

DEFORESTATION AND DEGRADATION  
OF JUNIPERUS PROCERA FOREST  
THE CASE OF NEGELLE BORANA

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The Case of Negelle Borana**

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List of Amharic Words and Abbreviations  
that appear in this thesis

List of Amharic words

- Awraja : The smallest administrative unit in the currently operating administrative hierarchy, since 1989.
- Chikabet : A house, the walls of which are daubed with mud.
- Kebele : ~~The smallest unit in the urban dwellers association.~~
- Kinchib : Finger euphorbia
- Kolla : A climatic zone that ranges between 500-1500m.a.s.l
- Wereda : The smallest administrative unit in the administrative hierarchy that was operating before 1989.
- Woinadega: A climatic zone that ranges between 1500-2300 m.a.s.l

List of Abbreviations

- Eth.c. : According to Ethiopian calendar. Example, 1976 Eth.c. Note that all other years and periods that appear in this paper (without Eth.c.) refer to the Gregorian calendar.
- FAO : Food and Agricultural Organization
- Fig : Figure
- ILCA : International Livestock Centre for Africa
- RDP : Rangelands Development Project
- RRC : Relief and Rehabilitation Commission
- MOA : Ministry of Agriculture
- SORDU : Southern Rangelands Development Unit
- UNDP : United Nations Development Programme

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## ABSTRACT

This is a study of deforestation and degradation of the Juniperus procera forest in Liben Awraja near Negelle Borana, as affected by human settlement and land use.

The Liben area (annual rainfall 750 - 1500 mm) is part of the Semi-arid lowlands of Ethiopia; 60-70 per cent of Liben area is used mainly for livestock raising. Only about 2 per cent of the area can marginally be used for rainfed crop farming. The Woody Vegetation of Liben area includes: the dry upland juniperus forest, woodland, bushland and ticket.

The methodology used included comparative analysis of aerial photos for 1964 and 1984, unstructured interviews among local pastoralists elders and older Negelle town residents, questionnaire survey in Negelle town and direct observation. Results show that, between 1964-84; the Juniperus procera forest around Negelle town has been reduced in size by 65 per cent and degraded. The causes are multifaceted, among of which are: the expansion of cultivation, the exploitation of wood for fuel and construction, forest fire, the immigration of four pastoralist groups and the low regeneration capacity of this forest. The ecological consequences are difficult to assess, however. Decline in ground water level, shortage of surface water during the dry season including the widespread erosion features, such as rills, the deepening and widening of gullies indicate the extent of the ecological impact of deforestation. Recommendations are made for afforestation and conservation programmes.

## CHAPTER ONE

### 1. INTRODUCTION

Forests play a vital part in the life of man, for the social, economic, ecological and aesthetic reasons (Taylor, 1962:1-3; Onweluzo. etal., 1977: 18-30). However, forests are continuously declining, both in their areal coverage and quality. The reasons being numerous and the impacts multifaceted. Deforestation and degradation of forests has become one of the major problem that the developing world is facing; where Ethiopia is one.

Of the total area of Ethiopia (1.2 million km<sup>2</sup>), only about 3 per cent are covered with forest (Hurni, 1986). However, there is no doubt that Ethiopia was a densely wooded and forested country in ancient and not so remote times (Russ, 1944; Mooney, 1959). But the relative land area covered with forest has declined through time. Hurni (1986), indicates that about 40 per cent of the country was forested in ancient times. This declined to 16 per cent in the early 1950's (Hedberg, 1979); 9 per cent in the late 1950's (Mooney, 1959); 8 per cent in the early 1960's (Wolde Michael, 1961) and 4 per cent in 1975 (Hedberg, 1979).

Past and present deforestation in Ethiopia cannot be explained by any single isolated factor. Rather deforestation must be seen as part of the broader development of the national economy. Specifically, increasing pressure of human and live-stock population, unlimited expansion of cultivation and development of urban centers are considered to be instrumental in deforestation (Brown, 1973; FAO, 1986). The rate of deforestation and degradation of the natural forest in Ethiopia is estimated

to be about 1000 km<sup>2</sup> per annum (Eckholm, 1976). The impacts of forest degradation is difficult to assess. However, the changing climatic situation and its unreliability (Mooney, 1959); the decrease in subterranean water level and the drying up of wells and springs resulting in increasing shortage of water during the long dry season (Chojnacki, 1963) and decline in wildlife (Brown, 1973) were among some observed.

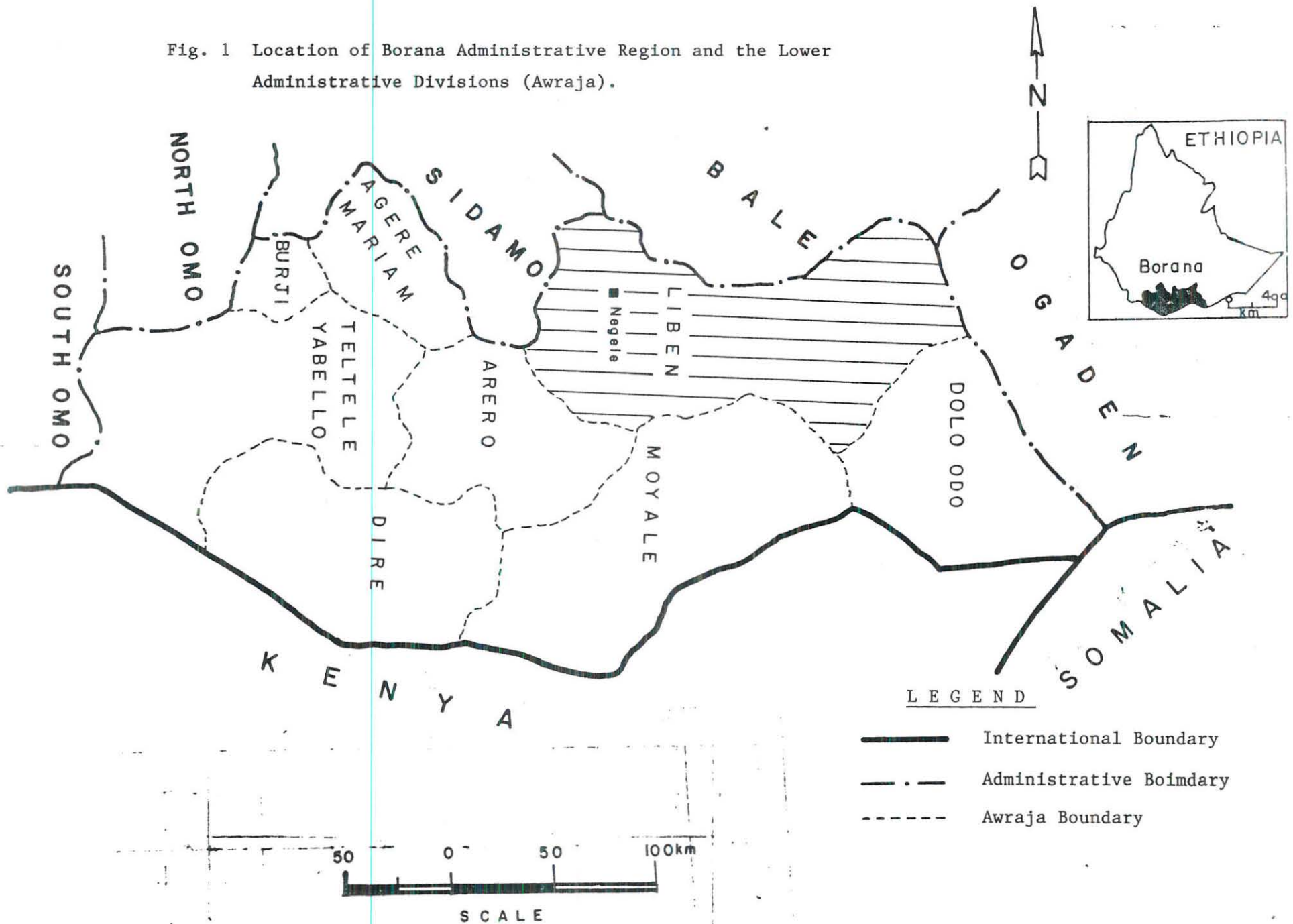
The influence of reduced vegetative cover on land degradation is considerable, in Ethiopia. Estimates indicate that about 900 million tons per year of fertile soil to be eroded and washed away by rain, which is mainly attributed to the absence of vegetative cover (Hurni, 1986). But the total impact of land degradation is unknown. However, the changing of the productive land into badlands, would possibly result in serious ecological damage and economic marginalization of the local people. And it would also further aggravate poverty and famine, due to the fact that the majority of the population being farmers whose livelihood mainly depend on the quality of the land.

Recognizing the problem of forest degradation and its ecological impact, the Ethiopian government has launched some afforestation programmes. That assumed to have contributed to conservation mainly in the highlands by the reclamation and protection of steep and/or severely degraded slopes (FAO, 1986). The natural eco-system of the semi-arid lowland areas is considered delicate. It is thought that disturbance begins with the disturbance of the vegetative cover. And it is also recommended that the main thrust in these areas be conservation rather than rehabilitation (UNDPLRRC, 1984).

However, in Ethiopia little attention has generally been paid by both the government and the people to vegetative conservation (FAO, 1986). Moreover, considering the wide gap between what has so far been done and what remains to be achieved, especially in terms of the current environmental degradation problem in the country, the efforts that have been made are insignificant. Thus, more research work and studies on forest and environmental degradation in general and of the nomadic pastoral regions in particular, are necessary to fill the gap in information and to arouse the awareness of responsible government departments and local communities.

Although a number of studies have addressed the problem of deforestation in Ethiopia, there is very little information about the conditions of forests and woodlands in the areas of pastoral nomadism. The causes and magnitude of forests and woodlands degradation in the semi-arid nomadic pastoral regions of Ethiopia and the ecological impact are poorly understood and require detailed study. This thesis attempts to investigate the causes and magnitude of the deforestation and degradation of Juniperus procera forest and environmental impact in the nomadic pastoral region surrounding Negelle town, in Liben Awraja, Borana Administrative region, Southern Ethiopia (see Fig. 1). The study area covers an area of about 427 km<sup>2</sup> around Negelle Borana (39° 30' - 39° 43'E and 5°9' - 5°23'N), although the focus is mainly on the area covered by Juniperus procera forest (see Figures, 9 and 10).

Fig. 1 Location of Borana Administrative Region and the Lower Administrative Divisions (Awraja).



Source: Adopted from the map showing the new administrative divisions of 1989. Ethiopian Mapping Agency, 1989.

### 1.1 Forests and Woodlands of the Semi-arid lowland areas of Ethiopia

In Ethiopia, 500,000 km<sup>2</sup> or 45 per cent of the total area of the country is designated as rangelands, with 200,000 km<sup>2</sup> of it in the lowlands (International Bank, 1970:8). Most of the lowlands, where nomadic pastoralism is practiced, are receiving rainfall less than 700 mm per annum (UNDP/RRC, 1984:35). Due to this climatic constraint, the larger part of these lowlands cannot support the luxurious growth of tall and thick growing tree species. The regeneration of dryland forests is very slow. Once these forests are degraded or destroyed afforestation may be impossible (UNDP/RRC, 1984:127).

The lowland areas consist primarily of open woodland, savana and deciduous woodlands with dense forests usually confined to river valleys. On account of their biological conditions, the areas might not be suitable for profitable timber production on a large scale. But they are suited best for the production of high quality wood for construction and furniture. Therefore, bearing in mind the present problem of forest resources of the country, these areas can be profitably included as supplementary sources of income in the productive forest area (Wolde Michael, 1961:5). Moreover, forests and woodlands in these nomadic pastoral regions are as important for the ecological balance as in the highlands and also to the economy of pastoralists. Grove (1977:60), while explaining the significance of forests and woodlands in these semi-arid pastoral areas, writes:

"...It provides foodstuff for animals and man. It brings up nutrients from below that are released to the base-poor sandy soils from the decaying leaves and from the substances washed off the leaves. It breaks the speed of the wind, reduces the rate of erosion, and provides shade for man and beast. Not least, it has an aesthetic value in improving the appearance of the landscape."

However, it is noticed that forests and woodlands in these areas undergo degradation due to various reasons. Livestock development have been launched in many nomadic pastoral regions ( World Bank, 1975: 6-8). This has resulted in the increase of both human and livestock population pressure on pasture land. Moreover, the spread of agriculture and the growth of urban centers has increased the pressure on pasture land, which has accelerated the deterioration of forests and woodlands (UNDP/RRC, 1984: 124-125).

In the Southern Rangelands of Ethiopia, specifically within the Borana region, where the study area for this paper is situated, there is considerable competition for land and range resources by outsiders. Especially this is intense in areas of relatively higher altitude and better rainfall, with better pasturelands and certain potential to support agriculture. This has resulted in shrinkage of the nomadic pastoral areas and deterioration of the resource base. According to the study reports of AGROTEC (1973:10) and UNDP/RRC (1984:116), this competition for land and expansion of cultivation is particularly serious around the towns of Negelle, Yavello and Teltele. All of them have a well distributed rainfall due to relatively higher altitudes (about 1600m ). These areas were once covered with

forests and woodlands, which are now in a state of degradation as a result of tree and shrub felling to allow temporary cultivation (AGROTEC, 1973:37-8). They are also affected by the growth of the urban centers.

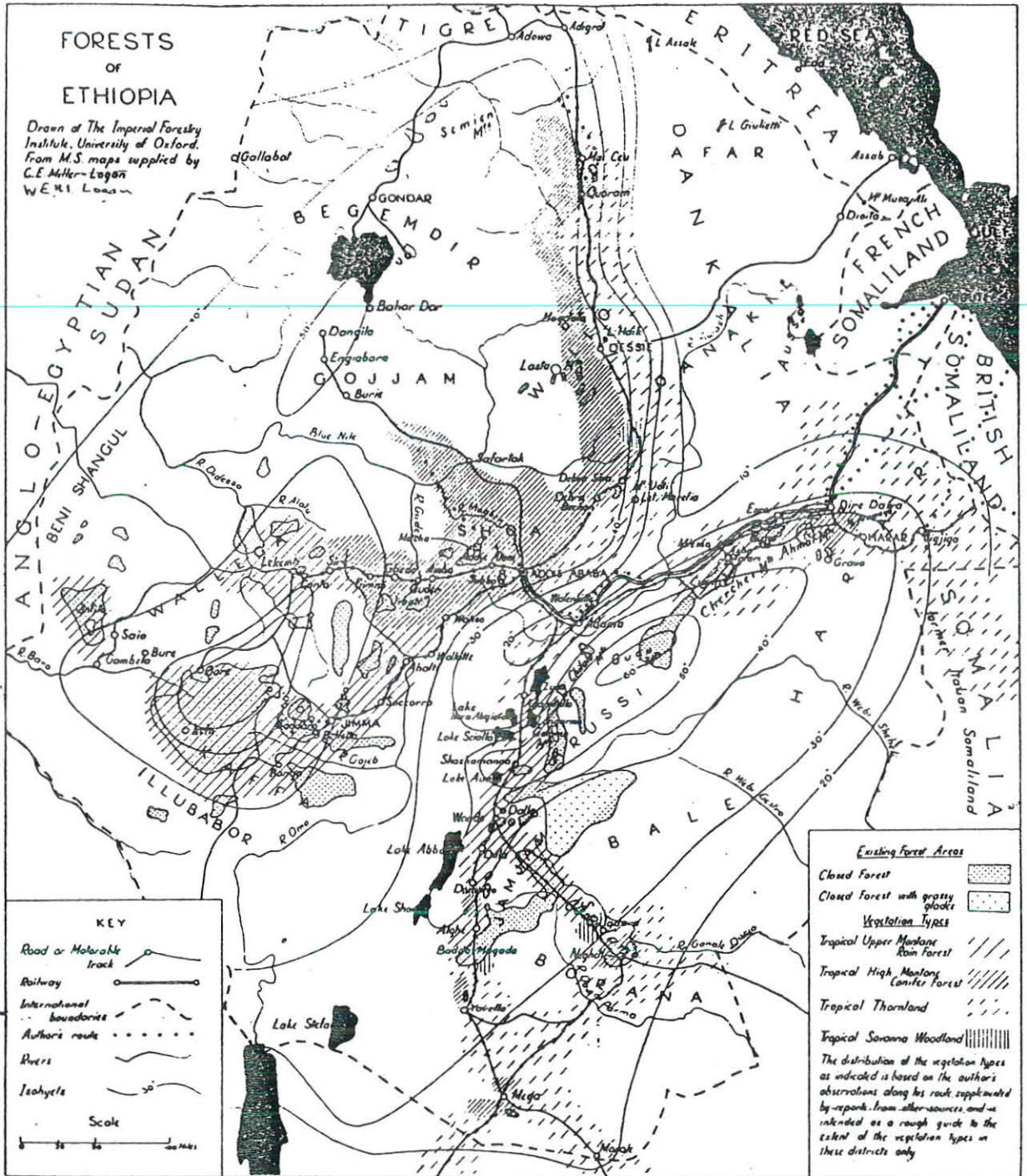
For a close study of environmental deterioration, it is perhaps more convenient and practicable to focus on a few problem areas especially those demanding immediate attention. Therefore, the focus of this study centers on the following.

1.2 Problem: the deforestation and degradation of the Juniperus procera forest around Negelle town

Study reports by AGROTEC (1973:37-8) and Haugen (1991), indicate that Liben Awraja of Negelle area is facing a considerable deforestation problem. Especially, the Juniperus procera forest in association with other tree species that were covering the area around Negelle town has declined significantly during the last several decades through unplanned accelerated cutting, felling and burning for various purposes. This was one of the areas of the country that once had untouched and preserved closed forest (see the map in Logan, Fig.2). According to Logan (1946:33), Juniperus procera, formed almost pure stands in this area in the 1940's.

Liben Awraja was traditionally settled by the Borana, but has been subject to recent immigration by four other ethnic pastoral groups, the Guji, Arsi, Marrihan and Digodia. This has resulted in competition over the pastureland. Moreover, the high and ever increasing size of livestock population of the

Fig. 2 Forests of Ethiopia, by Logan(1946)



region (AGROTEC, 1973:10), combined with unreliability of rainfall recorded between 1953-71 (AGROTEC, 1974b:8), climaxed, by a catastrophic drought in 1973-5 (Helland, 1980:50), contributed to massive and severe degradation of pasture. That eventually led to increased pressure and exploitation of the forests for grazing purposes through grazing, cutting and felling.

Moreover, the personal examination and observation of the area by the writer for a long period (Negelle town being his place of birth and residence of his parents) has confirmed increasing intensity of land use under cultivation, especially around the fringes of the town of Negelle. There are thus two incompatible phenomena. On the one hand, there is the growth and concentration of urban population with ever expanding needs (for agricultural products, for wood for building, heating etc). On the other hand, there is the deterioration of a declining resource base of the pastoral land through grazing, cutting and felling of forested areas by all local pastoralist groups.

This situation is further aggravated by the government policy, which resulted in the conversion of traditional Borana pastoral areas into ranching and some other modern activities, such as an air base (landing strip) and military training centers, taking away land from Borana pastoralists or even driving them away. This competition for land increases the pressure on the grazing pasture and may eventually lead to the destruction of the remaining natural vegetation cover.

Reference to oral and written traditions, besides personal observation, clearly reveal the extent of degradation and disappearance of the natural forest from this region during the course of several years. The present forest cover is much less dense and covers a smaller area than it covered in the past. Thus, it poses the question of the magnitude of deforestation, when this deforestation will be completed and what the ecological consequences will be.

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## CHAPTER TWO

### 2. Objectives of the study and methodology

#### 2.1. Objectives of the study

The major objectives of the study is to assess the causes and magnitude of deforestation around the town of Negelle in Liben Awraja. Specifically to study the magnitude of deforestation caused by urban and surrounding pastoral people and other factors. In addition, an attempt will be made to examine the adverse ecological consequences. General physical and cultural landscapes will be discussed in relation to Liben Awraja.

The specific objectives of the study can be summarized as follows:

- 1- To briefly assess the settlement history, since the Italian invasion of Ethiopia, of the Borana, Guji, Arsi, Marrihan in Negelle area of Liben Awraja.
- 2- To assess the causes, magnitude and some effects of deforestation around Negelle town, for the period 1964 and 1984, in relation to pastoralist and urban land use.
- 3- To assess the efforts made by different government and non-government organizations to control deforestation in the study area.
- 4- To make suggestions and recommendation based on the findings.

#### 2.2. Significance of the study

The paper intends to make some contribution to a better understanding of the following environmental and development

issue: As cited in the pastoral literature (Monod, 1975:103-10), one of the main reasons for the ecological deterioration in the semi-arid pastoral areas is the destruction of forests and woodlands. Moreover, it is unlikely that the governments and communities concerned in many African nomadic regions, including Ethiopia, can afford or are able to slow down the ever increasing ecological deterioration (Grove, 1977:62). One possible solution, as argued by many, is to regulate the felling of trees and to preserve forests and woodlands (Grove, 1977:63; Hepper, 1977:106). Therefore, knowledge of the history and process of forest degradation in Liben Awraja-Negelle area, may be useful for conservation and afforestation programmes.

