



**USE AND CONSERVATION STATUS OF NATIVE TREES AND
SHRUBS IN AND AROUND GONDAR CITY, AMHARA
REGIONAL STATE, ETHIOPIA.**

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By Enyish Tassew

Abstract

Native trees and shrubs serve a wide range of uses within conventional farming system. The objective of this paper was to document uses and conservation status of native trees and shrubs in and around the city of Gondar. To this end, 136 respondents from two rural kebele and one urban kifle ketema randomly. For selection of the most preferred native tree species and shrubs 12 key informants were purposively selected based on their wisdom about trees and shrubs. Questionnaire containing together open-ended and structured questions were employed to collect data on use (or abuse) of selected native trees and shrubs. The data, collected from 136 informants, were reviewed using the techniques of free-listing, preference ranking and direct matrix ranking. Verifying the preference ranking findings, direct matrix ranking also showed that Juniperus procera is the most exceedingly preferred tree based on multiple attributes. Key informants ranked it the first for its use in fencing and construction and a source of cash income. Accacia Abyssinica was also ranked as the highest of all as a source of fuel. Ricinus Communis was ranked higher than all other trees based on its growth performance. The most preferred native tree species (e.g. Olea europaea ssp.cappspodata and Juniperus procera) have become increasingly rare, as described in interviews. The most highly listed uses was fencing and the losses were beeforage and spiritual. Households have initiated planting a few native species. Immediate organized measures are crucial to avoid the rapid replacement of native woody plant diversity by a monoculture of non-native trees. A community-based platform for unified ecological renewal of native plant variety would necessitate assistance from local government organizations and non-governmental organizations.

Keywords: traditional, native trees and shrubs, local community use.

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CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Native trees and shrubs contribute many uses for traditional farming communities. Alemayehu (2010) Around 420,000 square kilometers, or 35 percent of Ethiopia's land, was covered by trees at the turn of the twentieth century. New research shows that the forest cover is now 14.2 percent. Because of lack of forest administration policy and proper operation forest fires, recurrent draught, war, uncontrolled grazing, and a lack of education among locals has led to a continuous deterioration of forested area (FAO) 2013. In Ethiopian unwisely using forests has economic and ecological implication like excess wearing, reduction of agricultural productivities, damage of habitats and reduction of streams volume, genetic resources that result in endangered change in local climatic situation. Bekele Tesema 2007).

The Amhara National Regional State is one among the nine regional states of the Federal Democratic Republic of Ethiopia. Nearly 87 percent of the region's population lives within the rural areas and depend upon agriculture and related activities (CSA, 2008). The forest resources are projected to hide about 6% of the overall area of the region. These forest resources include: high forest 0.48%, woodlands 4.2%, and plantation forests 1.23% and these forest resources are managed under three sorts of ownership: state, private and community (AFAP 1999). Crop production within the region is extremely challenged by variety of natural and anthropogenic factors. Among these challenges, the land degradation because of clearing forests followed by wearing away resulted in declining in land productivity (EFAP 1993).

The assessment of native trees and shrubs' protected status is an important first step in planning conservation and long-term efforts. Within the design and implementation of biodiversity conservation actions, information on the distribution and abundance of vulnerable plant species is critical. The need of focusing attention on rare and endangered species is recognized. within the objectives and implementing mechanisms of the most international biodiversity conventions.

Thus, this study tries to document use and conservation status of native trees and shrubs within the study area. Therefore, during this study the evaluation emphasis on about farmers'

knowledge they have about native trees and shrubs, contribution of farmer's income and related challenges within the study area.

1.2 Statement of the Problem

In our country native trees and shrubs used for traditional medicine, fuel wood, fencing and as shelter for many animals, small holder farmers through out the world deliberately maintain trees and shrubs on land that is used for ropping, fuel wood and grazing. The great role of native forests play in traditional farming systems have described by many authors. (Negash Melese , 2007:). Previous studies have acknowledged local ecological knowledge to trees and shrubs with in the Ethiopian high lands and proved that native plant diversity is critical to farmers livelihood. (Bekele Tesemma 2007); Negash Melese, 2007).

The above mentioned uses and threats were true in our locality. But the uses and conservation status of native trees and shrubs were not documented. Due to this valuable native trees and shrubs deforested by many reasons. So my research will fill the gap that document uses and conservation status of native trees and shrubs found in and around Gondar city.

1.3 Objectives of the Study

1.3.1 General Objectives

The main objective of this study is to document uses and conservation status of native trees and shrubs found in and around Gondar city.

1.3.2 Specific Objectives

The specific objectives of the study were:

- To investigate the knowledge of farmers regarding native trees and Shrubs
- To document the uses of native trees and shrubs in the study area.
- To identify problems in order to conserve native trees and shrubs by local people in the study area.
- To document efforts made to promote native plant diversity in the study area

1.4 Research questions

The following research questions were prepared from the objectives

- To what extent do the local people have the knowledge about native trees and shrubs?
- What are the uses of native trees and shrubs in the study area?
- What are the threats that create problem for conservation of native plants and shrubs?
- What are the efforts made to conserve native trees and shrubs in the study area?

CHAPTER TWO

2. REVIEW OF RELATED LITRATURE

2.1 Socio-economic Benefits of Native Trees and Shrubs

Ethiopia is one of the international locations with the principle occurrence of hunger, poverty and destitution withinside the world. Poor and at threat human beings generally lack the possibility to maintain biodiversity and they may be often compelled to apply herbal sources in an unjustifiable way, as a supply of meals. Valuable local bushes and shrubs which are below danger withinside the wild encompass *Erythrina burana*, *Senecio myrio- cephalus* and *Solanecio gigas*, that's used as hedge flowers round domestic yards; *Boswellia pirottae*, a supply of incense and fuelwood, and *Maytenus addat*, used for gas, medicinal drug and wood. *Hagenia abyssinica*, previously one of the most typical excessive-altitude woodland bushes in Ethiopia, is nowadays decreased to remoted people in mountain areas. The bark, plants and roots of this species are substantially valued for medicinal purposes, used as a drug to deal with intestinal parasites. The shrub *Taverniera abyssinica*, some other critical medicinal species, is threatened with the aid of using gathering. It is offered in city markets as a remedy for belly cramps and fever. Asfaw Berihun. (2006)

Wood merchandise constitute a main percentage of constructing materials, furniture, agricultural gear and family electricity for the agricultural negative of Ethiopia. In addition, woodland merchandise including gums, incense, resins, spices, honey and wax from bee retaining play an critical position withinside the intake styles and earnings diversification of rural communities. The position of those merchandise in rural communities' stays poorly documented. Therefore, they may be in all likelihood to feature drastically to rural family economies. Much collecting of woodland merchandise is typical with the aid of using folks who integrate this with a few machine of agriculture. Mostly gathering takes vicinity in secondary forests, bush fallow or farm bush in place of in pristine forests. Ayele Yirga (et. al 2014)

All maximum livelihoods of the united states of America human beings are relied on rain fed agriculture where in agroforestry exercise is foot print. Income earned from tree merchandise is calculated from each non-wood woodland product (NTFP) and wood woodland merchandise (TFP) including fruit, firewood, honey, spices, wood, pole and charcoal (Melaku Ermias et al, 2014) Even if the quantity of earnings acquired is various from vicinity to vicinity, that greater

earnings is gambling a fantastic position for enhancing the livelihoods of farmers. Mainly at some point of a few dangers happened associated with crop manufacturing because of weather changes. Furthermore, the farmer obtains earnings from NTFPs in Kaffa Zone , 800 to 1500 ETB in Wolaita Zone and 1683 ETB an annual common earnings from domestic lawn agroforestry exercise in Jimma Zone. However, the quantity of earnings derived from tree product is motivated with the aid of using numerous factors. According to a few literature reports of tree planting, age of farmer, family wealth status, land length and training degree are undoubtedly influencing the earnings of households (Jama Balcha & Zeila .A 2005),

The World Health Organization predicted that as a minimum 80% of the populations of maximum growing international locations depend on conventional medicinal drug for his or her number one fitness care. There are numerous works of literature, which suggests the blessings of tree or shrubs for conventional medicinal drug in exceptional elements of Ethiopia (Fisseha Mesfin, 2007, Hunde , Debela 2006 Abera Balcha 2014.) For instance, *Croton macrostachyus* for malaria, diarrhea, epilepsy, ringworm and pores and skin rash, *Cordia africana* to remedy evil eyes, *Euphorbia candelabrum* for ringworm, *Millettia ferruginea* for fungal infection, *Vernonia amygdalina* for diarrhea and belly. Thus, around fifty two medicinal plant species changed into diagnosed in Boosat district important Eastern Ethiopia Hunde Debela , (2006). Additionally 39 medicinal flowers used for the remedy of numerous illnesses have been differentiated in Jimma zone, Southwestern Ethiopia (Abera Balcha (2014). Tree-primarily based totally agroforestry land use exercise gives a color service. People are assembled below a color tree for social problems and non secular purpose. Negash Melese ((2007).

