



WOLKITE UNIVERSITY

**ASSESSMENT OF FUEL WOOD DEMAND AND PATTERN
OF CONSUMPTION IN TELLO WOREDA BEGA KEBELE**

PREPARED BY:-

1. ADISU HASSEN ----- 006/10
2. ALIMAZ ADETO ----- 013/10
3. BEDILU G/KIDAN ----- 030/10
4. KINFE FIKADU ----- 073/10

**COLLAGE OF AGRICULTURAL AND NATURAL RESOURCES
DEPARTMENT OF NATURAL RESOURCE MANAGEMENT
SUBMITTED TO IN PARTIAL FULFILLMENT OF THE
REQUIREMENT FOR THE BACHELOR OF SCIENCE (BSC) IN
NATURAL RESOURCE MANAGEMENT**

ADVISOR: MARUF. (MSC)

**WOLKITE
MAY 01, 2014 E.C**

Table of Contents

Acronyms /abbreviations /	III
Tables	IV
Chapter One	1
1. Introduction.....	1
1.1. Background	1
1.2. Statement of the problem	2
1.3. Objective of the study	3
1.3.1. General Objective	3
1.3.2. Specific objectives	3
1.4. Significance of the study	3
Chapter Two.....	4
2. Literature of Review	4
2.1. Wood as energy source	4
2.2. Fuel Wood and Forest Degradation	4
2.3. Fuel wood and Women's	5
2.4. Importance of Fuel wood	5
2.5. Fuel wood used as cooking	6
2.6. Fuel wood and charcoal as primary forest fuel	6
2.7. Factor influencing house hold energy consumption	7
2.8. Implication on socioeconomic and environment	7
Chapter Three.....	8
3. Materials and Method	8
3.1. Study area description.....	8
3.1.1. Location	8
3.1.2. Climate	8
3.1.3. Land Use Pattern	8
3.1.4. Soil	8
3.1.5. Socio economic status.....	8
3.2. Methodology	9
3.2.1. Methods of data collection	9
3.2.2. Methods of data analysis and interpretation.....	9

3.3. Material List.....	9
Chapter Four	10
4. Result and discussion	10
4.1. Fuel wood demand estimation in Bega kebele.....	10
4.2. Frequency of fuel wood collection per week	15
Chapter Five.....	17
5. Recommendation and Conclusion	17
5.1. Recommendation	17
5.1.1. Future recommended studies	17
5.1.2. Limitation of the research	18
5.2. Conclusion	18
REFERENCE.....	19
Works Cited.....	19
Appendix	21

Acronyms /abbreviations /

BKF-----Baga Kebele Farmers Association

FW ----- Fuel Wood

FWD ----- Fuel Wood Demand

FWC ----- Fuel Wood Consumption

H/r ----- Hectare

K.M -----Kilo Meter

HH ----- House Hold

LPG ----- Liquefied Peterllum Gases

Tables

Table 1 the following tables illustrates the daily fuel wood consumption by rich economic stratum ..	10
Table 2 shows the daily fuel wood consumption by poor peoples of economic stratum.....	12
Table 3 shows the daily fuel wood consumption by middle rich peoples of economic stratum.....	13

Chapter One

1. Introduction

1.1. Background

Fuel wood is one of the major sources of energy for cooking and heating in most developing countries. Especially people of poor country which has one economic capacity and electricity accessibility to use other means of alternative energy instead of fuel wood (Dovie.etal, 2004).

Even though fuel wood is the major source of energy in part of developing country like Ethiopia, due to consideration still hasn't given on its sustainable basis of consumption (FAO, 1997).

Countries like Ethiopia, which inspire under Ethiopian context the fuel which issue discourse of energy, obtain primarily from communal or government owned forestland. However as we known own a day the total countries forest coverage declining at high extent from time to time. This resource degradation ears to the in balancement of fuel wood demand and supply.

