for religious and cultural reasons, the Yao do not eat some insects and mammals.

Category 3 represents wild foods which Guinand, Y. and Lemmessa, D. (2001), classified as wild foods attracting additional consumers during food shortage periods. Children casually consume the fruits in normal times, but when food is in short supply, adults, as an additional consumer category, also collect and consume fruits and other foods from wild trees and bushes.

4.5 Household dependency on wild foods.

Household dependency was determined by the rate at which wild foods were consumed and a combination of the frequency at which individuals gather and consume wild foods. The frequency of gathering and consumption averaged produced what is termed as household dependency indicators. All wild foods that scored an average of $\geq 75\%$ were considered to contribute significantly to the diet of households (Table 7).

Based on the criterion used, it can be seen from Table 7 that households around Kaphuka EPA consider most wild foods, as important. Tubers such as *chilazi, mpama and buye* though not widely eaten during normal times, have highest dependency indicator levels, 97.4, 93.0 and 91.7 respectively because in extreme famine times they become important sources of food as they are usually the only food available and are consumed by every household member regardless of age, sex, tribe and education level.

Table 7: Household dependency on wild foods indicators (n=178)

Category of wild food	Freq. of gatherers %	Freq. of eaters%	Dependency indicator ≥ 75%
Fruits			
Matowo	78.1	71.9	75.0
Masuku	98.3	92.1	95.2
Nthudza	94.9	88.2	91.6
Nthenjere	87.1	80.3	83.8
Maye	77.5	72.4	75.0
Vegetables			
Luni	87.0	70.7	78.9
Mushrooms			
Katsobola	85.3	80.3	82.8
Katerera	87.6	85.3	86.5
Chipindi	96.8	80.3	88.6
Tubers			
Mpama	95.5	87.9	91.7
Chilazi	96.6	96.0	97.4
Buye	98.8	89.3	93.0
Birds			
Nkhwali	79.2	78.1	78.7
Nkhanga	86.5	85.3	85.9
Insects			
Nyenje	91.0	78.9	85.0
Makolo a imvi	81.4	50.6	80.9

Among the fruits, *masuku* (95.1) and *nthudza* (91.6) have highest dependency indicator levels because these wild fruits are eaten even during non famine periods and are gathered for commercial purposes. *"Masuku timatha kudya komanso amatithandiza kupeza ndalama tikagulitsa"* said Mrs Bengo (meaning that *masuku* is a source of food as well as money when sold).

Mushrooms have high dependency indicator values though seasonal, but through preservation (drying), households are able to use them when need arises (especially during dry season) as side dishes (*ndiwo*) become difficult to access.

Insects (winged) and (caterpillars) are also available at different times of the year and can be preserved for storage and selling. Birds have no specific time of the year - they are found throughout the year. (Refer to Table 3). This means that households can easily access these wild foods through out the year. Although there was a long list of vegetables, most them except *luni* had household dependency indicators level lower than 75. This finding could be explained by several factors:

First, most wild leafy vegetables are seasonal, do not last long, therefore cannot be preserved. This makes accessing the wild vegetables when they are not in season very difficult. Secondly, most wild vegetables are not preferred by many especially men resulting in households not considering them as important in diet and as famine coping strategy. A lady respondent commented during focus group discussions "*ndiwo za kutchirezi sizikoma, azibambo sazikondanso* (meaning these wild vegetables are not tasty and men don't like them) therefore households do not consider them to be important.

Thirdly, many of the wild vegetables are gathered during the rainy season, the same time when cultivated vegetables are also in abundance and women (main gatherers) prefer preserving cultivated vegetables compared to wild vegetables. These research findings agree with the findings of Gari, J.A. (2003) that the optimal use of wild foods relies upon preservation and processing practices. Therefore preservation constraints seem to have contributed to the low dependency level of most wild vegetables.

While many types of wilds foods are eaten during food shortage around Kaphuka EPA only a few, 16 out of 42 are regarded as important. This is because availability of the 16 species of wild foods coincides with the period of food shortage (December to March); therefore they become important sources of both food and income for the rural households. This means that, in this area, household dependency on wild foods is not by choice but by need.

The other 24 species of wild foods have low dependency levels due to several reasons including low yielding, seasonality, preference, scarcity of wild foods and lack of indigenous knowledge about wild foods. The diversity of indigenous knowledge is often a function of cultural background, which may be influenced by age, gender, tribe, and marital status, educational background and occupation among other things (Modi, M., et.al, 2004). Linear regression analysis was therefore performed to determine whether these independent variables had any effect on household dependency on wild foods by households in the study area. The results of the analysis are shown in Tables 8 and 9 below.

Table 8: ANOVA showing the effects of socio- demographic factors on household dependency on wild foods

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3.782	7	.540	2.361	.025[a]
Residual	38.898	170	.229		
Total	42.680	177			

a. Predictors: (constant), TRIBE, AGE, OCCUPATI, SEX, H/HOLD SIZE, MARITAL STAT, EDUCATIO.
b. Dependent Variable: Household Dependency on wild foods.

From the linear regression analysis the overall ANOVA showed a significant effect of the independent variables – age, education, sex, tribe, marital status, occupation and household size on the dependent variable, household dependency on wild foods. The results show that the overall significant for the ANOVA was 0.025 (Table 8 above) showing that when considered together, these factors had an effect on household dependency on wild foods. However, the partial analysis of these independent variables showed that some of these had no significant effect on household dependency on wild foods as shown in Table 9 below.