Little or no effort is made to protect the forests in Liben-Negelle area. The paper will therefore attempt to recommend a possible solution to the problem of deforestation, with a view of forest protection and ecologically balanced use in the study area. Thus, it tries to indicate the means by which an integration of overall public use and forest preservation may be attained in cooperation with government and non-government organizations and the communities involved.

Therefore, based on the objectives, the following hypotheses were formulated.

1- There is a significant change in the areal coverage of the Juniperus procera forest between 1964 and 1984 and there is little or no forest remaining in the study area.

2- It is impossible as well difficult to explain the depletion or degradation of the forest cover in the study area by any single isolated factor, rather it is the result of the interplay of various natural and human influences.

3. The degradation of the forest cover in the study area has a negative impact on the local ecology.

4. There is little or no effort made by the concerned government organizations to protect the forest resources in the study area.

### 2.3. Data sources and methodology

In order to achieve the objectives of the study, the following methods and techniques of obtaining data and analysis were used.

#### 2.3.1 Primary data

##### 2.3.1.1 Aerial photos

Two panchromatic black and white stereo air photos for the years 1964 and 1984, on a scale approximately, 1:50,000 and produced by the Ethiopian Mapping Agency, were used to appraise the changes in the physical and cultural landscapes that have occurred in the study area. A photo mosaic was prepared using the aerial photos for these two dates covering the study area, by the Ethiopian Mapping Agency. Using these photo mosaics, the following maps were prepared.

1- Two land use maps, scale, 1: 50,000, corresponding to the years 1964 and 1984 were prepared to study the changes in the land use pattern in the study area.

2- Two maps, scale, 1: 50,000, showing the forest cover were prepared to evaluate the changes in the forest cover during the 20 year period under investigation.

3- In the preparation of these maps, the 1: 50,000 topographical maps covering the study area, produced by the Ethiopian Mapping

Agency in conjunction with the aerial photos were used. The aerial photos were used as a base level from which to establish changes. And the topo maps were used to provide the vertical and horizontal control points that were tracked on the aerial photos and marked. The original maps, scale, 1:50,000, were reduced by half and a 1:100,000 scale maps that fit in a paper size were produced.

4- Measurements of areas (forest land, farmlands and urban built up areas) were made for the two periods using planimeter.

#### 2.3.1.2 Interview methods

Unstructured interviews were held with selected informants both in Negelle town and the pastoralist groups. The method involves personal interaction of the researcher, face to face with the informants using interview guides and interpreters, where necessary. The interview guides were used as a reminder of the subjects that should be covered. Even where specific lists of questions were used, the researcher was not restricted to the lists and was free to ask additional questions, to repeat questions, and to move off into tangents that show promise of providing information useful to the purpose of the research and likely to help answer the research question (Dalen, 1979:159-60). During the interview the researcher used to jot down the important points and write it out immediately after the interview was over.

Potential respondents in possession of information important for the research were selected from the five pastoralist groups and older town residents, using the deliberate sample selection technique as described by Fox (1969:340).

In order to find and select knowledgeable informants for the research, the writer used his personal contacts with and knowledge of the people in the study area. It was impossible for the writer to have a larger sample due to time and resource constraints. However, intensive interviews were made with thirteen informants of the different pastoralist groups, including three people from each group, except the Digodia. Likewise, intensive interviews were also held with six selected older town residents. The researcher also made a brief and informal discussion, in groups and on an individual basis, with a number of ordinary people from all pastoral groups and older town residents. Accordingly:

a) Interviews were made with elders of all tribal groups (Borana, Guji, Arsi, Marrihan and Digodia), in order to get information about tribal territorial occupations, expansions and encroachments on one other's territories, including underlying motivations and ecological and socio-economic consequences. The oral data and written materials were cross-checked for reliability of informants and chronology and authenticity.

b) Interviews were carried out among knowledgeable older Negelle town residents (retired soldiers, retired civil workers and indigenous) to study the land use, related to forest utilization, of the urban people around the fringes of the town and the causes and history of deforestation in the study area.

#### 2.3.1.3 Questionnaire method

A questionnaire survey was carried out in Negelle town to obtain information about the use of fuelwood, charcoal and construction materials, including the sources of fuelwood and

charcoal and changes in price over time and other infromations relevant to the study. Thus, a pre determined sample of 150 households, out of the total 2,300 dwelling houses of Negelle town were selected. That is, about 6.5 per cent of the dwelling houses found in Negelle town were included in the sample. In this sample, government buildings and other non-residential quarters were ignored.

A systematic sampling technique was employed to determine the samples. That is the 150 samples were distributed proportional to the size of the dwelling houses found in the five 'kebeles' as follows:

Table : 1 Distribution of sample households by  
kebele in Negelle town.

'Kebele'	No of dwelling houses	% of total	household sample share
01	412	18	27
02	577	25	38
03	434	19	28
04	598	26	39
05	279	12	18
Total	2,300	100	150

Source:- Author's calculation based on information obtained from the Negelle City Council.

The samples from each 'kebele' were selected based on the total number of the dwelling houses and the sample share to each 'kebele' In so doing, all dwelling houses in each 'kebele'

(leaving out the non-residential quarters), were recorded sequentially (taking note of the 'kebele' house number), and a serial number was assigned to each house. The initial sampled house was determined by dividing the total number of dwelling houses found in each 'kebele' by the number of the sample share to the respective 'kebele'. The calculated value was rounded to the nearest lower number leaving out fractions. And this was tracked on the sequentially arranged dwelling houses using the serial number. The remain sampled dwelling houses were determined by simply doubling, tripling etc, the initial sampled dwelling house serial number. And the corresponding dwelling houses were selected. This procedure was repeated until all samples in each 'kebele' were included.

Five, out of a job, high school graduates were used for enumeration. They are selected taking note of their previous experience in enumerating and acquaintance with the respective 'kebele' assigned. However, about a four hour orientation was given on the objectives of the research, nature of the different items in the questionnaire and the procedure that should be followed. They also made a preliminary practice, filling two questionnaires each. Based on this further discussions and clarifications were made pointing out the errors and the problems encountered. Then the final survey work was carried out.

### 2.3.2 Secondary data

a) Documents were reviewed and interviews made with the Liben Awraja Ministry of Agriculture, the Southern Rangelands Development Unit and 'Mekane Yesus' Development Center in Negelle. These organizations, all of which are concerned with forest and

forest products, their conservation and extraction, including rural development, were used to examine and study their activities, problems and achievements in the study area.

b) The Central Statistical Authority (CSA) publications were reviewed to obtain information on population of Negelle town. Documents of the Negelle town City Council were used to get information about the past history of Negelle town and the number of dwelling houses in the town, during the period of field survey. Climatic data for Negelle town was obtained from the National Meteorological Service Agency.

c) Various reports and books were reviewed in the libraries of the Institute of Ethiopian Studies (IES), Institute of Development Research (IDR), Kenedy main library (all three are in Addis Ababa University), Ministry of Agriculture (MOA), International Livestock Center for Africa (ILCA). That were important sources of information on the nature and history of the study area, including other relevant and substantial ideas to the study. The review was carried out since the preparation of the proposal.

### 2.3.3 Methods of analysis

Data obtained through the above mentioned methods were described and analysed using various maps, diagrams, tables and appropriate statistical techniques such as percentages and coefficient of variation (Cv).

In order to study the changes through time in settlement pattern of the Borana, Marrihan, Guji, Arsi and Digodia, different maps and diagrams were prepared. The causes and implication of

these changes were described and analysed in relation to deforestation.

To assess the magnitude of deforestation between 1964 and 1984, two land use and forest cover maps were prepared. Then using the planimeter the area covered by the different land use types and forest were measured for 1964 and 1984. Thus changes in forest cover between the two periods were evaluated against pastoralists and urban land use. In so doing distribution data was presented in tables.

For evaluating long-term changes in urban growth and influence on deforestation four types of measurements were made, namely: 1) The actual growth of Negelle town in physical size between 1964 and 1984. 2) Increase in population size between 1968 and 1991. 3) per capita fuel consumption and changes in fuel prices for Negelle town. 4) And, the relationship between growth of Negelle town and deforestation was evaluated and analysed indirectly using tables and percentages.

The climatic data (rainfall and temperature records for Negelle town, between 1953-89) were analysed using coefficient of variation (Cv) and graphs. That was used to assess the extent of the variability of the average rainfall received during the different periods, including the relationship between the rainfall amount and temperature. Thus, using the finding and relating it with the degradation of forest, an attempt was made to describe and deduce the impact on the local ecology, mainly soil erosion and hydrological changes, in the study area. The activities of the local government and non-government organizations

concerned with forest and forest products, their exploitation and conservation, including rural development was evaluated based on their performance against the outcome in the study area. This is described and analysed in terms of their influence on forest degradation.

Finally, based on the above findings suggestions and recommendations were made indicating the tendencies in resource use and misuse; and appropriate measures that should be taken to reverse recent trends in forest resource exploitation.

## CHAPTER THREE

### 3. Background of the study area

#### 3.1 The physical setting

##### 3.1.1 Location

The area under study constitutes part of Liben Awraja of Borana Administrative Region, in Southern Ethiopia. The Awraja occupies the north-eastern part of the Borana Plateau (see Fig.1) According to the administrative framework used until 1989, Liben was a Wereda within Borana Awraja, having a total area of 27,546.01 km<sup>2</sup>. But, after the new administrative division of 1989, Liben became one of the eight Awrajas of the Borana Administrative Region. Negelle town, the administrative centre of Borana Administrative Region is situated in Liben Awraja. It is 595 kms, south-south-east of Addis Ababa. The study focuses on the area reported as closed forest around Negelle town.

##### 3.1.2 Relief and drainage

Liben Awraja consists of a rolling plain sloping towards the south, south-east and west. Altitudinally, it lies between 300 meters and 1700 meters, with several peaks reaching more than 2000 meters. Only a small part of the region falls below 300 meters, mainly in the extreme south. Areas above 1700 meters are limited to the northern part of the region. However, the larger part of the region can be classified under 'kolla', most of which is within the upper 'kolla' range (750-1500m). Though small and limited in area, the north and north-western parts, including the area surrounding Negelle, fall within the lower 'wainadega' zone (1500-1800m).

Liben Awraja is drained by the Genale and Dawa river systems, which define the northern and southern boundaries, respectively. The tributaries which collect the surface run-off during rainy seasons are insignificant and non-perennial, forming mostly wide gullies.

### 3.1.3 Climate

The climate of Liben Awraja, like any other part of the country, is influenced by its location and altitude. In this sub-tropical region, rain falls during two distinct seasons, which are for the Horn of Africa linked with the monsoon and trade winds. The temperature is high most the year. However, the area experiences relatively low temperatures during the dry season and higher temperature during the rainy seasons (see Table-2 and Fig.3).

Table : 2 Summary of monthly averages of rainfall and temperature for Negelle town (1953-89).

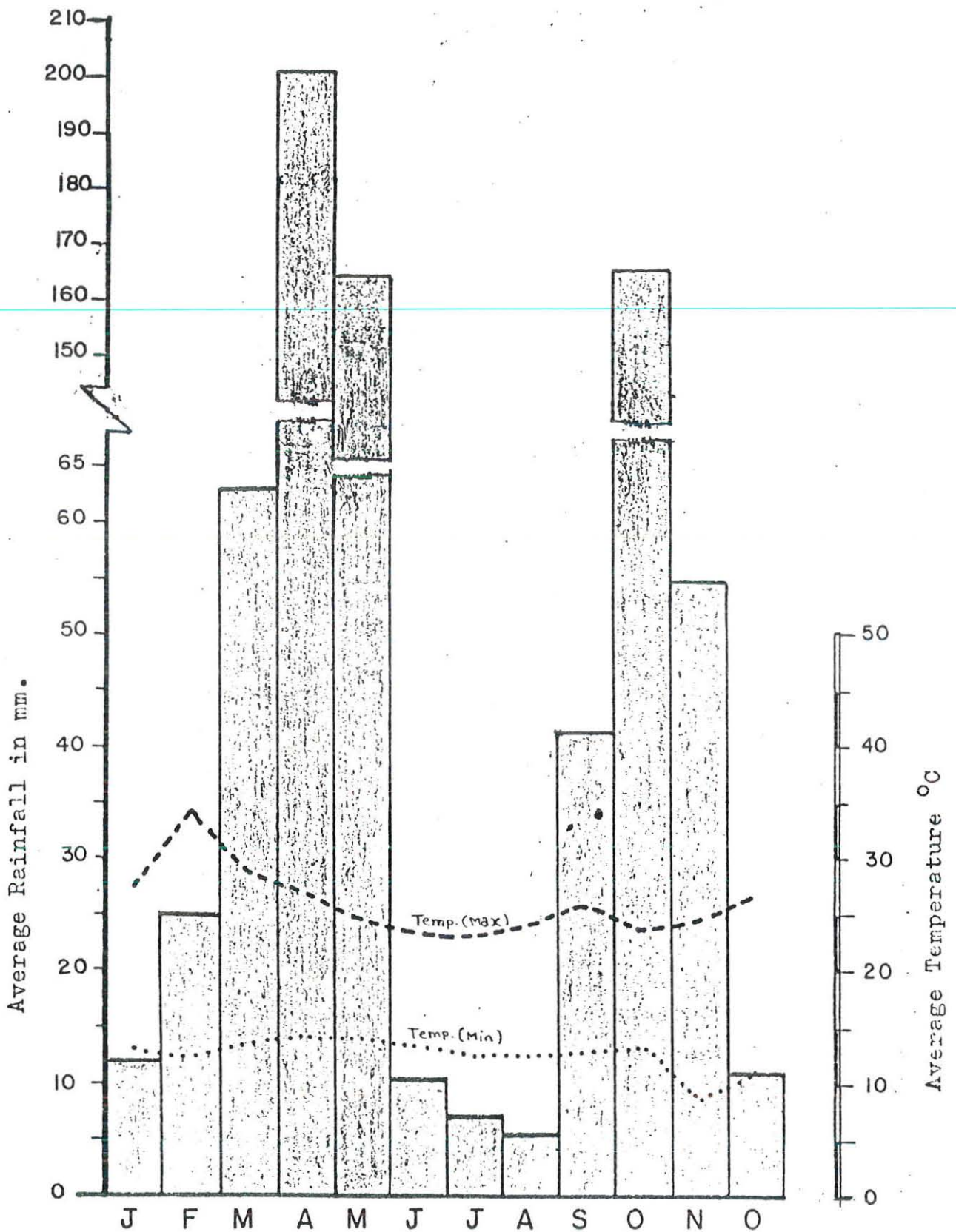
Months	J	F	M	A	M	J	J	A	S	O	N	D	
R.F (mm)	12.1	25.0	63.0	208.3	164.2	10.4	7.2	5.6	41.3	165.8	54.5	10.9	
Temp (°C)	Min	13.0	12.6	13.6	14.4	14.0	13.4	12.7	12.5	12.9	13.3	8.6	10.9
	Max	27.4	34.2	28.7	26.8	24.3	23.2	23.0	24.0	25.8	23.7	24.6	26.8
	Aver	20.2	23.4	21.2	20.6	19.2	18.3	17.9	18.3	19.4	18.5	16.6	18.9

Source:- National Meteorological Service Agency (1953-89). Addis Ababa.

#### 3.1.3.1 Rainfall

According to the study reports by AGROTEC (1973:4) and Helland (1980-56), the rainfall in the area ranges from less than 500mm in

Fig. 3. Summary of monthly averages of rainfall and temperature for Negelle town (1953 - 1989).



Source: National Meteorological Service Agency (1953-89). Addis Ababa

the south, south-west and east to over 700 mm around Negelle, generally in accordance with the higher altitude. The rainfall pattern is bimodal, with the main rains ('ganna' in Oromo) from March to May/June and the secondary rains ('haggaya') from September to November. The period from June to September ('adolessa') is characterized by heavy cloud cover, fog, mist and occasional showers. The main dry season ('bonna' or 'bonhaggaya') extends from November to March. Meteorological data at Negelle indicates that 50 percent of the total annual rainfall comes in the 'ganna' period and nearly close to 40 per cent during 'haggaya' (see table 2 and Fig.3).

#### 3.1.3.2 Temperature

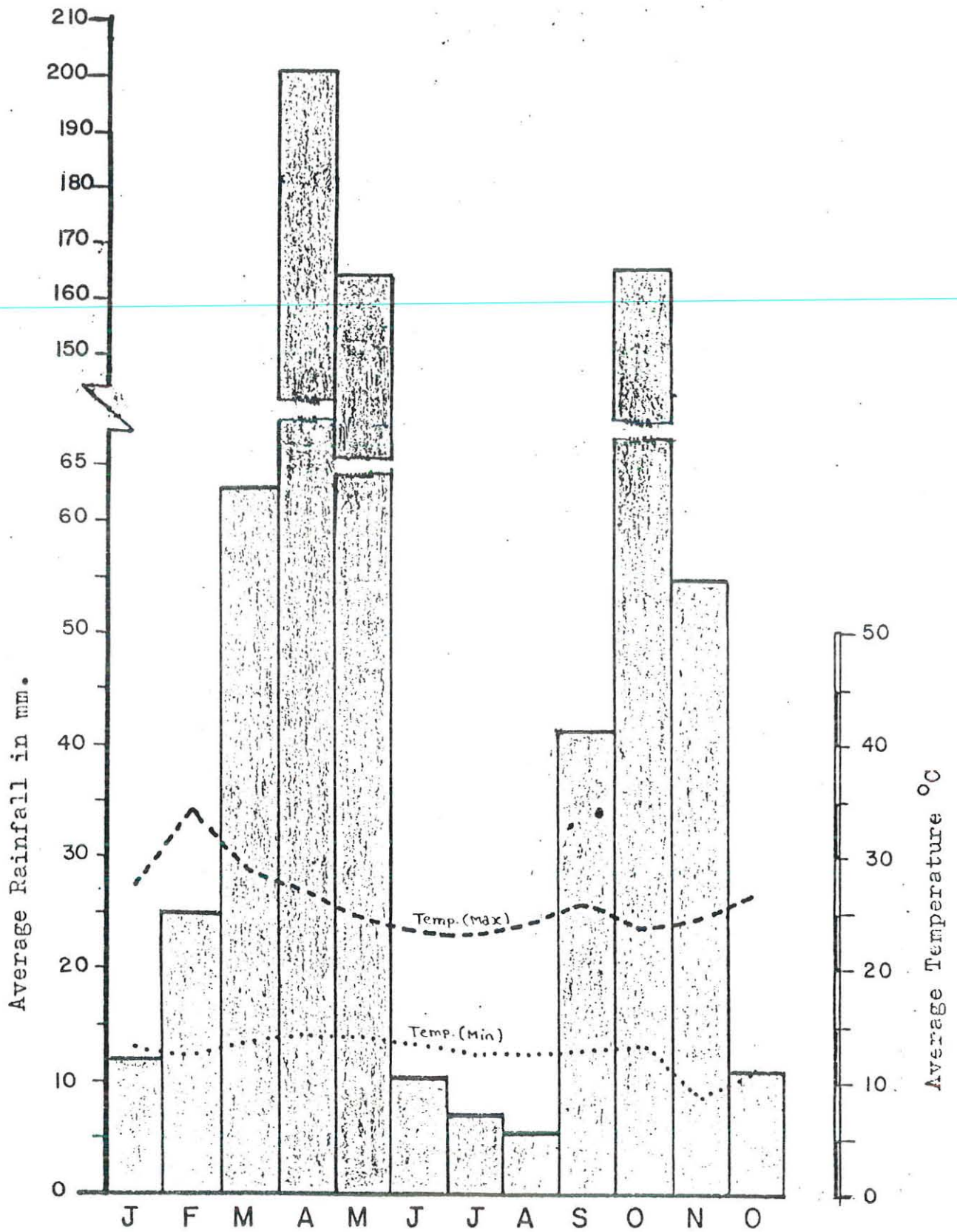
Taking note of average temperatures recorded in Negelle, the monthly averages are at their maximum in February-March and at their minimum in June-August and November. Average monthly maximum temperatures reach a peak in February and of minimum in November (refer to table-2).

In addition, temperature is inversely related with elevation. Thus, as a result of altitudinal variation, average daily temperatures vary between 20.0 and 23.2<sup>0</sup>c during the year and annual maxima and minima are 25.3<sup>0</sup>c and 11.17<sup>0</sup>c, respectively in different parts of the Borana region (ILCA/RDP, 1983:1).

#### 3.1.4 Soils

The study report by AGROTEC (1973:10), notes that the soils of Liben area are largely developed on parent materials of a metamorphic complex overlaid with basalt flow. Lithosols, on mountainous ranges, have developed from the metamorphic complex.

Fig. 3. Summary of monthly averages of rainfall and temperature for Negelle town (1953 - 1989).



Source: National Meteorological Service Agency (1953-89). Addis Ababa

The parent rock generally occurs within 30 cms of the surface. Surface layers are not well stratified and are rich in coarse elements. These soils occur on a rough terrain and suffer severe erosion. The bottom landscape is to a great extent dominated by dark vertisols. The soils in general have a good base supply, but fertility is often limited due to low proportions of organic matter and lack of phosphorus (Haugen, 1991).