One of the factors which contribute sits own share forth qualitative as well as quantitative degradation of countries forest coverage is unsustainable exploitation of wood for fuel as a prime source of energy (Broad,head.etal, 2001).

Because of the existence of in balancement of demand and supply of fuel wood. Increase when demand of fuel wood exceeds the supply impoverishment of their source begun to appear.

This situation obliged people to use varies materials like cow dug , straw, ruminants of crops and a source of fuel instead of wood especially in urban section of the country (Dovie.etal, 2004). In addition to the aforementioned out comes of unwise consumption of fuel wood distraction of communal or government owned forestland. In order to meet their fuel wood demand leads to qualitative as well as quantitative degradation of land resource (Eckhold, 1977).

Despite the above listed problem of unsustainable fuel wood utilization or consumption majority of Ethiopia people still do not give attention towards establishing private plantation site surround their home gardens to meet their fuel wood demand still dependency on

communal or government owned forestland is contrived (Ghilardi, A, G, Gverrero, and O. Massera, 2009). So as to address the ways for sustainable consumption theme thud to adopt sustainable use assessing the rate of per capital consumption of fuel wood is advisable and hence this paper relies on assessing fuel wood consumption in south west Ethiopia kafa zone Tello district Bega kebele farmer association (Bari.etal, 1998) (pandey, 2002).

The study area has at total land of 857.375 h/r with a total population of M= 468 F=514 T=982 holes primary income is dependent on crop production since the area is not accessible for electricity, the prime source of energy is fuel which is obtained from wood (PFM, 2002). However wood is considered as the prime source of energy for the residents of this locality, farm communities of the study area still has no privately owned plantation sites.

The highly dependent on two sources for the extraction of fuel wood i.e. from communal forest lands and from trees which released on their farm land in nature (NABU).

1.2. Statement of the problem

Assessment of fuel wood utilization is one of the very important activities in determining the resource (comparing the supply potential of ecology to demand of the users) community as whole. It is quite difficult to comprehend sustainability as well as unsustainability of resources without first determining per capital as well as annum total consumption of resource within a certain specific area identifying the core problem under study also give evidential warranted to the beneficiaries.

Various studies concerning fuel wood consumption has been conducted in different times by different researchers in different parts of developed and developing countries. However in most developing countries like Ethiopia a minimum emphasis as given on addressing the problem be studied on fuel wood consumption.

In order to establish means to measure whether there is sustainable fuel wood consumption or not to support the idea of sustainability or unsustainability conducting fuel wood assessment is important. Because of the above all reasons this paper study proposes to make study on the assessment of fuel wood consumption in Southwest Ethiopia, Kafa Zone Tello Woreda Bega Kebele farmers association. Therefore in this study area there were not past studies that pinpoints out the problem regarding fuel wood consumption, so this paper proposes in giving a certain in sight about the problems related to fuel wood consumption in Southwest Ethiopia, Kaffa Zone Tello Woreda Bega Kebele farmers association.

1.3. Objective of the study

1.3.1. General Objective

- The general objective of the study is to assess the fuel wood demand and pattern of consumption in Tello Woreda.

1.3.2. Specific objectives

- To assess pattern of fuel wood consumption by different individuals in different economic stratum (rich, middle rich and poor)
- To identify tree species Preference for fuel
- To assess their perception the impact on sustainability

1.4. Significance of the study

Resources are the prime source of development in a given country. However a country with ample among of resources may become failed to achieve economic development if they use the existing resources in unsustainable manner for a long period of time.

Before getting into stage of scarcity the level of existing resource should be studied periodically to check whether a community of a given area uses the resource sustainable or not.

One of the significance of this study is in order to assess the level of fuel wood resource and thereby to determine annum total consumption of fuel wood and to ensure weather there is sustainability or not.