Table 9: Effects of socio-demographic factors on household dependency on wild foods (p≤ 0.05).

Model	Unstandardized Coefficients		Standardized Coefficients	t	Significance
	B	Std. Error	Beta		
Constant	2.014	.258		7.804	.000
AGE	6.374E -02	.075	.063	.851	.396
EDUCATION	5.17E-03	.076	-.005	-.068	.946
SEX	9.29E-02	.078	-.092	-.1.186	.237
TRIBE	-.251	.118	-.158	- 2.120	.014*
MARITAL STATUS	-.124	.084	-.114	-1.480	.141
OCCUPATION	-1.48E-02	.092	-.012	-.162	.872
H/HOLD SIZE	.093	.075	.194	2.585	.011*

* = Significant at p = ≤0.05

The results in Table 9 above show that age, sex, marital status, education level and occupation individually had no significant effect on household dependency on wild foods. This is so because the study has revealed that consumption of wild foods in this area is not by choice but by need, meaning that dependency on wild foods is greatest in times of famine than during normal times (when harvest is good). In times of need, household members (regardless of age, sex, marital status, education and occupation eat what is available including wild foods.

Linear regression analysis results in Table 9 above however, show that tribe and household size were significant factors of household dependency on wild foods (giving p values of 0.014 and 0.011 respectively). By tribe, the Chewa are the majority and by virtue of being the dominant tribe in this study area (89.3%), they are the most consumers of most of the wild foods found in this study area as compared to the Yao. Tribal significant in Table 9 above appear to suggest that Chewa households depend more on wild foods than Yao households. This is so considering that in terms of wild foods consumption habits, the Chewa are less selective compared to the Yao who because of religious and cultural beliefs, do not eat some of the wild foods especially mammals and insects such as *nguluwe*, *mphalabungu* and *nsensenya*.

These results agree with the findings of Guinand, Y. and Lemmessa, D (2001), that religion represents a major constraint to the use and consumption of wild plants and animals. Therefore the results of this study entails that despite the rich biodiversity in the study area, the range of

wild foods available to the Yao during normal and famine times is narrowed considerably compared to that of the Chewa. Thus, this might increase the chance of malnutrition among the Yao households especially during the hunger periods when most of these wild foods are widely consumed. However, contribution of wild foods to nutritional status of the two tribes could not be determined from the study since it was not one of the objectives.

Results of this study have also shown that household size had a significant effect on household dependency on wild foods ($p = 0.011$ at $p \leq 0.05$). This means that household size is an important indicator of household dependency on wild foods. In this study area, the number of household members ranged between 1 and 5 with households having 5 or more members registering a high percentage (Table 10 below).

Table10: Size of household for respondents around Kaphuka EPA

	Frequency of respondent (n =178)	**Percent (%)**
<5 members	105	59.0
≥ 5 members	73	41.0
Total	178	100

From these results, it can be concluded that the larger the household size the more likely it is to face food shortage and consequently depend on wild foods than smaller households.

4.6 Importance of wild foods in reducing hunger

Worldwide, wild foods represent a versatile agro-biodiversity resource by providing different benefits and opportunities depending on the agro-ecological conditions, food security dynamics and nutritional needs (FAO, 2003). Around Kaphuka EPA, results of the study have shown that wild foods could have a role to play in reducing hunger.

4.6.1 Source of food

Around Kaphuka EPA, results of the study revealed that about 42 different species of wild foods (plants and animals) are used as sources of food both during normal times as well as during famine times (Table 3). Wild foods especially fruits and tubers are important emergency food sources for example tubers such as *chilazi*, *mpama* and *buye* play a critical role in reducing hunger as emergency food sources. Frequency of response results indicated that 88.8% of the respondents indicated that wild foods are important sources of food especially during food

shortages. Chauluka, C.M (2002) and Gari, J.A. (2003) also noted that wild food plants are important sources of food especially in rural areas where they represent relevant food sources during seasonal food shortage periods. Therefore, the research findings of this study agree with what other researchers noted about the importance of wild foods as sources of foods and a means of reducing hunger.

To assess whether men and women value wild foods the same way, an independent Samples T-test was done. The test was performed to compare mean responses between males and females in terms of valuing the importance of wild foods in reducing hunger in this study area. The results show that the magnitude of the difference in the means was very small; scores for males (Mean = 1.23, Standard Deviation = 0.55) and scores for females (Mean =1.12, Standard Deviation= 0. 42) and p value of 0.13 (Table 11 below). Hence there was no difference between the two sexes in valuing wild foods as a source of food for reducing hunger around the study area. Both males and females concurred that wild foods are important in reducing hunger around the area and during focus group discussion, men and women indicated that wild foods alone cannot improving food self-sufficiency as most wild foods are seasonal and not liked by many. This means that households around the study area regard wild foods as secondary or supplementary food sources.

Table 11: Mean differences between males and females in valuing the importance of wild foods in reducing hunger in the study area.

