Sudan University of Science & Technology
College of Graduate Studies

# Assessment of the Degradation of Al nour Natural Reserved Forest in Al roseires Locality, Blue Nile State

# تـقـــويم تـدهـــور غـــابة النور الطبيعية المحجوزة بمحلية الروصيرص، ولاية النيل الأزرق

A Dissertation of a Degree of Master (MSc) in Environmental Forest

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بسم الله الرحمن الرحيم

# Dedication

*To All Who Love*

*Prophet Mohammed*

**لكل أحباب المصطفى**

صلى الله عليه وسلم

# Acknowledgement

I am fully indebted to my supervisor **Prof. Dr. Ismail Mohamed Fangama Abdalla** for his valuable efforts, guidance, helpful, and continuous encouragement during the research period. Thanks, are due to **Ihab Babker Ibarhim Babker** in **technical Administration of the forest**.

I would like to acknowledge the contribution of **Eng.Taqiallah Mohammed Ismail Ahmed** who have provided valuable assistance and suggestions to words the improving and completion of this work. Thanks, are due to **Forest inspector. Hamid Rajab Bashir**.

I would like to express my gratitude to all those who gave me the possibility to complete this thesis.

# المستخلص

أجرت هذه الدراسة بغابه النور الطبيعية المحجوزة وتعتبر من الغابات النموذجية بولاية النيل الأزرق. هذه الغابة بها تنوع إحيائي مثل: الأشجار عرضية الأوراق والأشجار الشوكية والشجيرات والحياة البرية وغيرها. وأصبحت هذه الغابة مكاناً لبرامج الطلاب والباحثين. يقيم بجوار الغابة مواطنين، ونازحين منذ إندلاع الحرب الأهلية بجنوب النيل الأزرق في 2011م مما أدى إلى القطع الجائر للأشجار وأدى إلى تدهورها. هدفت الدراسة إلى معرفة أسباب وحجم التدهور بغابه النور الطبيعية المحجوزة. وقد تم جمع المعلومات عن طريق الإستبيان والمقابلات والزيارات الميدانية والملاحظات، فضلاً عن استخدام النظرية المركزية للنقاط الرباعية لتقدير كثافه الأشجار بالغابة الآن. وكذلك تم الحصول على المعلومات عن طريق المراجع من مكتبة كليه الغابات والمراعى. توصلت الدراسة على أن غابة النور الطبيعية المحجوزه تدهورت بشكل خطير وصارت الكثافة أربعه شجيرات في الهكتار الواحد. توصي الدراسة على استزراع الأماكن الخالية وحمايتها وإدراتها أ إداره سليمة وتوعية المواطنين وإشراكهم في حماية وزراعة الغابة.

## Abstract

The study conducted in the Al Nour natural reserved forest of model forests in Blue Nile State. It is characterized by biodiversity such as broad leaves tree and acacias, shrubs and other wildlife and the forest became of place for students programs and researchers. Citizens Staying near the forest and internally displaced persons since civil war broke out in southern Blue Nile in 2011, to led cutting down of trees and led to deterioration. The purpose of this study is to find out the causes and the size of the Al Nour natural reserved forest deteriorated. Information was collected through questionnaires, interviews and field visits and observations, as well as using the Central theory points to estimate the density of trees in the forest now. As well as information obtained through references college of forestry and range Library. The study recommends that the cultivation and protection of free spaces and manage a sound management and public awareness and involvement in the protection and planting of the forest.

## Table of Contents

## List of tables

## List of maps

## List of plates

# CHAPTER ONE
# Introduction

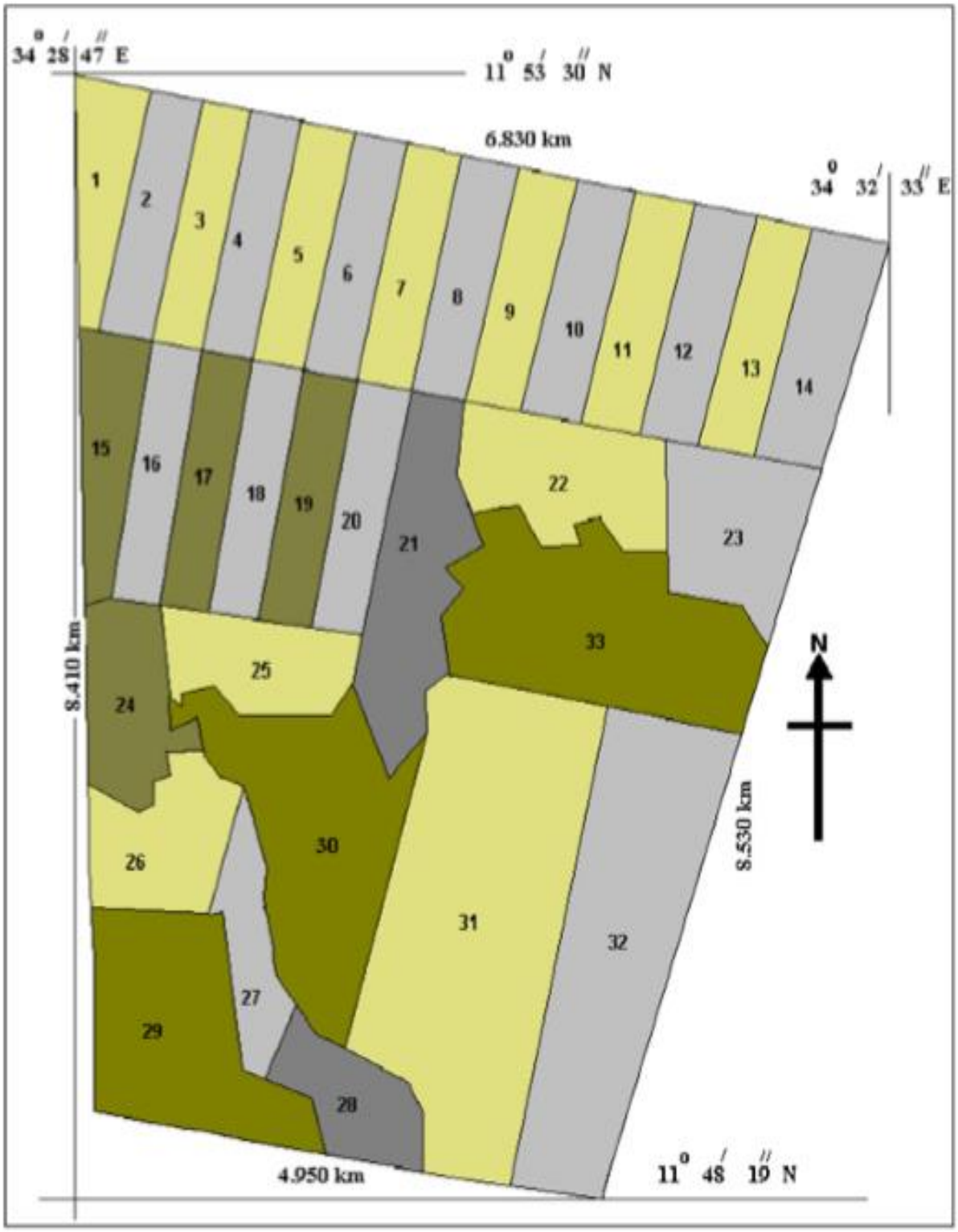
## 1.1 Introduction

The forest is important because serves different functions in the biosphere. Such regulations the flow of numerous biogeochemical cycles, influences on precipitation, wind, temperature, humidity, flooding and others (Mohamed, 2012). The degradation of forest land attracted attention because of these great influences on increasing run-off erosion, carbon dioxide concentration, local region and global climate change, hydrology land and loss of biodiversity (Myers, 1988). On the other hand, several studies displayed that the forest land changes are derived by both natural factor as well as the human being activities through cutting down trees (Agrawel, etal, 2002).