Chapter Two

2. Literature of Review

2.1. Wood as energy source

Wood energy has been used for cooking and heating and it remains the prime source of energy throughout much of the world (FAO, 2008); (Gregory.etal, 1999). In addition to wood agriculture residues including gricehusks, straw, corncobs and other farms of biomass are important source of energy as well (Hulscher, 1998); (CIFOR, 2003). Biomass energy is the largest source of renewable energy and accounts for 10.4% of a total global energy supply and 77.4% of global renewable energy supply (Arias and khang, 2008). Fuel wood is by the most important source of biomass energy a sits the primary energy source of more than a billion primarily poo people (Pattanayak.etal, 2004); (Tracons.etal, 2007). Because it's harvesting contribution to forest degradation in many region (Pattanayak.etal, 2004)

2.2. Fuel Wood and Forest Degradation

Fuel wood extraction does not necessary lead to forest degradation (FAO, 1997); (Primer and Macgregor, 2009). However it often leads to forest degradation where demands for fuel wood are high, where forest resources are limited (particularly high elevation and arid environment where plant growth is constrained by climate) and weather alternative energy resources LPG, Kerosene are not available (Gregory.etal, 2004).

It is important to notice that fuel wood is used for both domestic and industrial in both rural and urban areas through our much of the developing world (Dovie.etal, 2004). More than half of world global wood production is non-industrial round wood (Primer and Macgregor, 2009) and fuel wood harvesting is estimated to account forever 54% of global wood harvesting per annual (Bhatt and Sachan, 2003).

Approximately 1.7 billion cubic meters of fuel wood and charcoal were produced in the world in 2004, out of which 0.7 billion cubic meters of fire wood were produced in developing countries (IEA, 2006). In developing countries fuel wood accounts for 80% of all house hold energy consumption (Banskota, 2005). The number of people using fuel wood and other biomass fuels in Africa is projected to increase by 40% between 2000 and 2030 to

about 700 million while in Asia, approximately 1700 million people are expected to rely on fuel wood by 2030 (Arnold and Passion, 2003); (IEA, 2006).

2.3. Fuel wood and Women's

When fuel wood availability is stormily limited or costly food production and consumption can be adversely affected. Furthermore there are gender specific impacts fuel wood collection is generally considered to be women work (FAO, 1997). Thus when forests are degraded and fuel wood supplies limited women must spent more time to gathering wood (Machete.etal, 2007), (Bhatt, BPandM. S. sachan, 2003) estimated that on average women Garhwali Himalayas of Indies spent 55% of their total labor gathering fire wood energy that would otherwise be spent gathering or production food.

2.4. Importance of Fuel wood

In rural areas biomass fuel dominates household energy use with high dependency on locally collected fuel wood. In most rural areas locally gathered fuel wood constitutes the main source of domestic energy. Consequently these users are venerable to changes that affect their access to fuel wood (Singh.etal, 2009). Wide spread and unmanaged harvesting of vegetation for fuel wood and charcoal exceeds biomass growth in many parts of the world and often results in declining supplies and forest degradation (FAO, wood fuel integrated supply./ demand over view mapping (wisdom) methodology., n.d.a); (Haltberg.etal, 2000) not that fuel wood collection can affect future resource availability in two ways one directly when fuel wood harvesting exceeds biomass production (tree growth and yield) and another in directly when harvesting practice adversely affect the health and productivity of vegetation.

Fuel wood gathered from the forested commons is the most important source domestic energy in rural areas of many developing countries (Machete.etal, 2007) also animal dung and other material are also used. Fuel wood is collected from directly forests and fields in the Himalayan region, there are cattle, buffalos sheep and goat which range free on the pasture in this forests whose grow thing may reduce tree regeneration and their by affects future fuel wood supply (Rowel.etal, 2009). In addition the looping of broad lived trees in forests for fodder complicated fuel wood availability (Plisses, 1994).