### 3.1.5 Natural vegetation

The vegetation of the study area is not well studied. However, Haugen (1991) has made a brief inventory of the woody vegetation of the Borana region. He divided the woody vegetation into four major types. This includes forest, woodlands, bushlands and tickets, that encompasses various tree species.

The forest, mainly the dry upland juniperus forest, is found at altitudes above 1600m. This is limited to small areas, mainly in the vicinity of Negelle town. The dominant tree species in this forest is Juniperus procera. Olea africana is also common in this association. The woodlands are mostly found in the northern parts of the region, forming a transition zone between the Podocarpus - Juniperus forests of Wadera in the north, and the lowland bushland vegetation in the south. The dominant tree family are Mimosoideae and Combretaceae. The most common Combretum species is Combretum molle that covers great parts of the plateau-land between 1200-1600m. Terminalia brownii is a sub-dominant species, while Cussonia holstii, Pappea capensis and Fiscus species are common in this association. Depressions

are often vegetated with Acacia seyal. Acacia drepanolobium often forms almost pure stands on poorly drained soils of valley bottoms. Acacia goetzei reaches great dimensions in valleys of well drained soil, particularly at higher locations. A major part of the Borana region can be classified as deciduous bushland. The dominating genera are Acacia and commiphora. The dominant acacia species are Acacia bussei, Acacia nilotica and Acacia tortilis. Minor acacias are common at most locations, often forming nearly impenetrable thickets (Haugen, 1991). The English and local (Oromo) names of the above plants are given in Table-3.

Table : 3 Some major trees found in Liben Awraja

Scientific names	English names	Local names (Oromo)
<u>Juniperus procera</u>	Juniper	hindes
<u>Olea africana</u>	wild olive tree	ejersa
<u>Podocarpus species</u>	East African yellow Wood	birbirsa
<u>Combretum molle</u>	Not available	bik'a
<u>Terminalia brownii</u>	Brown's myrobalan	baresa
<u>Cussonia holstii</u>	Not available	abratu
<u>Pappea capensis</u>	Not available	pika
<u>Ficus species</u>	Fig, sycomore fig.	k'ilt'a
<u>Acacia seyal</u>	Seyal acacia	wach'u dimo
<u>Acacia drepanlobium</u>	Black galled acacia	Not available
<u>Acacia goetzei</u>	Not available	Not available

Acacia bussei	Not available	halo
Acacia nilotica	Egyptian mimosa	not available
Acacia tortilis	Umbrella tree	dadach

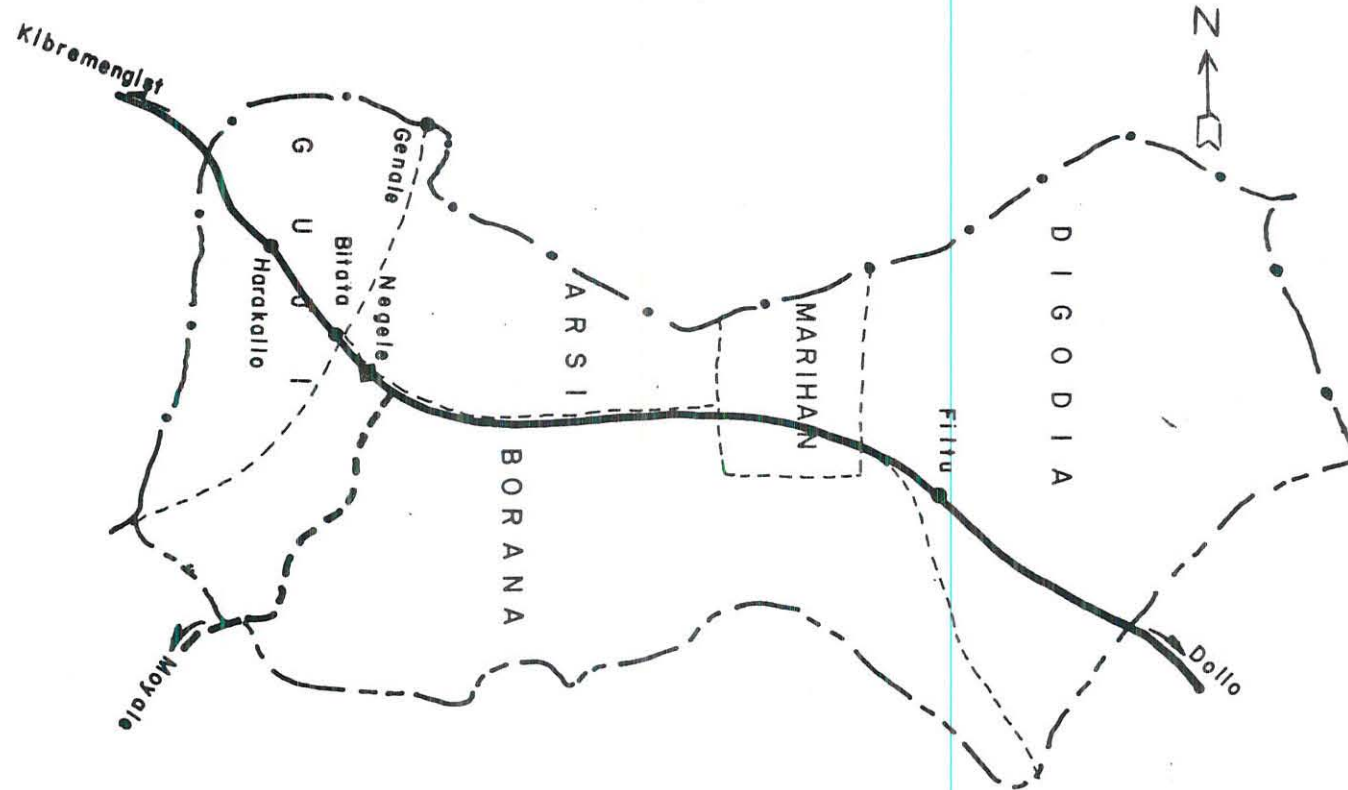
Source: Haugen (1991). Woody Vegetation of Borana, Southern Ethiopia: A study on the main vegetation types of the area. (unpublished). Negelle Borana. And Wolde Michael (1987). A Glossary of Ethiopian plant names. Addis Ababa.

### 3.2. Population and settlement






#### 3.2.1 The people

Liben Awraja is settled by different ethnic pastoral groups. The largest groups are the Borana, Arsi, Guji, Marrihan and Digodia (see Fig-4 ). The former three are Oromo speakers and the latter two Somali speakers. Two minor groups, the Geri and Gura (both Oromo speakers), are found dispersed within Borana and Arsi territory, respectively. The Awraja has a total rural population of 44,379 which are organized in 46 peasant associations. Their distribution is shown in Table-4.

Fig. 4 The present approximate Territorial Occupation of the Pastoralist Groups in Liben Awraja.



LEGEND

-  All Weather Road
-  Dry Weather Road
-  Administrative Region Boundary
-  Awraja Boundary
-  Tribal Boundary

20 0 40 80 120 km

SCALE

Source: Office of Liben Awraja Ministry of Agriculture, Negelle, 1991.

Table : 4 Distribution of rural population by ethnic group, size of area used and population density in Liben Awraja.

Ethnic group	No of P.A.S	Total Population	% of total	Approximate area in km <sup>2</sup>	Density 1km <sup>2</sup> of population
Borana	13	11,231	25.31	9815.0	1.14
Guji	19	17,709	39.90	3415.0	5.19
Arsi	6	5,889	13.27	3235.0	1.80
Marrihan	1	1,270	2.86	1505.0	0.84
Digodia	7	8,280	18.66	9576.0	0.86
Total	46	44,379.	100.00	27,546.0	1.61

Source:- Liben Awraja Ministry of Agriculture Office, 1991.

Area is measured by the author from the map (Fig-4)

Note: The minority groups, Gura and Geri, are included with the group to which they both occupy or share territory.

Of the total rural population, the Oromo speakers, Borana, Guji and Arsi, together constitute about 78.5 per cent; while the Somali speakers, Marrihan and Digodia, represent 21.5 percent,

The crude rural population density for Liben Awraja is about 1.6 persons per km<sup>2</sup>. That is about twenty one times lower than the national density for 1984, 34.4 persons per km<sup>2</sup> (C.S.O, 1984).

There is variation within the different groups, ranging approximately between 5.2 persons per km<sup>2</sup> for the Guji, to 0.84 persons per km<sup>2</sup>, the Marrihan (refer to Table-4).

The only recognized urban center in the Awraja is Negelle town. which had a total population of about 18,376 during the field survey in January, 1991 (Office of the Negelle City Council).

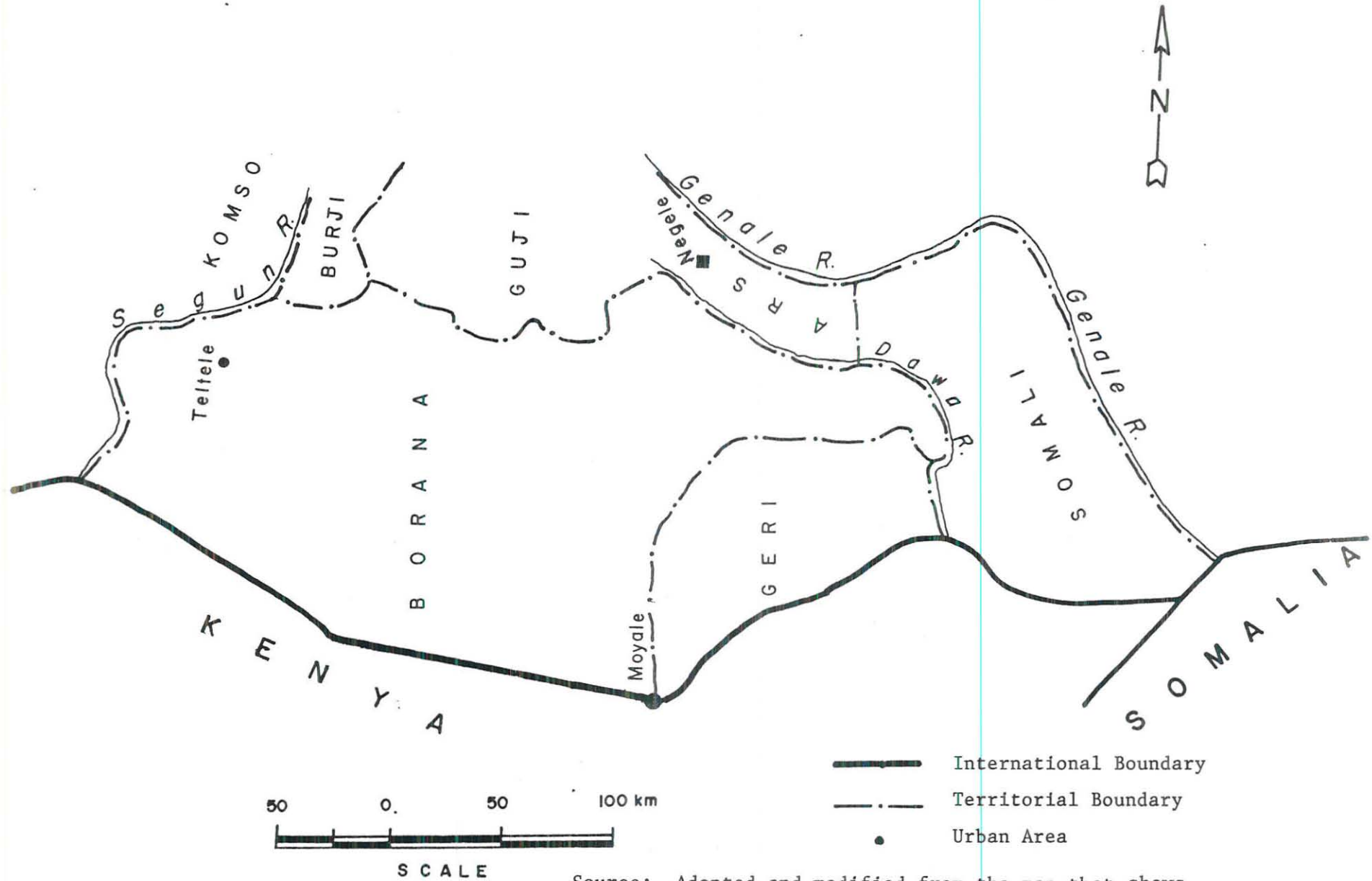
There are small rural market centers along better roads in the Awraja. These are: Harakalo, Bitata, Genale, which are found north of Negelle town, and Filtu, to the south-east. The population size of each of these centers is not known. But estimated to be between two hundred to about one thousand.

### 3.2.2. Settlement patterns of the pastoralists

Liben Awraja traditionally had been settled by the Borana semi-nomadic pastoralists (Asmarom, 1973:15). The Borana are specialized cattle pastoralists, who at present are occupying the better western-third of the Borana plateau, partly in Liben Awraja (ILCA/RDP, 1986:13). Until the first decade of the 20<sup>th</sup> century, the Borana occupied most of the Borana plateau. The larger part is now occupied by the Somali and other pastoralists, who captured it gradually from the Borana (Asmarom, 1973:15; AGROTEC, 1974b:1). At present the Borana give their name to the savana region, an area which is loosely defined by the triangle of land between the towns of Moyale, Teltele and Negelle (ILCA/RDP, 1983:2). See also, Fig-5.

Liben area was once a center of a thriving Borana pastoral economy. The abundant grasslands and forests made the area around Negelle town a favourable grazing area for the Borana (AGROTEC, 1974a: 19-20). The following short verses taken from a traditional Borana song can be used as supporting evidence for this statement. This is a song traditionally used by the Borana women while looking after their cattle, cheering their livestock and praising the suitability of the area for their livestock economy.

Fig. 5 The Borana Territory in the Borana Plateau, Southern Ethiopia.



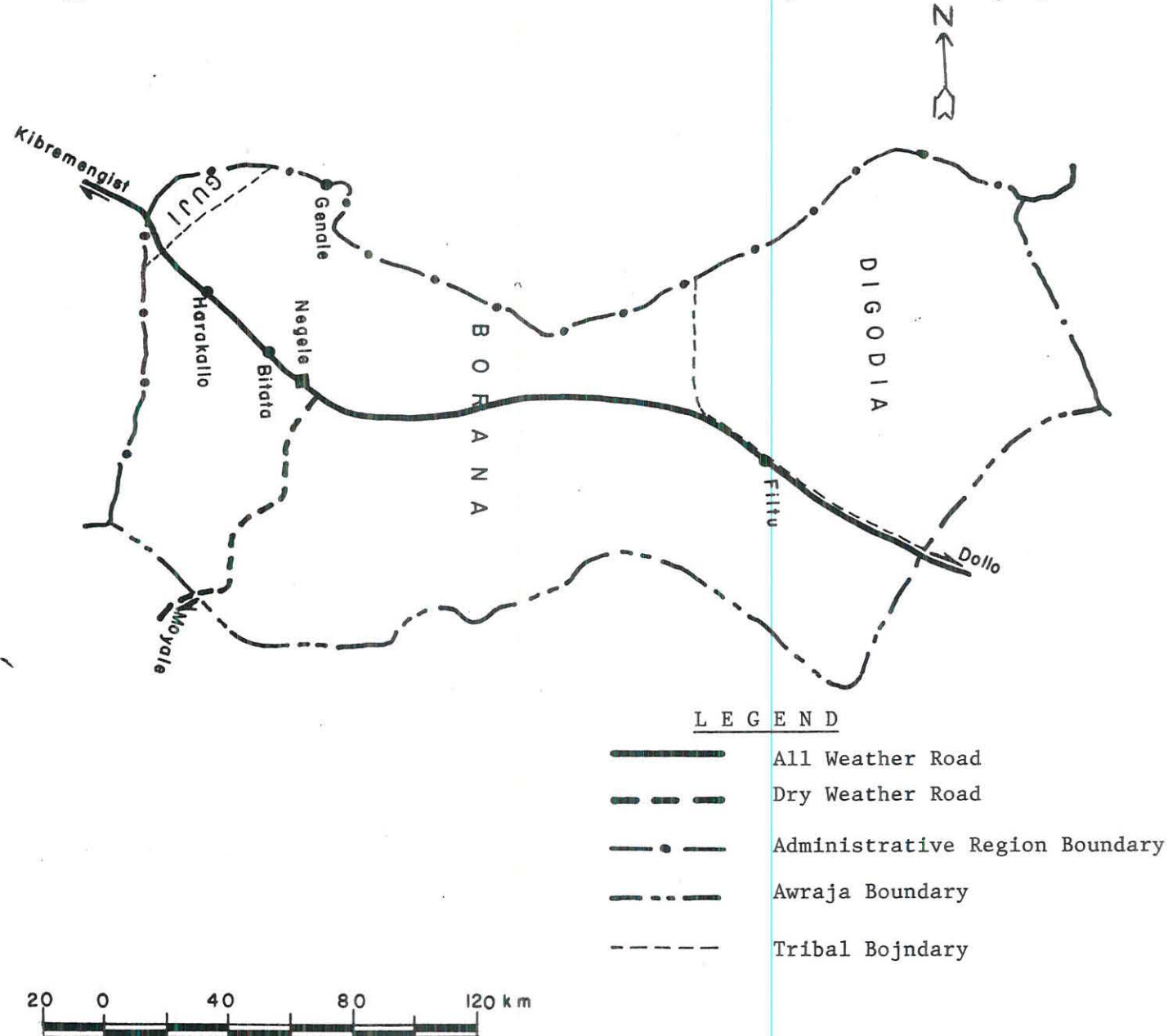
Source: Adopted and modified from the map that shows SORDU Project area, 1988.

<u>Original (Oromo)</u>	<u>Translation (English)</u>
Liben Tiyoya	Oh! my Liben
Hindessin Arota	The Juniper is greying
Rimeyin Delota	Cows are pregnant and ready to give birth
Letun Tititota	How similar they both are

Source:- Borana informants in Dida Liben (Author's field survey, Jan. 1991).

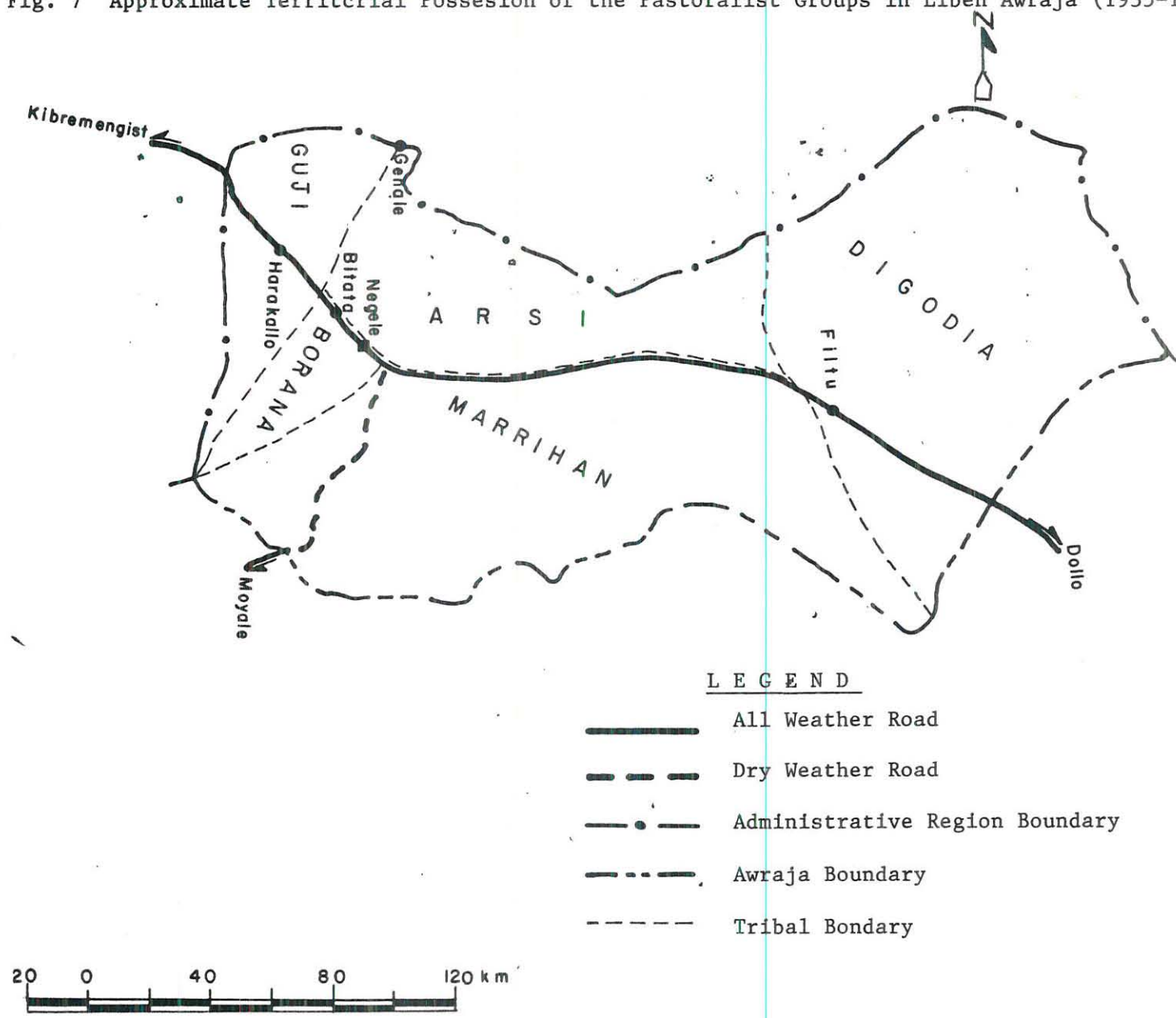
After the first decade of the 20<sup>th</sup> century, the Somali pastoralists, due to ecological reasons (in search of water and pasture) started penetrating into Borana land (Asmarom, 1973:15; AGROTEC, 1974b:1). And it was only during the Italian invasion that the Somali, particularly the Marrihan, supported by the Italians, reached the Liben area of Negelle (AGROTEC, 1974b:1; Perham, 1969:363-64). This is because the Italian army in Southern Ethiopia had been formed largely by the Somali, mainly; the Marrihan. And the Italians were passive to the appeals for protection made by the Borana. During this same period, the other groups, the Guji and Arsi, too get a chance in expanding into the Borana territory. The Guji shifted south from the foot-hills of the Jemjem Plateau into the Borana land. The southward movement of the Guji is attested by the fact that some Borana shrines are today located in the extreme northern region, along the Guji border, and sometimes well within Guji occupied territory (Asmarom, 1973:17). The Arsi of Bale Administrative Region, crossing the Genale river, occupied the north-eastern part of Liben Awraja. At the time, the Borana lost almost all of their territory, mainly to the Somali, and were forced to migrate southwest to 'Dire' area, crossing the Dawa river. Few Borana families settled around Negelle town. (See Fig 6 and 7).