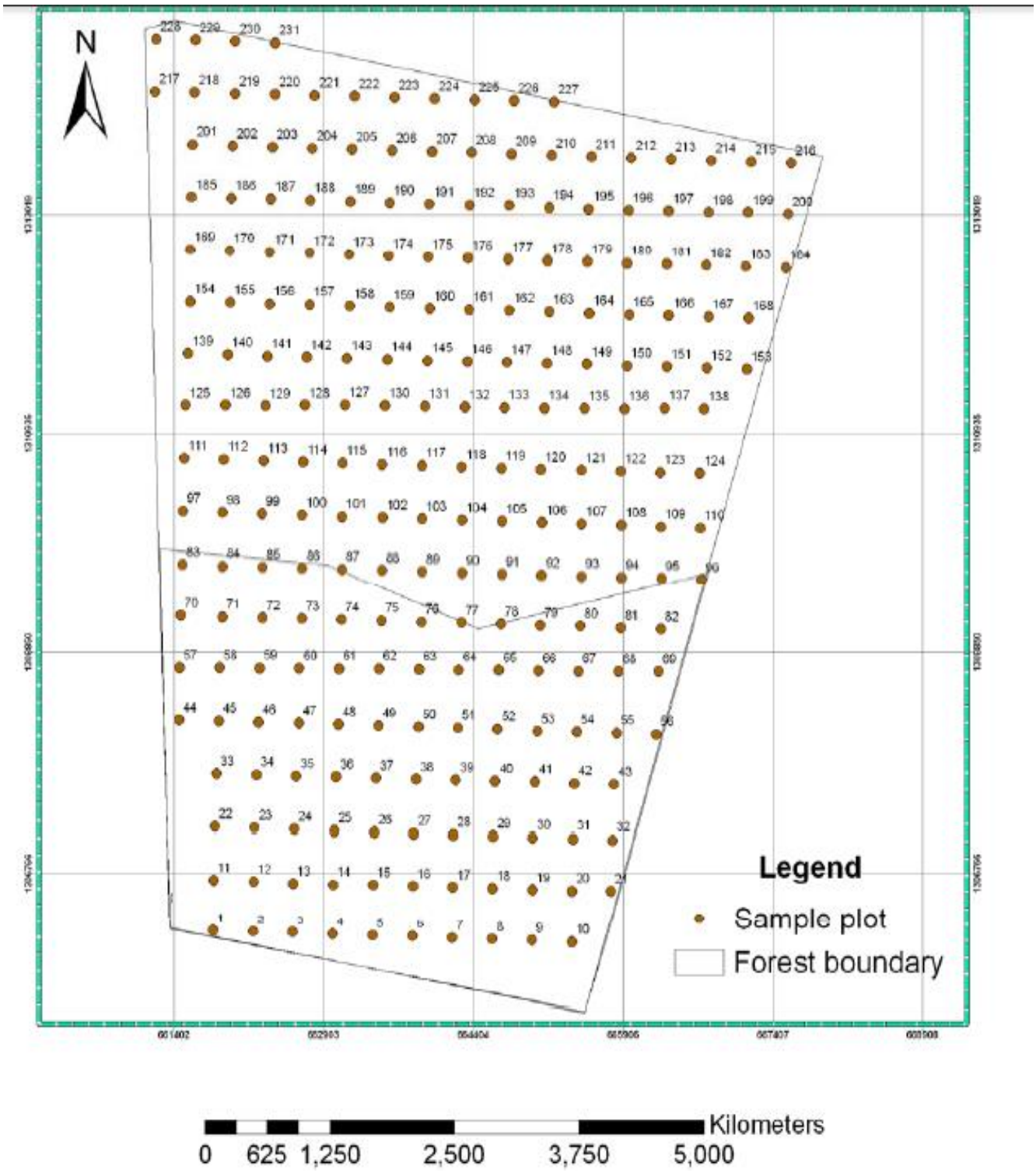
## 1.2 Study Area:

Al Nour Natural Reserved Forest one of the model forest in Blue Nile State because of its environmental and economical roles and research. It is considered one of the most important forests in scientific studies for researchers and students of different universities and programmes. Al Nour Natural Reserved Forest lies on the East bank of Blue Nile River. Six Kilometers East Al Roseires town. The total area of the forest is 11100 Feddan (2664 ha). It Reserves and dissemination Algazeth date: Call 394 AD on 15/6/1959 .Its objectives are as follows:

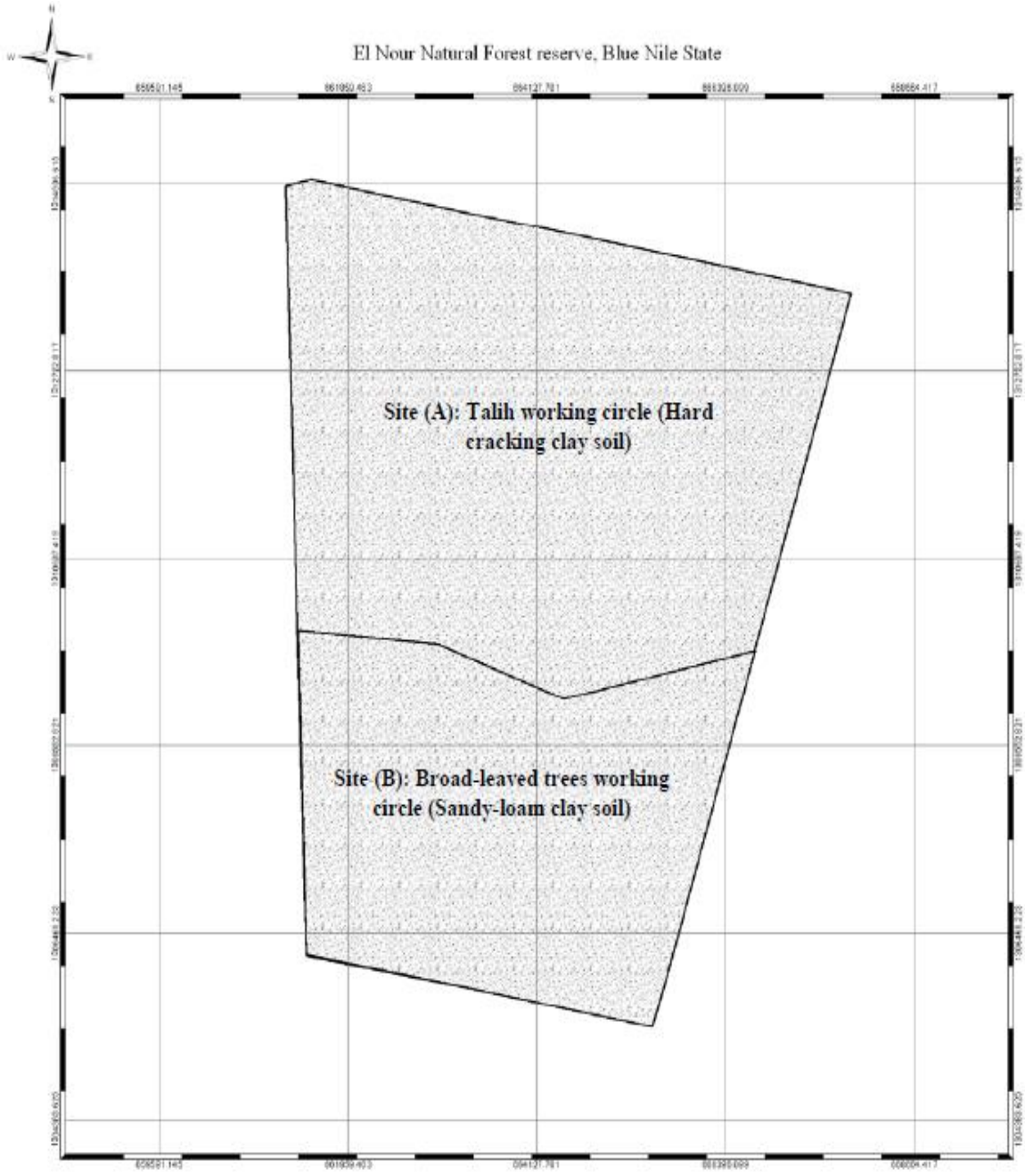
- Increase the reserved forest area.
- Protect tree species.
- Production of firewood.