2.5. Fuel wood used as cooking

About half of the world population cooks with biomass energy which provides around 35% of energy supplies and developing countries (Dovie.etal, 2004). Developing countries account for all most 90% of the world fuel wood consumption with wood being the primary source of energy for cooking and heating (Broad,head.etal, 2001). As fuel wood become increasingly scarce, households may respond by substituting different fuel or by adapting fuel saving technologies (Dovie.etal, 2004) such as more efficient stoves and perhaps event two or three households cooking together (Deweese, P.A., 1989).

However people still need wood to cook and in some areas to heat homes, it is even conceivable that the time spent collecting. May act as a check on deforestation by inducing greater energy efficiency and substitution (Dovie.etal, 2004). Failure to appreciate resource tenure access and control could adversely affect house hold live hood and wellbeing because of the cloth and profound dependency. Many people have non natural resource (Primer and Macgregor, 2009).

This it is essentially to understand pattern and variability in household dependency upon forests for fuel wood in developing policy and management (Pattanayak.etal, 2004). Argue that it is particularly important to have detailed understanding of the contribution of forest fuel to house hold economics and factors influencing house hold dependency on forests including (household wealth). In doing so we are beginning to careful ate relationship between poverty and forest use and explore how social and economic issues impact fuel wood use and management.

2.6. Fuel wood and charcoal as primary forest fuel

Fuel wood and charcoal are the primary forest fuel products and comprise approximately 60% of the world wide wood removals (FAO, 1997). This production increase to over 80% in developing country at peak sat over 90% in sub-Saharan Africa and some south Asia countries. All of which puts considerably pressure on forest on farms and around home resource (FAO, wood fuel integrated supply./ demand over view mapping (wisdom) methodology., n.d.a). Many rural populations consume fuel wood through towns and cities dwellers also consume substantial amounts of fuel wood (FAO, 1997).

2.7. Factor influencing house hold energy consumption

The primary factors influencing household energy consumption are the number of individuals in the households and household income (Barietal, 1998); (Pandey, 2002). Agro ecological practice also influence energy consumption as do sociocultural factors energy consumption differs from place to place for example household in temperate ion use more wood for heating (FAO, 1997) than tropical region where fuel wood consumption also great Erin high elevation areas than in low land respectively of family size (Rowel.etal, 2009).

2.8. Implication on socioeconomic and environment

The environmental effects associated with harvesting fuel wood are highly contentious and in adequately known in many sites. For many years the conventional wisdom assumed that fuel wood harvesting resulted in wide spread forest conversion soil erosion and land degradation with the Himalay a region often cited as particularly impacted environment (Eckhold, 1977).

Other assessments do not substantiate assertion that wood fuel demand exceeds sustainable supplies or that it is a major cause of deforestation (Singh.etal, 2009). Nevertheless adverse environmental and socioeconomic impact canaries from unsustainable fuel wood harvesting and leads to fuel wood shortage and the degradation of natural resource (Ghilardi, A, G, Gverrero, and O. Massera, 2009).

Regarding socioeconomic impacts, fuel wood harvesting that depletes resource supplies can disproportionately impact poor households who are forced to either spend more time collecting fuel wood or pay high prices to buy wood or alternative source.

Chapter Three

3. Materials and Method

3.1. Study area description

3.1.1. Location

This study was conducted in Kaffa Zone Tello Woreda Bega Kebele farmers association which is found at the distance of 29 km from Zonal town of Kaffa. The study areas bordered with Adiyo woreda in the north with Cheta woreda in south with Shada kebele in the eastern with cheta worda in the west part.

3.1.2. Climate

The climate of the study area is categorized into three agro climatic zones according to the Ethiopian agro climatic zone classification.

Dega - 40%

Weinadega - 50%

Kola - 10%

3.1.3. Land Use Pattern

Local communities of the study area repeated pulping for their farmland also to use intercropping and crop rotation as there is scarcity of land per head a farmer possess 0.25h/e of land.

3.1.4. Soil

The soil type of the study area is salty type of soil which is highly prone to erosion. From this rational majority of the study area was highly attacked by natural gully disaster during summer season.