SEX	N	Mean	Std. Deviation	Std. Error Mean
Male	66	1.23	.55	6.76E-02
Female	112	1.12	.42	3.96E-02

4.6.2 Nutritional importance

Nutritionally, wild foods both plants and animals are relevant in nutrition security of the majority of rural households. These contribute greatly to the nutritional well-being of rural people by providing the essential nutrients required for body growth and development and for prevention of diseases associated with nutritional deficiencies, such as blindness due to vitamin A deficiency (Gari, J.A 2003). Analysis of nutritional contents was not conducted for the widely eaten wild

foods (42 identified species) around Kaphuka EPA. However, work done by West, Pepping and Temalilwa in 1988 indicated that some of the wild foods found in this area are nutritious.-Table 12 below.

Table 12: Food compositions of some of the widely eaten wild foods around Kaphuka EPA (in 100g Edible Portions).

Food	% Edible portion	Water g	Energy Kcal	Protein g	Fat g	Iron mg	Vit A RE	Vit C mg
Starchy roots, tubers								
Yam fresh (Chilazi) Coleures (Buye) Orchids (Chikande) Dioscorea spp (Mpama)	84 100 100 100	69 67.3 70 67.3	110 94 115 124	1.9 3.2 1.3 3.2	0.2 0.2 0.0 0.1	0.8 - 7.8 -	4 - -	17 - -
Insects and Larvae								
Larvae (caterpillar – dried) Temites (Ngumbi)	100 100	24 75	430 148	52.9 10.0	15.4 12.0	2.3 1.0		
Vegetables								
Amaranthus Amaranthus cooked Mushroom fresh	76 0 91	84 84 90	45 39 29	4.6 4.0 1.5	0.2 0.2 0.5	8.9 7.7 1.5	383 283 0	50 34 3

Source: West, Pepping and Temalilwa (1988). The composition of Foods Commonly Eaten in Eastern Africa.
Latham (1997). Human Nutrition in the Developing World. FAO, Rome

It can therefore be seen from this table that most of the widely eaten wild foods around Kaphuka EPA are rich in essential micro- nutrients such as energy, proteins, vitamin A and C, and Iron. As indicated in table 3 above most of these wild foods are eaten during the hunger periods when rates of malnutrition related diseases are high. Therefore, it can be concluded that wild foods have an important role improving the nutrition security of households around Kaphuka EPA.

4.7 Availability and conservation status of wild foods around Kaphuka EPA

Results of the transect walk showed that the availability of most wild foods has significantly declined and people observed that the commonly gathered and consumed wild foods are becoming scarce than before and some species can no longer be found around Kaphuka area – localised extinction. Table 13 below presents results of the transect walk and field observation around the study area and the *Chongoni* forest reserve. Throughout the transect walk no specie of *mpama* was found while only a few (117 shrubs) of *buye* were identified. This finding confirmed what people were saying in focus group discussions that *buye* was one of the most commonly identified species that households could find without walking long distances. Similarly, *chikande (Orchids)* which people said used to be found even in agricultural gardens in the past, only two shrubs were spotted during the transect walk in the forest reserve. If this observed trend continues for the next few years to come, most of the widely eaten wild foods will not be available for the next generation.

Table 13: Results of transect walk and field observation

Local name	**Scientific name**	**Availability-participant response**	**Results of transect walks**
Masuku	*Uapaca kirkiana*	Abundant	Spotted many
Nthudza	*Flacoutia indica*	Available	Spotted many
Nthenjere	*Ximenia caffra*	Scarce	Spotted 9
Matowo	*Azanza garkeana*	Available	Spotted many
Maye	*Strychnos spinosa*	Scarce	Spotted 53 trees
Maula	*Parinari curatellifollia*	Scarce	Spotted 24 trees
Tubers			
Buye	*Coleus esculentus*	Scarce	Spotted 117
Mpama	*Dioscorea spp.*	Not available	Not available
Chilazi	*Dioscorea spp.*	Scarce	Not available
Chikande	*Satyrium sp Orchids*	Scarce	Spotted 2
Mushrooms			
Chamsuku	*Amanita tanzanica*	Available	But out of season
Katsobola	*Russulacompressa*	Available	But out of season
Chipindi	*Lactarius edulis*	Scarce	Spotted none
Kammapepa	*Amanita phalloides*	Available	But out of season
Kamuvi	*Termitomyces eurrhizus*	Available	But out of season
Nyonjwe	*Termitomyces tyleranus*	Scarce	Spotted none
Chansanga	*Cantharellus symoensii*	Scarce	Not available
Mathwe	*Auricularia polytricha*	Scarce	Locally extinct
Katerera	*Polyporus moluccensis*	Scarce	Out of season
Utale	*Termitomyces letestui*	Scarce	Out of season
Vegetables			
Mlozi	*Adenia ciccampeloides*	Scarce	Out of season