Map (1): Al Nour Natural Reserved Forest (El Mamoun, 2012)




Map (2): Al Nour Natural Reserved Forest, showing the boundaries and samples distribution in site A and site B (Haytham, 2003)




Map (3): Location of Al Nour Natural Reserved Forest, showing the boundaries and sites A and B. (Haytham, 2008).

**Location:** The forest is located between latitudes 11º 48' 19" and 11º 35' 30" North, the Longitudes are between 34º 28' 47" and 34º 32' 35" East.

**Climate:** The State lies in semi-dry region. The temperature in summer is 31ºC and 22ºC in winter. The annual rainfall ranges between 450-700 mm (UNDP, 2004).

**Vegetation:** The forest consists of different trees and shrubs such as *Acacias, Terminalia laxiflora, Combretum spp., Tammarindus indica, and Greiwa spp.,* the broad - leaved trees, such as *Loncharpus loxiflocens, Terminalia laxiflora, Combertum glutinosum, Anogeissus leiocarpus* and *Scllerocarya birrea*.

In addition to forklifts trees, such as *(Acacia seyal var. seyal, Acacia seyal vr.fistula , Acacia sengal var.sengal , Acacia melifera and acacia Polycantha* ). Its bio - diversity and geographical location makes it a destination for scholars in various degrees.

**The Soil:** The forest land characterized by two types of the soil sand in the South of the forest and clay soil in the North.

**Population:** Many tribes settled surround the forest in addition to Internally Displaced Persons (IDPs). Their activities concentrated on agriculture, firewood collection, grazing and trade.

## 1.3 Research problem:

Since the outbreak of war in Blue Nile State in the early of September 2011 the (IDPs) settled surround Al Nour Natural Reserved Forest with their livestock with natives in Al azaza village. Factors such as hunger and poverty compelled them to collect and cut down trees inside the forest to generate income. The cutting down of trees and shrubs is very heavy, The economical trees such as *Acacia seyal, Acacia seyal vr.fistula , Acacia senegal* and *Acacia melifera* were disappeared from the forest. Also, their nomads range in the forest. Now the condition of the forest is unfavourable and the degradation of the forest is very clear. In addition to the absence of awareness and lack of protection were contributed to degradation of the forest.

### 1.4 Objectives

The main objective of the research is to know the reasons and size of degradation of Al Nour Natural Reserved Forest.

#### 1.3.1 Specific objectives

1. To identify the existence types of trees in 2011 and in 2017.
2. To know the number of families depend on the forest products.
3. To estimate the density and frequency of the remaining trees in the forest.

### 1.5 Importance of the study

The study will contribute to help in protection planning and management of Al Nour Natural Reserved Forest.

# CHAPTER TWO

# Literature review

## 2.1 Forest degradation in Africa

### 2.1.1 Introduction

The African dry forests and woodlands cry for attention as they continue to degrade and desertification to set and intensify. Africa is the driest of the world continents with 45% of its landmass falling under dry lands. Furthermore 38% of this land is occupied by hyper-arid or desert land. About 50% of the African population lives in the arid, semi-arid, dry sub-humid and hyper-arid areas. A total of 340 million ha of woody vegetation in dryland zones of Africa have become degraded through human activities like; overgrazing, agricultural expansion, overexploitation, and deforestation, in the order of importance. Small-scale farming activities in the dry areas have, in particular, caused the greatest impact on vegetation degradation. Frequent fires and droughts have continued to accelerate degradation of woodlands and dry forests, About 482 million ha of drylands in Africa have suffered desertification through several physical factors. Such physical agents of desertification includes, in the order of importance; wind erosion, water erosion, loss of nutrients, salinization, land compaction and water-logging.

Very few case studies have been followed for enough time to provide adequate data to enable effective interventions. Methodologies for monitoring extent and impacts of agents of degradation and desertification also vary greatly. Regional and local initiatives geared towards rehabilitation of the degraded vegetations need to be urgently identified and focused support by partners provide (Bellefontaine R. Gaston, A. & Petrucci, Y. (2000)).

### 2.1.2 Status of aridity and degradation vulnerability

Degradation of natural resources eventually leading to desertification is more pronounced in Africa than any of the other contents of the world. Africa is dominated by the Sahara Desert in the North and the Namibian and Kalahari Deserts in the South, contains a preponderance of hyper-arid and arid lands, which are mostly unsuitable for agricultural activities. About 45% of the landmass in Africa is dry land and is comparable only with Asia, which has 39% of its landmass as dry land indicating that Africa is the driest of the world continents. Aridity zones for Africa have been calculated using the high-resolution climate data (Corbett etal 1996; UNSO/UNDP, 1997).

The Eastern African countries include; Burundi, Djibouti, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania and Uganda. Hyper-arid, Arid and Semi-arid zones largely occupy Sudan, Djibouti and Somalia. Kenya and Ethiopia have large areas occupied by the arid and semi-arid zones while Tanzania and Uganda have largely semi-arid and dry sub-humid dry land zones. Burundi has only 5% of its land area covered by dry sub-humid zone. About 51% of Tanzania is relatively dry while over two thirds of Kenya falls within arid and semi-arid zones where 33.3%, 51.8% and 12.3% of this land experience slight, moderate and severe hazard levels of land degradation respectively (UNEP/UNSO, 1997).

### 2.1.3 Extent of forests and woodlands degradation

Removal and degradation of vegetation cover is common in the dry areas of Africa and this directly leads to soil degradation after exposure. Deforestation and removal of natural vegetation is increasingly caused by various human activities. The extent of such woody vegetation degradation as a result of human activities (Table 1).

Table (1): Land degradation due to deforestation and de-vegetation in Africa (million, ha).

| | Aridity Zones | | | |
|---|---|---|---|---|
| Factor | Arid | Semi-arid | Dry sub-humid | Total |
| Overgrazing | 119.9 | 61.9 | 12.6 | 194.4 |
| Agricultural activity | 11.1 | 33.8 | 15.5 | 60.4 |
| Over exploitation | 42.0 | 11.7 | 1.8 | 55.5 |
| Deforestation | 3.9 | 7.6 | 10.5 | 22.0 |
| Total | 176.9 | 115.0 | 40.4 | 332.3 |

Source: World Atlas of Desertification (1997).

Overgrazing is the most notable factor in causing de-vegetation and hence degradation. The heaviest impact of overgrazing takes place in the Sahel countries especially areas falling within the Arid and Semi-arid zones Table (1). Overgrazing is concentrated around settlements and is often related to decentralization of nomadic herders. The extent of degradation in semi-arid zones is more influenced by agricultural activities than in Arid and Dry sub-humid zones while over exploitation in Arid zone is more important in natural resource degradation. Agricultural and deforestation activities are also important factors of soil degradation in dry sub-humid zones. A total of about 332.3 million ha of land in dryland zones has its soils eventually degraded through the four human activities. Human activities in forest areas surrounding the drylands help to extend areas that become more vulnerable to soil erosion. Table (2) better illustrates the role of deforestation, especially for purposes of agricultural activities and new settlements.