3.1.5. Socio economic status

96% of the study area community's livelihood is dependent on agriculture and 4% of the communities dependent on trade.

3.2. Methodology

The demand and pattern of daily fuel wood consumption was assessed by taking 55 respondents by stratified random sample method from Bega Kebele farmers association (BKFA). Accordingly 55 respondents were provided with a list of open-ended and closed-ended semi structured questions raise.

The 55 respondents were also resolved in to three economic stratum as:-

- Rich
- Middle rich
- Poor based on their economic stratum.

I was provided a list of questionnaires so as to assess the fuel wood (FW) consumption, demand and pattern by the local people of the study areas.

3.2.1. Methods of data collection

The fuel wood (FW) consumption and demand was assessed by taking sample from 55 respondents. An assessment was performed through questionnaires or interview method.

3.2.2. Methods of data analysis and interpretation

Both fuel wood consumption and demand were analyzed and presentation by using descriptive static method (such as mean). This technique was properly applied to assess the fuel wood demand and pattern of consumption in Tello Woreda Bega Kebele.

3.3. Material List

In this study I have used the following materials such as:-

- Notebook
- Pen
- Questionnaire format
- Bag

Chapter Four

4. Result and discussion

4.1. Fuel wood demand estimation in Bega kebele

the demand of fuel wood was estimated by taking sample of 55 respondents from Bega kebele and also I was estimated to resolve the 55 sample respondents 1 into 3 economic stratum –as rich, middle rich and poor was taken as a sample of 9 peoples from rich economic stratum, 21 peoples from poor economic stratum, and 25 peoples from middle rich economic stratum.

From the information I was obtained from sample respondents I will presents the following result on fuel wood consumption demand by categorizing the sample respondents into three economic stratums

Table 1 the following tables illustrates the daily fuel wood consumption by rich economic stratum

House Hold	Daily fuel Wood consumption(kg)	Number of families		
		Male	Female	T o t a l
1	19	3	2	5
2	20	4	2	6
3	21	4	3	7
4	22	4	4	8
5	22.5	4	3	7
6	20	4	2	6
7	19	3	1	4
8	18	3	-	3
9	17	4	-	4

The average daily fuel wood consumption by rich economic strata of sample respondents were also estimated accordingly using the following equation

The estimate the average per head fuel wood consumption by rich peoples of the study area by taking the total fuel wood consumed per day by the whole rich peoples and then by dividing it to the total 9 sample respondents.

The average per head fuel wood consumption = total fuel wood consumed (kg/day)

Total no of house hold

$$= \frac{19+20+21+22+22.5+20+19+18+17}{9}$$

9

$$= \frac{178.5 \text{ kg}}{9}$$

9

$$= 19.83 \text{ kg/house hold/day.}$$

As it has seen in the above table rich person of people in the study locality consumed 19.83 kg of fuel wood per house hold per day.

Totally sample respondents of 9 households consumed a total of $9 \times 19.83 = 178.5 \text{ kg}$ of fuel wood /day.

Table 2 shows the daily fuel wood consumption by poor peoples of economic stratum.

House hold	Daily fuel wood consumption(kg)	T o t a l m e m b e r o f f a m i l y		
		M a l e	F e m a l e	T o t a l
1	1 5	3	3	6
2	1 4	4	1	5
3	1 3	5	1	6
4	1 6	3	2	5
5	1 7	4	3	7
6	1 5	2	3	5
7	1 3	2	4	6
8	1 2	2	2	4
9	1 4	3	1	4
1 0	1 3	4	1	5
1 1	1 4	-	5	5
1 2	1 5	4	2	6
1 3	1 6	4	1	5
1 4	1 4	3	1	4
1 5	1 4	3	2	5
1 6	1 5	2	4	6
1 7	1 3	4	1	5
1 8	1 4	3	1	4
1 9	1 3	2	1	3
2 0	1 2	1	2	3
2 1	1 1	2	1	3

A total of kg fuel wood is consumed per day by all individuals per house hold of poor family of the study locality and also this study shows on average kg of fuel wood was consumed per house hold per day.

