

**Sudan University of Science & Technology**

**College of Graduate Studies**

**Participation of Rural Woman in Forestry Extension Activities**

**(Eastern Galabat Locality - Gedaref State – Sudan)**

**مشاركة المرأة الريفية في أنشطة إرشاد الغابات**

**(محلية القلابات الشرقية - ولاية القضارف – السودان)**

**A thesis submitted for partial fulfillment of the requirements of the  
Master degree (M. Sc) in Environmental Forestry**

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**April 2018**

# **DEDICATION**

**To the soul of my father and mother**

**To the soul of my brother Hafiz**

## **ACKNOWLEDGEMENT**

I am grateful to Allah for successfulness to accomplish this research, and I would like to express my deep gratitude to the College of Forestry and Range Science, Sudan University of Science and Technology and my supervisor Dr, Musab Abdalla Ali for his continuous guidance, valuable advice, directions that enabled me to achieve this research and encouragement during the period of the study.

I would like also to thank strongly D, A bdelwadood Abdalla Elkhalifa the College of Forestry and Range Science, Sudan University of Science and Technology.

Deep thanks to Ministry of Agriculture in Gedaref State.

My worm thanks to the rural women of the study area for their assistance during carryout of the questionnaire.

I wish to express my deep appreciation to the assistance offered by Mr. Fath elrahman Abulgasim and all the staff of Forest office in Eastern Galabat.

My great thanks to my friends for their help and encouragement.

Finally, I am very grateful to my family, brothers and sisters.

# **Abstract**

## **Participation of Rural Woman in Forestry Extension Activities**

### **(Eastern Galabat Locality - Gedaref State)**

The broad objective of this research was to indicate the contribution of rural woman in forestry extension activities and its impact on knowledge level. Two types of data were collected for this research, namely; primary and secondary data. The primary data was collected from 10% of all the families in three villages (Rashid, Um Rakoba, Al Hamra) of Eastern Galabat locality, who were interviewed. The secondary data was collected from the archives of Forests National Corporation (FNC), various documents relevant to the study, this include books, institutional report, records and papers which provide information for the study.

The main findings of the study were that; the rural women played a substantial role in participating into forest programs with the FNC, Non-Governmental organizations (NGOs), Ministry of Agriculture and other institutions which provided environmental and social services in the villages. The level of genuine participation was good as perceived by the entire interviewed sample.

Most of the respondents in the three villages belong to Dago, Masaleet and Fur tribes. These tribes have no problem with woman working in agricultural sector beside their domestic work. About 80% of the women questioned were married, and the mean family size was 7 persons, so this indicates the importance for additional women work to increase the family income to meet the basic needs of life. Therefor the women were engaged in agriculture activities as natural practice to produce vegetable crops for their meals and sale part of it to increase their income. The average annual woman income was 7,344 SDG/year, including beside agricultural activities, other activities like handcrafts and housekeeping.

The overall educational level among rural women was low; however most of them were members in some local committees such as agricultural, environmental and

social committees, beside their participation in forest programs like seedling production, making improve stoves and other activities.

Degradation of the forests in the study area as result to many reasons such as overgrazing, illegal cutting and climate change leads to decrease in wood and non-wood forest products and indirectly decrease other crops production that made it important to develop rehabilitation and conservation programs for these natural resources.

Most of respondents in the study area were selected as participants in the extension programs, about 80% of the women mentioned that they benefited of these programs.

The main conclusion of this study is that; women in the study area have great desire to participate in forestry and development programs. The main constraint confronting the participation of women in these activities was the discontinuity of these programs.

The main recommendation drawn from the study; there is an urgent need to develop and conduct additional forest extension programs and to give more rooms for women participation in these programs to increase the welfare of rural societies through increasing family income.