Fig. 6 Approximate Territorial Position of the Pastoralist Groups in Liben Awraja (Before 1935).








Source: Interview with elders of the pastoralists.  
 Authors field survey, January - February, 1991.

Fig. 7 Approximate Territorial Possession of the Pastoralist Groups in Liben Awraja (1935-1948)



LEGEND

-  All Weather Road
-  Dry Weather Road
-  Administrative Region Boundary
-  Awraja Boundary
-  Tribal Bondary

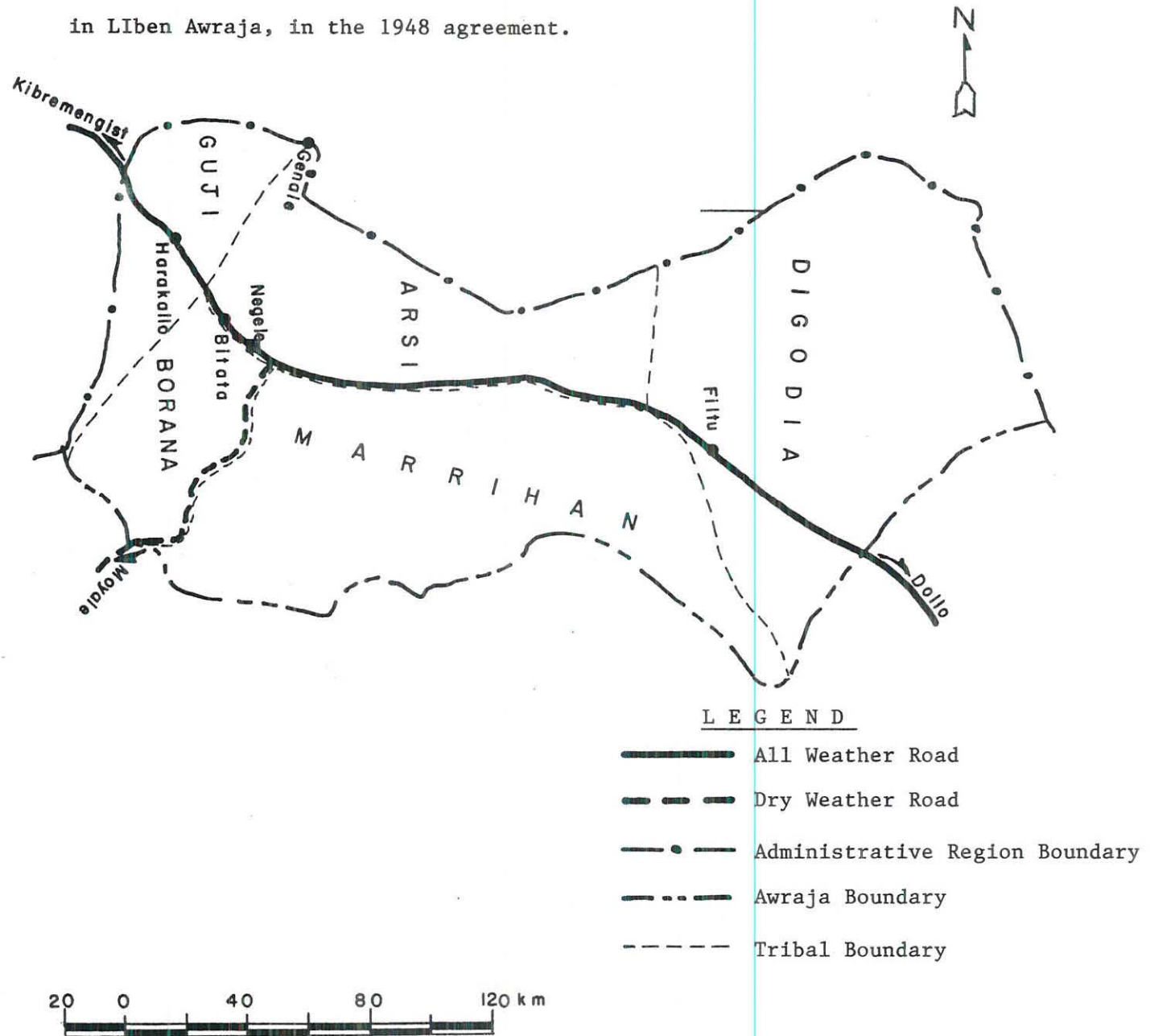


Source: Interview with elders of the pastoralists.  
Authors field survey, January - February, 1991.

After the defeat of the Italians in 1941, the Borana appealed to the newly established Ethiopian Government for the return of their former lands and to stop the encroachment by other pastoralists. Accordingly, in order to restrict further encroachment on the Borana from all directions, particularly from the eastern border near Negelle by the Somali Marrihan, an agreement was made in 1948, sponsored by the Government of Ethiopia. This agreement declares the region to be a collective 'rist' or hereditary property of the Borana, temporarily allocated for use by the Somali and other pastoralists (AGROTEC, 1974b:69). To avoid any potential dispute between the various pastoralist groups, the authorities in cooperation with the elders of all groups, divided the area into several sections. Each group was assigned a grazing area for its sole use (LMB, 1971-2:12-13). See Fig.8.

But conflicts do arise occasionally between these pastoralist groups over land use. Frequent conflicts have been observed between the Borana and Marrihan. This occurs both during the dry season, when the Marrihan camel breeders infiltrate the dry bushland and tend to approach the Borana well points in Borana territory, and during the wet season, when the Borana herdsmen cross the borderline into Marrihan territory, to exploit their former grassland leased to the Marrihan in eastern Liben (AGROTEC, 1974a:45). Further there has been tribal unrest along the frontiers between the pastoralist groups. This is usually expressed by raiding that involves looting and killing of people. Sometimes this leads to major armed conflict and dispute, although confrontations over pasture and water may also be settled peacefully.

Fig. 8 Approximate Territorial Land Area Designated for Use for the Pastoralist Groups in Liben Awraja, in the 1948 agreement.



Source: Interview with elders of the pastoralists Authors Field Survey. January - February, 1991.

Although there has sometimes been unrest along the frontier over land use, the tribal territorial boundaries have remained as delimited in the 1948 agreement. However, there were times where this borderline shifted temporarily giving some groups more territory at the expense of the others. There were two periods characterized by significant changes in territory. They are the periods of the Ethio-Somalia border conflicts of 1956 Eth.c and 1969 Eth.c. In the period 1956 to 1962 Eth. c, which is locally known as 'tumbur' movement (the name 'tumbur' is given to the movement after the kind of rifle that the participants of the movement were armed with, which in Amharic is known as short 'alben' with bayonet), the Borana lost much of their territory when they were pushed by the Marrihan for years. In 1962 Eth.c, the Marrihan lost this area again to the Borana by the intervention of the local government military force. In 1969 Eth.c, most of the Marrihan people, being sympathizers to the war waged by the Somali Government, left their territory and joined the Western Somali Liberation Front against the Ethiopian Army. After the defeat of the Somali, the Borana recaptured some of their former territory that was given to Marrihan during the 1948 agreement. The Arsi lost part of their former south-eastern territory to the Marrihan. Thus, presently the operating territorial boundary differs from the one that existed between 1948 agreement and the Ethio-Somali war of 1978. (See and compare Fig. 4 and 8.

There are different views about the existing borderline between the different pastoralist groups. The Borana, Guji and Digodia have a positive attitude while the Arsi and Marrihan have

a negative one. The Borana mainly want the maintainance of the borderline for fear of lossing its remaining territory. Behind this, they are occupying the better pasture ground relative to the others. The Guji, though accepting the presence of the borderline, support the use of Borana territory for certain periods of the seasons, mainly based on an agreement made between the Guji and Borana. The Digodia are passive for they have sufficient territory. The other two, the Arsi and Marrihan, oppose the existing borderline because the land area that they occupy is very small and their pastoral resources (grazing and water) are relatively poor. They usually lack a dry-season grazing area.

Another new development that is observed since the onset of the 1974 revolution in the country, is the existence of a borderline within a tribal territory formed by the peasant associations. This borderline has made difficult and restricted the free movement of the pastoralists within their respective tribal territories. It is only with the consent of the offices of the peasant associations to which one belongs and where one wants to go, that one is able to change or temporarily move into other peasant association territory. This law or regulation applies also for non-ethnic members, but the permission or duration a person or a family may be permitted to stay is usually short or is specified.

### 3.3 Economic activities

#### 3.3.1 Livestock raising

Liben Awraja is endowed with extensive grazing and browsing areas and is thus mainly suited for livestock raising. It is

estimated that, of the total land area of the Awraja, about 60-70 per cent is suitable only for livestock raising (Tilahun, 1990:26), and there is little cultivation. The following table shows the size of the livestock population found in Liben Awraja.

Table : 5 Livestock population of Liben Awraja (1981 Eth.c).

Livestock types	Size	Percent/total	Rank
Cattle	466,895	31.03	2
Camels	366,170	24.34	3
Sheep	183,311	12.18	4
Goats	472,908	31.43	1
Donkeys	14,311	0.95	5
Mules	610	0.041	6
Horses	394	0.026	7
Total	1,504,599	99,997	-

Source:- Southern Rangelands Development Unit, Negelle (Archives).

The major livestock raised in Liben Awraja are cattle, camel, sheep and goats. In 1981 Eth.c, cattle and camel, constituted about 55.4 per cent and sheep and goats, about 43.6 per cent of all livestock. The beasts of draught (excluding camel), constitute only about one per cent. The most important beast of draught is donkey. Mules and horses are very few in number. Especially horses are few in number because the hot climate is not suitable to their reproduction and existence.

Although there is such extensive grazing area, the larger part is far from permanent water points. That makes it difficult

for the pastoralists to use the grazing resources all year round. In order to overcome this problem, part of the family moves, mainly during the dry season, with their livestock in search of dry season grazing and water. The watering intervals of the different types of livestock (mainly during the dry season) raised in the region varies between 2 and 15 days from one place to the other in accordance with the variation of the local environment.

The herd composition varies among the different pastoral groups. The Borana, Guji and Arsi, largely concentrate on cattle, although they also have some sheep, goats and camels. Raising camels is a recent practice of the Borana and Guji, mainly since the coming of the Somali camel pastoralists into the region. The Borana and Guji acquired camels initially as a result of raids on the Somali and latter through buying. And yet, only a few Borana and Guji families own camels. The two groups have a negative attitude towards raising and appropriating camel. They consider the raising of cattle together with camel to be a difficult task, as they both need quite different physical environments and care. There is also a belief that camel urine affects the health of cattle, for it spoils the grazing resources and encourages ticks that kill calves. Furthermore, a camel disease, locally known as 'dukana' is thought to increase the prevalence of the lethal cattle disease 'luta'. The Marrihan and Digodia mainly concentrate on camels, goats and sheep. But, they are still holding some cattle for milk and butter.

### 3.3.2 Crop farming

The largest part of Liben Awraja is too dry for rainfed agriculture and crop farming has traditionally not been part of the local economy. Only two per cent of the total land area of the Awraja is suitable for cultivation (Liben Awraja Ministry of Agriculture office, 1982 Eth.c.). Besides the physical constraints all the pastoral groups, except the Guji, have a negative attitude towards crop farming. According to the Borana informants, the Borana despise those people who cultivate land. For they turn the earth upside down uprooting the grass that feeds their cattle. They have a saying: 'nami obru kote, nami uf awale' (he who ploughs land is a one who cannot move). This signifies the difficulty of pursuing both livestock raising and crop farming side by side. Likewise, as told by the Somali informants, the Somali people too express their preference for livestock raising as follows: 'ber wahei kubirobka, rob kadilway lewayenma' (one can cultivate crops only when there is rain. But you can have your camel even when there is no rain).

Crop farming is an activity which was recently introduced into the region, after the establishment of the military garrison in 1919 Eth.c. and along with it, the Negelle settlement. It was mainly developed by the retired soldiers, who initially came to the region for military service and latter decided to stay in the area. These people, started to cultivate land as a means of supplementing their small pension. The first centre around which this activity developed is Negelle town, where most of these retired soldiers settled.

Crop farming is increasingly becoming an important complement to the income of the rural pastoral people. Almost all families of the various pastoral groups in the region have some farmland that they cultivate. Especially people who are living in the peasant associations around Negelle town and other small rural market centers, such as Genale, Harakallo and Bitata are largely engaged in this activity. These are areas of relatively higher altitude and better distribution of rainfall. The Guji, who basically have a positive attitude toward crop farming and have settled in a relatively better geographical region (highlands) than the other pastoralists, adopted agriculture to their pastoral economy earlier than the others (Asmarom, 1973: 17). At present an increase in the size of the cultivated land and a diversification of the types of crops cultivated can be observed in the Guji area. The other groups have adopted crop farming only recently, approximately since thirty years back. The reasons for the increasing involvement of these pastoral people in crop farming are many, among which are:

1- Man-made and natural problems: The empoverishment of some families (loosing their livestocks and property) due to war, recurrent droughts and epidemics that occured in the region in historical times.

2- Change in consumption pattern (food habits): The diet of these pastoral people was traditionally based mainly on livestock and livestock products. But recently, they have started supplementing their diet with some cereal crops (maize, wheat, barley and even of teff).

3- Extra income: These pastoralists do not like selling their livestock due to cultural reasons. Thus, with increasing demand for manufactured goods, they are using crop farming as a means of generating income.

4- Establishment of settlement sites by the National Relief and Rehabilitation Commission and the push by the government toward the starting of crop farming in these sites aimed at making the settlers self sufficient. Examples here are the 'Negelle sefera' and 'Genale sefera'. These are settlements established by the local Relief and Rehabilitation Commission office, near Negelle town and Genale river, respectively. The aim is to support and rehabilitate the poor people, both from the town and rural areas who lost their property for various reasons.

5- Agricultural extension services offered by the local branch of the Ministry of Agriculture Office and recently by the 'Mekane Yesus' Development Centre.

6- Water development works by the Southern Rangelands Development Unit, which significantly reduced the movement of the pastoralists and led to increased sedentarization.

7- Establishment of the peasant associations: The establishment of the peasant associations and the boundaries between them, have limited the free movement of the pastoralists and facilitated sedentarization.

However, the pastoralists are facing problems in carrying out crop farming along with livestock raising. Among the problems are:

1- Environmental problems: It is difficult to raise livestock and grow crops side by side. For example, the local physical environment which is conducive for cultivation is not suitable for livestock raising, as it encourages ticks that attacks cattle's utters.

2- The problem of labour force: Raising livestock in this drier environment and with the traditional methods needs a larger labour force than crop farming. Therefore, small families will have difficulties in performing these activities together.

### 3.3.3 Crops grown and cropping calendar

The Liben area has two rainy seasons and corresponding growing seasons. The types of crops grown during these periods vary in accordance with the duration of the rains. In most cases, the people cultivate dominantly cereal crops, such as maize, wheat, barley and teff and some peas and beans during the main rain season. Peas and beans are mostly grown during the short rain season, that include mainly chick peas, still cultivating wheat and teff.

Table : 6 Simplified Cropping Calendar for Liben Awraja

Months	J	F	M	A	M	J	J	A	S	O	N	D
Early		xxx	+++			---		A	B			C
Normal	C		xxx	+++		---			A	B		
Late		C		xxx		+++		---		A	B	

'ganna' (main rain)

'haggaya' (Secondary rain)

xxx Land preparation

A- Land preparation

+++ Sowing

B- Sowing

--- Harvesting

C- Harvesting

Source:- Author's field Survey, January, 1991.

## CHAPTER FOUR

### 4. The Dry Upland Juniperus Forest Around Negelle Town

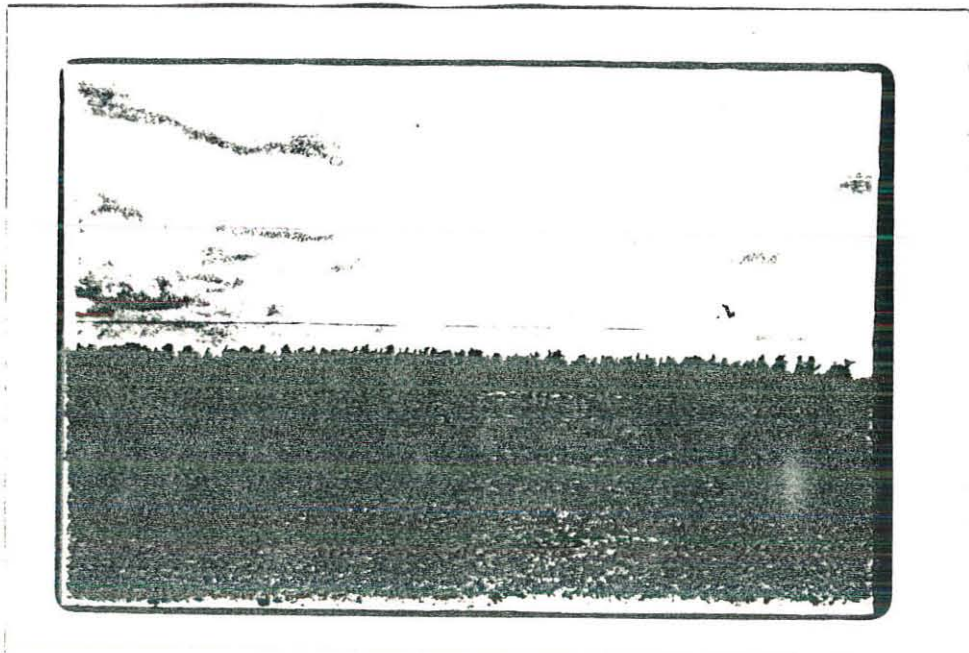
#### 4.1 Status of the forest in time perspective

The area around Negelle town was covered with dry upland Juniperus forest as late as the 1940's (Logan, 1946:33). At present there are also indications of some remnants of the roots and stumps of juniper tree even within Negelle town. This implies that the present area occupied by urban settlement had also been covered with forest. This is confirmed by the elders in the region.

The major tree species of the forest is Juniperus procera, which forms the dominant stand. Olea species, mainly Olea hochstetteri and Olea africana (the principal sub-dominant species), Pygeum africanum, Ekebergia rueppelliana, Bersama abyssinica, Croton macrostachys and several species of Euphorbia being among the tree species found in the association. The shrub layer is poor in species. The principal element consist of Sideroxylon oxyacantha, Vernonia abyssinica, Corissa edulis, Calpurinia Subdecandra, Rosa abyssinica and occasionally Teclea nobilies. The herb layer is generally fairly dense and well developed. But mosses, ferns and lianes are relatively scarce (Logan, 1946:34). The local (Oromo) and English names of the above plants are given on Table 8.

According to the recent study made by Haugen (1991), the forest of Negelle area is very old and mostly outlived, with little regeneration. Within the forest, it is even difficult to find seedlings. In conformation with this concept I observed,

PLATE - I



The partial View of the Juniperus procera forest (Mankubsa area). The photograph was taken from an open area within the forest. The open area on the foreground was naturally devoid of the dense growth of trees except short tuft grasses. There are also few widely dispersed Juniper tree stands and some big acacia trees. This open area is covered with black earth (may be Vertisols) as opposed to the forest area which is covered with reddish soil (may be Laterite).

during my field work (January-February, 1991), a dying tree stand, mainly of Juniper trees, the tops of which have begun to dry up. And there are also some old trees that are uprooted by the wind and have fallen. This is one of the most threatened Juniperus forests found in the Borana Administrative Region (Haugen, 1991). At present the forest covers only a very small area, that is mainly limited to the south of Negelle town, in the 'Mankubsa' area. The forest here covers an area of about 3280 hectares of land (Liben Awraja Ministry of Agriculture Office, personal communication). The forest in 'Mankubsa' area is in a relatively better situation than other forest areas in the locality. There are some remnants of widely dispersed Juniper trees to the east-north-east of Negelle town, in the 'Miessa' area, which had once been dense forest. Around Negelle town, one cannot see any forest in all directions.