The average per house hold (HH) daily fuel wood consumption was calculated by using a formula of

Average daily fuel wood consumption per house hold=

Total daily fuel wood consumed

Total no. of house hold

=15+14+13+16+17+15+13+12+14+13+14+15+16+14+14+15+13+14+13+12+11

21

=293 kg/21

=13.95 kg/house hold/per day consumed in poor peoples of economic stratum.

Table 3 shows the daily fuel wood consumption by middle rich peoples of economic stratum.

House hold	Daily fuel wood consumption in(kg)	Total number of family		
		male	female	T o t a l
1	17.5	4	2	6
2	17	4	1	5
3	18	5	2	7
4	18.5	5	1	6
5	16	3	1	4
6	17	2	4	6
7	18	4	1	5
8	19	5	2	7
9	16	2	3	5
10	17	3	1	4
11	17.5	4	1	5
12	16	2	1	3
13	18	5	2	7

14	15	1	3	4
15	16	-	4	4
16	17	4	2	6
17	18	6	1	7
18	17	2	4	6
19	20	-	6	6
20	19	5	1	6
21	18	1	5	6
22	17	3	2	5
23	16	3	1	4
24	18	2	3	5
25	17	2	2	4

It has seen in the above table that total of 435.5 kg of wood was consumed per house hold per day.

The average of fuel wood consumption per house hold per day in this economic stratum was calculated.

Average fuel wood consumed per house hold per day=

$$\frac{\text{Total fuel wood consumed per day}}{\text{Total no. of house hold}}$$

$$=435.5/25$$

$$=17.34\text{kg}$$

17.34kg of fuel wood was consumed on average per house hold per day.

I was also calculated the total fuel wood consumed per day by the sample respondents of the study area by summing up the amount fuel wood consumed per day by the individual economic strata.

Accordingly the amount of total fuel wood consumed per day was calculated as

Total fuel wood consumed per day is = total daily fuel wood consumption by rich family
+total daily fuel wood consumption by poor family +total daily fuel wood consumption by middle income of family

And hence the total daily fuel wood consumption becomes

$$=178.5\text{kg}+293\text{kg}+433.5\text{kg}$$

$$=905\text{kg per day.}$$

4.2. Frequency of fuel wood collection per week

I was also made an attempt to collect information regarding frequency of fuel wood collection per week in the study area this information helped me to calculate the total fuel wood consumption per week per house hold this in turn guided mean total fuel wood consumption of the local people.

Based on this I have made an interview with sample respondents and I have got the following information on the frequency of fuel wood collection per week per house hold.

Accordingly of the response of sample respondents 30 of sample respondents collect fuel wood 5 times per week and 20 of sample respondents collect fuel wood 6 times per week and 5 of sample respondents collect fuel wood 4 times per week.

I have also obtained the average no. of days in which house hold engaged in fuel wood collection per week per house hold by summing up 3 respondents response and dividing into three.

By doing that I have obtained the following results ,that is the average number of days in which house hold engaged in fuel wood collection per week= $6+4+5/3=15/3=5$ days per week. So on average in my study area households collect fuel wood 5 times per week. I have also converted the no. of days in which a house hold engaged in fuel wood collection per month by multiplying 5 by 4 which is equal to 20 days per month and I have so converted this to annum by multiplying with 12 which is no. of months in year this becomes 20 times 12 is equal to 240 days per days per year. This is no. of days in year in which a family engaged in fuel wood collection again. I have also calculated the daily fuel wood consumption on average from table 1.1 of rich economic stratum and from table 1.2 of poor economic stratum and from table 1.3 of a middle income economic stratum respectively this result shows the average weight of fuel wood collected per times of collection and those it becomes the average weight of fuel wood collected per a time of collection for rich house hold becomes

$$\frac{19+20+21+22+22.5+20+19+18+17}{9}$$

9

= $178.5\text{kg}/9=19.83\text{kg}$ per day per house hold. The average weight fuel wood collection per a time of collection for poor households.