Mlombwe	*Thunbergia lancifolia*	Scarce	Out of season
Chansungwi	*Assassin gangetica*	Scarce	Out of season
Luni	*Gynadropis gynandra*	Scarce	Spotted plenty around homes
Bonongwe	*Amaranthus lividus*	Scarce	Spotted plenty in fields
Animals			
Kalulu	*Lepus spp*	Scarce	Spotted none
Nguluwe	*Phacochoerus aethiopicus*	Scarce	Spotted none
Gwape	*Tragelaphus spp*	Scarce	Not available
Ntchenzi	*Not available*	Scarce	Spotted 1
Nsanasana	*Eidolon spp*	Scarce	Out of season
Birds			
Nkhwali	*Not available*	Scarce	Spotted none
Njiwa.	*Vinago spp*	Available	Spotted plenty
Nkhanga	*Numida spp*	Available	Spotted none
Insects			
Inswa/ngumbi	*Termitidae*	Available	But out of season
Nyenje	*Munza latidavia*	Scarce	Out of season
Mafulufute	*Cicadidie family*	Scarce	Out of season
Nsensenya	*Pentatomidae coccinellidae*	Scarce	Spotted plenty
Ziwala	*Schistocerca spp.*	Scarce	Spotted plenty
Caterpillars			
Malasankhuli	Not available	Scarce	Out of season
Makoloamvi	Not available	Scarce	Out of season
Mphalabungu	Not available	Scarce	Out of season
Achankhobo	Not available	Available	But out of season

Factors affecting availability of wild foods

Results of the research have also shown that the availability of wild foods around Kaphuka EPA is threatened by several factors; among the notable ones are:

4.7.1 Deforestation

About 5% of the respondents indicated that deforestation has led to loss of many trees, which provided a good ecological environment for the breeding, and growth of animals, insects, plants and fungi. For example, mushrooms grow on dead wood and leaf normally found in indigenous woodlands. Since the indigenous forests are declining due to deforestation, the result is that yield of mushrooms obtained from the woodlands is also declining. Around Kaphuka EPA, *Amanita tanzanica (chamsuku)* species, which normally grows under *uapaka kirkiana (masuku)* trees, has greatly declined due to deforestation of *Uapaka kirkiana (masuku*) trees.

Table 14: Reasons for the scarcity of wild foods around Kaphuka EPA.

Reason for scarcity	Frequency of response	Percent	Valid percent
Cutting down trees	90	49.2	50.6
Less rainfall	14	7.7	7.9
Overpopulation	36	19.7	20.2
Bush fires	24	13.1	13.5
Out of season	1	.5	.6
Not applicable	13	7.1	7.3
Total		97.3	100.0

This agrees with what other researchers found about the declining status of mushrooms. Häkönen, M., et.al (2003), noted that in Tanzania there is a reduction in the availability of mushrooms because the trees have been cut. Guinand, Y. and Lemmessa, D (2001) discovered that many useful indigenous plant species are gradually disappearing, being the unfortunate victims of deforestation and the general destruction of land and trees. In Kasungu National Park, Fromme, A. (2005) discovered that caterpillars locally known as *matondo* are no longer available because their preferred host tree, *Julbernardia paniculata (miombo*) has been chopped down by villagers who need firewood for cooking and heating. Nowadays, if people want to collect wild foods, they travel ever further from their villages because more and more bush land is being destroyed and turned into arable land for cultivation.

4.7.2 Bush fires

Bush fires have also contributed to the declining status of most wild foods around Kaphuka EPA. The Chewa are fond of hunting by setting bush fires in order to ease the hunting process. During the individual interviews, a respondent from *Chamadenga* village commented on this by saying, "*moto uja umathandizira kusaka nyama*" (meaning the fire help in hunting the animals). Bush fires destroy not only plants but also other living things found in the area including edible insects like grasshoppers. Nording, S. (2005) also noted that bush fires do not limit themselves to one area they end up destroying large areas of trees, plants, and animals that are trying to live there and that were used to be food for others. The decline in biodiversity as observed in this study area is a potential threat to food security as crops become more vulnerable to pest attacks, diseases and dry spells. Unless something is done to reverse this trend, the future generation may not benefit from these nutritionally important wild foods.

4.7.3 Population pressure

Since most of the households have large household sizes (59.6%), it means that in times of food shortages larger families are the most affected compared to smaller families. It follows then that when it comes to surviving famine, households with more members use more of wild foods than households with few members. Larger families therefore may lead to over depletion of wild foods leading to their being rare. Therefore, large household sizes are also considered as a threat to survival of wild foods.

4.7.4 Influence of western diets and status

The study has also revealed that households around Kaphuka EPA have not been spared from the influence of western diets and foods. From the interviews it was learnt that people value more cultivated vegetables such as 'chinese cabbage' and 'mustard' than the wild leafy vegetables. One of the respondents said, "*timangodyera mavuto, koma sizingafanane ndi mpiru"* (meaning "we eat because of problems, they can not be compared with chinese cabbage"). These results agree with what (Nordin, S. 2005) wrote that humans often look at the foods of other cultures as 'exotic' or 'better' than the food that grow naturally around them (Nording, S. 2005). Wild or locally produced foods are often seen as only for people who cannot afford to buy other foods.

4.7.5 Over emphasis on maize

Maize is the staple food in Malawi and people regard other types of food as side dishes only. Among the study participants, 99% said that maize is their main source of food. *"Ife tikati tadya, timanena nsima,"* said village headman *Nkhonga* during focus group discussions. This is re-enforced by national mechanism of dealing with famine for instance since 1992 when Malawi started experiencing maize shortfalls, maize has been brought in to make up for the shortfall. This system allows people to remain dependent on maize and people are not concerned with finding other foods such as wild foods that used to provide them with a variety of different nutrients.