2.2 Some selected Native Tree Species and Shrubs in Amhara Region of Ethiopia

2.2.1 Buddeja polystachya (Anfar)

Buddeja polystachya is belong to the own circle of relatives **Buddlejaceae**, is usually referred to as Butterfly Bush. It is a multi-branched shrub or small tree endemic to the semi-arid highlands flanking the Red Sea in Eritrea, Ethiopia, Saudi Arabia, and Yemen. It grows in secondary scrub or round wooded areas at elevations of between 2,200 meters. It usually grows to less than five meters, but can reach 12 meters in height on rare occasions. The bark can be either redbrown or gray. The vibrant orange vegetation shape dense panicles much less than 20 cm lengthy; the

heady fragrance is acrid and commonly taken into consideration unpleasant. The leaves are approximately 15 cm lengthy and narrow, with a pointed tip, the higher floor a light gray-inexperienced. Asfaw B (2006)

In Ethiopia, historically the dried or clean leaves of the plant turned into used for the remedy of malaria, the leaves powder with butter smeared at the pores and skin topically for remedy of wounds/sicknesses of the pores and skin. Besides, the juice acquired through soaking with water used for eye contamination carried out through losing at night time times, for dingetegna carried out in nasal. The genus **Buddleja** used for wound recuperation and the infusion of the leaves is used normally for the remedy of burns, outside and inner ulcers. It extensively utilized historically within the shape of a poultice or lotion to sell wound recuperation, turned into capable of stimulate the increase of dermal fibroblasts and decrease inflammation. Asfaw B 2006.

2.2.2 Cordia africana (Wanza)

Cordia africana is an early colonizer in wooded area re-increase and is regularly discovered alongside wooded area margins. It regularly regenerates in clearings and wooded area gaps. On average, it attains a top among 14 and 21 m and a diameter at breast top (dbh) among 0.60 and 0.90 cm and suggests splendid morphological variant. Flowers are entire and pollinated predominantly through bees. The end result are fit for human consumption, and seed dispersal is specially accomplished through mammals and birds. *Cordia africana* is a fast-developing and distinctly valued wood tree in Ethiopia. It is fairly difficult and sturdy wooden makes it a precious uncooked cloth for making excessive best furnitures and family materials. It is likewise the maximum essential multipurpose tree species broadly going on croplands, grazing regions, homesteads and farm boundaries. For instance, it is a superb supply of medicine (bark, root), food (fruit), firewood and bee forage. The contribution of scattered timber of *Cordia africana* to enhance soil fertility and its significance as a coloration tree in conventional agroforestry systems. The modern distribution, the habitats and the populations of *Cordia africana* are seriously laid low with deforestation, fragmentation and selective Overharvesting can threaten the species. Without control intervention, it is able to result in the extinction of a species and lack of related native expertise on use and control, Sisay Mulugeta (2013).

2.2.3 *Croton macrostachyus* (Bisana)

Croton macrostachyus is usually called rush foil or broad-leaved Croton (English). A deciduous tree belongs to the own circle of relatives **Euphorbiaceae**, a totally massive own circle of relatives with three hundred genera and 8,000 to 10,000 species. The call of the genus **Croton** comes from a Greek phrase Kroton, this means that ticks, due to the seeds' resemblance to ticks. The precise epithet is from the Greek macro- (massive) and stachyus (referring to a spike) hence “with a massive spike”. The genus carries over 1200 species, that are dispensed at some point of the world (Legese Negash 2010).

There is still no single language spoken by the entire Ethiopian population. In different parts of Ethiopia, the species is known by different names. In addition to preserving ecological balance by offering different ecosystem services, *Croton macrostachyus* has multiple ethnobotanical uses. *Croton macrostachyus* has a medicinal value for treatment several diseases. The farmers especially in Hararghe and Shoa used to protect stored grain from pests. The flowers are heavily scented and used for bee forage. It is one of the plant species used for the smoking and cleaning of milking and fermenting utensils. It has domestic use to make tool handles, small stools and boxes. The leaves are used as green manure, (Legese Negash 2010).

2.2.4 *Ficus vasta* (Warka)

Ficus grandiflora (Warka) Holy fig (*Ficus sycomorus*) is a common name for *Ficus sycomorus*. The tree belongs to the **Moraceae** family of plants. There are 53 genera and 1400 species in the family, which are found in tropical, subtropical, and warm temperate climates around the world. The tree is a medium size, deciduous plant with large spreading crown. *Ficus sycomorus* is native to the Middle East and Eastern Africa. In Ethiopia, the species is distributed in river and lake margins, woodlands, wooded grasslands, evergreen bushlands, forest edges and coffee forests in moist to wet mid highlands between 500 to 2000 m a.s.l Bekele Tesema, (2007).

Ficus sycomorus has a wide range of ecological benefits, including erosion management, shade or shelter, improved soil organic matter and nutritional status, and increased soil water holding capacity Bekele Tesema, (2007). *Ficus sycomorus* was a holy tree in several communities Legesse Negash, (2010). This has been associated with the tree believed to be a place of worship as “Adbar”, under which various religious ceremonies are conducted by a variety of communities.

In addition, the tree canopy provides shelter in various communities for many social purposes including for community meeting and social justice.

2.2.5 Juniperus procera (Yehabesha Tid)

Juniperus procera, commercially known as the **African pencil cedar**, is the largest **Juniper** in the world. The tree belongs to the Family **Cupressaceae**, and its occurrence extends from Arabia to Zimbabwe, with approximately altitudinal range between 1750 and 2500m.a.s.l (Legesse Negash, (2002, 2010)). The species usually grows in mountainous areas and on rocky grounds. *J. procera* is an evergreen timber tree that thrives on well-drained soils of tropical montane area Legesse Negash, (2002).

This tree had become endangered due to the extensive and unwise exploitation for various services and products Legesse Negash, (2010). The tree produces timber of economic importance. The wood is used for a great many purpose, including the manufacture of lead-pencil and pencil holders, the construction and lining of buildings, joinery, as well as for fence posts Legesse Negash, (2010). In Ethiopia, timber from *J.procera* is highly valuable for the construction of Orthodox churches and houses mainly because of its durability, termite resistance, workability, beautiful grains and distinctive scent (Legesse Negash, (2002, 2010));

Unfortunately, those diverse uses of this tree have resulted in a widespread distraction of the tree. Consequently, the remaining trees are mostly found within church compounds, graveyards or other enclosed areas (Legesse Negash, 2010).

2.2.6 Acacia abyssinica (Girar)

Acacia abyssinica belongs to the family **Fabaceae (Leguminosae)**, and sub-family **Mimosodeae**. The species occurs in woodland, wooded grassland, and in moist highland, forest edges. The tree is widely distributed in the afro-montane region of Africa (Legesse Negash, (2010)).

The tree species is a very important component of the vegetation system in the drier, as well as in the wetter ecological zones of Ethiopia. It is highly used for conserving and improving degraded soils and landscapes. Nutrient pump by the tree from deeper soil horizons is an essential biological process that is vital for the regeneration of soil fertility and continued land

productivity as well as economically useful, shade-loving plants such as coffee may be planted beneath the tree (Legesse Negash, 2010).

2.2.7 *E. divinorum* (Dedeho)

It happens in grassland with scattered trees and open bushland, frequently on termite mounds, but also in secondary forest, margins of evergreen forest and on stony slopes, from sea-level as much as 2700 m altitude.

The bark of *E. divinorum* is collected from the wild and used to produce fast reddish brown dyes, and for tanning hides and skins. In East Africa an infusion of the bark is used as a condiment in the preparation of a fatty meat and milk soup. The thin fleshy part of the fruits is edible, but not very palatable as it consists of a variety of emetic compounds. The roots and twigs are popular as toothbrushes and roots are chewed as a disinfectant and to colour the lips and mouth red. The wood is used for tool handles and carving, and as firewood. The root is also used for oral care, tooth ache, fungal diseases, sores and abscesses (Mobow C. et al., 2014). In Kenya, the hot root decoction is drunk for malaria, fevers and anaplasmosis and venereal diseases. In South Africa, the leaves are used for management of noisy stomach, headache, general cleansing, and tooth ache (Mobow C. et al., 2014).

In Ethiopia, the dried powdered leaves of these perennial shrubs commonly known by their vernacular names Dedeho (Amharic) and Mi'essa (Oromiffa) are used to treat scabies, inflammation of the skin, eczema, abdominal pain, gonorrhoea and constipation (Abott, 1998). In some regions of Ethiopia, the dried roots of these plants are also crushed and swallowed for some kidney problems (Abera Balcha (2014).

The application of *Euclea spp* in Ethiopia is not limited to their medicinal uses only; the fresh leaves of *Euclea spp* are placed under 'enjera', a traditional Ethiopian bread made out of teff flour, to prevent the development of molds. It is not uncommon to find the plants in some areas being used for ornamental and shade purpose. They have been also used in order to prevent milk from curdling by treating the pots in which milk is kept with the smoke of *Euclea spp*. In South-Western region, the branches of the *E. divinorum* are put into the water gourds and left there for several hours to attract dirt and purify the water Abott (1998)

2.3 Status of Major Native Tree Species and Shrubs in Ethiopia

Native tree species in Ethiopia, specifically, *Podocarpus falcatus* (Thunb.) R.Br.Iex Mirb., *Celtis africana* Burm .F. *Croton macrostachys* Hochst. *Pouteria adolfifriederic* (Engl.) A. Meeuse (synonym: *Aningeria adolfi-friederici* (Engl.) Robyns & Gilbert), *Polyscias fulva* (Hiern) Harms, *Prunus africana* (Hook.F.) Kalkman and *Syzygium guineense* (Willd.) DC., *Acacia abyssinica*, *Annona senegalensis* (A. Chrysophylla, *Acacia sieberiana*, *Acacia lahai*, *Acacia abyssinica* subsp. *Abyssinica*, *Ficus sycomorus*, *Millettia ferruginea*, *Acacia sieberiana* (hereafter mentioned by way of their genus or medical names) having huge ecological and monetary significance. Linger Ewketu, (2014).