$$= \frac{15+14+13+16+17+15+13+12+14+13+14+15+16+14+14+15+13+14+13+12+11}{21}$$

21

$$= 293 \text{ kg} / 21 / \text{time of collection / house hold} = 13.95 \text{ kg} / \text{time collection / household}$$

Chapter Five

5. Recommendation and Conclusion

5.1. Recommendation

Fuel wood is likely to remain an important source of energy to the residents of Bega. However per house hold fuel wood consumption may decline with the coming of electricity.

Based on the rate of fuel wood consumption I recommended the government to provide other alternative means of energy sources for peoples of surrounding. However wood is a renewable source of energy, it is cheaper more readily available than LPG or other purchased fuels and its use will help Bega peoples becoming its goal achieving carbon neutral.

In the coming long run professionally I recommended the government to put annual fuel wood limit per house hold like it was done in developed countries villages. Now days forest coverage in the area is declining at higher extent from the past one decades accordingly of the information I have obtained from elderly peoples one of the major cases for the reduction of forest coverage in this study area become dependency of local community on forest for the sake of fuel wood, expanding agriculture villagization so as to overcome the rate of destruction.

I was recommended all the concerning bodies to carry out the following responsibilities. The government as government has to continue creating awareness concerning the wise utilization of forest resources and expanding the reforestation programs around the bar areas of the study locality, expanding carbon neutral other means of alternative energy sources (solar).

For the case related to the expansion of agricultural land the government could able to create job opportunities other than agriculture for landless uses by doing this it is to use the existing forest resource on the sustainable bases.

5.1.1. Future recommended studies

This fuel wood consumption assessment in Bega was timely .when the study was conducted electricity was not available but will be provided to the area in the near future and there is a needed to understand and document (quantify) changes in the fuel wood consumption and harvesting patterns in the area in the near future. The historical anthropogenic roles that disturbs Bega ecological resources still not identified and will documented and also continual assessment fuel wood consumption should be made and documented to have evidential comparisonal criteria of variation through times

5.1.2. Limitation of the research

A primary short coming of this research is that the estimate of fuel wood consumption. The estimate fuel wood consumption based on the dried wood (minimum moisture content) and also the estimated of fuel consumed is carried out only summer season.

Thus current biomass may be less than what has been estimated. Fuel wood consumption pattern and demand were also do only in on farmers association that is in Bega.

The estimate fuel wood consumed may vary in the adjacent neighboring farmers association and also I have used a list of questionnaires to assess theaters demand and pattern of fuel wood consumption.

I could not actually weight the fuel wood consumed per day per house hold or per year per house hold. I simply recorded what a sample respondent told to me. So its accuracy will be highly falling to questionable. Other short coming of this research was that when I was classifying the sample respondents in to three economic stratum as rich, middle rich and poor. I didn't any scientific criterion to say rich, middle rich and poor. I was simple used relative comparison on the study area basis this may have its own influence on the result of fuel wood consumed per economic stratum.

5.2. Conclusion

Fuel wood is a critical source wood for heating and cooking for peoples of Bega kebele farmers association. Dependence on fuel wood is not likely to change so on. Like in other locality of the world most of the fuel wood in Bega originates from government owned forests .with a very small amount coming from extraction is unsustainable leads to the loose of forest cover and degradation of land also encouraging peoples to use fuel wood as their main energy sources rather than shifting to more expensive nonrenewable fuels would help the government of Ethiopia desire to achieve its national goal of becoming carbon neutral .

Despite the tremendous importance of fuel wood to have households in most parts of Ethiopia very little is known about fuel wood consumption or bio mass availability growth and yield (potential sustainable harvesting rates) in the wide variety of forest type found through out of the country. Additionally communities and forest specific studies are needed to better understand fuel wood resources use availability and to develop policies to manage this important and renewable energy sources.