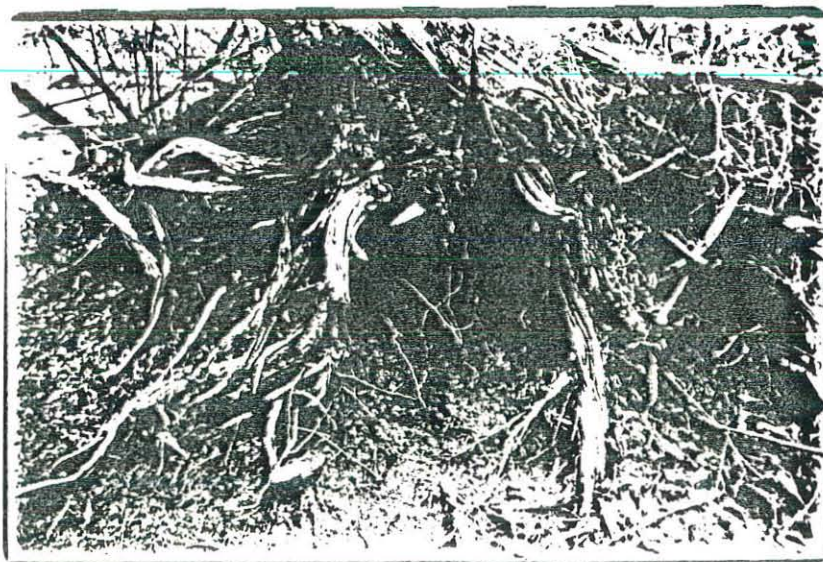
Table : 7 Lists of some plants found in the Juniperus forest

Scientific name	English name	Local name (Oromo)
<u>Juniperus procera</u>	Juniper	hindes
<u>Pygeum africanum</u>	Iron wood	Miesa
<u>Olea hochstetteri</u>	wild olive tree	Ejersa
<u>Olea africana</u>		
<u>Ekebergia rueppellian</u>	Not available	Not available
* <u>Ekebergia capensis</u>	Not available	Ononu
<u>Bersama abyssinica</u>	Not available	Dolkisa, Lolchika
<u>Croton macrostachys</u>	Not available	Ankowa
<u>Euphorbia species</u>	Finger euphorbia	Adami
<u>Sideroxylon oxyacantha</u>	Not available	Kombolcha

PLATE - II



(a) The dying Juniper tree stands the tops of which have started drying up.



(b) Exposed roots of old Juniper tree stands  
(Note the shallow depth of the soil).

Vernonia abyssinica	Not available	Not available
*Vernonia amygdalina	Not available	Ebicha
Corissa edulis	Not available	Jagamsa
Calpurnia subdecandra	East African laburnum	Ch'eka
Rosa abyssinica	Wild Ethiopian rose	Lnkwoto
Teclea nobilis	Not available	Lelcha

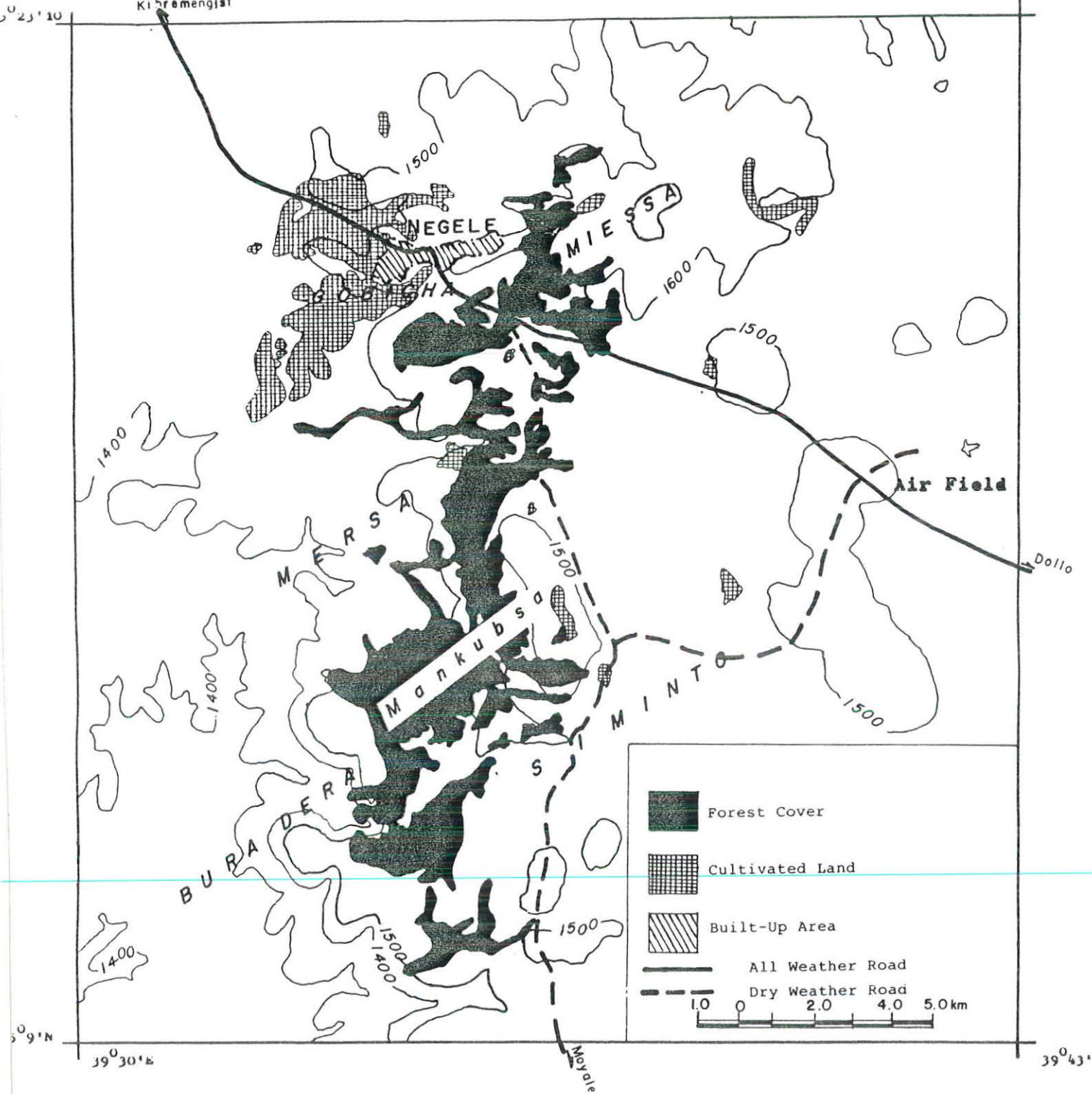
Note: \*These plant names are included to those plants whose local names are not available but belong to the same species.

Source: Logan (1946). An introduction to the forests of Central and Southern Ethiopia. London. And Wolde Michael (1987). A Glossary of Ethiopian plant names. Addis Ababa.

#### 4.2 The forest cover between 1964 and 1984

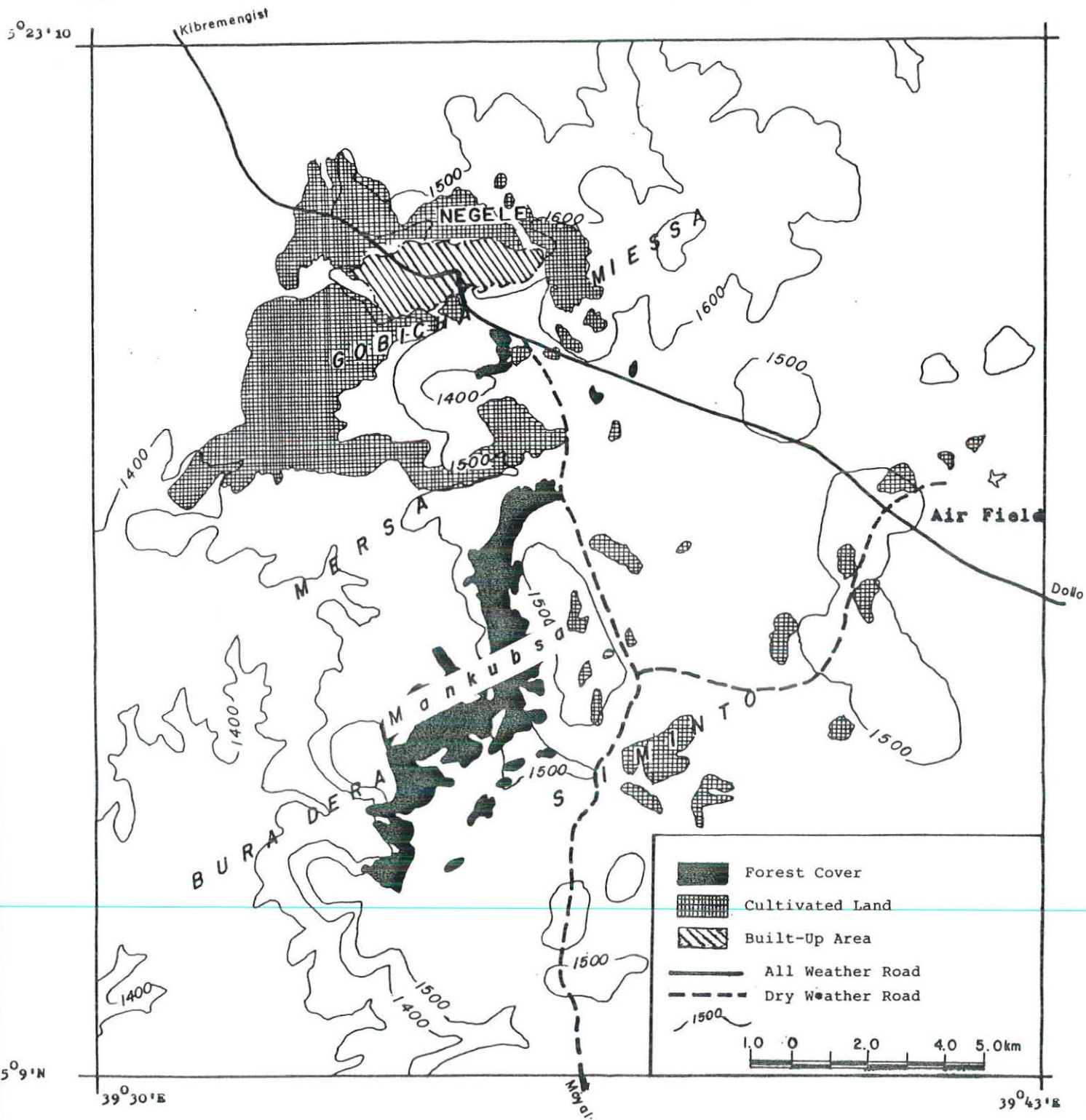
The areal coverage of forest around Negelle town seems to have dwindled for various reasons. According to the information obtained from the aerial photos for 1964 and 1984, major changes have occurred in the forest area. This change can be seen from the following table (Table: 8) and in Figures, 9 and 10.

Fig. 9 Land Use and Forest Cover in the Study Area, Around Negele Town(1964)



**Source:** The 1964, 1:50,000, aerial photos and the 1989, 1:50,000, topographic map, prepared by the Ethiopian Mapping Agency, covering the study area.

Fig. 10 Land Use and Forest Cover in the Study Area, Around Negelle Town (1984)



**Source:** The 1984, 1:50,000, aerial photos and the 1989, 1:50,000, topo-map, prepared by the Ethiopian Mapping Agency, covering the study area.

Table : 8 Changes in the areas occupied by the different land use and natural vegetation types between 1964 and 1984 in the study area, around Negelle town.

Land use and natural vegetation types	Approximate area in hectares				
	1964	1984	Difference	% change	Average annual % change
Forest (dry upland)	16540	5760	10780	65.2	3.3
Cultivated land	5652	15440	9788	173.2	8.7
Urban built-up area (Negelle town)	680	2320	1640	241.2	12.1
Others (woodland, bush grassland open land etc.)	19828	19180	648	3.3	0.2
Total:-	42700	42700	=	=	=

Source: Author's measurement from the aerial photos, 1964 and 1984.

As observed, the areal coverage of the forest has shown a significant decline, while there is an increase in the degraded and subclimax vegetation and the cultivated area during the 20 years period. The forest area decreased by 65 percent, from 16540 hectares to 5760 hectares, declining by 10780 hectares or 3.26 per cent per year. The largest part of the deforested area has been converted into shrubland and agricultural land. The cultivated land increased from 5652 hectares to 15440 hectares, at a rate of 8.66 percent per year.

The relationship between the decrease in forest areas and increase in the shrubland and cultivated area can be described in

various ways. However, according to the information obtained from the aerial photos from 1964 and 1984, the decrease in forest is the result of the expansion of cultivation at the expense of the forest, woodlands, shrub vegetation and grassland. That is, of the total cultivated areas in 1984, about 19 per cent were converted from areas that had been covered with forest in 1964. While, the remain are converted from areas that were covered with some kind of natural vegetation other than forest.

Comparing the maps for the two periods, in 1964 the forest had been found largely in the areas north-east and south of Negelle town, namely in the areas of 'Miessa', 'Gobicha' and 'Mankubsa'. By 1984, the forests of 'Miessa' and 'Gobicha' had been largely destroyed, while the 'Mankubsa' forest had been reduced in size. The forest in 'Gobicha' area has been changed into bushland and cultivated land. In 'Miessa' area, the largest forest area has been converted into cultivated land, except for little remnants of forest. That are still either under exploitation or are being reduced by the expanding cultivation. The forest in 'Mankubsa' area is the only larger forest cover seen in 1984. However, a significant portion of this forest has also been converted into bushland and a small area into farmland (see Figures, 9 and 10).

The straight line distance measured from the centre of the town in the direction of the forest has shown significant changes between the years under investigation. In 1964, it was possible to reach the edge of the forest travelling east-north-east for a distance of about 5 km, and to the south and east

only about 2 km. However, in 1984, one has to travel east-north-east for a distance of about 15 km. and to the south and east about 7 km. This travel distance has been continuously increasing since then, making it difficult for local people, especially the residents of Negelle, to obtain firewood and construction wood.

In 1964, the area covered by cultivation around Negelle town measured only about 4060 hectares. This increased to 12930 hectares in 1984. On average, it was possible to reach the outer edge of the cultivated land from the centre of Negelle town by travelling in a straight line after a distance of about 4 km. in 1964. This increased to 7 km in 1984. The larger areas that were within the perimeter of the urban settlement and either used for cultivation or grazing in 1964, had changed into built up areas by 1984. This includes the further expansion, mainly towards the opened up areas in the east. (see Fig. 9 and 10).

#### 4.3. Factors in the decline of the forests

The causes for the degradation of the forest appear to be numerous. Here, I try to present some of the important factors based on the information obtained through various methods and sources.

##### 4.3.1 Forest fire

Wildfire (the frequency and origin is not known), has destroyed much forest area in historical times. According to the informants, there have been many major and minor wild forest fires. The forests of 'Miessa' and 'Gobicha' were destroyed

mainly due to frequent fires. But there are no records about the number of fires and the size of the forest area that was destroyed as a result.

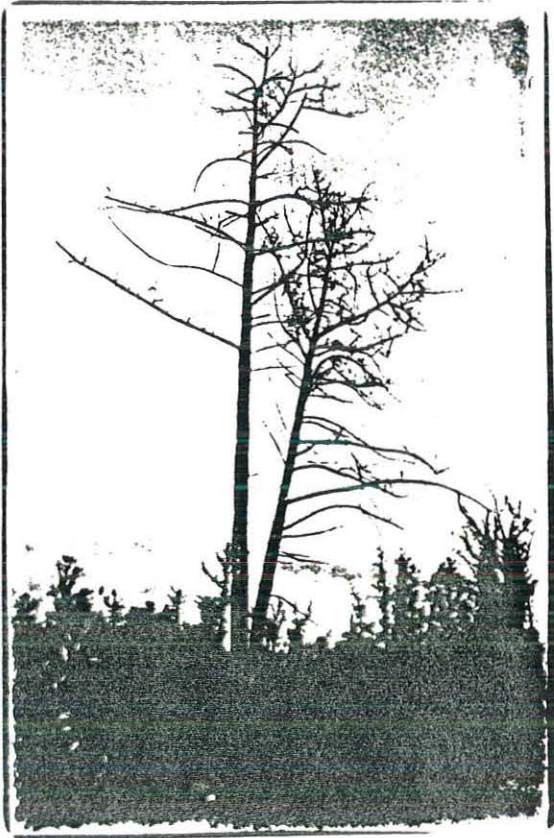
Recently, there was one major recorded forest fire in the region. According to the report from the Liben Awraja Ministry of Agriculture Office, this occurred in the February, 1976 Eth.c, in 'Mankubsa' area. The fire lasted for more than a week, until it was controlled. This is because, the Juniper tree is susceptible to fire. It burns easily and quickly. If once set to fire, the flame bursts and protrudes out accelerating the easy expansion and a wider area coverage of fire within a short period of time. The people in the region, mainly military men, urban dwellers and the nearby peasant association members made a great effort to extinguish the fire. About 800 hectares of forest were destroyed. The area is now colonized by a kind of bush tree species of lower economic value, mainly Dodonea viscosa ('tedech').

It may be concluded that the wildfires, which usually occur during the dry season, have had a significant impact on the degradation of the forest in the study area.

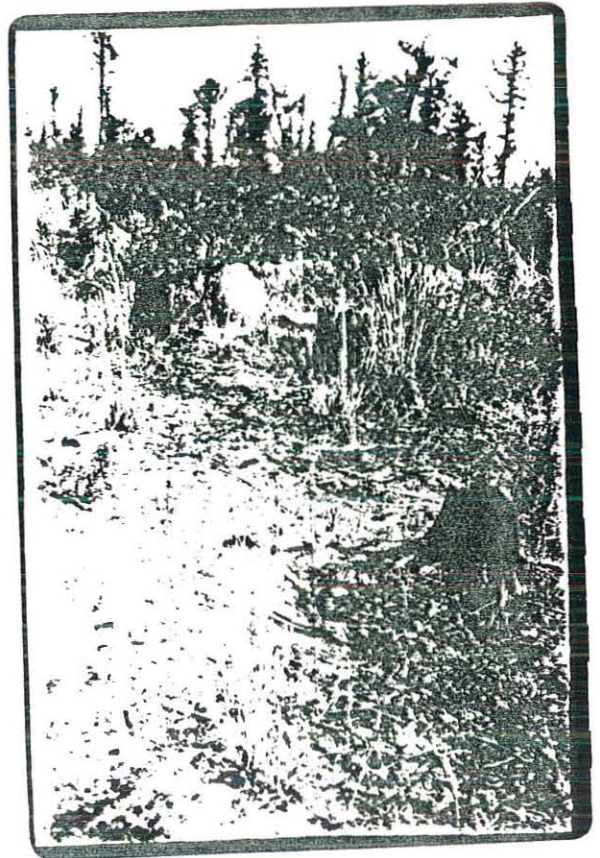
#### 4.3.2 Change in settlement pattern of the pastoralists and competition over land use

Liben area had been a centre of attraction for all pastoralist groups due to the favourable environment, mainly the availability of water and good pasture. For this reason, there was a continuous struggle, both hidden and open, between these

PLATE - III



(a) Remnant stands of Juniper trees within the burnt forest area.



(b) Remnant stumps of a Juniper tree within the burnt forest area.



(c) The burnt forest area is dominantly colonized by the *Dodonea viscosa* ('tedech') plant species.

groups, for full control over the area or atleast to have access to it. Thus there was a shift in territorial occupance of the pastoralist groups, temporary or permanent, in historical times. This competition over land use and change in territorial occupance influenced the degradation of the forest, either directly or indirectly.

In the chapter-3, it is noted that the traditional settlers of the region were the Borana. The Borana considered forest as part of their cultural heritage. For instance, I was informed by the Borana elders that, the Borana herdsmen living in other parts of the Borana territory ('Dire' or in Northern Kenya), while exchanging greetings with fellow Borana from Liben, usually uttered first the question, 'lechun Liben negaya?' (how are the two Liben?). The word 'two' here, refers to the forest and streams flowing in the region. During traditional gatherings and when rituals are performed, the Borana elders and tribal leaders usually bless the three forests ['beda Liben' (in Liben); 'beda Arero' (in Arero); and 'beda Tuka' (in Dire)] and the three streams ['legagula' (Liben); 'legasure' (Moyale) and 'legaware' (Arero)] found in their traditional tribal lands. The prefixes, 'beda' and 'lega', mean forest and stream, respectively, in Borana language.