The trees are used in the farm land in the form of agroforestry; serving in a multifunction. Conservation of native tree species is crucial for restoration of ecosystems and provision of livelihood support functions among rural communities. (Muleta .D et al, 2007). Although farmers have always incorporated trees in their farming systems; but since the onset of technological advancement trees became neglected factor in agriculture. (Kebebew Zerihun & Urgessa Kaba, 2011). Widespread use of synthetic fertilizers and pesticides combined with mono-cropping, appear to be the simplest manner of increasing productivity, and currently the enlargement of non-native species which can be getting used for fuel wood and construction substances accordingly, undermining herbal fertilizers from indigenous bushes and their function, is one of the foremost hassle affecting the density and diversity of native bushes in farming communities in Ethiopia.

Additionally, herbal forests and native tree species in Ethiopia are declining unexpectedly due to their conversion to arable lands coupled with unwise and excessive usage brought about with the aid of growing populace boom (Kebebew Zerihun et al, 2011). This had and keeps to have serious outcomes on range and density of native timber species in Ethiopia. On the alternative hand, about 94%, of Ethiopian population is predicated on wood-based totally and biomass gasoline for household electricity. For his or her rapid increase and suitable yield, Eucalypt has provided gasoline timber, production cloth, scaffold, transmission pole, wooden and therefore, the species emerge as the popular distinguished tree species growing in the rural and urban areas of Ethiopia. The genus changed into introduced to East Africa within the overdue 19th and early twentieth century and by means of the early Seventies the place of eucalypts in Ethiopia,

Rwanda, Uganda, Kenya and Sudan had reached 95,684 ha, the biggest plantations at that point had been in Ethiopia and Rwanda, at 42,three hundred ha and 23000 ha, respectively Negash Melese ,2007).

CHAPTER THREE

3. MATERIALS AND METHODS

3.1 Description of the Study Area

3.1.1 Location

Gondar is located at a road distance of 747 kms north-west of Addis Ababa. Astronomically it's miles located at 120 30' North and 370 20' East (Ethiopian Mapping Agency, 1981:92). The town limits of Gondar enclose a place of forty.27 km² (CSA, 1998:27) The northern boundary of the metropolis is confined by the jap slopes of mountains Mushira Dengay, Tigrie Machohiya, Hog and Amba Soni.I The western boundary runs alongside the cresets of Mt. Amba Terara, Mt.Bilajig and Mt.Anchi Duba.To the south, the town extends extraordinarily over simple vicinity in the direction of the Tewodoros II Air port; whereas the eastern boundary of the town is limited by River Angereb.

Relief

The topographic characteristic of Gondar is made up of slopping terrain dissected by a number of rivers that start from the mountains west of the town and drain towards south east before joining the Angereb river.The notable rivers that drain the town include Angereb, keha, Dimaza and Shinta. Generally, scattered hills, vallyes and eroded land comprise a serious portion of the town's topography. Elevation within the town ranges from 1800m.a.s.l around Keha River to 2200 m.a.s.l at Goha Ridge (Planning and Economic Development Department for NGAZ, 1999:4). Associated with this are some edges and vistas that offer special elements of the town's landscape.

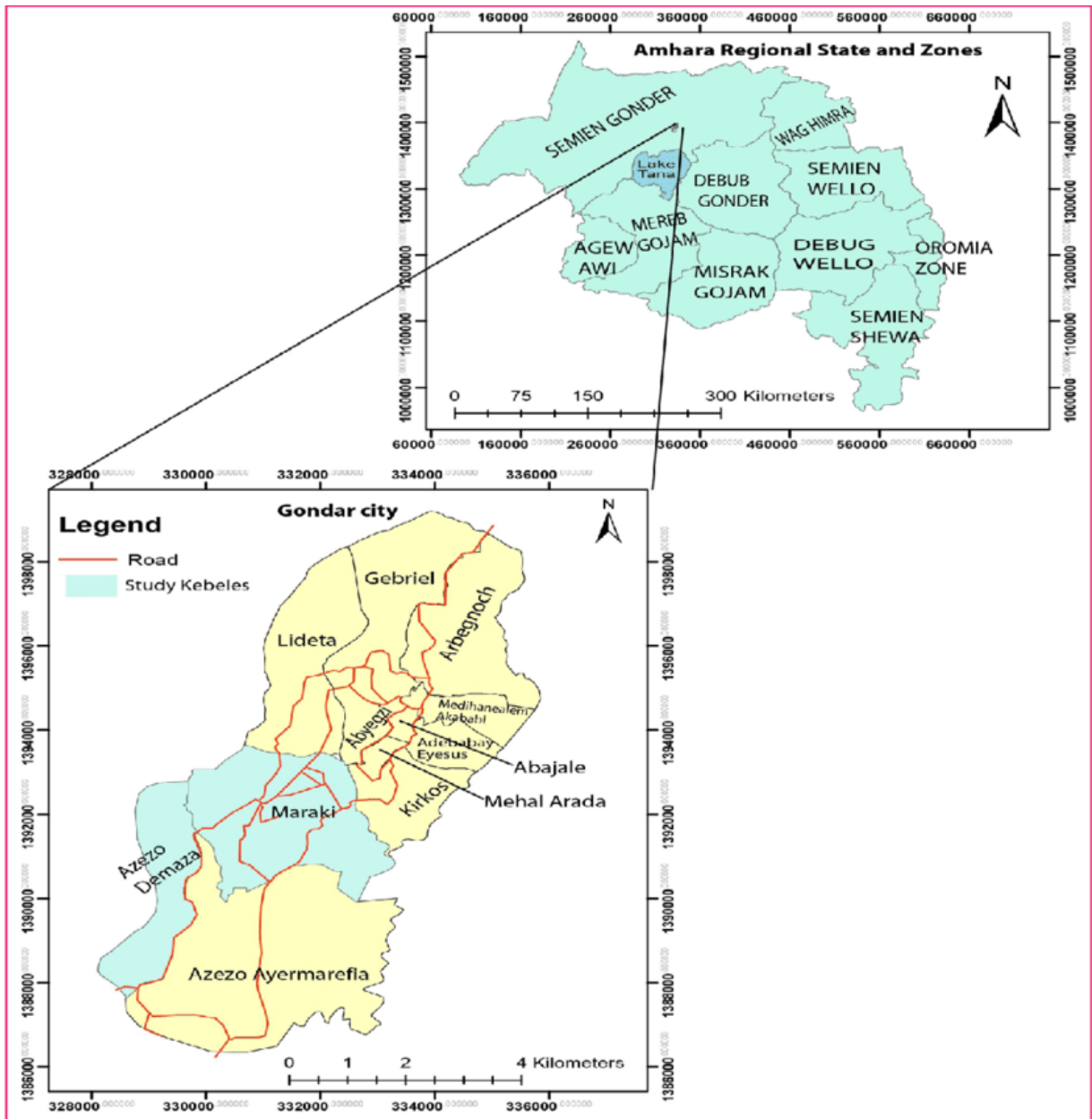
The nature of the topography of Gondar functions a notable influence on the event of the city. First it in part determines the herbal route of the city's expansion to be along the left side of the maximum asphalt avenue that extends from Gondar to Addis Ababa . Second, even though the city extends from north east to south west in the course of a linear strip along the maximum course from Addis Ababa to Gondar, the settlement is disjointed at least at four locations because of its topographic features.The first is the Core Gondar, which comprises almost 3 fourth of the whole area of the city. The 2d is that the Addis Alem vicinity, which is separated from the Core region of Gondar with the aid of a comparatively steep slope. The 0.33 and the fourth refer to the

Azezo location that are further divided in two places. The Azezo place is separated from the Core Gondar by the ridges of Mt.Maraki and Mt.Genfo Quch.

Climate

Gondar, though located on the 12° 30'N parallel, has mean monthly temperatures that range from 14°C to 20°C due mainly to its elevation. The annual average temperature of the town is 19.70°C (Ethiopian Meteorological Services, 1979:3; Planning and Economic Development Department for NGAZ, 1999:4). And therefore, it is most of the time comfortable. In terms of the traditional climatic classification based on altitude and temperature, the town could be categorized under the 'Woina Dega' climatic zone.

There is seasonality of rainfall in Gondar, with the maximum precipitation occurring from June to September. The rain occurs during summer and spring seasons. Summer is that the main rain season which lasts from June to September. The small rains of spring usually occurs between February and April. The remaining months of the year are almost free of rain. The annual rainfall of Gondar amounts 1772mm (Planning and Economic Development Department for NGAZ, 1999:4).



3.2 Study Design

This study employed a cross-sectional design by which the data were collected and analyzed at one point in time. Regarding the extent of the depth of the investigation, the study is descriptive in that it describes the current situation in terms of use and conservation status of native trees and Shrubs in and around Gondar city.