Table (2): Net forest area changes (1990-2000) in Africa by Sub-regions (area in `000).

| Sub-region | Area change | % | Remarks |
|---|---|---|---|
| North Africa | 33 | 0.5 | Increase |
| West Africa | 1,351 | 1.5 | Decrease |
| Central Africa | 852 | 0.4 | Decrease |
| East Africa | 1,357 | 1.0 | Decrease |
| Southern Africa | 1,741 | 0.9 | Decrease |
| Net change | 5,268 | 3.3 | Decrease |

Source: FAO 2001

Except in North Africa, all the other sub-regions of Africa suffered net losses of forestland during the last decade. The countries in the North Africa gained the small net forest cover through tree planting with Egypt having the highest increase of 3.3%, Algeria 1.3% and only Morocco had a non-significant net decrease of its forest cover. During the decade North African sub-region planted a total of 1,693,000 ha, which is 27% of the total forest cover in the sub-region (FAO, 2001). In Western Africa only Gambia had a net forest cover gain of 1.0% during the decade. This sub-region experience one of the highest growth of urban population and this has caused deforestation in the immediate vicinity because of increased forest exploitation for fuel wood and building materials while settlements continue to increase (Bellefontaine et al. 2000; FAO 2001). Swaziland in the Southern Africa region had a net forest gain of 6000 ha or 1.2% during the decade. Countries in the South lost much land through deforestation and few efforts were made to compensate the losses through afforestation programmes. A country like Tanzania has continued to loose about 500,000 ha annually through deforestation (Munyanziza, 2001). In

1980s the annual deforestation in Burkina Faso was 50,000 ha for the purpose of expanding agricultural land (Middleton and Thomas 1997). Deforestation in Niger has been so high that this has contributed to serious threat on the population of giraffe, which numbered only 100 individuals in mid 1990s from a much high population (Ciofolo, 1995).

Africa's closed canopy forests were being cleared at a rate of 0.8 per cent annually , with West Africa, West Sahel and East Sahel recording rates of 2.1, 0.9, 0.8 per cent respectively (Rasheed, 1996). The fastest rate of deforestation is occurring in West Africa where 4% of the closed forests is being cut down every year. Between 1900 and 1980 Cote d'Ivoire closed forests dropped from 14.5 million ha to 4 million ha, indicating an annual rate of deforestation of 300,000 ha. Uganda had 40% of its land covered by tropical forests by 1900 but this had dropped to only 3% by 1993. It is estimated that Burkina Faso, Burundi, Chad, Ethiopia, Gambia, Ghana, Guinea-Bissau, Liberia Mauritania, Niger, Rwanda, Senegal and Sierra Leone have already lost over 80% of their total forest land. Countries that have lost between 50 to 80 % of their forest cover since the turn of 20 $^{th}$ century includes, Benin, Botswana, Cameroon, Central Africa Republic, Cote d'Ivoire, Equatorial Guinea Guinea Bissau, Kenya Lesotho, Madagascar, Malawi, Mozambique, Nigeria, Somalia, Sudan, Swaziland, Togo, Uganda, Republic of Congo and Zimbabwe (Rasheed, 1996).

The extent of deforestation of forests, and therefore initiation of land degradation to the extent described above, has been largely attributed to the rising need for agricultural land especially around frings the dry areas. Analysis by FAO (2001) revealed that 4% of forests were deforested for shifting cultivation into undisturbed forests, 8% through intensification of agriculture in already shifting agricultural areas, 60% as

direct conversion of forest area to small-scale permanent agriculture, 12% as direct conversion of forest area to large-scale permanent agriculture and 17% for other purposes like settlements etc. In the whole African continent only 8% is considered as gain in forest area during the last decade and this included also open areas that gained in canopy cover as reflected by satellites images analysis (FAO 2001). It is apparent from this analysis that the so common small-scale farming activities in the sub-humid, dry sub-humid and dryland areas has a serious impact in initiating and accelerating land degradation and to the extents shown in (Tables 1 and 2).

In general and in addition, the combination of overgrazing, droughts, human population and choice of land use have been argued to play an important role in the extent of degradation of vegetation and soil conditions (Middleton, 1997; Middleton and Thomas, 1997). The contribution of population in degradation of natural resources is more apparent when the effects of drought incidences and various types of land uses reported in (Tables 1 and 2).

Data on fire incidences and intensities in Africa is inadequate to facilitate useful and comprehensive analysis of its contribution to land degradation (FAO 2001). Information on forests, woodlands and grasslands fires is therefore grossly missing yet fire is an important factor in the maintenance of vegetation cover and degradation in drylands. Although areas burnt by fire may sometimes recover after the rains, a combination of fire and drought, which is a common phenomenon in drylands of Africa will usually lead to serious degradation of vegetation and eventually to land degradation. Fire incidences, some of them very bad, are common in the entire African continent but more so in the dryland zones. During the 1986-87 dry season, for example 120,000 ha of forest

and woodlands (which is 30% of total area of Burkina Faso) was burnt in Burkina Faso and such a disaster causes a heavy loss in terms of plant and animal resources and, induces land degradation.

Degradation of vegetation exposes soil mantle to further degradation. The major soil degradation agents in the African dry zones are wind erosion (52%) followed by water erosion (30%), then by loss of chemical nutrients and salinisation (10%) and physical compaction (8%) (Middleton and Thomas, 1997). Water logging play only a small role in soil degradation of the semi-arid and dry sub-humid zones. Erosion by wind is more prominent in the arid areas but has about the same effect in the semi-arid zone. Water erosion is the more important agent of soil erosion in the dry sub-humid zone. Due to high population of livestock in the semi-arid zone, soil compaction is greatest here than in the other dry zones. Some 480.5 million ha of drylands in Africa are thus exposed to degradation by wind and water erosion in addition to loss of nutrients, physical compaction and to a less extent water logging. Soil erosion will inevitably lead to desertification.

### 2.1.4 Forests and woodlands degradation rates

In very few cases are annual rates of land degradation in Africa been reported with certainty. This is mainly because only a few case studies have been followed for sufficient number of years that would allow evening out of the annual variations in records. In most of the cases reported gaps of information have been pointed out and more data and improvement of methodologies have been urged (UNEP, 1992; Middleton and Thomas, 1997; FAO, 2001).As a result of variability of methodologies used and prevailing conditions of natural resources, estimates of rates of degradation are generally very different even in areas

close together. Table (3) attempts to summarize reported estimates of desertification/degradation rates for several countries and areas.

Table (3): Estimates of annual degradation/desertification rates in several countries of Africa

| Country | Site/Locality | Aridity zone | Rate % | Remarks |
|---|---|---|---|---|
| Kenya | Baringo<br>Marsabit | Semi-arid<br>Arid | 0.6<br>1.3 | Two study sites using the same methodology |
| Mali | Nara<br>Mourdiah | Semi-arid<br>Dry sub-humid | 0.03<br>0.2 | Two study sites using the same methodology |
| Mauritania, Mali, Niger | Sahel | Sahel | 0.62 | million ha was the collective annual rate of degradation for the three Sahel countries between 1961-1987 |
| Tunisia | Drylands | Dryland | 10 | Annual loss of productive land to desert, mainly through grazing |

Source : UNEP 1992; Middleton and Thomas 1997; FAO 2001

As observed briefly in Table 3, the rates of degradation vary greatly, from 0.03 to 10%. What is more apparent from the results is that the more arid the area the higher the rate of desertification. In a more general study conducted in 50 countries affected by desertification, in 1989, by UNSO through a questionnaire, half of the countries reported to have experienced significant worsening situations - falling ground water levels, evaporation of surface waters, rangelands degradation, rain fed and irrigated crop deterioration and deforestation. 17% of the countries rated the desertification situation as being slightly worse. A similar study by UNEP in Southern Africa in 1989 concluded that the situation is

worsening throughout the entire Southern Africa region (UNEP, 1992). In both situations, it is more likely that the situation is presently even much worse, one decade later.

## 2.2 Forest degradation in the Sudan

### 2.2.1 Introduction

We can say that Sudan is the main donor for refugees. Because once the international assistance isn't enough refugees go to complete their needs by the use of more raw materials form natural resources (UNHCR, 2004).

It's to mentioned that considerable amount of vegetation cover had been inhabited by refugees this in addition to the negative effect of over grazing notably by goats which damage verdant fields (UNHCR, 2004).

Over the year refugees have depended on wood as the principal source of fuel for cooking in Africa is to make a shallow hole in the ground around which three stones called Aladais are positioned. Some of the areas occupied by refugees are semiarid. The stock of wood per a unit area and the capacity of trees for regeneration are generally very low. Additionally, refugees maintained a high number of livestock. Which has resulted in over grazing and extremely poor natural regeneration.