4.7.6 Lack of policy direction on wild foods

Among the agricultural and biodiversity initiative programmes both by government and NGOs. Working around Kaphuka EPA, there are no programmes targeting the promotion and conservation of wild foods. Most of the agricultural programmes around Kaphuka EPA are

aimed at increasing maize production such as the *'Sasakawa Global 2000'* maize planting system. There is lack of policy direction on the promotion and conservation of wild foods as stated by the Agricultural Extension and Development Coordinator of Kaphuka EPA, "Our food security and conservation strategies do not include wild foods. Studies done elsewhere, (Gari, J.A. 2003), have also shown that agricultural programmes perceive the use of wild foods as useless and "backward" resulting in none or very little attention to them.

4.7.7 Poor scientific knowledge and awareness on the values of wild foods.

There is poor scientific knowledge and awareness on the values of wild foods, such as their nutritional qualities, ecological features, and local uses. Loss of knowledge about wild foods was also noted to contribute to declined use as well as loss of wild foods. Most of the knowledge about wild foods is orally passed on from one generation to another. In Kaphuka, most of the young respondents expressed little knowledge about wild foods and mentioned their parents and grandmothers as source of information on wild foods. Due to lack of knowledge of the wild foods and how to prepare them, the young age group does not rely much on wild foods. As less and less people rely on wild foods around them, the knowledge about how to use them also declines. Lack of knowledge and awareness of the importance of wild foods has also led to inadequate or no support for initiatives to explore domestication potential and conservation strategies for wild foods among households around Kaphuka EPA.

4.8 Conservation status of wild foods around Kaphuka EPA

The study also assessed what people know or do to conserve wild foods around Kaphuka EPA and the results are presented in table 15 below. Each year during the tree-planting season, a lot of trees are planted but not a single 'wild fruit' tree is planted.

Table 15: Knowledge of conservation methods for wild foods in the study area

Conservation Methods	Frequency (n=178)	Percent (%)
Planting some	50	28.1%
Conserving existing ones	38	21.3%
Domesticating some	24	13.5%
Doing nothing	66	37.1%
Total	178	100 %

From the table above, 28.1% mentioned that they were planting some, 21.3% conserving existing ones and 13.5% indicated that they were domesticating some of the wild foods. Despite these efforts, 37.1% of the respondents indicated they were doing nothing to conserve wild foods.

When asked what government was doing to conserve wild foods, 47.8% of the participants felt that government was doing nothing to facilitate conservation of wild foods. This shows that communities and government attach less importance and value to wild foods. Therefore renewed efforts especially on the government side are needed to revise its policies and strategies to inform and support communities (through civic education) to recognise the value of conserving wild foods.

4.9 Domestication potential of wild foods around Kaphuka EPA.

Widely eaten wild foods found in Chongoni Forest reserve and around Kaphuka EPA have not been purposely grown or domesticated. Many of the respondents indicated that it was difficult to domesticate wild fruit trees such as *Uapaka kirkiana (masuku)* because once they are taken away from the natural forests; their survival rate is always low. This agrees with the findings of Malembo, L. (1998) that there have been efforts to domesticate some of the most preferred indigenous fruit tree species including *Uapaka kirkiana and Flacourtia indica,* but findings show that many wild food plants do not survive outside their natural setting.

Wild leafy vegetables like *Amaranthus* (*bonongwe)* and *Gynadropis gynandra (luni)* germinate in home gardens and farmlands but are usually not given much attention although they are commonly consumed like any other cultivated crop and have the potential for domestication (Table 16).

Table 16: Domestication potential of some commonly used wild foods in Kaphuka EPA

Category	Scientific name	Can be domesticated	Method of Domestication	Frequency (n =178)
Tubers				
Mpama	*Dioscorea spp.*	Yes	Tubers	95.5 %
Chilazi	*Dioscorea spp.*	Yes	Tubers	94.9 %
Buye	*Coleus esculentus*	Yes	Tubers	93.8 %

Vegetables				
Luni	*Gynadropis gynandra*	Yes	Seeds	74.7%
Bonongwe	*Amaranthus lividus*	Yes	Seeds	69.1%
Animals				
Kalulu	*Lepus spp*	Yes	Off springs	42.7%
Birds				
Nkhwali	*Not available*	Yes	Eggs hatching- local chicken	75.3%
Nkhanga	*Numida spp*	Yes	Eggs hatching-local chicken	83.7%

Wild edible mushrooms have also proved difficult to grow domestically. Studies done at FRIM, Bvumbwe and Chancellor College in Zomba to explore ways to increase productivity of wild mushrooms had little success because techniques to keep the spawns alive are difficult and not available. However, households in the study, reported successful stories in domesticating *nkhanga* through local chickens hatching guinea fowl's eggs as shown in figure 4 below.

Figure 4: Domesticated guinea fowls using eggs hatched on local chicken

Therefore the study has shown that only few wild foods can be successfully domesticated at household level but the majority are difficult to domesticate especially at household level. Many of these may be successfully domesticated by researchers using scientific techniques and in controlled and modified environments.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS.

5.1 Conclusions

The study was conducted to assess the importance of wild foods to improve food security among rural households around Kaphuka EPA. From the results of the study, the following conclusions have been drawn:

- A wide range of wild foods is available around Kaphuka EPA and these are gathered and eaten by household members around Kaphuka EPA. Women and children are the main actors concerning collection and preparation of wild foods. By tribe, the Chewa are the main consumers of most of the wild foods including mammals and insects. The Yao, because of religious and cultural constrains do not eat most of the wild mammals and insects.