## مستخلص الدراسة

### مشاركة المرأة الريفية في أنشطة إرشاد الغابات

#### (محلية القلابات الشرقية – ولاية القضارف)

الهدف من هذا البحث هو معرفة مساهمة المرأة الريفية في أنشطة الغابات واثرها علي مستوي المعرفة. إعتمدت الدراسة علي نوعين من المعلومات (معلومات اولية ومعلومات ثانوية). المعلومات الاولية جمعت من نسبة 10% من مجموع الأسر الموجوده في ثلاث قري بمحلية القلابات الشرقية بولاية القضارف ( راشد- ام راكوبه- الحمراء) الذين تمت مقابلتهم. المعلومات الثانوية جمعت من مكتبة الهيئه القومية للغابات واوراق وتقارير وكتب ومراجع لها علاقه بالدراسة.

النتائج الرئيسية من البحث هي: لعبت المرأة الريفية في منطقة الدراسة دور كبير في المشاركة الفعالة في برامج الغابات التي تمت بواسطة الهيئه القومية للغابات بالتعاون مع المنظمات المحلية والأجنبية ووزارة الزراعة والغابات وبعض المؤسسات الاخرى والتي قدمت خدمات بيئية وإجتماعية في منطقة الدراسة. مستوي مشاركة المرأة في هذه البرامج كان جيدا".

تنتمي اغلب النساء المستهدفات في منطقة الدراسة لقبائل الداو والمساليت والفور ، هذه القبائل لاتمانع في عمل المرأة في مجال الزراعة والنشاطات المحلية . 80% من النساء متزوجات وعدد افراد اسرهن كبيرة بمتوسط عدد 7 افراد للاسرة وهذا يزيد من مسؤولية المرأة تجاه اسرتها لذلك لا بد ان تعمل المرأة لمقابلة المتطلبات الاساسية لاسرتها وهذا ادي الي انخراط المرأة في الانشطة الزراعيه كعمل طبيعي لانتاج المحاصيل الغذائية ، ايضا تقوم المرأة ببيع جزء من المحصول لزيادة دخلها. متوسط دخل المرأة SDG 7,344 في السنه . تقوم المرأة بانشطة إضافية مثل الاعمال اليدوية بجانب اعمال التدبير المنزلي.

في منطقة الدراسة مستوي التعليم بين النساء المستهدفات منخفض ، وبالرغم من تدني نسبة التعليم نجد ان اغلب النساء في الثلاث قري مشاركات في الجمعيات التعاونية الموجوده في مناطقهن ، مثال لهذه الجمعيات الجمعيات الزراعيه والبيئية وغيرها من الجمعيات، بجانب مشاركة النساء في برامج الغابات مثل زراعة الشتول وصناعة المواقد المحسنة وغيرها من البرامج.

حصل تدهور للغابات في منطقة الدراسة نتيجة لعدة اسباب مثل الرعي الجائر والرعي الجائر وتغير المناخ مما ادي إلي النقص في منتجات الغابات الخشبية وغير الخشبية، وبصورة غير مباشرة ادي إلي نقص انتاجية المحاصيل الزراعيه. لإعادة تعمير الغابات والمحافظة علي الموارد الطبيعية تم تنفيذ عدد من برامج وأنشطة الإرشاد الغابي. في منطقة الدراسة اغلب النساء قمن بالمشاركة في أنشطة وبرامج إرشاد الغابات وحوالي 80% منهن ذكرن أنهن إستفدن من هذه البرامج.

اهم الإستنتاجات من هذه الدراسة هي ان المرأة تلعب دور هام في التوعية والمشاركة في برامج وانشطة الغابات ولديها رغبة كبيره في المشاركة في هذه البرامج ، والمعوق الذي يعترض مشاركتها في هذه البرامج هو عدم المتابعة لهذه البرامج.

التوصية من هذه الدراسة هي إعطاء المرأة فرص اكثر للمشاركة في برامج الغابات لزيادة رفاهية المجتمعات الريفية من خلال زيادة دخل الأسرة.