Refugees are contributing to the already known severe problem of deforestation by cutting trees and bushes to clear land for agricultural activities, building their houses short -term perspectives when it comes to the environment (Fatima, 2007).

### 2.2.2 Degradation of vegetation

There is a fast rate of forest resources depletion especially in the Sudan and in developing forest land systematically cleared for agriculture residential settlement and infrastructures associated with development

project. In addition, wars and conflict together with insufficient reforestation led to decrease of forest cover. Many studies curried out in Sudan greed that agricultural expansion has resulted in forest cover decline estimates that deforestation, rate continuous at an average of 0.455 million ha per year.

Ref. Reported that the forest in the Sudan it has been reduce to 454000 $Km^2$ (45,400,000 ha) at average loss of about 7.5 $Km^2$ (7500 ha) per year (Mohamed Idris Ibrahim , 1993).

### 2.2.3 Causes of degradation of forest in the Sudan:

**- Cutting down of trees:**

Cutting down of trees for building huts and rakuba to each family. they use dagag ,korki, matarig and grasses. The hut renovates every ten years because the wood is affected by termites and wood borers.Some families consumed two cubic meters of firewood every year for cooking ,Charcoal is used for making coffee and tea and cooking food.The damaged on the natural forest resulted in removal of huge number of trees from land. Then the area became opened and exposed to erosion by rainwater and wind and the type of species change to poor ones (Fangama,2013).

**- Overgrazing**

The grazing of animals on plant material, faster than it can naturally regrow leading to the permanent loss of plant cover, a common effect of too many animals grazing limited range land. Overgrazing occurred in Blue Nile State for Years , but it assumes a wide scale and acute intensity only during the past few decades (Table 4) (EU, FAO and Ministry of Animal Resources and Fisheries , Blue Nile State, 2013).

Table (4**)** Census of livestock in Blue Nile State:

| Kind of animal | Census 2013 |
|---|---|
| Cattle | $5.7 \times 10^6$ |
| Sheep | $1.43 \times 10^6$ |
| Goats | $8.0 \times 10^6$ |
| Camels | $0.15 \times 10^6$ |
| Total | $15.28 \times 10^6$ |

In addition, the traditional style of the pastoral system and the pastoral farming system determines the livelihoods of the majority of families

Rural areas of the state. Rural communities also depend on animal products to cover the deficit during production and seasons Hard.

The livestock breeding system is more than a subsistence system with limited support for basic services (EU, FAO and Ministry of Animal Resources and Fisheries, Blue Nile State, 2013).

**-Climate and fire regimes:**

The dry season starts two to three weeks after the rains end in Northern Sudan, i.e. November to April/May. Tall and short grasses are increasingly desiccated during the dry season. Increased wildfire hazard is associated with low humidity, high fuel loads and the presence of moving grazers. Annual wildfires are common and spread rapidly due to Northeast winds and flat terrain. This is the case in Central, Western and Southern Sudan. Repeated fires occur if the hot dry weather continues, i.e. late rains (Goldammer, 1991).

**- Ecological role of forest fires:**

In the high-rainfall savannah ecosystems of Southern Sudan fires kill certain fire-sensitive trees, e.g. *Isoberlinia doka, Danielliaoliveri*, etc. and reduce the growth of other species. Fires may reduce gum yields from *Acacia senegal* by up to 50 percent. This is considered a big economic loss. In an average year fires affect about 70 percent of the open rangelands.

Fires may also encourage the spread of some species, e.g. *Acacia mellifer*a in central Sudan on clay soil where the "*Acacia-grassland* cycle" takes place. The occurrence of *Acacia* alternates with tall grasses. *Acacia* takes over if the fires are of low severity. Grasses become dominant with increasing fuel loads and high-intensity fires (Goldammer, 1991).

**- Impacts of wildfires**

Lightning fires or fires caused by nomads often damage or destroy whole villages with huts that are built from grass and wooden materials. This problem is very common in central Sudan. Villagers in many instances are caught by surprise (Bayoumi, 2000).

# CHAPTER THREE

## Materials and Methods

The data collected through the following:

### 3.1Primary data:

Primary data is included the following:

**1- Field visit**: field visit was carried out to collect the data through the methods such as:

El Nour (El Azaza) is the nearest village to the forest, belonging to Hamag civil administration, under the Mayor Obied Abou Shotal, the main tribes is Kenana (Arab), Rufaa (Arab), Bargo, Masalit, Fallata, Dinka, El broon and Tama. The inhabitants in the village are enjoying the privileges of collecting the small dry branches, twigs as fire wood; fruits, leaves, barks and roots for local medicine and other possible materials for building their local homes. The forest is considered as a natural range particularly in the dry seasons from March to May, so grazing and browsing are a right for all livestock owners in all forest areas, and the grazing is prevented in the areas where the new regenerations are established. In terms of economic and land use activities, the year 2004 was the starting point in preparation of working plan for sustainable management of the forest to drive more economical, sociological and environmental benefits from the forest, in addition to protection and conservation of the vegetation cover in and around the forest area.( Haytham Hashim Gibreel, 2003).

**2- Forest management**

a- **Measurements:** the forest cover was measured using (Muller ,1974) method to determine the following parameters:

- Types of trees in the forest

- Density of trees.
- Dominant species.

-. Distribution of trees in the forest.

Then, the vegetation parameters were calculated according to the following equations:

Step 1. Calculation of the total distance (dt.)

$$dt = \sum_{i-1}^{n} di = \ldots\ldots\ldots\ldots \text{ meters.}$$

Where dt is the total distance, di is the distance to tree number i, and n is the total number of trees.

Step 2. Calculate the average distance between trees, ($\bar{d}$):

$$D = \bar{dt} / n \ldots\ldots\ldots\ldots\ldots\ldots \text{meters.}$$

Step 3. Calculate the average area occupied per tree, (A):

$$A = \bar{d^2} = \ldots\ldots \text{meters}^2.$$

Step 4. Calculate the absolute density for all trees, (Da), in trees per Hectare (ha).

$$Da = (10 \text{ m})^2 / A^2 = \ldots\ldots\ldots\ldots \text{ trees/ha.}$$

### 3.2 Questionnaire

A questionnaire will be used 55 sample to obtain social data through different dimension including the socio-economic aspects, the state and types of forest tree cover in the past & in the present, the reasons of degradation the forests, activities led to forest degradation, the role of the Forest National Corporation (FNC) and how the forest will be rehabilited in the future. The data will be collected from both IDPs and

the natives surround the forest as target groups. Tree density has been calculated by the tape to know, heavy, light, and medium by a Muller to measure the density of trees, recently witnessed forest declined considerably due to lobbing trees and cutting down of trees.

The study population includes the local community forest and Al-nour natural reserved and displaced persons and forest managers and heads of departments technically were divided into 55 people and considered exclusively a comprehensive study by the questions and distributed the following: 30 % of displaced persons and 20% of the society the local and another 5%.

### 3.3 Interview

Interview was also used to collect the data the staff of FNC and the local authorities will also be interviewed.

### 3.4 Secondary data

Secondary data was obtained from many sources, including books, previous study of the forest, published papers and reports from the library of the College of Forestry and Range Science in Soba.

### 3.5 Data analysis

The socioeconomic data analyzed by Social Statistics Package System software **(**SPSS) to know the reasons and size of degradation of Al Nour Natural Reserved Forest.