- The most commonly eaten wild foods are fruits, leafy vegetables, mushrooms and winged insects. These wild foods conform to the three categorises (typical wild famine foods, wild foods with famine-food components and wild-foods that attract additional consumer categories during food shortage periods) describe by Guinand, Y. and Lemmessa, D in 2001.

- There is low household dependency on wild foods around Kaphuka EPA, because high consumption of the available wild foods around Kaphuka EPA is always during the hunger periods compared to the good harvest periods. This means that household consumption of wild foods around Kaphuka EPA is not by choice but by need. Therefore, households do not consider wild foods as an integral part of their daily diets.

- The status of many of the commonly gathered and eaten wild foods around Kaphuka area is declining. Most of the wild foods are scarce and some have already become extinct. Deforestation, bushfires, over harvesting and ecological modifications are some of the contributing factors to the declining status of wild foods around this area.

- Despite the declining status of wild foods around this area, very little is being done to reverse the situation through conservation. Neither *in-situ* nor *ex-situ* conservation is

being done both at grass root as well as at policy level. There are no tailor made policies aimed at conserving wild foods especially wild food plants. Food security initiatives for Kaphuka EPA do not include promotion of wild foods and the government is doing very little in the promotion and conservation of wild foods; more attention is focused on planting non-food trees.

- While the future of wild foods around Kaphuka EPA seem not promising, some commonly gathered wild foods have the potential to become valuable domesticated foods and important alternatives to the usual cultivated food crops. Many wild plant tubers, vegetables and fruits have potential for domestication and birds such as guinea fowls have already shown some good domestication results. But this can only be possible if national as well as international agricultural and food policy research institutions become interested and willing to initiate further in-depth research regarding the domestication potential of some of these widely eaten 'wild –food species'.

In summary, the study found out that a wide range of wild foods is consumed around Kaphuka EPA, and they are important in food and nutrition security. The most significant finding of the study is that although a wide range of wild foods is consumed around Kaphuka EPA, households do not very much depend on them for food security. Wild foods remain neglected and little if any effort is put in place to conserve them as potential sources of food for improving household food security for the majority of the people around Kaphuka EPA. However, there is potential for some of the widely eaten wild foods to be domesticated. Unless government policy, attitude, knowledge and practice changes infavour of promoting wild foods, the current consumption rate of wild foods can not be considered a viable strategy for improving household food security among households around Kaphuka EPA.

5.2 Recommendations

From the results of the study, the following recommendations are put forward:

a. Considering the wide range of the wild foods available around Kaphuka EPA, there is need to advance the inventory and publish such information to enable specialised researchers and research institutions to carry out specific studies on a variety of issues

concerning the prevalence and use of edible wild foods not only around Kaphuka EPA and the whole of Dedza district, but even in some parts of the country.

b. In conjunction with Department of Forestry, government should introduce Community Based Natural Resources Management programmes aimed at promoting sustainable use and conservation of wild foods such as natural habitat conservation projects, sustainable harvesting schemes and consideration for domestication of some highly valuable wild foods.

c. Among food security programmes, government should include civic education and public awareness about the value of wild foods covering issues of understanding of cultural tastes, traditions and food preferences and preservation methods and techniques as these are some of the constraints to ultimate use of wild foods. Thus promoting awareness and use of wild foods at the community level is a critical task.

d. The promotion of wild foods also needs consideration to gender issues, since rural women have shown to be the main actors in the gathering and preparation of most wild foods. This would enhance women's role in household food security whilst advancing awareness on gender issues in natural resource management in general.

e. Wild foods can represent an easy income source, especially if specific policies and programmes were deployed to expand market niches and support the integration of wild foods in adult literacy school programmes and in nutrition education programmes to recognise their value and potential. This requires redefining agricultural extension support, agriculture research programmes, biodiversity conservation initiatives, and even food and nutrition policies.

f. NGOs and grass root based organizations are the essential link between the findings of research and their popularisation for general use. They are the outlets of research findings. The research recommends that government and NGOs work together as one way of promoting wild foods especially in devising simple affordable and sustainable

processing, preservation and conservation techniques of widely eaten wild foods in the area and in the area of domestication of some commonly gathered wild foods in the area using simple technology.

g. *Uapaka kirkiana* (*masuku*) makes a good wine and the study has shown that *masuku* ranks number one among the common gathered and consumed wild fruits around Kaphuka EPA. If projects like the one at Kam'mwamba in Mwanza where fruit juices are made from *malambe* and *bwemba* can be introduced in this area they could benefit a lot of people nutritionally as well as financially.

5.3 Suggested Future Research Areas

The findings of this study suggest that research is needed in the following areas:

- National inventory of edible wild foods.
- Assessment of domestication potential of wild edible foods (emphasis on wild edible plants).
- Exploration of strategies for the commercialisation of wild foods among poor rural households.
- Assessment of the food composition of the most widely eaten wild foods

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APPENDICES

APPENDIX 1: INDIVIDUAL HOUSEHOLD LEVEL QUESTIONNAIRE

Chancellor College

DEPARTMENTS OF HOME ECONOMICS AND BIOLOGY

An Assessment of the importance of wild foods in improving Food Security among households around Kaphuka EPA, Dedza, District.