## Table of Contents

Topic	Page No
Dedication	I
Acknowledgments	II
Abstract in English	III- IV
Abstract in Arabic	V-VI
Table of Contents	VII-X
List of tables	XI
Abbreviations	XII

### CHAPTER ONE INTRODUCTION

1.1 General .....	1
1.2 Research problem. ....	3
1.3 Objectives .....	3
1.3.1 General objectives .....	3
1.3.2 Specific objectives.....	3
1.4 Research questions.....	4

### CHAPTER TWO STUDY AREA

2.1 Location and Area .....	5
2.2 Population and Administrative Localities.....	5
2.3 Climate .....	6
2.4 Soil.....	6



2.5	Rainfall .....	6
2.6	Economic Activities .....	8
2.7	Forest and vegetation cover.....	8
2.8	Eastern Galabat Locality.....	9
2.8.1	Physical and socio–economic description.....	9

## **CHAPTER THREE**

### **LITERATUR REVIEW**

3.1	Background .....	11
3.2	Women, Poverty and Environmental Degradation.....	11
3.3	Dimensions and determinants of rural poverty.....	13
3.4	Women and Rural development .....	14
3.4.1	Environmental training and informatio.....	14
3.4.2	Women in rural Sudan .....	15
3.4.3	Women participation in developing projects.....	16
3.5	Forest Projects.....	17
3.5.1	Intigrating local indigenous communities in sustainable forests management.....	18
3.5.2	Strengthening the role of women in sustainable forest management....	19
3.6	Example of local committees work in rural development.....	21
3.6.1	Zenab for Women in Development.....	21
3.6.2	Women Farmers Unite.....	22
3.7	Challenges of conservation and development projects .....	23
3.8	Forestry Extension Programs .....	24
3.8.1	Definition of forestry extension.....	24
3.8.2	Purpose of forestry extension.....	24
3.8.3	Function of forestry extension.....	25
3.8.4	Philosophy and methods of forestry extension.....	25

3.8.5 Design of forestry extension.....	25
3.8.6 Developing a forestry extension program .....	25
3.9 Diffusion and Adoption of Innovation.....	26
3.9.1 Adoption process.....	26
3.9.2 Diffusion elements .....	26

**CHAPTER FOUR**  
**RESEARSH DESIGN AND METHODOLOGY**

4.1 Area of study.....	28
4.2 Methods of data collection .....	28
4.2.1 Secondary data .....	28
4.2.2 Primary data.....	28
4.3 Sample selection.....	28
4.4. Data analysis.....	29

**CHAPTER FINE**  
**RESULTS AND DISCUSSIONS**

5.1. General characteristics of respondent.....	30
5.1.1 The Tribe .....	30
5.1.2 The Marital status .....	30
5.1.3 The Education level .....	31
5.1.4 The Family size.....	32
5.1.5 The Occupation.....	33
5.1.6 The Income/year.....	34
5.2. The Participation in cooperative committees .....	35
5.2.1 Membership of the respondents in committees.....	35
5.2.2 Participation of the respondents in environmental committees.....	37

5.3 The Activities of women in the study area .....	38
5.3.1 The handcraft.....	38
5.3.2 Sources of raw material .....	39
5.3.3 Courses of housekeeping.....	40
5.3.1 Kinds of housekeeping courses.....	40
5.3.2 Benefits of housekeeping courses.....	40
5.4. Forestry Extension Activities in the study area.....	41
5.4.1 Kinds of forests extension activities.....	41
5.4.2 Benefits of application the extension programs .....	43
5.4.3 Sources of technical and financial support.....	44
5.4.4 Women participation in stages of forest extension programs.....	46
5.4.5 Acceptance and diffusion to extension programs.....	46
5.4.6 Women Participation in the Community Forests.....	47
5.4.7 Benefits of Community Forests.....	48
5.4.8 Benefits of shelter belts.....	49
5.4.9 Challenges faced the establishment of Shelterbelts.....	50
5.5 Benefits of Forest .....	51
5.6 Reasons of Forest Degradation.....	52
5.7 Reasons for not using energy alternatives.....	54