# CHAPTER FOUR
# Results and Discussion

## 4. Measurement of the forest in 2016

### 4.1.1 The distances of trees

From table 5&6 below, explain sample 1, the total distances in ground points A, B, C&D are 210 meters. When dividing the total distances by four

Table (5): Measurement of trees in sample (1) points (A &B)

| Point A | Dis/m | species | Point B | Dis/ m | Species |
|---|---|---|---|---|---|
| 1 | - | - | 1 | 7 | *Anogeisis leiocarpus* |
| 2 | - | - | 2 | 9 | *Acacia senegal* |
| 3 | 5 | *Dalbergia me lanoxylon* | 3 | 7 | *Sterculia setigera* |
| 4 | 3 | *Sterculia setigera* | 4 | 10 | *Sterculia setigera* |
| 5 | 5 | *Dalbergia me lanoxylon* | 5 | 5 | *Anogeisns leiocarpus* |
| 6 | 8 | *Sterculia setigera* | 6 | 3 | *Sterculia setigera* |
| 7 | 6 | *Sterculia setigera* | 7 | 15 | *Anogeisns leiocarpus* |
| 8 | 8 | *Sterculia setigera* | 8 | 9 | *Balanites aegyptiaca* |
| 9 | 5 | *Anogeisis leiocarpus* | 9 | 18 | *Balanites aegyptiaca* |
| 10 | 4 | *Acacia senegal* | 10 | 5 | *Sterculia setigera* |
| Total | 44 | | Total | 88 | 132 |

Table (6): Measurement of trees in sample (1) points (C& D)

| Point C | Dis/ m | species | Point D | Dis/ m | Species |
|---|---|---|---|---|---|
| 1 | 4 | *Anogeisis leiocarpus* | 1 | 5 | *Combertum glutinosum* |
| 2 | 10 | *Anogeisis leiocarpus* | 2 | - | - |
| 3 | 5 | *Sterculia setigera* | 3 | 3 | *Sterculia setigera* |
| 4 | 7 | *Sterculia setigera* | 4 | - | - |
| 5 | - | - | 5 | 4 | *Sterculia setigera* |
| 6 | - | - | 6 | - | - |
| 7 | 8 | *Sterculia setigera* | 7 | 6 | *Anogeisis leiocarpus* |
| 8 | - | - | 8 | 13 | *Anogeisis leiocarpus* |
| 9 | - | - | 9 | - | - |
| 10 | 5 | *Sterculia setigera* | 10 | 8 | *Anogeisis leiocarpus* |
| Total | 39 | | | 39 | 78 |

Points equls to 52.5 m/ha.

Table 7&8 sample 2 also shows the total distances of the four points are 191m. The average distances is equals to 47.75m/ha

Table (7): Measurement of trees in sample (2) points (A &B)

| Point A | Dis/m | species | Point B | Dis/m | Species |
|---|---|---|---|---|---|
| 1 | 10 | *Acacia senegal* | 1 | 4 | *Balanites aegyptiaca* |
| 2 | 4 | *Acacia senegal* | 2 | 11 | *Acacia senegal* |
| 3 | 7 | *Balanites aegyptiaca* | 3 | 6 | *Combertum glutinosum* |
| 4 | 2 | *Acacia senegal* | 4 | 12 | *Acacia senegal* |
| 5 | - | - | 5 | 7 | *Combertum glutinosum* |
| 6 | - | - | 6 | 8 | *Acacia senegal* |
| 7 | 5 | *Acacia senegal* | 7 | 7 | *Acacia seyal var. seyal* |
| 8 | 4 | *Balanites aegyptiaca* | 8 | 3 | *Acacia seyal var. seyal* |
| 9 | - | - | 9 | 6 | *Acacia seyal var. seyal* |
| 10 | 7 | *Acacia senegal* | 10 | - | - |
| Total | 39 | | | 64 | 103 |

Table (8):Measurement of trees in sample (2) points (C &D)

| Point C | Dis/m | species | Point D | Dis/m | Species |
|---|---|---|---|---|---|
| 1 | 6 | *Acacia seyal var.seyal* | 1 | 5 | *Acacia senegal* |
| 2 | 5 | *Acacia senegal* | 2 | - | - |
| 3 | - | - | 3 | 7 | *Acacia seyal var. seyal* |
| 4 | 5 | *Acacia senegal* | 4 | 11 | *Acacia senegal* |
| 5 | 11 | *Balanites aegyptiaca* | 5 | 6 | *Acacia senegal* |
| 6 | - | - | 6 | 11 | *Acacia senegal* |
| 7 | 6 | *Acacia senegal* | 7 | 7 | *Balanites aegyptiaca* |
| 8 | 9 | *Acacia seyal var.seyal* | 8 | - | - |
| 9 | 7 | *Acacia senegal* | 9 | 5 | *Acacia senegal* |
| 10 | 3 | *Acacia seyal var.seyal* | 10 | 5 | *Acacia senegal* |
| Total | 31 | | | 57 | 88 |

In sample 3, tables 9&10 the total distances in the four points are191m. Then the average distances is equals to 47.75m/ha.

Table (9):Measurement of trees in sample (3) points (A &B)

| Point A | Dis/m | species | Point B | Dis/m | species |
|---|---|---|---|---|---|
| 1 | 13 | *Sterculia setigera* | 1 | - | - |
| 2 | 7 | *Sterculia setigera* | 2 | 7 | *Sterculia setigera* |
| 3 | - | - | 3 | - | - |
| 4 | 12 | *Terminalia laxiflora* | 4 | 4 | *Terminalia laxiflora* |
| 5 | - | - | 5 | 8 | *Terminalia laxiflora* |
| 6 | 5 | *Sterculia setigera* | 6 | 13 | *Sterculia setigera* |
| 7 | 10 | *Sterculia setigera* | 7 | - | - |
| 8 | - | - | 8 | - | - |
| 9 | - | - | 9 | - | - |
| 10 | 6 | *Anogeisns leiocarpus* | 10 | - | - |
| Total | 53 | | | 32 | 85 |

Table (10): Measurement of trees in sample (3) points (C &D)

| Point C | Dis/m | species | Point D | Dis/ m | Species |
|---|---|---|---|---|---|
| 1 | - | - | 1 | - | - |
| 2 | 9 | *Terminalia laxiflora* | 2 | - | - |
| 3 | - | - | 3 | 4 | *Terminalia laxiflora* |
| 4 | - | - | 4 | - | - |
| 5 | 11 | *Sterculia setigera* | 5 | 6 | *Terminalia laxiflora* |
| 6 | - | - | 6 | - | - |
| 7 | 7 | *Terminalia laxiflora* | 7 | 15 | *Sterculia setigera* |
| 8 | 13 | *Terminalia laxiflora* | 8 | - | - |
| 9 | 14 | *Sterculia setigera* | 9 | 17 | *Terminalia laxiflora* |
| 10 | - | - | 10 | 10 | *Terminalia laxiflora* |
| Total | 54 | | | 52 | 106 |

Table 9 and 10, sample (3), the total distances are 191 meters. The average distances is 47.7 m/ha.

### 4.1.2 The density of trees

Table (11): Average distances measured for trees in sample 1,2 and 3

| Sample | Average distance (m) |
|---|---|
| 1 | 52.50 |
| 2 | 47.75 |
| 3 | 47.75 |
| Total | 141.00 |
| Average | 47 |

From table 11, the average distances is 47m/ha. This obtained by divided (141/3). Then the density of trees = $\frac{10000}{(Dis)^2} = \frac{10000}{(47)^2} = 4 trees / ha$

The result showed that, the density of trees in Al Nour Reserved Forest is 4 trees / ha. When multiply this figure by the total area of the forest

(4trees × 2664 ha), the result is equals to 10656 trees. This estimated that the trees existing now in the whole forest. This result indicated that the forest was subjected to heavy cutting by the people settled surround the forest. The finding agreed with the report of (Fangama, 2013) the trees were removed or destroyed by the people settled around the forest. They cut down trees for building materials, charcoal and firewood.

### 4.1.3 Frequency of trees

Table (12) explained that the frequency of *Sterculia setigera* is dominant and its frequency is higher than other trees which are equal to 35.5% of the total trees in the forest. While *Dalbergia melanoxylon*is is lower one. This result is the same as the answers of the respondents in 2016.