According to the Borana informants, the Borana use the forest for grazing purpose, mainly during the long dry season. The forest provides shade for their livestock and herdsmen. The grass and undergrowth within the forest, including the dried leaves of trees, are fodder for their livestock. Water

PLATE - IV



(a) Cattle grazing during the dry season in the relatively degraded forest. Note the seasonally low weight of the cattle.



(b) Cattle grazing in the burnt forest area.

is obtained from the springs flowing out of the forest and the adjacent stream valleys below. The forest is also a source of some woods needed by the Borana. The Borana use 'halo' (Acacia bussei), 'ejersa' (Olea africana, O. hochstetteri), 'jirersa' (pistacia lenticus) for firewood. 'Aroresa' (Grewia mollis, G. bicolora), 'ditech' (a kind of grass), 'sililach' (a kind of grass) are used to obtain house construction materials. 'Jirersa', 'ejersa' and 'rukes' (Combretum aculeatum) are used for 'korasuma' (fumigating their milk and drinking utensils). The bark of 'hindes' (Juniperus procera) is used for house construction and the reddish feather-like substance found on the branches of matured juniper trees ('arri') to decorate their houses. During rituals, the leaves of 'hindes', 'jirersa' and 'miesa', are spread in a place where blessings are made.

I was also informed that, there is only one ritual or occasion where the Borana collect and burn a pile of wood obtained from live trees. Mainly small and thin trees with poor barks are used for this. That can easily be burnt without heavy smoke. such rituals are held only during the time of serious problems that the Borana face, as in times of long and severe drought, war and epidemics. The Borana elders and leaders gather and call for the help of their God ('Waq'), blessing the tribe and averting the prevailing problem that the tribe is facing.

The Borana forbid the cutting of some tree and bush species found in the forest, including 'kilta' (Fiscus species), 'jima' (Catha edulis), 'dadech' (Acacia tortilis), 'andode' (Tarchonanthus comphoratus) and 'Indidu' (Phytolacca dodecandra). These trees

are recognized as sacred trees. And some are treated as shrines where important rituals are performed. The trees might be sacred either because they are exceptionally large or they grow on a sacred ground and can be used only during certain rituals. The trunks of the shrine trees are often anointed with butter, and cattle are also slaughtered under them on the occasion of rituals. These trees are not only protected but the whole area around them and the path leading upto them are also guarded. The study by Asmarom (1986), in Northern Kenya, of the Borana conforms with the statement above.

The Borana, though are using the forest for various purposes the method is less destructive and the disturbance minimal. Moreover, they traditionally have a positive and protective attitude toward forest. In the recently (in 1981 Eth.c) held tribal gathering in Liben, 'gumigayo' (general assembly of the Borana, that is held every eight years), noting the problem of deforestation and the decrease in the forest land in their tribal territory, the Borana introduced a new regulation. This regulation makes it a responsibility of all members of the Borana to protect the forest. It was made clear that any fellow tribes man who acts against this regulation is a criminal. Any person who is found guilty will be handed over to the concerned government department for punishment ('Yekebt Hab'et Lemat', 1981 Eth.c:16).

The increasing pressure and encroachment, from all sides, on the Borana has resulted in the shrinkage of the Borana traditional pastoral land area, in Liben Awraja. That disrupted the prevailing traditional use of the land, increased the pressure

on the remaining pasture land and forced the Borana to increase the grazing period in the forest. The longer the duration in using the forest for grazing, the higher will be the disturbance of the forest ecology. This takes place either through the overuse of the undergrowth, grasses and leaves or exposure of the soil to trampling of the tree seedlings by cattle hoofs. This eventually leads to the deterioration of the forest.

The situation stated above, combined with the introduction and conversion of the Borana pastoral land into ranches, military training centre, air base (landing strip) and farms, that reduced the land area available to the Borana, has aggravated the problem of pasture land. Of all the areas allotted to the different activities, that converted into ranches ('Wellenso' ranch, under the Southern Rangelands Development Unit, that encompasses about 25,000 hectares of land) and fattening station (near the airport, locally known as 'Dibe Guchi', under the Ethiopian Meat Corporation, that encompasses about 10,000 hectares of land), had been the most important ones. The 'Wellenso' area was traditionally used by the Borana as a dry-season grazing ground. Being near to the Dawa river, it was easy for the Borana to get water during the dry season. The area converted into the fattening station was an important wet-season grazing ground ('forra'). The availability of good grass and saline soil ('haya'), made the area an important grazing ground to the Borana, mainly during the rainy season. Furthermore, the area within the station, specifically known as 'Ittu', was used by the Borana for the traditional purpose [It was a place where the 'Ya'a', (The camp

that constitute, the 'gada assembly' or simply 'the assembly'. The size of the bands is thirty to forty huts under normal circumstances and much larger than that on ceremonial occasion (Asmarom, 1973:69) and 'raba', (senior warriors in a gada class (Asmarom, 1973:65), stay for about one to two years, in eight years period , to which only the Borana are permitted. The appeal to the government and opposition by the Borana against the conversion of the area into a fattening station brought no response. The conversion of the land into the ranch was with the knowledge of and agreement by the Borana. However, seeing nothing of the advantages that they had been promised, the Borana have developed a negative attitude toward its presence.

During the Italian invasion of Ethiopia, the camel breeding Marrihan Somali were able to reach Liben area. The Marrihan, expelling the Borana, controlled most of the Borana territory, including the forest area, for some time. These people, mainly camel and goat breeders, used the forest to feed their livestock. In so doing, especially when the leaves of trees are high above the reach of the camel and goats, they used to climb trees and lop off the branches. Some forest trees that are used up in this way are 'jagamsa' (Carissa edulis), 'rukes', 'ejersa', and 'jirersa' which are consumable by the camel and goats. The same method is followed to get 'jima' (Catha edulis) leaves # (The leaves of this plant are chewed and the juice consumed by the pastoralists as a stimulant). These methods followed by the Marrihan are all more destructive than those by the Borana.

It became difficult for me to find time series data on the changes in both human and livestock population size for the region (for no such surveys have been made at the 'wereda' level: Liben had 'wereda' status until 1989). However, it is natural that there was a steady growth both in the human and livestock population through time. That increased the pressure on the land resources (mainly grazing and water), and contributed to the increasing deterioration of the natural vegetation cover.

#### 4.3.3. Increasing involvement of the pastoralists in crop farming

The introduction of crop farming into the Liben area and increasing involvement of the pastoralists in this activity do have both direct and an indirect influences on forest depletion, including the following:

1- The increasing conversion of land for cultivation has disrupted the originally stable land utilization by squeezing the grazing areas available for livestock grazing and increasing the pressure on the remaining pasture lands. This has led to more intensive use of forest land for grazing and browsing. An increase in the pastoral use of forest land naturally leads to the change in forests composition and decreased regeneration. Since livestock are selective in their plant use, and the undergrowth and small trees including the seedlings are trampled by the hoofs of the cattle.

2- The cleared forest areas naturally provide excellent conditions for the cultivation of crops. Thus, increasing conversion of forest land for cultivation and further encroachment

of farmland on forest edges is leading to continuous reduction of forest areas.

3- Increasing sedentarization and cultivation by pastoralists has resulted in:

(a) A structural change in Borana house types and the construction materials used by the pastoralists. Traditionally, the pastoralists used light and easily transportable houses (huts) made especially of poles of thin trees covered either with grasses or 'dessa' (mats made of grasses). But sedentarization has permitted the pastoralists (mainly the Borana) to build permanent dwelling houses. The sources of construction materials are obtained from big trees, mainly Juniper. As observed, there is a wider conversion of the traditionally mobile huts into permanent houses ('Chika bets'), mainly with grass cover while some (those near Negelle town) are having corrugated iron roofs. This change in house types has accelerated the exploitation of the forest products for construction.

(b) The reduced seasonal movements of the pastoralists have resulted in longer use of the existing grazing land near water points, especially near the settlements and farmlands. That accelerated the degradation of the rangeland resources. Therefore, intensified grazing of forest land is seen by the Borana and other pastoralists as an alternative solution to the problem.

(c) Change in consumption patterns that involves the recent addition of cereal crops as in the diet of pastoralists, has increased the consumption of firewood in the preparation of food. Traditionally the pastoralists used only small amounts of wood,

primarily for heating, fumigating and certain other limited purposes.

4.3.4 Selling of forest products as a source of cash income.

The pastoralists find the selling forest products as useful supplement to their meagre cash income. There is a tendency of increasing involvement of the pastoralists in the selling of mainly wood and charcoal. With the increasing demand for fuel wood and charcoal in Negelle town, people residing in the nearby peasant associations are increasingly engaging in this activity.

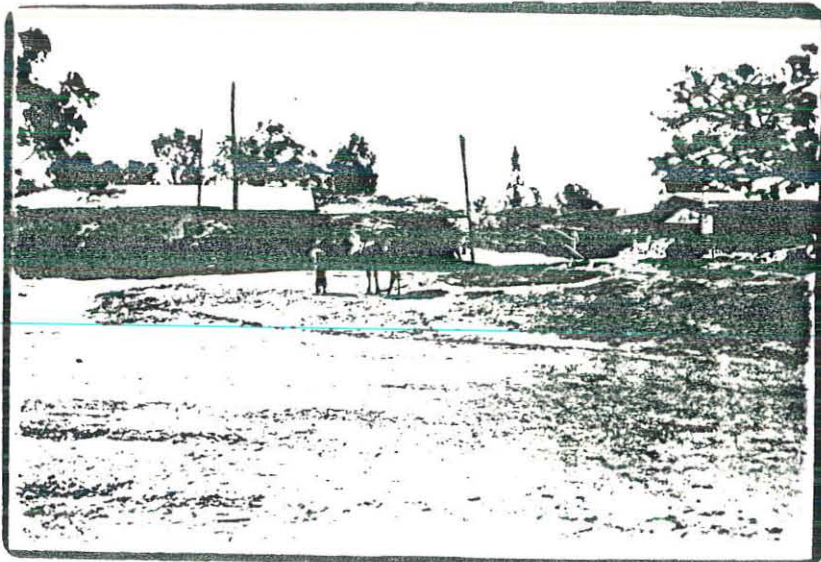
The pastoralists bring the charcoal and fuelwood to Negelle town using mainly donkeys and camels. This trade involves the felling of thousands of trees every year. Firewood is usually collected from the dried branches of trees and from areas affected by fire. However, some times, for the purpose of obtaining firewood, the pastoralists cut live trees and leave them for some time to dry. Charcoal making exclusively also involves the cutting of live trees. It is prepared by burning the wood in a hole dug underground, and covering it with soil. Then it is left for some time to smoulder, usually for about two to three days. When the soil cover is removed the charcoal is ready for use or sale. The major tree species that are cut for firewood and sold in markets are 'hindesa', 'rukes', 'miesa', 'halo', 'jirersa', and 'ejersa', the source of which is the nearby Juniper forest. These trees are also used for the preparation of charcoal.

The suppliers of construction wood for the towns are the 'wata' people, although, a few people from all pastoral groups

PLATE - V



(a) Donkeys loaded with fuelwood and charcoal  
(Negelle town)



(b) Camel loaded with fuelwood (Negelle town).  
(Note the electric poles in both photographs  
that are made of Juniper trees)

are also currently involved. The 'wata' are the outcast section of the Borana. However, the 'wata' living around Negelle town are said to have originated from the Guji who due to their long settlement in Borana territory represent themselves as Borana. It is this section of the 'wata' family that is being discussed here. These people have no livestock and farmland. Their livelihood had been dependent on hunting and gathering. However, due to the depletion of the forest and the game in it, they started to supplement their living by employment in the military camp. The military employed them as daily labourers in the canteen, for hauling water from wells and looking after livestock, mainly cattle, owned by some members of the military families.

During their stay with the military, the 'wata' boys learned the preparation of lumber and other construction wood materials. Latter they started their own business, having been taught by some retired soldiers building houses in Negelle town. This helped them to develop more skills in the preparation of construction wood materials than other groups. At present, these people make their living mainly by selling construction wood to the town population. The growing house construction trade in the town has proliferated the demand for construction wood which is being supplied mainly by the 'wata'. The only tree species that is widely used for construction in the town and that suffers heavy exploitation is Juniperus procera. This is mainly due to its resistance to the termite and avaiiability.

#### 4.3.5 Influence of Negelle town on the surrounding forest

According to the information I obtained from the Negelle City Council, Negelle was founded in the year 1919 Eth.c, as a military garrison by the delegate of the then Ministry of War, Fitawrari Biru Wolde Giorgis. Military men came along with their families and settled in the area. However, before this, the area had been settled by small number of hunters who have come from Tigray. These people, making small clearings in the forest erected their small huts. Latter, people from different areas of Ethiopia, mainly traders and others, who looked for their fortune came and settled. With this, the population started to grow, initiating the further construction of small settlements.

The Italians, during their short stay in Ethiopia, made Negelle their military command post in the southern region. They constructed different houses for the army and army officers. Most of them are still being used as offices of different government departments. The Italians used the forest resources, especially Juniper tree, for the construction of houses and bridges in the region. In order to obtain the necessary wood material they established about six sawmills in Liben Awraja.

But it was only in 1942, a year after the departure of the Italians, that Negelle town got a municipality. The town started gaining more importance after 1949, when it became the administrative capital of the then Borana Awraja. It was during this time that the town got its first urban plan and took the shape that it has today. All this was favourable for the growth of the town both in the physical size and population. With the

growth of Negelle, the negative impact on the surrounding forest accelerated. Basically, the prime reason for the selection of the site for settlement had been the availability of water and wood for construction from the Juniper forest. Haugen (1991), commenting on this issue, writes..." The town to a great extent owes its existence to the forest, which from the very beginning provided valuable termite-resistant construction Juniper material as well as logs of considerable commercial value."

4.3.5.1 The growth of the population of Negelle town.

Any rise in populstion has a significant impact on the demand and supply of wood. It increases the demand for wood (even if per capital consumption tends to decline) and reduces the forest area. This increases the distance travelled to obtain wood and the price of wood.

Table : 9 Population size and growth of Negelle town for the different years.

Year	Size of population	Population growth between years in %
1968	4,365	-
1974	10,660	12.8
1984	11,997	1.2
1991	18,376	6.1
1968-1991	-	6.0

Source: CSO (1968,74,84). Ethiopian Statistical Abstract.

And the 1991 data is obtained from the office of Negelle City Council, during the survey period. Jan-Feb, 1991.

The population of Negelle town grew rapidly between 1968 and 1974, at a rate of 12.8 per cent per annum. Between the years 1974 and 1984, the growth was stagnant, with a rate of only 1.2 per cent per annum. Then, between 1984 and 1991, there was a significant rise in the growth rate to 6.1 per cent per annum. Such immediate rise between these periods might be due to the administrative status the town achieved in 1989. The overall growth rate between 1968 and 1991 was 6.0 per cent per annum. That gives the town a higher growth rate than the national average of 4.0 per cent per annum (CSA, 1991).

#### 4.3.5.2 Consumption of wood and wood products

##### 4.3.5.2.1 Construction wood

The built-up area of Negelle town has also shown significant change. According to the data obtained by imperial measurement from the 1964 and 1984 maps, the size of the built-up area changed from 680 hectares to 2320 hectares during these 20 years, growing at a rate of 12.1 per cent per annum. The expansion of the town was mainly toward the east and west. Large areas that were used for cultivation and grazing in 1964 had been converted into built-up area by 1984. This signifies the increase in the number of dwelling houses constructed within the town and in the newly developed areas (See Figs, 9 and 10).

The cause for the rapid decline of the size of the forested area around Negelle can also be seen from the type of materials used for the residential construction. During the survey period, there were about 2,300 dwelling houses in the town (Office of the Negelle City Council).

Table : 10 Distribution of the 150 houses, by type, sampled for the questionnaire survey in Negelle town

Types of house	Number of houses	Percent of total
Mud houses ('Chika bets')	147	98
Wooden houses	1	0.7
Others (Brick/Stones	2	1.3
Total:-	150	100

Source: Author's field survey. January, 1991.

Of the 150 sampled dwelling houses in Negelle town, 147 dwelling units ( 98 per cent) were mud houses. One dwelling unit was exclusively a wooden house. The remain two dwelling units were brick/stone houses. The kind of material used in the construction of these houses is the important point that should be assessed (Table - 11).

Table : 11 The distribution of the 150 sampled houses, by construction material in Negelle town

Construction material	Number of houses	Per cent of total
Wood (Juniper)	130	86.7
Wood (Podocarpus)	1	0.7
Stone/Bricks	2	1.3
Not known	17	11.3
Total:-	150	100

Source: Author's field Survey. January, 1991.

Of the 147 mud houses, the materials used in the construction of 17 dwelling units (11.3 per cent) was not known. The 130 (86.7 per cent) remaining houses used almost exclusively Juniper wood obtained from the surrounding forests. Amidst the rapid growth of Negelle town, residential construction is expanding largely due to its administrative importance in the Borana region. Thus, its influence on the surrounding forest can be envisaged from the kind of construction wood used. In Negelle town, most of the houses have fences. The materials that these fences are made of can be seen from Table - 12.

Table : 12 Materials used in fences, in the 150 sampled houses in Negelle town.

Fence type	Number of houses	Per cent of total
Wood (Juniper)	100	66.7
Wood ( <i>Pygeum africanum</i> )	1	0.7
'Kinchib' (living plant)	1	0.7
Others (stones/corr.iron)	2	1.3
No fences	46	30.7
Total:-	150	100

Source: Author's field survey. January, 1991.

Of the 150 sampled houses, 46 (30.7 per cent) dwelling units were without fences and 104 (69.3 per cent) had fences. From which, the 101 (67.3 per cent) were made of wood. Of the fenced 104 houses, 101 (97.1 per cent) were made of wood, where Juniper accounts for about 92.2 per cent.

PLATE - VI



(a) In Negelle town most of the houses are fenced with split wood obtained from Juniper tree.



(b) The Negelle foot ball stadium being fenced with splits of wood obtained from Juniper tree.

4.3.5.2.2 Fuel Consumption

The majority of the town's population use fuelwood and charcoal, as seen from the Table - 13

Table : 13 Type of fuel used by the 150 sampled households in Negelle town

Fuel type	Number of households	Per cent from total
Wood and charcoal	132	88.0
Wood only	14	9.3
Electricity and Kerosine including charcoal and wood	4	2.7
Total:-	150	100.0

Source:- Author's field Survey. January, 1991.

Nearly 100 per cent of the 150 sampled households were using wood as the only or major source of fuel. Fourteen (9.3 per cent) households were exclusively fuelwood users; 136 (90.7 per cent) households were using charcoal and other fuels. Only 4 (2.7 per cent) households used electricity and kerosine, as supplementary fuel sources.

The amount of wood and charcoal (the major sources of fuel for the town's population) used by each household varied depending largely on household size and income. But the average household unit reported to consume about one to two donkey loads of wood and a sack of charcoal per a month (see Table - 14 and 15).

Table : 14 Amount of fuelwood consumed per month in the 150 households in Negelle town

Donkey's load/ month (x)	Number of households (y)	xy
1	51	51
2	60	120
3	29	87
4	8	32
5	2	10
Total:-	150	300

$$\bar{x} = \frac{xy}{y} = \frac{300}{150} = 2$$

2 loads of donkey/  
month/ household.

Source: Author's field survey. January, 1991.

Table : 15 Amount of charcoal consumed per month in the sampled households in Negelle town.

Sacks charcoal/ month (x)	Number of households (y)	xy
$\frac{1}{2}$	22	11
1	91	91
2	22	44
3	1	3
Total:-	136	149

$$\bar{x} = \frac{xy}{y} = \frac{149}{136} = 1.1$$

1.1 sacks/month/  
household.

Source: Author's field survey. January, 1991.

The price of firewood per donkey's load and charcoal per sack varies depending upon the quality of both the wood and

charcoal. The calculated average price of fuelwood per donkey's load is birr 6.40 and per sack of charcoal birr 11.60 (see Table-16 and 17). However, there are price fluctuations in the different seasons. During the rainy season, the price goes up while during the dry season, it goes down. There are various reasons forwarded, but the engagement of the rural pastoral people (the main suppliers) in cultivation primarily during the rainy season was said to be the major one.

Table : 16 Price of fuelwood per donkey's load reported by the sampled households in Negelle town

Price/donkey's load in birr (x)	Number of households (y)	xy	
5	15	75	Average price of fuelwood/ donkey's load. $\bar{x} = \frac{xy}{y} = \frac{903}{141} = 6.4$ birr 6.4/donkey's load.
6	78	468	
7	26	182	
8	20	160	
9	2	18	
Total:-	141	903	

Source: Author's field survey. January, 1991.

Although, all the sampled household reportedly used fuelwood, nine households were obtaining fuelwood either through collecting from the forest, using family labour or getting it through other means. The remaining 141 households obtained their fuelwood from the market.

Table : 17 Price of charcoal per sack reported by the sampled population in Negelle town

Price of charcoal/sack in birr (x)	Number of households (y)	xy
8	10	80
9	6	54
10	17	170
11	11	121
12	62	744
13	14	182
14	16	224
Total:-	136	1575

Average price of charcoal/ sack

$$\bar{x} = \frac{\sum xy}{\sum y} = \frac{1575}{136} = 11.6$$

birr 11.6/sack.