3.3 Selection of the Study Area

The researcher selected two rural kebeles around Gondar city and one kifle ketema as a research site using purposive sampling techniques from the total of urban kebeles in Gondar city because of the following reasons:

- The existence of limitation of the diversity of native trees and shrubs in the study area,
- As I have received information from the previous researchers, no study has been conducted in the rural kebeles regarding the use of native trees and shrubs in and around Gondar.
- The researchers' familiarity with the rural kebeles and knowledge of the local language and culture.

3.4 Sampling technique

One of the study area, which is Dabrka rural kebele has 1560 households, with this 927 (59.4%) are male headed households and 633 (40.6%) are female headed households. Of these, 17 are model farmers and 18 are old age groups. In Fenter rural kebele, there are 1724 households with this 1635 (94.8%) are male headed and 89 (5.2%) are female headed. Out of the total households, 16 of them are model farmers and 59 are old age groups. In Maraki kifle ketema there are a total of 3442 households of which 2479 are male headed and the remaining 963 are female headed.

Table1 Total household and selected sampled household respondents

Purposively selected RK	Total households			Randomly selected sampled HH
	Male Headed	Female headed	Total	Total
Dabrka Kebele	927	633	1560	32
Fenter Kebele	1635	89	1724	35
Maraki Kifleketema	2479	963	3442	69
Total	5041	1685	6726	136

Source : CSA, 2007

3.5 Sample size Determinants

Sampling is the process of selecting a representative group from the population under study. The target population is the total group of individual from which the sample might be drawn. A sample is the group of people who take part in the investigation.

Encompassing all population in the study area is impossible because of cost, time and measurement procedure limitation. To determine the sample size of respondents, the researcher used sample size determination technique developed by (Kothari, 2004).

$$n = \frac{z^2 \times p \times q \times N}{e^2(N-1) + z^2 \times p \times q}$$

Where

P=sample proportion

q=i(1-P)

e- Expected error 0.05 significant

Z- Standardize normal variable and valued that Corresponds to 95% degree of confidence level

N= total number of households

n=total house hold samples

$$= \frac{(1.96)^2 \times 1-0.1 \times 0.1 \times 6726}{(0.05)^2 \times (6726-1) + (1.96)^2 \times 0.9 \times 0.1}$$

$$= \frac{3.841 \times 0.9 \times 0.1 \times 6726}{0.0025 \times (6725) + 3.841 \times 0.9 \times 0.1}$$

$$= \frac{2325.11}{17.15819}$$

≈ **136**

Finally, for this study 136 respondents were included from the total two rural kebeles households and 1 urban kifle ketema then the researcher employed proportional stratified random sampling

to keep proportionality in each purposively selected rural and urban kebeles. Regarding to selection individual sampled household the researcher used lottery method selection by receiving the total name of lists from local authorities. Hence, the lottery winners were selected as sample respondents for this study.

$$n_1 = \frac{n}{N} \times N_1$$

N=Total household

n_1 = Each kebele sample households

N_1 = Total kebele households

n=Total household samples

$$n_1 = \frac{n}{N} \times N_1$$

$$= \frac{136}{6726} \times 1560$$

$$= \frac{212160}{6726}$$

= 32 Respondents are selected from Dabrka Rural kebele

$$n_2 = \frac{136}{6726} \times 1724$$

$$= \frac{234464}{6726}$$

= 35

And 35 respondents are randomly selected from Fenter rural kebele.

$$n_3 = \frac{136}{6726} \times 3442$$

$$= \frac{468112}{6726}$$

= 69

And 69 respondents are randomly selected from Maraki Kifle ketema.

3.6 Sampling and Data Collection.

Questionnaire which become consist of both open ended and structural questions was carried out to a complete of 136 participants from the sampled rural kebeles and urban kebele. In the first round of questionnaires, the researcher applied ethnobotanical techniques (Martin G. 1995,) to research the relationships among native trees and shrubs and farming communities. Informants freely listed the nearby names of native trees and shrubs placed within their village and the encircling land scape. For each species listed, the researcher asked a serious of questions about its use, cultivation, and association with specific habitats. Informants were additionally asked approximately main threats to native trees and shrubs, and the control practices that communities use for their conservation.

After the first round of data collection was complete, 12 key informants (eight men and four women) were preferentially sampled from among the original 136 informants, following previous ethnobotanical research (e.g. Hailu H. & Asfaw Z. 2009). Key informants were selected based on their knowledge and enthusiasm regarding native trees and shrubs. A second round of detailed interviews was conducted with the key informants, beginning with a series of questions about the parts of plants used for purposes discussed earlier and the abundance of native trees and shrubs within the surrounding landscape. Preference ranking and direct matrix ranking exercises were conducted with each key informant.

3.7 Method of Data analysis

The researcher used a combination of data analysis methods for quantitative and qualitative data. The quantitative data were coded and entered to the statistical package for social science (SPSS) version 20. To analysis percentage, frequency, distribution, graphic and tabular presentation were employed to summarize the data. The qualitative data also narrated and summarized accordingly. A descriptive statically method including percentage and frequency were analyzing and summarize the data on species of shrubs and trees associated knowledge, use and conservation.

The 13 native trees and shrubs that were most frequently listed in the first round of the survey were chosen to be ordered by preference in the Martin method (1995). cards based on their overall preferences (they put the favorite plant on top and the least favorite plant on the bottom). Following Martin (1995) with key informants, the five most often cited trees and shrubs during the first round of the questionnaire were chosen for direct matrix ranking. In addition, the matrix ranking contained qualities for the four most regularly reported uses and the four most commonly cited cultivation conditions. The five plants were ranked by key informants based on each attribute. Grades were entered in a matrix (five for the greatest grade, one for the lowest grade), and a total score for each species was determined for the 12 key informants, followed by an overall grade for each species.

CHAPTER FOUR

4. RESULT AND DISCUSSION

This chapter gives a detailed assessment of research findings with in-depth analysis and discussion of the study. As previously mentioned, this study aimed at assessing and documenting use of native trees and shrubs in and around Gondar City. The study also aimed at exploring the perception and knowledge of farmers towards practicing native trees and shrubs in the study area.

4.1 Free Listing

136 respondents freely listing native trees and shrubs, which are found around their local area.

Table 2 Answers what proportion of respondents prefer which native plant species?

Table 2: Preferred Native trees and shrubs by 136 Respondents

S.N	Native trees and Shrubs	No of Respondents	% of Respondents
1	<i>Acacia abyssinica</i>	120	88.24
2	<i>Buddeja polytachya</i>	98	72.06
3	<i>Calpurina aurea</i>	114	83.82
4	<i>Carissa spinarum</i>	110	80.88
5	<i>Cordia Africana</i>	95	69.85
6	<i>Croton macrostachyus</i>	117	86.03
7	<i>Dodonaea agustifolia</i>	96	70.58
8	<i>Euphorbia abyssinica</i>	88	64.70
9	<i>Fikus Sur Forssk</i>	90	66.17
10	<i>Fikus Vasta Forssk</i>	93	68.38
11	<i>Juniperus prosera</i>	130	95.59
12	<i>Ollea europaea subsp. cuspidate</i>	128	94.12
13	<i>Ocimum lamifomium</i>	60	44.12
14	<i>Vernonia amygdalina</i>	115	84.59
15	<i>Ricinus communis</i>	118	86.76
16	<i>Euclea schimperi</i>	100	73.53
17	<i>Ruta chalepensis L.</i>	64	47.06
18	<i>Solanium marginatum L.f</i>	58	42.65
19	<i>Rumex nervosus vahl</i>	86	63.24

As it is indicated in the table *Juniperes prosera* is the most freely listed tree species favoured by 95.59% of the respondents followed by *Ollea europaea* 94.12% and *Acacia abyssinica* 88.24% of

respondents respectively. The small number of respondents (42.65%) listed only *Solanium marginatum*. It is similar to Negash Melese (2007)

4.2 Use of Native trees and shrubs

The 136 informants generated a list of names of Native trees and shrubs, which consist of 19 plant species belonging to 15 families.

Table 3. use of Native trees and shrubs in and around Gondar Town

The table shows the free listed native trees and shrubs listed (Table -2) earlier scientific name, family name, local name, growth the habitat, uses and their habitat.