1. **OFFICIAL INFORMATION**

Questionnaire Number:…….
Name of Enumerator:……..
Date of interview:……/……../ 2006
Village:……
Name of Respondent…….Age……Sex……Tribe

DEMOGRAPHIC CHARACTERISTICS

No	Name of Respondent	Sex : 1 = Male 2 = female	Age: 1=<50 2=>50	Marital Status 1=married 2= otherwise	Level of educ. 1= educated 2= otherwise	Work Status 1= farmer 2= otherwise
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

A. Household Food security Status

1. What is your main staple food?
   1 = maize, 2 = cassava, 3 = rice, 4 = millet/sorghum, 5 = plantains, 6 = other (specify)
2. How much did you harvest last year as compared to this year?
   1= more; 2 = less; 3 =same

3. Of what use was your last year's harvest?
   1=mainly consume; 2=mainly sell; 3=consume & sell; 4 =other (specify) _____

4. Do you still have your staple food from last season's harvest? 1=Yes, 2=No, 3=NA |__|

5. If yes; when (month) will it run out? 1=Nov; 2= Dec; 3=Jan; 4= Feb; 5=Mar; 6=Apr; 7=others specify

6. If No, when (month) did the food run out? 1=Nov; 2= Dec; 3=Jan; 4= Feb; 5=Mar; 6=Apr; 7=others specify

7. Household food source: "Do you have staple food in the house (Yes = 1, No = 2) If yes, from what source?
   1=Own production; 2= purchased food; 3=borrowed food; 4 =gift from relatives; 5 =food aid; 6= others_____.

8. If food is purchased: source of money (circle each that apply)
   1 =Ganyu; 2=Business; 3=Employment; 4=Sale of assets 5=Borrowed money; 6=Others.

9. When the harvest is good, how many times do you normally eat food per day?
   1. Once (breakfast only), why? ……
   2. Once (lunch only), why? …….
   3. Once (supper only), why?…….
   4. Twice (breakfast and supper), why? …….
   5. Twice (lunch and supper), why? ……
   6. Three times), why?…….

10. When the harvest is bad, how many times do you eat food per day?
    1. Once (breakfast only), why? ……
    2. Once (lunch only), why? ……
    3. Once (supper only), why? ……
    4. Twice (breakfast and supper), why? ……
    5. Twice (lunch and supper), why? ……
    6. Three times, why? ……

11. In times of famine/hunger, what do you eat?
    1=Nsima; 2=Rice; 3=Bananas; 4= potatoes; 5 =Cassava; 6=Wild foods; 7= others specify

12. How easily accessible is the food?……

B. Gathering and Consumption of Wild Foods

13. Do people in this area eat wild foods? 1=Yes; 2=No;
14. If yes, what are some of the widely consumed wild foods?

Table 1. Commonly gathered and eaten 'wild foods'

Category	**Gatherers**	**Eaters**	**Utilization**			**Month when available**
	Key: 1.men 2. women 3.children 4.all	**Key:** 1.men 2. women 3.children 4.all	**1. Sale**	**2.Eating**	**3.Both**	
Fruits						
1 *Masuku*						
2 Nthudza						
3 Nthenjere						
4 Matowo						
5 Maye						
6 Maula						
7 others specify						
Roots/tubers						
1 Mpama						
2 Chilazi						
3 Buye						
4 others specify						
Mushrooms						
1 Chamsuku						
2 Katsabola						
3 Chipindi						
4 Kammapepa						
5 Chatelera						
6 Ngodzi						
7 others specify						
Leafy Vegetables						
1 Mlozi						
2 Mlombwe						
3 Chansungwi						
4 Luni						
5 Bonongwe						
6 others specify						
Mammals						
1 Kalulu						
2 Nguluwe						
3 Gwape						
4 Nchenzi						
5 Nyani						
6 Nsanasana						
7 Others specify						
Birds						

1 Nkhwali						
2 Nkhanga						
3 Njiwa						
4 others specify						
Insects						
1 Inswa/Ngumbi						
2 Nyenje						
3 Mafulufute						
4 Nsensenya						
5 Ziwala						
6 other specify						
Caterpillars						
1 Malasankhuli						
2 Makolo a imvi						
3 Mphalabungu						
4 others Specify						

15. In times of famine/hunger, who relies mostly on 'wild foods'
1=Men; 2=Women; 3 =Children 4=The aged, 5= Expectant mothers; 6.=Lactating mothers; 7 =All.

16. To what extent do communities in this area use wild foods both as part of daily diets and as a famine coping strategy? 1 =Very much; 2 =Not very much; 3= No dependency at all.
17. How important are wild foods in reducing hunger in this area?
1 =Source of food; 2=Source of income; 3=Others specify

C. Status of wild foods in the study area

18. What is the status of 'wild foods' in this area?

Table: 4 Current status of 'wild foods in the study area

Category of food	**Current status**		
	1= Available	**2= Scarce**	**3= Not available all**
Fruits			
1 Masuku			
2 Nthudza			
3 Nthenjere			
4 Matowo			
5 Maye			
6 Maula			
7 others specify			
Roots/tubers			
1 Mpama			
2 Chilazi			
3 Buye			
4 others specify			