Table (12): Frequency of trees

| No. | Species | Frequency | Percentage |
|---|---|---|---|
| 1 | Dalbergia melanoxlon | 04 | 3.0 |
| 2 | Sterculia setigera | 48 | 35.5 |
| 3 | Anogesis leiocarpus | 29 | 21.48 |
| 4 | Acacia senegal | 26 | 19.25 |
| 5 | Balanites aegiptiaca | 12 | 8.8 |
| 6 | Combretum glutinosum | 05 | 3.7 |
| 7 | Terminalia laxiflora | 11 | 8.14 |
| | Total | 135 | 100 |

## 4.2 Socio-economic aspect

Table (13): Sex of respondents

| Type | Frequency | Percentage |
|---|---|---|
| Male | 48 | 87.3 |
| Female | 7.0 | 12.7 |
| Total | 55 | 100.0 |

From the table above 87.3% of the total respondents are males whereas 12.7% of them were females.

Table (14): Age of the respondents

| Age | Frequency | Percentage |
|---|---|---|
| 20 – 25 | 19 | 34.5 |
| 25-35 | 14 | 25.5 |
| 35-45 | 6 | 10.9 |
| 45-55 | 16 | 29.1 |
| Total | 55 | 100 |

Table (14) explained that, 34.5% of the total respondents are youth, while 29.1 are over 45 years. This mean that they know the status of the forest in the past and in the present.

Table (15): Profession of respondents

| Profession | Frequency | Percentage |
|---|---|---|
| Farmers | 19 | 34.5 |
| Herders | 14 | 25.5 |
| traders | 6 | 10.9 |
| Workers | 16 | 29.1 |
| Total | 55 | 100.0 |

From the table above, 34.5% of the respondents their profession are farmers, whereas 25.5% of them are herders, 10.9% of them traders and 29.1% are workers respectively.

Table (16): Educational level

| Level | Frequency | Percentage |
|---|---|---|
| Illiterate | 13 | 23.6 |
| Quran learner | 12 | 21.8 |
| Primary school | 7 | 12.7 |
| Secondary school | 16 | 29.1 |
| Graduate | 7 | 12.7 |
| Total | 55 | 100.0 |

From table (16), 23.6% of respondents are illiterates, 21.8% Quran learners, 12.8% primary school, 29.10% secondary school, 12.7% of them graduate. This explained that the community of this area need awareness in order to introduce their children to the school.

Table (17): Status of the forest in the past

| Case | Frequency | Percentage |
|---|---|---|
| Thick | 55 | 100 |
| Moderate | 0 | 0 |
| Thin | 0 | 0 |
| Total | 55 | 100 |

From the table (17), it is cleared that all members of the study sample believe that, the case of Al Nour Natural Reserved Forest in the past is thick, this indicated that the forest was not subjected to cutting down trees in the past. This is a similar information said by Nasr Aldien Abu Gazaz (2016)Al Nour Natural Reserved Forest was crowded by different vegetation in the past .

Table (18): Status of the forest in the present.

| Case | Frequency | Percentage |
|---|---|---|
| Thick | 0 | 0 |
| Moderate | 25 | 45.5 |
| Thin | 30 | 54.5 |
| Total | 55 | 100.0 |

From table (18), 55.5% of respondents, answered that, the status of forest is thin in the present. This result is the same as said by the foresters (2016). They mentioned that, the forest was subjected to cutting down trees for building materials, and firewood.

Table (19): Types of trees before settlement of IDPs surround the forest

| Species | Freq | % | Species | Freq | % |
|---|---|---|---|---|---|
| *Cordia africana* | 2 | 0.8 | *Diospyro mespiliformis* | 15 | 6 |
| *Loncharpus loxiflocens* | 3 | 1.2 | *capporis-decidua* | 10 | 3.9 |
| *Sterculia setigera* | 9 | 5.6 | *Ficus cycomorus* | 18 | 7.2 |
| *Combertum glutinosum* | 8 | 3.2 | *Adansonia digitata* | 15 | 6 |
| *Commiphora africana* | 28 | 11.2 | *Cordia sinensis* | 2 | 0.8 |
| *Anogeisis leiocarpus* | 10 | 3.9 | *Poly cantha* | 10 | 3.9 |
| *Bauhinia ssp.* | 3 | 1.2 | *Cassia arech* | 18 | 7.2 |
| *Commiphora Africana* | 2 | 0.8 | *Zizphus mauritania* | 9 | 5.6 |
| *Scellerocarya birrea* | 7 | 2.9 | *Balanites aegyptiaca* | 5 | 2.0 |
| *Grewia tenax* | 5 | 2.0 | *Terminalia laxiflora* | 11 | 4.4 |
| *Acacia nilotica* | 10 | 3.9 | *Acacia senegal* | 4 | 1.6 |
| *Tamarindus indica* | 10 | 3.9 | *Acacia seyal* | 3 | 1.2 |
| *Pterocarpus lucens* | 11 | 4.4 | *Piliostigma reticalatum* | 6 | 2.3 |
| *Dalbergia melanoxylon* | 16 | 6.4 | *Zizphus spinachristi* | 1 | 0.4 |

Table (19) explained that, *Commiphora africana* is equals to 11.2% of the total trees in the forest. While *Ficus cycomorus* and *Cassia arech* are equal to 7.2% form the total trees in the forest before the arrival of IDPs and settled near the forest.

Table (20): Type of grasses in the forest in the past

| Grasses | Freq | % | grasses | Freq | % |
|---|---|---|---|---|---|
| *Corchorus fascicularis* | 19 | 9.8 | *S. pur pueo-sercium* | 31 | 16.1 |
| *Dineber rolro flexa* | 17 | 8.9 | *Albroons* | 39 | 20.2 |
| *Phyllanthus maderas pensis* | 7 | 3.6 | *Vossia Cuspidata* | 9 | 4.7 |
| *Desmodium dicotomum* | 20 | 10.4 | *altrera* | 4 | 2.7 |
| *Cassia tora* | 20 | 10.4 | *al goar* | 8 | 4.1 |
| *Tribulus lgwestris* | 21 | 10.8 | - | - | - |

The table (20) showed that, *Abbrons* grass is the highest percentage compare to other grasses which is equal to 20.2% of the total grasses.

Table (21): Types of trees that disappeared from the forest

| Species | Freq | Pec | Species | Freq | Pec |
|---|---|---|---|---|---|
| *Tamarindus indica* | 6 | 3.5 | *Ficus cycomorus* | 2 | 1.2 |
| *Diospyro mespiliormis* | 2 | 1.2 | *acacia polyacantha* | 9 | 5.3 |
| *Adansonia digitata* | 1 | 0.6 | *Capporis decidua* | 5 | 2.9 |
| *Pterocarpus lucens* | 33 | 19.4 | *Piliostigma reticalatum* | 25 | 14.7 |
| *Xeromphis nilotica* | 39 | 22.9 | *Acacia nilotica* | 2 | 1.2 |
| *Commiphora africana* | 12 | 7.1 | *Scllerocarya birrea* | 1 | 0.6 |
| *Bauhinia ssp* | 33 | 19.4 | | 170 | 100 |

Table (21) explained that *Xeromphis nilotica* is equals to 22.9%, of the total trees disappeared from the forest. Species of *Pterocarpus lucens*, *Bauhinia ssp*, and *Piliostigma reticalatum* were disappeared from the forest which is equal to19.4% and 14.7% respectively.

Table (22): Trees available now in the forest

| Trees | Freq | Pec | Trees | Freq | Pec |
|---|---|---|---|---|---|
| *Zizphus spinachristi* | 1 | 0.4 | *Acacia sengal* | 13 | 5 |
| *Terminalia laxiflora* | 24 | 9.4 | *Anogeisns leiocarpus* | 32 | 12.4 |
| *Balanites egyptiaca* | 15 | 5.8 | *Combertum glutinosum* | 36 | 13.9 |
| *Loncharpus loxiflocens* | 37 | 14.3 | *Dalbergia lanoxylon* | 11 | 4.2 |
| *Acacia seyal* | 25 | 9.7 | *Scllerocarya birrea* | 2 | 0.8 |
| *Sterculia Setigera* | 42 | 16.2 | | | |

Table (22) showed that, the available trees in the forest. This result is the same as said by the foresters (2016) the forest subjected to heavy cutting, and agreed with the result of around survey.