S.N	Scientific Name	Family	Local Name (Amharic)	Growt h Habit	Uses	Habitat
1	<i>Acacia abyssinica</i>	Fabaceae	Girar	Tree	1,2,3,5,6,7,8,10,14	Hg, Cf, Ft, Ub, Ch, Rz, Ga, Ht
2	<i>Buddeja polytachya</i>	Scrophulariaceae	Anfar	Tree	1,2,3,4	Hg, Ub, Ch, Rs
3	<i>Calpurina aurea</i>	Fabaceae	Zigita	Shrub	1,2,6	Cf, Ft
4	<i>Carissa spinarum</i>	Apocynaceae	Agam	Tree	1,2,12	Ft
5	<i>Cordia Africana</i>	Boraginaceae	Wanza	Tree	3,10,12	Hg
6	<i>Croton macrostachyus</i>	Euphorbiaceae	Bisana	Tree	1,3	Cf, Ft
7	<i>Dodoniaea agustifolia</i>	Sapindaceae	Kitkita	Tree	1, 2, 3, 4, 5, 6, 7, 10	Hg, Ft
8	<i>Euphorbia abyssinica</i>	Euphorbiaceae	Kulkual	Tree	1, 2, 6, 8, 10	Hg, Cf, Ch
9	<i>Fikus Sur Forssk</i>	Moraceae	Shola	Tree	1, 2, 3, 12	Ft
10	<i>Fikus Vasta Forssk</i>	Moraceae	Warka	Tree	3,12	Ch,
11	<i>Juniperu sprosera</i>	Cupressaceae	Yehabesha Tid	Tree	1, 2, 3, 4, 5, 6, 7, 8, 10	Hg, Cf, Ft, Ub, Ch, Ga, Fn, Ht
12	<i>Ollea europaea subsp. Cuspidate</i>	Oleaceae	Weyra	Tree	1, 2, 3, 4, 5, 6, 7, 10, 14, 15, 16	Hg, Cf, Ft, Ub, Ch, Ga
13	<i>Ocimum</i>	Lamiaceae	Damakesie	Shrub	1, 4,9	Ht

	<i>lamifomium</i>					
14	<i>Vernonia amygdalina</i>	Compositae	Grawa	Shrub	1,2,5,9,13,14,16	Ch,Fn, Ub
15	<i>Ricinus communis</i>	Euphorbiaceae	Gulo	Tree	3, 7, 11	Ch, Ga,Ub
16	<i>Euclea schimperi</i>	Ebenaceae	Dedeho	Shrub	1,2,10,13,	Bd
17	<i>Ruta chalepensis</i> L.	Rutaceae	Tena adam	Shrub	7,9	Hg
18	<i>Solanium marginatum</i> L.f	Solanaceae	Embuay	Shrub	4	Ub, Rz
19	<i>Rumex nervosus vahl</i>	Polygonaceae	Embacho	Shrub	1, 2, 3, 4, 5, 9, 14	Hg, Cf, Ft, Ub,Ht

- All scientific names have been verified on the International plantlist (www.plants.org).
- Habitats within the study area as listed by farmers: Hg - Home gardens; Cf - Crop fields; Ft = Forest; Ch - Church; Rz -Riparian zones; Ga -Grazing areas; Fn - Fences; Ht - Hill tops; Rs - Road sides; Bd -Boundaries; Ub = Ubiquitous.
- Uses within the study area as listed by respondents: 1 - Fencing; 2 - Fuel wood; 3 - Shade; 4 - Cleaning supplies; 5 -Fodder; 6 - Construction; 7 -Income; 8 -Furniture; 9 - Medicine; 10 - Tools; 11 - Bee forage; 12 - Food; 13 -Ornamental; 14 - Soil fertility; 15 - Spiritual; 16 - Dental care.

A list of 19 native plants belonging to 15 families was generated by the 136 contributors (Table 3). There are 12 tree species and 7 shrubs in this natural plant. Three species belong to the Euphorbiaceae family, while two species each belong to the Fabaceae and Moraceae families. A single species distinguishes the remaining 12 families. These findings are consistent with Abebe Tesfaye et al(2005) .'s findings that Epophubia made up the largest proportion of native plants in the arid grasslands of northern Ethiopia (500-1780 m above sea level). Sources list gardens, houses, and crops as examples of tree and shrub environments. Fields, fences, grasslands, churches, riverbank districts, roadways, forest parts, and mountains are only a few examples (Table 3). According to farmer's lists, gardens, houses, and yards have the most native plants (9 species), followed by temples (8 species), and forests (8 species) according to farmer's lists (7 species). Other habitats mentioned by farmers include rice fields (6 species), pasture lands (4 species), and slopes (5 species). It has been described as being unique among eight species in the

landscape, meaning that habitat requirements are less specialized and more environmentally friendly. It is more widespread than other species.

Tolera M.et al. (2008) observed that the native plant species richness in household gardens was substantially higher than in surrounding crop areas. Home gardens have the most plant diversity, according to the interviews, in part because home owners have a stronger sense of ownership, and plants in home gardens benefit from direct care from household members. Perennial plants, in particular, provide ongoing benefits in house gardens due to their long-term existence in close proximity to the family home.

4.2.1 Use Frequencies

The following table is use frequencies of the general respondents. It answers what proportion of respondents use the preferred trees and shrubs for what purpose (use)

Table 4: The Use frequencies by respondents

S. N	Uses Frequency	Number of Respondents	% of Respondents
1	Fencing	107	78.68
2	Fuel wood	85	62.50
3	Shade	71	52.21
4	Cleaning supplies	50	36.76
5	Fodder	50	36.76
6	Construction	42	30.88
7	Income	42	30.88
8	Furniture	21	15.44
9	Medicine	21	15.44
10	Tools	50	36.76
11	Bee forage	7	5.15
12	Food;	28	20.59
13	Ornamental	14	10.29
14	Soil fertility	28	20.59
15	Spiritual	7	5.15
16	Dental care	14	10.29
17	Both fencing and fuel	85	62.50

As it is indicated in the table 4, 78.68 % of respondents said that most of the species uses for fencing and followed by fuel wood. 52.21% of respondents selected native trees and shrubs for shade. The small number of respondents 5.15% selected trees and shrubs for spiritual and Bee forage.

4.2.2 Knowledge of farmers regarding native trees and Shrubs

Table 5. Knowledge of respondents regarding native trees and shrubs

This table shows that what proportion of species selected for what use.

S.N	Uses	Frequency of species	% of Species
1	Fencing	15	78.95
2	Fuel wood	12	63.16
3	Shade	10	52.63
4	Cleaning supplies	7	36.84
5	Fodder	7	36.84
6	Construction	6	31.58
7	Income	6	31.58
8	Furniture	3	15.79
9	Medicine	3	15.79
10	Tools	7	36.84
11	Bee forage	1	5.26
12	Food	4	21.05
13	Ornamental	2	10.53
14	Soil fertility	4	21.05
15	Spiritual	1	5.26
16	Dental care	2	10.53
17	Both fencing and fuel	12	63.16

For farming families in and around Gondar, native trees and shrubs provide a variety of uses. Fencing (15 species, 78.4 percent), fuel wood (12 species, 63.16 percent), and shade are the most commonly listed applications (10 species, 52.6 percent). Native forests are also used as forage and fodder (7 species, 36.84 percent), construction materials (6 species, 31.58 percent), tools and equipment (7 species, 36.84 percent), sources of income (6 species, 31.58 percent), cleaning supplies (7 species, 36.84 percent), traditional medicines (7 species, 36.84 percent), and cleaning supplies (branches and leaves for sweeping the house and washing dishes, 7 species, 36.84 percent) (3 species, 15.79 percent), improving soil fertility (4 species, 21.05%), furniture (three species, 15.79%), bee forage (one species, 5.26%), ornamentals (two species, 10.53%), food (four species, 21.05%), spiritual practices (one species, 5.26%), and toothbrushes (two species, 10.53%). Furthermore, the majority of natural forests provide several roles. 12 species (63.16 percent) are used for both fencing and fuel wood, for example (Table 5). This research aligns to Asfaw Berihun (2006).

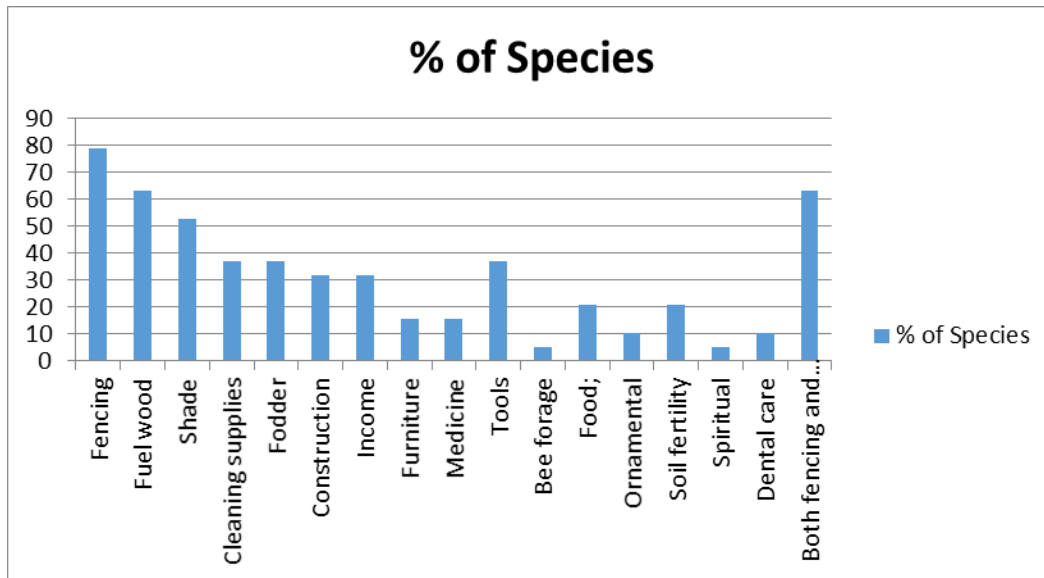


Figure 1: Percentage of Species by their use.

More than 75% of the species identified in the research region were employed for fence, as shown in graph 1. Furthermore, roughly 63 percent of the species used for fuel wood are native to the United States. 63% of the species in the area were used for both fence and fuel. In terms of medical plants, Abera Balcha (2014) recognized 74.5 percent of the species as medicinal plants, but just three (15.7 percent) of the species were identified as medicines by the informants. Numerous traditional healers and medicinal plant merchants questioned by Abera Bulcha (2014) were likely aware of the therapeutic benefits of many plants, but this study's informants were not..