Source: Author's field survey. January, 1991.

A decrease in the available forest area influenced the price increase of the fuelwood and charcoal. Likewise, the increase in the price of fuelwood and charcoal can be explained by the decline in the forest area. Analysis of price tendencies in this respect is made on the above assumptions in Table - 18.

Table : 18 Change in the relative price of fuelwood and charcoal reported by the sampled households for different time periods since the 1950's in Negelle town.

Years/period (Eth.C.)	Average price in birr			
	Wood/donkeys load	% change since 1950s	Charcoal/sack	% change since 1950s
1950's	0.50	-	0.75	-
1960's	1.25	150	1.50	100
1970's	3.00	500	4.00	433
1980's	6.00	1100	11.00	1366.7
Average changes year	-	55.0	-	68.3

Source: Author's field survey. January, 1991.

The price of fuelwood and charcoal increased sharply through time. The price of fuelwood increased about 12 fold while that of charcoal about 15 fold, since the 1950's (Eth.c), with mean annual rates of increase of 55 per cent and 68 per cent, respectively. These changes in price appear to be the result of the increase in the distance travelled by wood cutters and gatherers to bring the forest products to Negelle town and also inflation, although their relative contribution is not known.

## CHAPTER FIVE

### 5. Consequences of forest degradation and measures taken

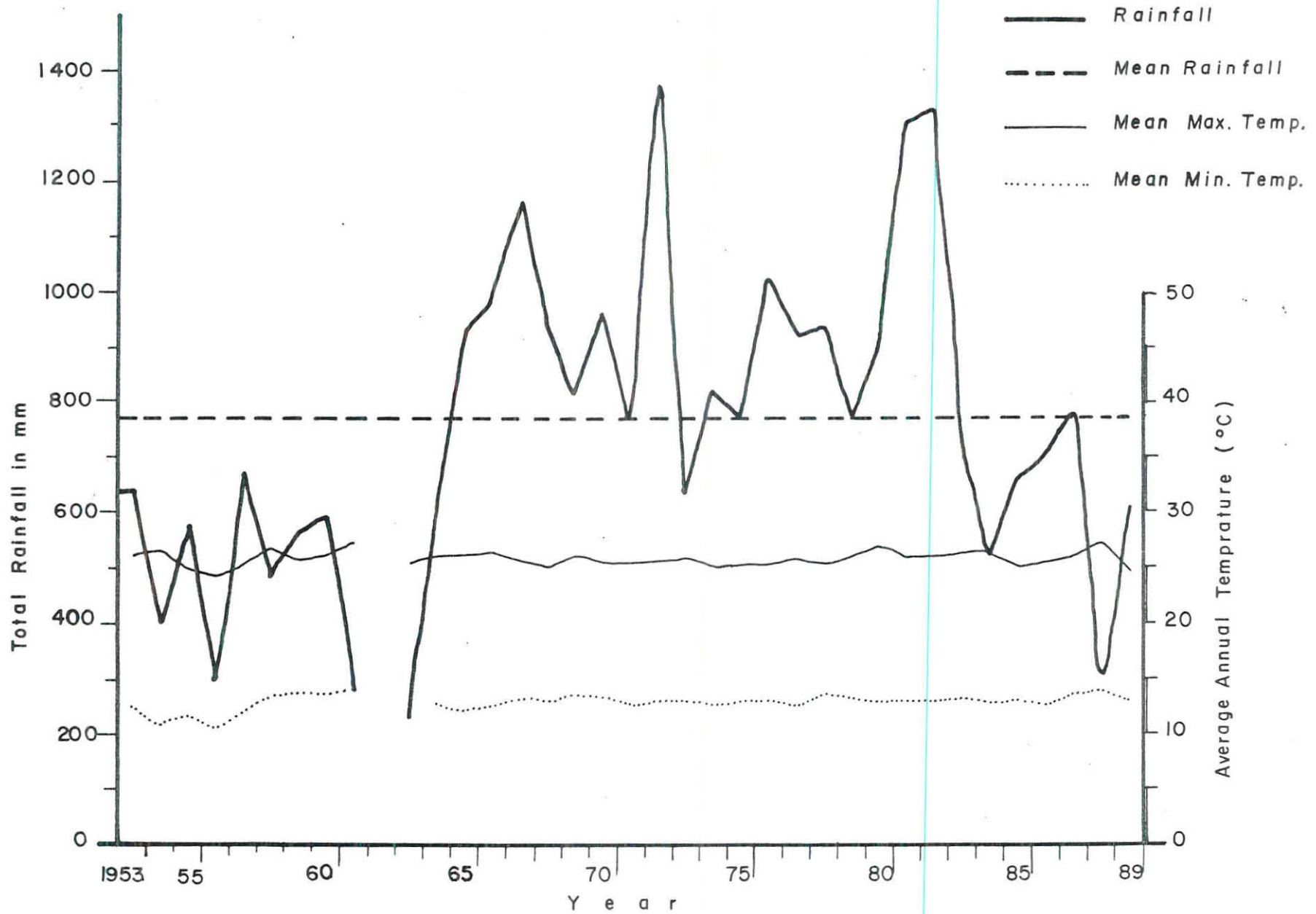
#### 5.1 Forest degradation Vis-a-Vis environmental consequences

It is a well known fact that vegetation reflects the relationship between climate, soil, water and animal life and pressure exerted by man over time. I analysed degradation of the juniper forest in relation to environmental consequences.

According to the climatic records for Negelle town, for the period since 1953-1989, there was a significant variation in the amount of annual rainfall received. In some years the amount of the rainfall received was either significantly lower or higher than the averages (Cv 35.0 per cent). This signifies the uneven distribution of the rainfall amount received during the 36 year period. (see Figure. 11). And yet there are times when the rainfall was concentrated in a few months of the year. This rainfall variation combined with the depletion of the forest cover may be expected to impact on the local ecology, although this effect cannot be quantified here.

From the hydrological point of view, the process of ecological change may be manifested by the disappearance of semi-permanent pools or wells, the transformation of permanent pools and wells into temporary ones and the decreased flow of streams. In the study area, the springs that were found within the forest have dried up. The perennial streams have now dried up and changed into dry valleys, through which water flows briefly only during the rain seasons. These stream valleys and other wider gullies were sources of water for the pastoralists during the dry season.

Fig. 11. Annual rainfall and average temperature for Negelle town (1953 - 89).



Most of the wells and pools were situated either along the valley sides or on the valley floors. However, today some of these pools and wells are dry, others have declined in capacity. The Borana have deepened many wells in response to the lowered water level.

The variation of the rainfall naturally results variation in the ground water level. Mainly due to the variation in the amount of water intering the ground. The infiltration capacity of the ground on the other hand depends on the nature of the land cover and depth of the soil. Land covered with little tree and bush vegetation and shallow soils is subject to high surface runoff and low water retention in the soil. High evaporation rates due to lack of protective vegetation cover and high temperature worsens the situation. Moreover, the high concentration of rainfall in certain months adversely effects the amount of water entering the ground. The rain runs off in the form of flash floods with increased volume of runoff and decreasing the infiltration into the ground.

The influence on the soil is also evident in the study area. The absence of tree vegetation cover and increased concentration of rainfall with high volume of runoff has resulted in accelerated soil erosion in the study area. The problem, though not severe due to the low relief, is clearly observable. Rills, widening and deepening gullies and sheet erosion on deforested slopes are clearly visible inside the degraded forest. I was able to observe the widening of gullies due to collapse of their sides and deepening of their bottoms. In some gullies the bed rock is exposed resulting in accelerated lateral widening of the gullies.

In the areas devoid of the forest cover, much of the shallow top soil has been washed away, exposing the bed rock. In the relatively lower and level grounds larger deposits of silt soils and sands have been deposited by erosion.

The decline in the number and variety of the wildlife species is another indication of ecological upset. The study area had been endowed of various types of wildlife, big and small, carnivorous and herbivorous. However, some of these mammals have declined in numbers and some have migrated to other areas.

#### 5.2. Activities of the Liben Awraja Ministry of Agriculture Vis-a-Vis the forest resources in the region.

The responsible government department concerned with the forest cover in the study area is the Liben Awraja Ministry of Agriculture, forestry department, in Negelle. According to the information obtained from the experts in that department, there are three major activities related to forestry to which attention is given.

- 1- To preserve and protect the existing natural forest
- 2- To carry out an afforestation programme
- 3- To systematically exploit the forest resources and deliver to the users with a reasonable price.

In the following, I try to describe how these activities are carried out and how successful these programmes are.

##### 5.2.1 Preservation of the nature forest

The aim is to care for and protect the depleted natural forest from increasing destruction by man. This is done by

restricting forest use by any one [ the pastoralists living in the peasant associations adjoining the forests (mainly Borana) and the urban people, including the military ] and keeping an eye by employing forest guards. Further an attempt has also been made by the local forestry department to educate the people (both the rural and urban, through the peasant and urban dwellers associations, respectively) about the necessity of protecting the forest to the well being of the society.

According to the information I obtained (personal contact) from the forestry department, in the office of Liben Awraja Ministry of Agriculture, there are two forest areas in Liben Awraja that are planned to be converted into a State Forest Project Area, since 1980 Eth.c. They are the 'Mankubsa' Forest State Project Area and the Genale/Dawa Forest State Project Area. The former was fairly well surveyed while the latter was not. Accordingly, the 'Mankubsa' Forest State Project Area encompasses an area of about 17, 780 hectares of land. Of these, only about 3,280 hectares of land were forested. Since the Genale/Dawa Forest State Project Area was not yet surveyed, nothing was known about the areal coverage of forest. The only forest in the Awraja, that was having guards and was protected, since 1976-82 Eth.c, was the 'Mankubsa' forest. In spite of this protection various problems were encountered by the local forestry department, which are still existing. Among these the following problems deserve to be stated:

- 1- The use of the forest for grazing by the pastoralists (mainly the Borana) in the peasant association adjacent to the

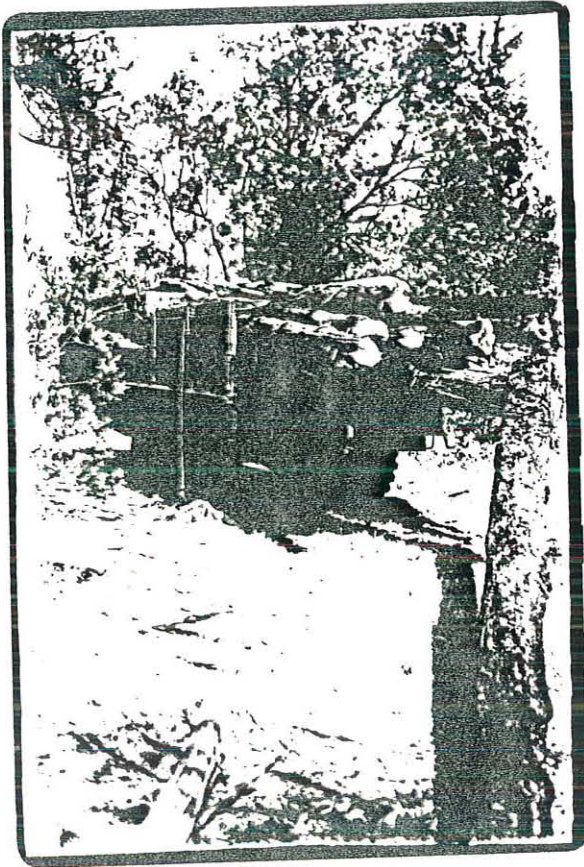
'Mankubsa' forest results in degradation. I was informed by the forestry expert (in the Liben Awraja Ministry of Agriculture Office) that, the pastoralists do not accept the area delimited as State Project Area. Their opposition is usually expressed by dismantling the boundary markers that were erected along the State Project Area boundary. There is fear among the pastoralists that, if they do not act now, there might come a time in the future when they will totally be denied of the right to use the 'Mankubsa' forest for grazing, their most important source of the dry-season grazing.

2- There are poachers, mainly 'wata', whose livelihood is totally dependent on the selling of wood, particularly construction wood materials. It has become difficult to control their destructive activities in view of this economic dependence. The increasing involvement of the pastoralists in selling wood and charcoal as a source of cash income, is another problem.

3- The illegal and sometimes forceful exploitation of the 'Mankubsa' forest by some government organizations, mainly the military, for firewood and construction purposes has resulted in deep vehicle tracks and areas devoid of mature trees.

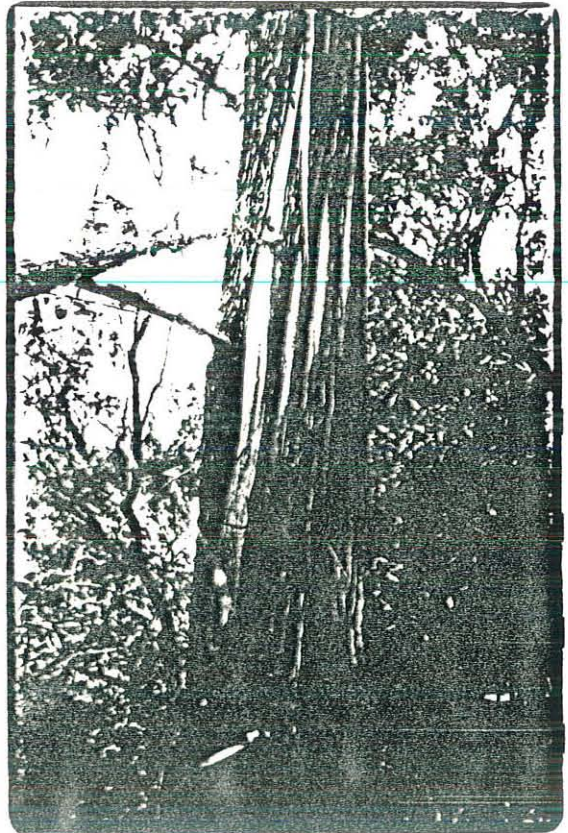
4- The lack of guards, since 1982 Eth.c. due to financial problems faced by the local office of the Ministry of Agriculture has resulted in increased illegal cutting of wood. I observed numerous Juniper trees, the bark of which had been girdled with axes in order to kill them and dry their wood before cutting and subsequent rapid transport out of the forest. The growing urban

PLATE - VII



(a) A military vehicle being loaded with logs of Juniperus procera trees (inside the Mankubsa forest)

(b) Juniper trees are made to dry due to the removal of their barks for various reasons. In the photograph the bark of a J. procera has been removed from its trunk (inside the Mankubsa forest).



capacity of raising about 300,000 seedlings per year. But it was closed in 1982 Eth.c. due to the same problem mentioned above.

Table : 19 Area coverage during the Afforestation period (1976 - 1982 Eth.c) in Liben Awraja

Planting sites	Area covered (in hectares)	Per cent of total
Harakallo	20.0	12.7
Genale/Dawa	3.65	2.3
Gudba	14.00	26.1
Gobicha	43.45	27.6
Mankubsa	32.5	20.7
Sedabra	16.6	10.6
Total:-	157.2	100.0

Source: Liben Awraja Ministry of Agriculture (Archives), Negelle.

During the afforestation period (1976-1982 Eth.c.), a total area of 157.2 hectares of land was planted at the six planting sites. The dominant tree species planted were Eucalyptus camaldulensis ( a fast growing and termite resistant tree species). Other important tree species include: different species of acacia (Acacia albida, A saligna, A. senegal), Albizia lebbek, Cupressus species, Delonix regia, Eucalyptus citriodora, Grevillea robusta, Juniperus procera, Melia azedarach, Parkinsonia aculeata spathodea nilotica, and others. In addition, various ornamental tree species were

also distributed by the nurseries to the Negelle town population [Office of the Ministry of Agriculture, Liben Awraja. Negelle (Archives).]

However, there is no record about the number of seedlings planted during this period. Moreover, no follow-up was made in the planting sites about the situation of the plants. Survival estimates have been made only in a part of the 'Mankubsa' area. This is mainly due to manpower shortage. Of the total area planted at the 'Mankubsa' site, the 18.5 hectares has been devoted to Juniperus procera (grown from indigenous trees). This area was planted during the 1982 Eth.c. main rainy season. The third round survival count was made by Liben Awraja Ministry of Agriculture, forestry department, in February, 1983 Eth.c. (while I was working in the field). The survival rate was found to be about 80 per cent, which is promising. Thus, there is a future plan to increasingly plant Juniperus procera, mainly in areas that had originally been covered with this tree species.

### 5.2.3 Exploitation

The exploitation of forest wood and wood products for sale, by the Office of Ministry of Agriculture, in Liben Awraja, Negelle, started in 1979 Eth.c. The involvement of the local forestry department in this activity was to control the indiscriminate and uneconomical exploitation of the remnant small forests found in the Liben area and to promote a systematic exploitation of the forest, so that it can last for a longer period. The main source area to be exploited in this way is the 'Mankubsa' forest. The department mainly uses the burnt forest area and old trees. and

sells them to nearby consumers. The major customers are: the nearby military base, Negelle hospital, the local bakeries and the urban community (mainly during important occasions or festivals, like weddings, and for house construction). [Liben Awraja Ministry of Agriculture Office, Negelle (personal communication)].

The prices of wood and wood products in Liben Awraja is determined by the type and condition of the wood. Accordingly, there was such classification of wood prices by the Liben Awraja Ministry of Agriculture Office (Table-20).

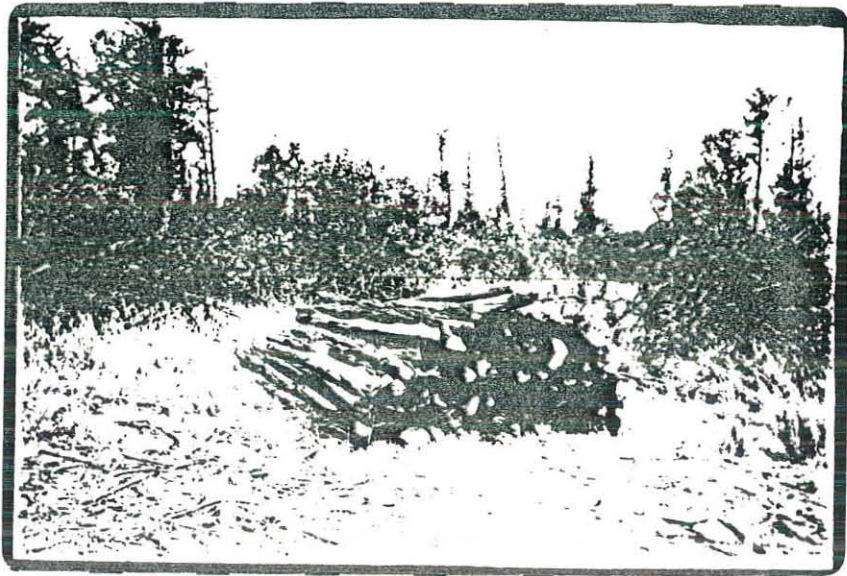
Table : 20 The price of wood and wood products fixed by the Liben Awraja Ministry of Agriculture, Negelle

Wood/wood products	Cost of labour (in birr)	Tax (in birr)	Total price (in birr)
Rectangular pole (4mx10cm)	3.00/piece	1.56/piece	4.56/piece
Beam (4mx 10cm)	2.00/piece	1.56/piece	3.56/piece
Beam (3mx 10cm)	1.50/piece	1.56/piece	3.06/piece
Split wood	80.00/lorry load	0.55/piece	about 300.00
Fuelwood	Self	7.00/m <sup>3</sup>	7.00/m <sup>3</sup>

Source: Liben Awraja Ministry of Agriculture (Archives). Negelle.

All type of wood and wood products, except fuelwood, use employed labourers by the local agricultural office. The price of the wood and wood products, fixed by the Liben Awraja Ministry of Agriculture Office, include both the labour cost involved in the preparation of the different wood products and the tax being

PLATE - VIII



The Juniper tree remained the main source of timber for Negelle town population. On the photograph a pile of construction wood (poles and beams) are seen waiting for transportation to Negelle town. [ Inside the burnt forest area of the Mankubsa forest].

paid, respectively. The labour cost is determined by the labour involved in the preparation of the different wood products. Taxes are being paid per pieces, except for the fuelwood, per m<sup>3</sup>

The only income collected by the Awraja Ministry of Agriculture office is that obtained from tax. The rest goes to the labourers. Table-21, indicates the amount of income tax obtained annually by the Awraja Ministry of Agriculture Office for the sale of wood for the period 1979-1982 Eth.c.

Table : 21 Income tax received from the sales of wood and wood products by the Liben Awraja Ministry of Agriculture for the different years.

Year (Eth.c)	Income tax received (in birr)
1979	35,553.76
1980	No records
1981	No sale
1982	18,497.20

Source: Liben Awraja Ministry of Agriculture (Archives), Negelle.

It happened difficult to discuss the table (Table-21), due to the gap in the data obtained. However, it seems that, the local agricultural office received significant sum of money from the sales of wood and wood products.

During these four years the following wood types and amounts were marketed locally:

Table : 22 Types and amounts of wood sold by Liben  
Awraja Ministry of Agriculture in 1979-1982 Eth.c.