REFERENCE

Works Cited

- Ali, J., and T.A. Bentaminsen. (2004). Fuel wood, timber and deforestation in Himalayas: the case of Bashovalley, Baltistan region. Pakistan: mountain research and development .
- An, I.F. Lupi, J. live, M.A. Linderman and J. Huang. (2002). Modeling the choice to switch from fuel wood to electricity for giant panda habitat conservation. In *Ecological economics*. (pp. 42(2002):445-457.).
- Arias and Khang. (2008).
- Arnold and Passion. (2003).
- Banskota, S. a. (2005).
- Bari MND, O. Hall, N.J.D. Lucas and S. M.A. Hossain. (1997). biomass energy use at the household level into two villages of Bangladesh: assessment of field methods biomass and bio energy. .
- Bari.etal. (1998).
- Bari.etal. (1998).
- Bhatt and Sachan. (2003).
- Bhatt, B. and M. S. Sachan. (2003). fire wood consumption along an altitudinal gradient in mountain ill ages of India-biomass and bio energy.
- Broadhead.etal. (2001).
- CIFOR. (2003).
- Deweese, P.A. (1989). the wood fuel crisis reconsidered. In *observation dynamics of abundance and scarcity. world development* (pp. 1159-1172).
- Dowie.etal. (2004).
- Eckhold. (1977).
- FAO. (1997).
- FAO. (2008).
- FAO. (n.d.a). *wood fuel integrated supply./ demand over view mapping (wisdom) methodology*. Food and agriculture organization of the United Nations forest development.
- Ghilardi, A, G. Gverrerro, and O. Massera. (2009). *AGIS based methodology for high lighting fuel wood*.
- Gregory.etal. (1999).

Gregory.etal. (2004).
Haltberg.etal. (2000).
Hulscher. (1998).
IEA. (2006).
khang, A. a. (2008).
Machete.etal. (2007).
NABU. (n.d.). unpublished.
pandey. (2002).
Pandey. (2002).
Pattanayak.etal. (2004).
PFM. (2002). unpublished.
Plisses. (1994).
Primer and Macgregor. (2009).
Rowel.etal. (2009).
Singh.etal. (2009).
Tracons.etal. (2007).

Appendix

A list of questionnaires designed to collect assessment of fuel wood consumption in Bega kebele.

A list of questionnaires developed related to the proposal fuel wood consumption assessment for house hold.

Name of the owner of house holds_____

Sex __age__

Total number of family member, M ____F ____total__

Total area of taxable land _____h/r

Area of land currently occupied by perennial agricultural crops _____h/r

Area of land currently occupied by seasonal agricultural crops ____h/r

Area of land occupied by private plantation ____h/r

Fuel wood

1, what is the sources of fuel wood in the house hold ?

A, natural forest tree B, private plantation

C, others

2, who is responsible for collecting fuel wood in house hold

Boys__girls__mens __womens

3, what is the frequency of fuel wood collection per week in the family? _____

4, the weight of fuel wood collected per one time of collection? _____

5, the weight of fuel wood consumed per day per households?_____

6, do you consume dry _____wet _____parts of wood as a fuel?

7, families intention towards private plantation establishment can be explained as:-

Positively _____negatively _____undefined_____

8, the stratified economic status of house hold

Wealth (rich) _____

Middle rich _____

Poor _____

9, the purpose of fuel wood collection

Commercial _____

Domestic purpose _____

Both

10, what is the number of days per week a household engaged in commercial fuel wood collection purpose/ _____

11, what is the weight of fuel wood collected at a time of fuel wood collection for commercial purpose? _____

12, who is responsible for the purpose of commercial fuel wood collection?

Boys____girls ____ men ____women____?

13, which type of species of wood do they prefer? Why?