4.2.3 Preference ranking results for key informants for most frequently listed native trees and shrubs

Table 6. Preference ranking results for key informants for most frequently listed native trees and shrubs.

This table was done by 12 key informants by taking from the first round frequently listed 13 native trees and shrubs. The key informants arrange the cards which hold the name of the native plant species

Key informant code	Selected Native trees and shrubs by key informants												
	5	6	7	9	3	8	10	11	12	1	13	2	4
GON1	9	10	10	9	6	6	7	5	3	4	1	2	1
GON2	10	1	10	10	7	7	8	6	4	4	3	2	1
GON3	10	10	8	7	6	8	4	5	8	1	1	2	1
GON4	10	9	6	8	5	2	8	6	6	4	3	1	1
GON5	10	10	9	7	8	9	6	5	4	2	1	3	2
GON6	10	10	7	10	8	9	1	4	6	2	5	3	2
GON7	10	9	7	9	4	8	1	2	7	5	6	3	1
GON8	10	10	8	9	10	6	7	5	2	3	4	1	1
GON9	10	10	10	7	9	6	2	8	5	3	1	4	2
GON10	10	7	8	5	6	8	10	3	9	4	2	1	1
GON11	9	10	10	8	10	7	5	3	6	2	4	1	1
GON12	10	10	9	7	8	6	5	10	1	3	2	4	1
Total	118	106	102	96	87	82	64	62	61	37	33	27	15
Rank	1	2	3	4	5	6	7	8	9	10	10	12	13

1-Buddleja polytachya,
 2-Cordia Africana,
 3-Croton macrostachyus,
 4-Ficus vasta frossk,
 5-Juniperus procera,
 6-Ollea europaea subsp. cuspidate

7-Acacia abyssinica,
 8-Vermonia amygdalinal,
 9-Ricinus communis,
 10-Calpurina aurea,
 11-Carissa spinarum
 12-Euclea divinorum,
 13-Dodonaea agustifolia

The 13 native trees and shrubs that were most frequently listed during the first round of questionnaire were selected for preference ranking in the manner recommended by Martin (1995). The names of these plants were printed on cards, and key informants were asked to arrange the cards according to their general preferences (they placed the most preferred plant at the top and the least preferred at the bottom).

Preference ranking indicated that *Juniperus prosera* was the most preferred native plant by almost all farmers, while *Olea europaea ssp.cuspidata*, *Acacia abyssinica*, *Ricinus communis* and *Croton macrostachyus* were ranked second, third, fourth, and fifth, respectively (Table 6).As in other regions where it has been introduced, *Juniperus prosera* is favored for its rapid growth rates, minimal management requirements, and coppicing ability (FAO 2013). By comparison, the slow growth rates of most native tree species were mentioned by farmers as a critical factor discouraging their cultivation.

Table 7. Direct matrix ranking results from key informants, including five most frequently listed native plants and eight most frequently discussed attributes.

Each attribute compute by 12 key informants, (maximum score 12x5 =60 and minimum score also 1x12=12)

Feature	<i>Acacia abyssinica</i>	<i>Juniperus prosera</i>	<i>Olea europaea</i> subsp. <i>Cuspidate</i>	<i>Ricinus communis</i>	<i>Croton macrostachyus</i>
Construction	30	51	43	26	24
Fodder	25	26	25	40	23
Fencing	54	42	34	53	43
Fuel wood	54	42	36	42	38
Growth performance	25	28	23	35	21
Seedling availability	28	36	12	12	14
Source of income	45	33	46	42	28
Variety of uses	38	53	38	32	28
Total	299	311	257	282	219
Overall rank	2	1	4	3	5

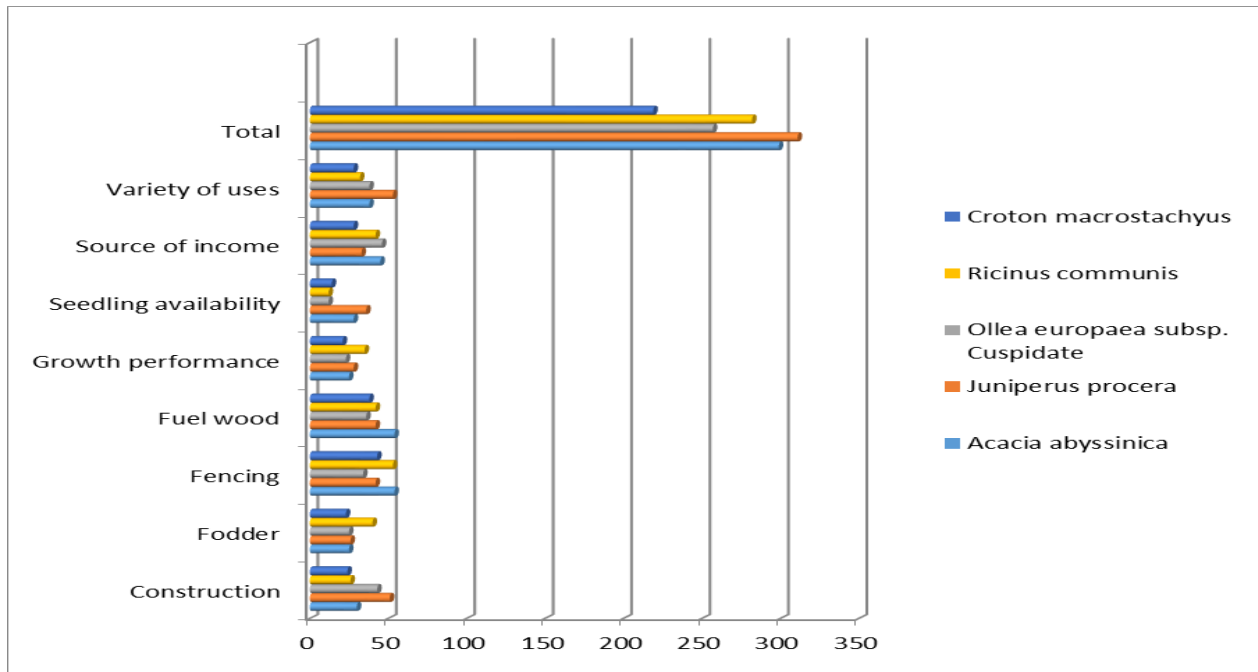


Figure 2. Direct matrix ranking of five most frequently listed native trees and shrubs

Confirming the preference ranking results, direct matrix ranking also indicated that *Juniperus procera* is the most highly valued tree based on multiple attributes (Table 7 and graph 2). Key informants ranked highest use was fencing. *Accacia Abyssinia* was also ranked as the highest of all as a source of fuel and fencing. *Resinus Communus* was ranked higher than all other trees based on its growth performance. *Juniperus procera* was ranked highest for its availability of saplings at local extension offices, was ranked first for its overall multi functionality (variety of uses) when compared with other tree species. These findings are confirmed by the report of FAO (2013), which characterized *Juniperus procera* as the most preferred multipurpose native tree for small-holder farmers throughout the Ethiopian highlands.

4.3 Threats and efforts identified by farmers

4.3.1 Threats identified by farmers

According to informants native trees and shrubs with the study area were threatened by overexploitation, lack of natural regeneration, lack of management, insufficient availability of saplings for planting, climate change, planting of introduced species (particularly Eucalyptus), and extension of croplands are all threats to native trees and shrubs in the study region, according

to informants. Each of these causes leads to the loss in native species' abundance and variety in distinct ways. Overexploitation, according to 41% (56) of the respondents, is causing native plant diversity and density to diminish. In other parts of Ethiopia, several of the causes cited by a small percentage of interviewees in and around Gondar are recognized as primary threats to native plant variety. Deforestation owing to agricultural development, for example, is the largest danger to native woods in Mana Angetu District, southeast Ethiopia, according to Lulekal et al. (2008). Only seven (5%) of the informants in the research area, on the other hand, highlighted agricultural development as a major danger to native plant variety. Both the least and most beneficial native woods have the best likelihood of being protected in agricultural landscapes, according to two key informants in the study area. Because they are left alone and not harvested, the least useful natural woods and shrubs, as well as those with fewer uses, are maintained. Some of these species, such as *Rumex nervosus*, are mostly disregarded by farmers since they are rarely utilized for fuel wood or fencing material, and can only be browsed by goats or sheep, making them less vulnerable to overexploitation.

Native forests that are highly preferred by the local community are also relatively abundant in the study area, particularly *Carissa spinarum*. The communities' passion for growing to suit their own home requirements and local market demand can be linked to the high abundance of this and other species. According to the informants, native woody plants such as *O. europaea ssp. cuspidata* and *J. procera* are declining. The community uses the few remaining trees without replanting them. Many native plant species' survival is in question unless farmers and other community members raise replanting rates to match the rate of loss. Efforts to promote Native plant diversity

4.3.2 Efforts to promote native plant diversity

Informants mentioned many efforts to increase the abundance of native trees and shrubs within and around Gondar City. Fencing, watering, hoeing, fertilizing, preventing illegal cuts, weeding, pruning, and producing shade are all examples of management and conservation methods. Fencing and irrigation were mentioned by 102 (75%) and 86 (63%) of the respondents, respectively. Because these management approaches are more easily applied to cultivated plants, non-cultivated natural forests may be in jeopardy. The study found a general desire among Gondar inhabitants to conserve and promote native plant diversity, but pressures to exploit native

trees and replace them with Eucalyptus outweigh attempts to save native flora, which plainly require protection.