Year (Eth.c.)	Wood types and amount sold				
	Pole,beam, (in pieces)	Split wood ( in m <sup>3</sup> )	Fuel wood ( in m <sup>3</sup> )	Floor-board (in pieces)	Plank (in pieces)
1979	9,784	103.26	305.0	111.16	36
1980	1,565	142.5	360.0	-	-
1981	-	-	-	-	-
1982	1,707	254.8	444.16	-	-
Total	13,056	500.56	1109.16	111.16	36

Source: Liben Awraja Ministry of Agriculture (Archives),  
 Negelle.

The largest amount of wood and wood products were marketed in 1979 Eth.c. The selling of construction wood accounted for the largest share. This signified the construction of new houses. Almost all of the construction wood materials were prepared from the Juniper tree. The two types of wood products, floor-board (4m x 20cm) and plank (4m x 30cm) were confiscated from poachers. No permission is given by the department for the preparation of wood products with length and width more than 4m x 10cm, respectively. Therefore, the Awraja Ministry of Agriculture is not involved in the selling of such kind of wood products.

## CHAPTER SIX

### 6. Summary, Conclusion and Recommendations

#### 6.1 Summary and Conclusion

The area around Negelle town and even that where the town is situated had been once covered with Juniperus procera forest. The town also owes its existence to the forest that provided timber and other wood products to the town's population. The Borana, the traditional settlers of the area, considered the forest as part of their cultural heritage. The Borana use the forest for various purposes, particularly it has been important to their pastoral economy. For it provides pasture, and the springs within the forest and the streams below, water to their livestock during the long dry season.

From the study results and the discussion, it can be concluded that the existing forest around Negelle town has been badly depleted in recent decades. The reasons for the depletion of the forest cover is due to the interplay of various factors. Particularly the exploitation for building materials, fuel and fodder for livestock, and the expansion of cultivation as well as wildfires have been instrumental in this degradation and deforestation. The immigration of the different pastoral groups into Liben Awraja and encroachment on to the Borana territory, including the shift in their territorial occupance (due to ecological and other reasons) has also, directly or indirectly, resulted in forest depletion.

Continuous exploitation of the forest without sufficient conservation or reforestation to insure the existence of adequate future

supplies has caused a rapid depletion of forest resources. As a result, forests have dwindled both in area and quality. Many of the forest areas which were over exploited turned into bushy stands and eventually into open shrubs. These are of very little use to either man or beast. The process of forest degradation will most likely go on unabated with the exception of few remnant stands found in 'Mankubsa' area. They too are under serious pressure and exploitation. The 'Miessa' and 'Gobicha' forests have already been largely destroyed. Contrary to the popular belief, there now is little forest land left untouched by man's hand.

Vast forest areas have been clean cut for agricultural purposes. The 'Miessa' forest area that appears on the 1964 map, covering an area of about 1000 hectares of land was mostly under crops of one sort or another, in 1984. The remnant 'Mankubsa' forest, has been disturbed. Although the forests of Liben Awraja have been seriously overexploited and degraded, they remain the most important timber and fuel source of Negelle town, and considerable quantities of lumber and fuelwood are still being obtained without planned cutting.

It appears that forest clearings by themselves have an adverse effect on the local and ecologically fragile Juniper forests in this subhumid area. When the ground is no longer protected by trees erosion accelerates. If the process unabated may lead to the complete removal of the soil cover, especially on slopes. This results in the exposure of the bed rock below and the disfigurement of the landscape, as observed in parts of

the study area. Furthermore, it might modify the local climate and result either in reduction or variation and unreliability of the average rainfall received. Even if there is no actual reduction in rainfall, little water may infiltrate into the soil, runoff is likely to increase and the water table fall. This situation, combined with the increasing intervention of man (through clearing of the land for cultivation, burning, grazing and cutting of forests etc), makes it considerably more difficult for the Juniper forest to re-establish itself.

## 6.2 Recommendations

Understanding the increasing depletion of the forest cover around Negelle town, including the causes and the problems that have occurred and might possibly occur in the future, certain recommendations are made here as guidelines for land use and regional planners, as follows:

1- The natural forest ecosystem in the study area, like all other semi-arid lowlands in Ethiopia, is delicate. And disturbance mainly begins with the disturbance of the natural vegetation cover. Moreover, the regeneration capacity of the dominant tree species, Juniperus procera, is poor. Therefore:

- It is necessary, for maintenance of the ecological balance, to have adequate natural forest areas, whether officially designated as reserves (like the 'Mankubsa' forest) or not. That can conserve the local species and cover a wider area of habitats. Because, if the pressure is relieved to allow the plants to develop and seed, trees may grow naturally.

- Whatever natural trees remain today, they should be closely protected. Particular attention must be paid to remnant Juniper stands. Because, this species is particularly susceptible to misure and intensive exploitation.

- A detailed study of the dryland Juniper forests and flux species composition and ecological requirements is fundamental to any attempt of conservation.

2- All elements in the forest ecosystem, both inorganic and biologic, interact and effect each other. Therefore:

- An ecologically oriented approach is necessary to attain fruitful results expected from the conservation of the nature forest.

- Inter-desciplinary ecological investigations involving botanists, ecologists and social scientists should be made. The results must be taken into serious consideration by planners and technical staff responsible for development schemes.

3- Though in this region conservation is more appropriate than reclamation and afforestation, there is still a need for promoting afforestation as a remedy. Thus:

- As there is a growing demand for forest products, mainly for construction purpose, and as little suitable timber remains in the depleting forests, afforestation efforts are necessary to satisfy future needs. During the last few years (mainly between 1976-1982 Eth.c), an attempt was made by the Liben Awraja Office of the Ministry of Agriculture to introduce various species of plants. The afforestation programme, although it

lasted for a short period and was discontinued, should be resumed after resolving the hinderances.

- More follow-up attention needs to be given to the planting of seeds of plants, mainly the indigenous ones, that are tolerant of local climate and soil conditions. The promising result obtained from the planting of the indigenous Juniperus procera varieties in the 'Mankubsa' area is encouraging.

4- Further measures should be taken to control or minimize forest degradation through appropriate utilization. In so doing the following points should be taken into consideration:

- If effective measures are to be taken against deforestation, the people involved must be educated and persuaded of the advantages that well established and productive forests offer to them. Whenever possible measures should be of a positive rather than a restrictive and forced nature. Some problems are presented by the local pastoralists, whose traditional land use system does not fit neatly into the planning frameworks. However, there are some possibilities of winning over or convincing the pastoralists. For instance, the manipulation of the 1981 Eth.c. traditional gathering of the Borana people aroused the awareness and responsibility of the tribe and the willful resolution passed to the protection of the forest.

- Various small dispersed permanent rural settlements of the pastoralists are coming into being due to increased sedentarization. Further, Negelle town is growing due to its administrative importance. Thus, in order to regulate the felling

of trees for fuel and timber, authorities may be able to introduce alternative fuel and construction materials, such as bricks made from clay soils and a bio-gas. The Liben area is endowed of various non-forest construction materials (stones, sand, limestone etc). They can be used as a resource. Moreover, it is possible to produce a huge amount of bio-gas from livestock excreta that can easily be obtained in abundance, together with weeds and agricultural waste materials. They may be used as fuel substitutes for wood. However, both need reasonable capital, skilled man power and managerial capacity to start with. The solution can be sorted out by the local authorities in cooperation with concerned experts and local communities.

- Land use planning should take into account: the history of land tenure of the Liben area, the land use and settlement pattern, including the wishes of the pastoralists, in order to bring about a solution to the conflicts that arouse between the different ethnic groups on one hand and the pastoralists and the development projects on the other.

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Appendix -.I

List of the selected informants, both from Negelle town older residents and among the pastoralist groups in Liben Awraja, with whom intensive interviews were made (January - February 1991).

A-- Among the pastoralist groups

Name of the informant	Age	Group(tribe)	About the informant		Date of interview
Dub Dima Kula ('Balamberas')	63	Borana	Was formerly one of Borana chief in Liben Awraja. He is the prominent elder of the Borana in Liben	Dida Liben (Tedech bika)	19-5-83 20-5-83
Kempere Godana ('Balamberas')	59	Borana	He was one of the Borana chief in Liben Area. He is still the prominent Borana elder in Liben.	Hades	21-5-83 22-5-83
Hassen Adin	46	Borana	He was chief of the Awraja people's Army ('Hizbawi')	Boba	10-6-83

Name of the informant	Age	Group (tribe)	About the informant	Adress	Date of interview
Mohammed Ali Wako (Maâlim')	55	Arsi	He is prefessor of 'Koran' and representative of 'Awalia' in Liben. His parents were among the first Arsi families settled in Liben.	Miessa Darole	14-6-83
Kedir Godana Jara	55	Arsi	was working as chairman of the Kobadi peasant Association. His parents were among the first Arsi families settled in Liben.	Kobadi	19-6-83
Guye Chemeri	67	Arsi	Was chairperson of the People's tribunal in the Arda Bururi peasant Association His parents were also among the first Arsi families settled in Liben	Arda Bururi	19-6-83

Name of the informant	Age	Group(tribe)	About the informant	Address	Date of interview
Safoye Tapula	49	Guji	Was vice-chairman of the Adadi oda chebe peasant Association. Represent the Guji in the Awraja elders and peace committee.	Adadi oda chebe	26-6-83
Syhannes Gambela	48	Guji	Engaged in cattle trading. His father was a Guji story teller. He was curious to learn about the Guji from the elders.	Both in Harakalo area and Negellettown	27-6-83
Yohannes Dembi	50	Guji	An ordinary Guji. Engaged as cattle-broker in Negelle town and the Guji area.	Negelle town and Gofa. Yambo area.	27-6-83
Deas Sheik Hussien	55	Marrihan	He is the son of the former Marrihan chief (sheik Hussien) The leader of the first Marrihan immigrant families to Liben. The Marrihan looked up to Deas as the prominent figure of the tribe.	Haisuftu	22-5-83

Name of the informant	Age	Group(tribe)	About the informant	Adress	Date of interview
Ali Hussen (Fander)	52	Marrihan	A prominent figure of the 'Wararseme' people (A sib-group within the Marrihan community)	Kobadi	23-5-83
Mohammed Sika	53	Marrihan	Ordinary Marrihan elder	Gobicha	23-5-83

B. Negelle town older residents

Name of the informant	Age	About the informant	Years of stay in Negelle town	Present adress	Date of imtervoew
Zegeye Reda	60	A retired civil worker. Formerly worked in the Borana Awraja Administration office as a clerk	52	Negelle town kebele 04	15-5-83
Solomon Tefera	63	A retired civil worker. Formerly worked in the different departments of the Borana Awraja Administration office. Before his retirement, he was Administrator of the Harakallo Wereda.	50 years	Negelle town keble 02	

Name of the informant	Age	About the informant	Years of stay in Negelle town	Present adress	Date of mtervoew
Alemayehu Marye	66	A retired soldier. Cultivate land and keep some livestock.	40	Negelle town kebele 04	10-5-83
Hussien Yahiya	62	A retired soldier. Has farm-land and keep some livestock	41	Negelle town kebele 03	22-6-83
Gebre Abebe	76	He was one of the earliest men involved in wood cutting and supplied wood for construction to the town population. But now he was so weak that he had to beg for his bread.	60	Negelle town kebele 05	16-5-83
Alye Molle	58	Belong to the 'watta', and he is involved in wood cutting mainly construction wood.	Since birth	Woffee' area along the south Eastern fringe of Negelle town	14-5-83

Appendix - II

Section - one : Interview guides (used while dealing with selected elders of the pastoralists groups (Borana, Guji, Arsi, Marrihan, Digodia).

A. Record of the personality (Respondents/ informants)

1. Name \_\_\_\_\_
2. Age \_\_\_\_\_
3. Sex \_\_\_\_\_
4. Tribe \_\_\_\_\_
5. Position in the tribe \_\_\_\_\_
6. Local name of place of residence \_\_\_\_\_
7. Distance and direction from the town, Negelle.  
Distance \_\_\_\_\_  
direction \_\_\_\_\_
8. Date of interview \_\_\_\_\_

B. On the history of the tribal territorial occupation and settlement pattern.

- 01- When did your ancestors (your tribe) came to the Liben area of Negelle ?
- 02- Why did your tribe (your ancestors) move to this place ? and from where ?
- 03- Who were the settlers (tribes) of the area that your tribe met when first came here ?
- 04- Was there any resistance or conflict with the earlier tribes settled in occupying the area ? If yes,  
(a) what was the cause (immediate) that brought the conflict ?  
(b) for how long did this conflict lasted ?  
(c) how did you tackle to solve the problem ?  
(d) do you know (remember) any historical time or period where the conflict had become severe ? What do you call that historical period ? When was this? After what is this name given?
- 05- How large were the first families (their number) of your tribe who entered this area first? Who was the leader of the group?

- 06- What was the territorial extent that your tribe occupied when first came here? (State in place names and location).
- 07- How far had your tribal territory expanded and or declined ever since? and why?
- 08- What is the present territorial limit that your tribe control? (indicate using place names and other methods of locational references).
- 09- Who are your neighbouring tribes and which part do they live in reference to your position? And how is your relationship with your neighbouring tribes?
- 010- Is there a definite border line between yours and the neighbouring tribes? If yes,
- (a) How is it defined (means of delimitation)
  - (b) When and by whom ?
  - (c) Is there any historical time where the borderline changed? When and why?
  - (d) How far is the borderline used properly ?
  - (e) What will be done, if one tribe crosses on to another territory violating the rule ?
  - (f) Is there any reason that any one tribe wishes to cross the borderline? If yes, why and when? Can you state some of the important events and the way it is resolved ?
  - (g) Do you support the existence of this borderline ? If yes or no, please can you state the reasons in order of their importance ?
  - (h) Before this borderline was superimposed or delimited, was your tribe occupying larger or smaller territory than you are occupying now? Where was it? Can you indicate using place names and/or other locational references ?
- 011- Are there areas in your tribal territory, which are delineated for any other purpose and which your tribe is not allowed to use? If yes.
- (a) Which part of your land ?
  - (b) For what purpose ?

- (c) How was your tribal response to this situation and the adjustment made ? (Petition made or presented to the government, to which particular government body ? Time and content of the petition.
- 012- How do you select the site of your settlement ? And who is responsible in selecting the site of the settlement ?
- 013- What is the average number of families settling together ? And how is this arranged ?
- 014- How many villages of your tribe are found in this area ?
- 015- During what months (seasons) do you change your settlement and why ? How is this movement determined ? (Time, direction of movement etc).
- 016- What are the reasons/regulations in shifting once residence (family) from one settlement to another ?
- B. On the attitude of the pastoralist towards vegetation (forest cover)
- 017- When your tribe first came here, how was the vegetation (forest) cover of the area as compared to the present ?
- 018- In your knowledge of the area, have you observed any significant change in the vegetation cover of the area that you live ? If yes,
- (a) Do you think that the deterioration of the natural vegetation cover is a problem ?
  - (b) Why is it a problem ?
  - (c) Was any measure taken by your tribe to control the problem ? What are these ?
  - (d) In your knowledge, what do you think are the reasons for the deterioration of this vegetation cover ?
- 019- In your knowledge of the area
- (a) What type of vegetation (trees, grasses, bushes etc) in your language had been dominant (within the Juniper forest) ?
  - (b) At present what are the dominant vegetation (trees, grasses, bushes etc) ?
- 020- Does your tribe have preference to any species of vegetation (trees, bushes, grasses, herbs etc) ? If yes,

- (a) What are these species of plants (trees, grasses, bushes etc) and for what purpose are they used ?
  - (b) In your tradition, is there any situation where different trees or seeds of plants are made to grow ? when and why ?
  - (c) Are there any unwanted species of plants (trees, grasses, bushes etc) ? State their name ? and why ?
- 021- Which types of vegetation (main species) is preferred for your livestock.
- (a) Camels \_\_\_\_\_
  - (b) Sheep \_\_\_\_\_
  - (c) Sheep \_\_\_\_\_
  - (d) goats \_\_\_\_\_
  - (e) any other purpose state.
- 022- Have you ever be given formal education on how to use and protect the vegetation of the area ? If yes,
- (a) Who gave you the education ?
  - (b) How frequent and for how long ?
- D. On pastoralists economic activity, and land use.
- 023- What type of livestock does your tribe own (raise) when first came here ? Please state their names, the proportion and uses of each of there livestock. (using one family as a reference).
- 024- Does your tribe have any specific attitude or attachment towards these livestocks ? How ?
- 025- ~~What special environment does these livestocks need ? (type of temperature, rainfall, water, topography, vegn etc).~~
- 026- What are the types of livestocks that your tribe own at present and in what proportion ? Can you see any change ? Why ? (Use a family as a reference), please, indicate the particular purpose to which these livestocks and their products are used ?
- 027- Does members of your tribe in your locality cultivate land ? If yes,
- (a) Who are the first engaged in cultivation ? and what was their number ? (in family)

- (c) Whose numbers have declined and increased ?
- (d) What do you think is the reason for the extinction decline and increase in size of these wildlives? Please state your reason in order of importance?
- (e) Which of these are useful and how ?
- (f) Which of these are harmful and why ? And how does your tribe tackle the harmful ones ?
- (h) Is there any traditional game, in your tribe, that gives fame to a person killing a wild animal ? It yes,
  - 1- Which animals and why ?
  - 2- How are they trapped or killed ?
  - 3- Is this tradition still existing ? If no, Why ?

Section-two: Interview guides (used among fuelwood and charcoal sellers )

A. Record of the personality

- 1- Name \_\_\_\_\_
- 2- Age \_\_\_\_\_
- 3- Sex \_\_\_\_\_
- 4- Tribe \_\_\_\_\_
- 5- Local name of place of residence \_\_\_\_\_
- 6- Distance and direction from the town, Negelle,
  - Distance \_\_\_\_\_
  - direction \_\_\_\_\_
- 7- Date of interview \_\_\_\_\_

B. Questions

- 01- Why did you start selling charcoal and wood ?
- 02- Since when are you engaged in selling charcoal and wood ?
- 03- Before you are engaged in selling charcoal and wood what was your means of living ?
- 04- At present, is this the only means of your living or do you have any other source of income ?
- 05- How many days do you bring wood and charcoal to the town ? And in what amount ?
- 06- How do you bring wood and charcoal to the town ?

- 0.7- Where do you bring these charcoal and wood ?
- 0.8- What type of wood do you bring to the market ?
- 0.9- What type of trees are used in making charcoal ?  
and how do you make them ?
- 010- Which types of wood an charcoal are mainly needed  
by town's people ?
- 011- Is there a difference in distance travelled to  
bring wood and charcoal since you started this  
activity ? why ?
- 012- What is the price of wood and charcoal in donkeys/  
camels and sacks respectively that you sell ? Is  
there a difference in price since you started this  
activity ? Why ?

Appendix - III

Questionnaire Survey (Negelle town)

A- Household address

Kebele \_\_\_\_\_

House No \_\_\_\_\_

B- Outcome of interview

Completed \_\_\_\_\_ Not completed (Refused) \_\_\_\_\_

If not completed or refused, please state the reason.

\_\_\_\_\_

C- Name of Interviewer \_\_\_\_\_

Date of Interview \_\_\_\_\_

D- Number of questionnaire \_\_\_\_\_

1- Are you head of the household ?  yes  No

2- How many people are living in this household ? \_\_\_\_\_

3- Does the household own or rent the house ?

1- own  2-  3- Rent free

4- If owned, how did you own it ?

1- built by own

2- bought from some body

3- other specify \_\_\_\_\_

5- What is the type of the house you live in ?

1- 'Chika bet'

2- Brick house

3- Stone house

4- Other specify \_\_\_\_\_

6- Do you know the material the house made of ?

yes  No

- If yes, what is it made of ? Please state \_\_\_\_\_

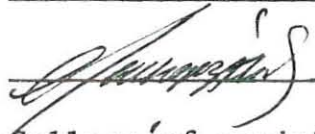
7- Does the house have fence ? Yes  No

- If yes, what is the material the fence is made of ?  
Please state \_\_\_\_\_

- 20- What do you think are the reasons for price change (increase) both in fuelwood and charcoal ? Please state your reasons in order of importance. \_\_\_\_\_
- 21- Is there a price fluctuation (increase) in fuelwood and charcoal within a year? yes  No
- 22- If yes, when and why? State the specific time period and the reasons. \_\_\_\_\_  
\_\_\_\_\_
- 23- What are the major types of fuelwood found in the market ?  
1) \_\_\_\_\_ 2) \_\_\_\_\_ 3) \_\_\_\_\_ 4) \_\_\_\_\_
- 24- Does your household use Juniper wood for fuel ?  
yes  No
- 25- What are the major types of charcoal found in the market ?  
1) \_\_\_\_\_ 2) \_\_\_\_\_ 3) \_\_\_\_\_ 4) \_\_\_\_\_
- 26- Is there a price difference in the different types of fuelwood and charcoal ? yes  No
- 27- If yes, what do you think are the reasons for the price differences ? \_\_\_\_\_

DECLARATION

I, the undersigned, declare that this thesis is my work and that all sources of material used for this thesis have been duly acknowledged.

Name: Solomon Tulu  
Signature:   
Place: College of social sciences, A.A.  
Date of Submission: September, 1991.