Mushrooms			
1 Chamsuku			
2 Katsabola			
3 Chipindi			
4 Kammapepa			
5 Chatelera			
6 *Ngodzi*			
7 others specify			
Vegetables			
1 Mlozi			
2 Mlombwe			
3 Chansungwi			
4 Luni			
5 Bonongwe			
6 others specify			
Animals			
1 Kalulu			
2 Nguluwe			
4 Nchenzi			
5Nsanasana			
6 others specify			
Birds			
1 Nkhwali			
2 Nkhanga			
3 Njiwa			
4 others specify			
Insects			
1 Inswa/Ngumbi			
2 Nyenje			
3 Mafulufute			
4 Nsensenya			
5 Ziwala			
6 other specify			
Caterpillars			
1 Malasankhuli			
2 Makolo a imvi			
3 Mphalabungu			
4 others Specify			

19. If they are scarce, why are they scarce?

Table 5 Reasons for Extinction

Name of wild food	**Reasons for extinction**
1	
2	

3	
4	
5	
6	
7	

20. Now that the 'wild foods' are scarce, what should be done to preserve the 'wild foods'?
    1=Planting some; 2=Conserving the existing ones 3=Domesticating; 4=Doing nothing.
21. If you are conserving the existing ones, what are some of the conservation methods used?

Table 6. Conservation method used

Conservation method used	Source of information
1	
2	
3	
4	
5	

22. What is our role in conserving 'wild foods'?

1. Role of Households:

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2. Role of Community:

---

3. Role of Government:

D. Future prospects for domesticating wild foods

24. Among the wild foods gathered and eaten in this area, are there some, which could be domesticated?

    1. Yes□; .2. No □

25. If yes, mention some

Table 7: Requirements for successful domestication of widely used wild foods in the study area

Category of wild foods	Requirement for successful domestication
Fruits	
1 Masuku	
2 Nthudza	

3 Nthenjere	
4 Matowo	
5 Maye	
6 Maula	
7 others specify	
Roots/tubers	
1 Mpama	
2 Chilazi	
3 Buye	
4 others specify	
Mushrooms	
1 Chamsuku	
2 Katsabola	
3 Chipindi	
4 Kammapepa	
5 others specify	
Vegetables	
1 Mlozi	
2 Mlombwe	
3 Luni	
5 Bonongwe	
6 others specify	
Animals	
1 Kalulu	
2 Nguluwe	
3 Gwape	
4 Nchenzi	
5 others specify	
Birds	
1 Nkhwali	
2 Nkhanga	
3 Njiwa	
4 others specify	

Thank you very much for participating in this academic research

APPENDIX 2: RESULTS OF KAISER- MEYER-OLKIN (KMO) TEST

Kaiser-Meyer- Olkin(KMO) and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.843
Bartlett's Test of Sphericity	Approx. Chi-Square	5408.953
	df	861
	Sig.	.000

APPENDIX 3:INFORMED CONSENT

Chancellor College

DEPARTMENTS OF HOME ECONOMICS AND BIOLOGY

An Assessment of the importance of Wild Foods in Food Security among households around Kaphuka EPA.

My name is Yunes Agabu.

Iam a student at the University of Malawi, Chancellor College and Iam carrying out an academic study. Iam here to ask you some questions on the importance of wild foods in Food Security among households in this area. I would like to know the type of wild foods available in this area especially those from Chongoni Forest Reserve, I would also like to know if people in this area eat wild as part of their daily food and as a famine coping strategy; the status of the widely eaten wild foods; current conservation strategies and domestication potentials of some of some of the widely used wild foods in this area. All the information that I will obtain from your household will not be shared with other people, but will be used to know the importance of wild foods in food security in this area. May you tell me whether or not you understand why Iam here, and if you would like me to proceed with the interview. If **YES**, proceed with the survey. If **NO**, thank the respondent and go to the next household.

APPENDIX 4: GUIDING QUESTIONS FOR FOCUS GROUP DISCUSSIONS

1. In this area when people say they have eaten food, what do they normally eat and how many times a day

2. In times of extreme famine/hunger, what do people eat?

3. Do people in this area eat wild foods?
4. What are some of the widely consumed wild foods in this study area?

5. How important are wild foods in reducing hunger in this area?

6. To what extent do communities in this area depend on wild foods as part of daily diets?

7. What is the availability and conservation status of wild foods in this area?

8. If they are scarce, why are they scarce?

9. Now that the wild foods are scarce, what are households and government doing to preserve wild foods?

10. What are some of the conservation methods used?

11. Among the wild foods gathered and eaten in this area, are there some, which could be domesticated?

12. If yes, mention some and the requirements for successful domestication

Thank you for taking your time in this discussion.

APPENDIX 5: CONSERVATION OF WILD FOODS

Role of households in conserving wild foods

Role	Frequency (n=178)	Percent (%)
Planting trees	34	19.1%
Domesticating some	17	9.6%
Avoid deforestation	15	8.4%
Avoid bush fires	18	10.1%
Fencing	1	.6%
Making firebreaks	8	4.5%
Nothing	87	48.8%
Total	**178**	**100%**

Role of Government in conserving wild foods

Role	Frequency (n=178)	Percent (%)
Encouraging people to plant more trees	25	14.0 %
civic educate people abut 'wild foods'	23	12.9%
Avoid bush fires	43	10.1%
Punish offenders	40	22.5 %
Nothing	85	47.8%
Total	**178**	**100%**