Spiritual beliefs and religious institutions may aid efforts to protect local plant diversity in Ethiopia's highlands. Ethiopia has a wide range of spiritual systems, religious traditions, and cultural taboos, many of which are linked to native plants, notably huge charismatic and symbolic trees. For example, some farmers in the study region claim that the *Ficus vasta frossk* tree has spiritual power and that if they can make a pact with the gods that live in these trees, their agriculture will be productive. The importance of *Ficus vasta frossk* and other plants linked to these and other comparable beliefs and activities may contribute to their landscape conservation.

As in other parts of Ethiopia, the researcher observed that trees located close to Ethiopian Orthodox churches are protected from cutting. Although the researcher excluded church yards from this study because the researcher focused on the areas managed by individual households, the researcher observed that native forests such as *J.procera*, *O.europaea ssp.cuspidata*, *Cupressus lusitanica*, *Rosa abyssinica*, *Euphorbia abyssinica*, *H.iabyssinica*, and *A.abysynica* are more abundant around Ethiopian Orthodox churches than in other parts of the landscape. Many of the churches in Gondar are surrounded by extensive patches of *J.procera trees*. The trees and plants that surround churches and monasteries in northern Ethiopia may be representative instances of remaining forest patches (Wassie A. et al. 2005). Spiritual/religious bans against cutting trees and bushes from these regions maintain these forests. Taboos and social punishments preserve remaining forests from decline in the same way they do in other regions of the world (King-Oliver et al. 1997). Church yards in Gondar may be one of the last remaining sites for native woody species that require mature tree understory conditions. In situ conservation sites like as churches and monasteries have a good chance of surviving for the foreseeable future. These patches not only showcase the beauty and benefits of native woody species but may also serve as important sources of seeds as a living source of germ plasm for raising saplings for planting.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study only selected use and conservation status of native trees and shrubs diversity in and around Gondar revealed an alarmingly that low diversity of trees and shrubs. It is important to remember that although the study area was once primarily woodland, it was transformed into settlement and agricultural landscape a long time ago. Native forests are retained within this landscape because they have been important to farmers, and local community members underline that trees and shrubs continue to play a wide range of roles in their day-to-day lives. However, most valuable native trees and shrubs are being threatened with overexploitation and habitat modification.

Home gardens had a higher number of native plant species than most other land use groups studied by the researcher. This is likely due to the fact that home gardens are under the constant inspection and management of the household, which has clear tenure rights for perennial plazas, in addition to being refuges for natural woodlands and shrubs that have become rare in the environment..

Selection of native plant species for planting by households is based primarily on variety and intensity of uses. Fencing and fuel wood are two of the most common uses of native forestes. *Juniperus procera* has become the most planted native plant in the absence of the preferred multi purpose native plant species, owing to its relatively fast growth, seedling availability, and high market value, which provides prospects for money generating.

5.2 Recommendations

Local and regional governments, as well as non-governmental organizations, must work to protect environmentally, socially, and economically important native trees and shrubs in urban and agricultural settings. Cutting trees for use and to make room for farming, as well as urban sprawl, are important dangers to the diversity of native plant species that can be mitigated by tighter implementation of existing regulations prohibiting such actions. Native species self-recruitment (particularly valuable woody plants such as *O. europaea ssp. cuspidata*, and *J. procera*,) should be protected from trampling and consumption by livestock with adequate

fencing. Local nurseries are raising vital native plant species, including the species mentioned above, according to the researcher, and promotion of their planting is an exciting recent trend. In addition, community members, local extension workers, the regional forestry department, and non-governmental groups must work together to design successful programs and policies to help communities maintain their natural resources. While farmers recognize the need of native plant diversity, local communities require assistance in order for communal, voluntary ecological restoration to acquire traction.

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Appendices

Addis Ababa University

Department of Zoological Sciences

Dear respondents,

First of all, I would like to thank you for your willingness to complete this questionnaire. The questionnaire is part of a thesis entitled “**Socio-Economic Importance of Selected Native Trees and Shrubs in and around Gondar City, Amhara Regional State, Ethiopia**”. Upon completion, the thesis will be submitted as a partial fulfillment of the requirement for the Degree of Master of Science in Biology at Addis Ababa University. The information that you will provide will be used only for academic purposes and will be kept confidential. Moreover, the personal information that you will provide will be utilized as an input for the aggregate result as a partial fulfillment of the requirement for the Degree of Master of Science in Biology at Addis Ababa University. The information that you will provide will be used only for academic purposes and will be kept confidential. Moreover, the personal information that you will provide will be utilized as an input for the aggregate result. The questionnaire has two parts, and researcher kindly asks your cooperation to attempt all questions objectively and honestly.

ውድ ተጠያቂ፣ በመጀመሪያ ይህንን መጠይቅ ለመሙላት ፍቃደኛ ስለሆኑ አመሰግናለሁ። እኔ እንደሽ ጣሰው የተባልኩት የአዲስ አበባ ዩኒቨርሲቲ የባዮሎጂ ትምህርት ክፍል የድጎረ ምረቃ ተማሪ የመመረቂያ ጥናቴን ለመስራት ይህን መጠይቅ አዘጋጅቻለሁ። ይህ መጠይቅ የተዘጋጀው በጎንደር ከተማና አካባቢው የሚገኙ ሐገር- በቀል ዛፎች እና ቁጥቋጦዎች ያላቸውን ማህበራዊ እና ኢኮኖሚያዊ ጠቀሜታ ለማጥናት ሲሆን፣ የሚሰጡት መረጃ በሙሉ ለሚደረገው ጥናት ዓላማ ብቻ ይውላል።

Part 1 (ክፍል 1). Identification (መለያ)

- 1.1 Region _____
ክልል
- 1.2 Zone _____
ዞን
- 1.3 City/Woreda _____
ከተማ/ወረዳ
- 1.4 Village Name _____
የመንደር ስም

Part 2- Socio Demographic information of respondents

Please indicate your reply by putting (✓) Mark

እባክዎን የ(✓) ምልክት ያስቀምጡ

2.1 Sex _____

2.2 ያታ

Male (ወንድ)

Female (ሴት)

2. Age of Respondent (እድሜ)

20-30

31-40

41-50

More than 50(ከ 50 አመት በላይ)

3. Marital Status (የጋብቻ ሁኔታ)

Single (ያላገባ/ች)

Divorced (የፈታ/ች)

Married (ያገባ/ች)

Widowed (ሚስቱ የሞተችበት/ባሏ የሞተባት)

4. Educational background (የትምህርት ሁኔታ)

Illiterate (ያልተማረ/ች)

Grade1-4

Grade 5-8

Grade8-10

Above Grade 10 (ከ10ኛ ክፍል በላይ)

5. Religion (ሀይማኖት)

Orthodox (ኦርቶዶክስ)

Muslim (ሙስሊም)

Protestant (ፕሮቴስታንት)

Other (ሌላ) _____

Local community’s perceptions about the socio-economic importance (medicinal values) of selected native trees and shrubs found in and around Gondar city. (የአካባቢው ህብረተሰብ በጎንደር እና አካባቢው ስላሉ የተመረጡ የሐገር በቀል ዛፎች እና ቁጥቋጦዎች ማህበራዊ እና ኢኮኖሚያዊ ጠቀሜታ (ለምሳሌ፣ለመድኃኒትነት አገልግሎት ይውሉ እንደሆነ) ያለው ግንዛቤ።)

1. Do you know these native trees and shrubs?

ስማቸው የተጠቀሱትን ሐገር-በቀል ዛፎችንና ቁጥቋጦዎችን ያውቋቸዋል?

A. *Buddeja polytachya* (Anfar) (አንፋር)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላወቀውም)

B. *Cordia africana* (Wanza) (ዋንዛ)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላወቀውም)

C. *Croton macrostachyus* (Bisana) (ምሳና)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላወቀውም)

D. *Ficus vasta frossk* (Warka) (ዋርካ)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላወቀውም)

E. *Juniperus prosera* (YehabeshaTid) (የሀበሻ ጥድ)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላወቀውም)

F. *Ollea europaea* subsp. *Cuspidate* (Woyra) (ወይራ)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላወቀውም)

G. *Acacia abyssinica* (Girar) (ግራር)

Yes, I know (አዎ አወቀዋለሁ)

No I don't know (አላውቀውም)

H. *Vermonia amygdalinal* (Girawa) (ግራዋ)

Yes, I know (አዎ አውቀዋለሁ)

No I don't know (አላውቀውም)

I. *Ricinus communis* (ጉሎ)

Yes, I know (አዎ አውቀዋለሁ)

No I don't know (አላውቀውም)

J. *Calpurina aurea* (ድግጣ)

Yes, I know (አዎ አውቀዋለሁ)

No I don't know (አላውቀውም)

K. *Carissa spinarum* (ኣጋም)

Yes, I know (አዎ አውቀዋለሁ)

No I don't know (አላውቀውም)

L. *Euclea divinorum* (ደደሆ)

Yes, I know (አዎ አውቀዋለሁ)

No I don't know (አላውቀውም)

M. *Dodonea agustifolia* (ከትከታ)

Yes, I know (አዎ አውቀዋለሁ)

No I don't know (አላውቀውም)

2. If your answer is 'yes', please tell me the socio-economic importance (e.g., medicinal values) of each of the native trees and shrubs listed above. (መልስዎ አዎ ከሆነ እባክዎን ከላይ የተዘረዘሩትን የሐገር በቀል ዛፎች እና ቁጥቋጦዎች ማህበራዊ እና ኢኮኖሚያዊ ጠቀሜታ (ለምሳሌ፣ ለመድኃኒትነት አገልግሎት ይውሉ እንደሆነ) ይንገሩኝ?