Table (23): Type of shrubs available now in the forest

| Shrubs | Frequency | Percentage |
|---|---|---|
| *Dichosty chuscineava* | 9 | 16.4 |
| *Calatropis procera* | 17 | 30.9 |
| *lina forotococza* | 5 | 9.1 |
| *Acacia Orefota* | 24 | 43.6 |
| Total | 55 | 100 |

Table (23), explained the available shrubs in the forest now.

Table (24): Types of grasses available now in the forest

| Grasses | Freq | Pec | Grasses | Freq | Pec |
|---|---|---|---|---|---|
| *Dinber rolro flexa* | 4 | 3.9 | *S. Pure pueo-sercium* | 24 | 23.3 |
| *Tribulus Igwestris* | 9 | 8.7 | *Forsskalea-tenacissima* | 3 | 2.9 |
| *Corchprus Fascicularis* | 13 | 12.6 | *Desmodium dicotomum* | 9 | 8.7 |
| *Phyllanthus maderas pensis* | 8 | 7.7 | *Forsskalea-tenacissima* | 4 | 3.9 |
| *Prinoce* | 29 | 28.2 | *Total* | 103 | 100 |

Table (24) explains that the types of grasses are available now in Al Nour Natural Forest Reserved compared with the grasses in the past.

Table (25): Degradation of trees in the forest

| Answer | Frequency | Percentage |
|---|---|---|
| Yes | 54 | 98.2 |
| No | 1 | 1.8 |
| Total | 55 | 100.0 |

Table (25) explained that, 98.2% of the respondents believe that there is a degradation in Al Nour Natural reserved Forest, while 1.8% of them they answered that, there is no degradation in the forest. This result

agreed with the measurement of trees in the forest (2016), Some trees were completely removed.

Table (26): Cutting down of trees in Al Nour Natural Reserved Forest

| Answer | Frequency | Percentage |
|---|---|---|
| Yes | 53 | 96.4 |
| No | 2 | 3.6 |
| Total | 55 | 100.0 |

Table (26) explained that, 96.4% of the respondents answered that, the cutting down of trees in Al Nour Natural Reserved Forest is existing from natives and IDPs. They were cutting down trees for the purposes of charcoal, building materials, and firewood.

Table (27): Protection of the forest

| Answer | Frequency | Percentage |
|---|---|---|
| Yes | 45 | 81.8 |
| No | 10 | 18.2 |
| Total | 55 | 100.0 |

Table (27) explained that, 81.8% of the study sample members answered that, there was a protection for Al Nour Natural Reserved Forest. On the other hand, some of them answered that there is no protection and the population entered inside the forest at night to cut down trees.

Table (28): Environmental awareness

| The answer | Frequency | Percentage |
|---|---|---|
| Yes | 51 | 92.7 |
| No | 4 | 7.3 |
| Total | 55 | 100.0 |

Table (31) Explained that, 92.7% of the respondents answered that; there is an environmental awareness in the area, whereas 7.3% of them, answered that, there is no environmental awareness. Inspite of awareness

the people compelled to cut down trees as necessary demand and there is no other alternative for providing firewood.

### 4.3 Interviews

Saeed (2016) mentioned that, the forest surveyed and planned in2003 - 2013. There is no permanent camp to monitor the forest in Autumn season.Also Ebaid (2016) said that the, total fire lines are 29 kilometers and the forest dose not subject to fires since its booking.

**Plate (1) cutting trees from the middle**

Plate (2) lobbing trees

Plate (3) type of cutting

Plate (4) Animals are grazing inside the forest

## 4.5 Observations

It observed that the IDPs , some tribes and nomads were settled surround the forest. On the other hand (Abu Gazaz, 2016), mentioned that, there were 546 irregulates from 2014 to 2016 (plate, ).

# CHAPTER FIVE

## Conclusion and Recommendation

### 5.1 Results:

1 -the trees in AL nour natural reserve forest is reduced to 4 trees per hec Compared in the past.

2- the density of trees is declined because cuttingdown and lobbing trees to used to make charcoal and cottages.

3- some trees are disappeared such as *Piliostigma reticalatum, Bauhinia ssp , Commipgora Africana , Pterocarpus lucens.*

4- the forest degraded because increase forestry irregularities form indigenous populations and some village surrounding.

5- There are not monitor inside forest from Forest National Corporation in Blue Nile state.

## 5.2 Recommendations:

**1**.Reforestation the opening areas in the forest.

2. Protection the forest through Participation of the communities settled surround the forest, presence of forest guards inside the forest and opening fire lines.

3. Good management of the forest.

4. Awareness the population settled near the forest with the benefits of forest to them and the role of forest in combating the climate change.

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# APPENDIXES

بسم الله الرحمن الرحيم

**جامعة السودان للعلوم والتكنولوجيا**

**كلية الدراسات العليا**

**استبيان لجمع معلومات – بغرض بحث ماجستير في الغابات البيئية**

العنوان: تقويم تدهور غابة النور الطبيعية المحجوزة بمحلية الروصيرص ولاية النيل الأزرق

**أ- الشكل الاقتصادي الاجتماعي:**

1- النوع: ذكر ☐ أنثي ☐

2- العمر : ـــــــــــ سنة .

3- المهنة: مزارع ☐ ، مربي مواشي ☐ ، تاجر ☐ ، عامل ☐

4- المستوي التعليمي: أمي ☐ ، خلوة ☐ ، أساس ☐ ، ثانوي ☐ ، جامعي ☐

**ب- حالة غابة النور في الماضي والحاضر ونشاطات الانسان فيها :**

1- ماهي حالة غابة النور في الماضي ؟

كثيفة ☐ ، متوسطة ☐ ، خفيفة ☐

2- ما هي حالة غابة النور في الحاضر ؟

كثيفة ☐ ، متوسطة ☐ ، خفيفة ☐

3- ما هي أنواع الأشجار والشجيرات والاعشاب الموجودة بغابة النور قبل الاعتداء المكثف علي الغابة ؟

الأشجار:.....

االشجيرات:.....

الأعشاب:.....

ما هي أنواع الأشجار والشجيرات والاعشاب المهمة التي أختفت بعد الاعتداء علي غابة النور؟

الأشجار:.....

الشجيرات:.....

الأعشاب.....

.....

.....

4- ما هي أنواع الأشجار والشجيرات والاعشاب الموجودة الأن بغابة النور ؟

الأشجار:.....

الشجيرات:.....

الأعشاب.....

.....

.....

5- هل تعتقد أن هناك تدهور في أشجار غابة النور الأن ؟

نعم ☐ ، لا ☐

6- هل هناك أي إعتداء علي غابة النور من قبل المواطنين المجاورين لها .

نعم ☐ ، لا ☐

7- إذا كانت الإجابة بنعم ، فما هو نوع الاعتداء علي الغابة ؟

أ/ قطع الأشجار بغرض الفحم ☐ ب/ قطع الأشجار بغرض البناء ☐

ج/ قطع الأشجار بغرض حطب الحريق ☐ د/ إشعال حرائق سنوية ☐

هـ/ صيد حيوانات برية

**ج- دور إدارة الغابات في الارشاد والبيئة وحماية غابة النور :**

1- هل هناك حماية لغابة النور من قطع الأشجار ؟

نعم ☐ ، لا ☐

2- إذا كانت الإجابة بنعم ، لماذا لا توجد من قبل إدارة الغابات ؟

.....

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3- هل هناك أي إرشاد بيئي من قبل إدارة الغابات ؟

نعم ☐ ، لا ☐

4- إذا كانت الإجابة بنعم فهل الارشاد البيئي أدى دوراً كاملاً وكيف ؟

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