1. *Buddeja polytachya Fresen*(Anfar) (አንፋር) _____

2. *Cordiy africana* (Wanza) (ዋንዛ) _____

3. *Croton macrostachyus* (Bisana) (ብሳና) _____

4. *Ficus vasta frossk* (Warka) (ዋርካ) _____

5. *Juniperus prosera* (YehabeshaTid) (የሀበሻጥድ) _____

6. *Ollea europaea subsp.cuspidate* (Woyra) (ወይራ) _____

7. *Acacia abyssinica* (ግራር) _____

8. *Vermonia amygdalinal* (Girawa) (ግራዋ) _____

9. *Ricinus communis* (ጉሎ) _____

10. *Calpurina aurea*((ድግግ) _____

11. *Carissa spinarum* (ኡጋም) _____

12. *Euclea divinorum* (ደደሆ) _____

13. *Dodonea agustifolia* (ከትክታ) _____

14. Tell me if you know other native trees that didn't mentioned here (ሌላ ካለ ይጥቀሱ)-

3. What is the current status of these native trees and shrubs in your locality? (ከላይ የተጠቀሱት ሐገር በቀል ዛፎች እርስዎ በሚኖሩበት አካባቢ ያሉበት ሁኔታ ምን ይመስላል?)

Increasing (እየጨመረ ነው)

Decreasing (እየቀነሰ ነው)

4. If your answer is “decreasing” what do you suggest the possible reasons? (መልስዎ እየቀነሰነው ከሆነ ምክንያቱ ምን ይመስልዎታል?)

Deforestation (የደን መጨፍጨፍ)

Unwillingness of planting indigenous trees (የሐገር በቀል ዛፎችን ለመትከል ፈቃደኛ አለመሆን)

Lack of management & conservation of native trees (የሐገር በቀል ዛፎችን ጥበቃ እና እንክብካቤ ማዘን)

Lack of knowledge on how to propagate native trees and shrubs (የሐገር በቀል ዛፎች እና ቁጥቋጦዎችን በችግኝ መልክ ለማዘጋጀት የእውቀት ማዘን)

Seed scarcity of native tree seeds (የሐገር-በቀል ዛፎች እና ቁጥቋጦዎች ዘር እጥረት)

Lack of knowledge on how to raise, plant and establish native tree and shrub seedlings (የሐገር-በቀል ዛፎችን እና ቁጥቋጦዎችን ለማራባት እና ተክሎ ለማሳደግ የእውቀት ማዘን)

Rapid population growth (ፈጣን የህዝብ ቁጥር መጨመር)

Investment & road construction (መሰረተ ልማት እና የመንገድ ግንባታ)

Urbanization (የከተማ መስፋፋት)

Illegal landowning (ህገወጥ የመሬት ወረራ)

Others (ሌላ ካለ ይጥቀሱ) _____

5. What possible measures should be taken to restore native trees? (ከላይ የተጠቀሱትን የሐገር በቀል ዛፎች መልሶ ለማቋቋም መወሰድ ያለባቸው መፍትሄዎች ምን ሊሆኑ ይችላሉ?)

Knowledge on the propagation of native trees (የሐገር በቀል ዛፎችን ለማራባት እና በችግኝ መልኩ ለማዘጋጀት የሳይንሳዊ ዕውቀትን መጨበጥ)

Mobilizing the society to plant seedlings of native trees by developing effective incentive mechanisms such as cutting tax, ensuring tree ownership, providing recognition, etc. (የአካባቢውን ህ/ሰብ ሐገር-በቀል ዛፎችን እንዲተክሉ ማበረታታት፣ ለምሳሌ ግብርበመቀነስ፣ የዛፍ ባለቤትነትን በማረጋገጥ፣ እውቅና በመስጠት፣ ወዘተ)

Educate local people how to propagate, manage & conserve native trees (የአካባቢውን ህብረተሰብ ዛፎችን እንዴት ማራባት፣ መጠበቅ እና መንከባከብ እንዳለበት ማስተማር)

Engaging and incentivizing jobless youth & women by safety net program to care and grow native tree (የአካባቢውን ስራ አጥ ወጣቶች በሴፍቲኔት በማቀፍ እና ማበረታቻ በመስጠት ሐገር በቀል ዛፎችን እንዲተክሉ እና እንዲንከባከቡ ማድረግ)

6. In your locality, the most important native trees are owned by? (እርስዎ በሚኖሩበት አካባቢ ያሉ የሀገር በቀል ዛፎች ባለቤትነታቸው የማን ነው?)

Private (የግል)

Communal (የጋራ)

Governmental (የመንግስት)

Institutional (የተቋማት)

Open access (ለህዝብ ክፍት የሆኑ)

Others (ሌላ ካለ ይጥቀሱ) _____

7. In your locality the current status of native trees is? (እርስዎ ባሉበት አካባቢ ያሉ የሐገር በቀል ዛፎች ያሉበት ሁኔታ ምን ይመስላል?)

Very good (በጣም ጥሩ ሁኔታ)

Good (ጥሩ)

Bad (መጥፎ)

Very bad (በጣም መጥፎ ሁኔታ)

Extinct (እየጠፉ ያሉ)

8. If your answer is “bad “what will be the best option? (መልስዎ መጥፎ ከሆነ ይህን ይህን ለማሻሻል ጥሩ የሚሉትን መፍትሄ ይጥቀሱ)

- Private ownership (የግል ይዘታ)
- Communal ownership (የጋራ ይዘታ)
- Government ownership (የመንግሥት ይዘታ)
- Public open access (ለህዝብ ክፍት የሆነ)
- Others (specify) (ሌላ ካለ ይጥቀሱ) _____

Thank you!!!

አመሰግናለሁ

Interview to the local people regarding the socio-economic importance (e.g., medicinal values) of selected native trees and shrubs found in and around Gondar. (ለጎንደርና አካባቢው ማህበራዊና ስለተመረጡ የሐገር በቀል ዛፎች እና ቁጥቋጦዎች ማህበራዊና ኢኮኖሚያዊ ጠቀሜታ ለማዎቅ የተዘጋጁ የቃለመጠይቅ ጥያቄዎች)

Identification

Region (ክልል):- _____

ZoneI (ዞን):- _____

City/Woreda (ከተማ/ ወረዳ):- _____

1. What is the current status or availability of native trees and shrubs such as *Buddejaipolsytachyai*(አንፋር), *Cordia africana* (ዋንዛ), *Croton macrostachyus* (ምሳና), *Ficus vasta* (ዋርካ), *Juniperus prosera* (የሀበሻጽድ), *Ollea europaea* subsp. *cuspidate* (ወይራ), *Acacia abyssinica* (ግራር), *Ricinus communis* (ጉሎ) *Vernonia amygdalina* (ግራዋ), *Calpurnia aurea* (ድግጣ), *Carissa spinarum* (አጋም), *Dodonea angustifolia*(ከትከታ), and *Euclea divinorum*(ደደሆ) in and around Gondar city? (ከላይ የተጠቀሱት የሐገር በቀል ዛፎች እርስዎ በሚኖሩበት አካባቢ አሁን ያሉበት ሁኔታ ምን ይመስላል?)
2. Which of the above native trees and/or shrubs are peculiar or unique in and around Gondar city? (ከላይ ከተጠቀሱት የሐገር በቀል ዛፎች እና ቁጥቋጦዎች ውስጥ በጎንደርና አካባቢው የተለዩት የትኞቹ ናቸው?)
3. Have any of the trees or shrubs listed above been propagated and cultivated? (እነዚህ የተጠቀሱት ዛፎች እና ቁጥቋጦዎች በችግሻ መልኩ ይዘጋጃሉ ከተዘጋጁበት በኋላ ተተክልዉ እንክብካቤ ይደረግላቸዋል ?)
4. If your answer to question number 3 is “No”, what do you think are the reasons? (ለጥያቄ ቁጥር 3 መልስዎ አይደለም ከሆነ ምክንያቶቹ ምን ይመስልዎታል?)
5. What are the socio-economic importance (e.g., medicinal values) of these native trees and shrubs in and around Gondar city? (ስማቸዉ ከላይ የተዘረዘሩትን የሐገር-በቀል ዛፎች እና ቁጥቋጦዎች ኢኮኖሚያዊ እና ማህበራዊ ጠቀሜታቸውን (ለምሳሌ፣ ለመድኃኒትነት አገልግሎት ይውሉ እንደሆነ) በተመለከተ ምን ይላሉ?)

Thank you
አመሰግናለሁ

Declaration

I declare that this thesis entitled Socio-Economic Importance of Selected Native Trees and Shrubs in and around Gondar City, Amhara Regional State, Ethiopia is my original work and all references used are duly as. It also never been presented in any university for fulfillment of any degree program.

Name: Enyish Tassew

Signature_____ Date_____

This work has been done under my supervision

Name: Proff. Legesse Negash

Signature_____ Date_____