## **CHAPTER SIX**

### **CONCLUSION AND RECOMMENDATION**

6.1. Conclusion.....	55
6.2. Recommendation.....	57
6.3 References.....	58
Appendix.....	61
Questioner.....	61
Maps.....	66

## **List of Tables**

- Table 5.1 Marital status of the Respondents
- Table 5.2 The Education level of the respondents
- Table 5.3 The family size
- Table 5.4 Occupations
- Table 5.5 Income of the respondents/ year
- Table 5.6 Membership of respondents in collaborative committees
- Table 5.7 The participation in the Environmental committees
- Table 5.8 Handcraft
- Table 5.9 Source of Raw material
- Table 5.10 Courses of housekeeping
- Table 5.11 Benefits of housekeeping courses
- Table 5.12 Kinds of Forests extension activities
- Table 5.13 Benefits of application the extension programs
- Table 5.14 Sources of technical and financial support programs
- Table 5.15 Women Participation in stages of forest extension
- Table 5.16 Acceptance and diffusion to extension programs
- Table 5.17 Women Participation in the Community Forests
- Table 5.18 Benefits of Communal Forests
- Table 5.19 Benefits of shelterbelts
- Table 5.20 Challenges faced the establishment of Shelterbelts
- Table 5.21 Forests benefits
- Table 5.22 Reasons of Forest Degradation

Table 5.23 Reasons for not using energy alternatives

### Abbreviations

<b>CARE</b>	Committee for American Relief Everywhere
<b>ESAPs</b>	Economic Structural Adjustment Programs
<b>FAO</b>	Food and Agricultural organization
<b>FNC</b>	Forests National Corporation
<b>FSL</b>	Food Security and Livelihoods
<b>GDP</b>	Gross Domestic Product
<b>ICDP</b>	Integrated conservation and
<b>ESAPs</b>	Economic Structural Adjustment Programs
<b>FAO</b>	Food and Agricultural organization
<b>FNC</b>	Forests National Corporation
<b>FSL</b>	Food Security and Livelihoods
<b>GDP</b>	Gross Domestic Product
<b>ICDPs</b>	Integrated conservation and development projects
<b>IDPs</b>	Internally Displaced Peoples
<b>LPG</b>	Liquid petroleum gas
<b>MDG</b>	Millennium Development Goals
<b>WID</b>	National machineries and Women in Development
<b>NGOs</b>	Non-Governmental organizations
<b>NWFPs</b>	Non-wood forest products
<b>PEM</b>	Protein Energy Malnutrition
<b>SFM</b>	Sustainable forest management
<b>UNDP</b>	United Nations Development Program

# CHAPTER ONE

## Introduction

### 1.1 General

Sudan is the largest country in Africa with less than one million square miles after separation of the southern part in 2010. The Northern part of the country is an extension of Sahara desert and the central part is a dry Savannah area tapering to a tropical forest climate in the junction with the northern boundaries with the southern country (Japan International Cooperation Agency, 2012).

The country population is expected to reach 43.2 million (including southern Sudan about 8.2 million) by 2011. The annual population growth is 2.6% and the total fertility rate is 5.6. Rural population constitutes about 62.4% of the total population. Male to female ratio at birth is 1.05 and decreases as the age increases which may be due to “brain drain”, migration or war depletion to males (Japan International Cooperation Agency, 2012). From the total population of Sudan, women account for nearly 50% of the population. Despite their active role in society, their socio-economic situation is still precarious. For decades they have remained marginalized both economically and socially, and sidelined in the political sphere. A large number of women have little or no access to health and education, and limited access to various resources. According to the Interim Constitution of 2005, both males and females have equal rights in relation to economic activities, political participation, education and all other human rights. Although constitutionally no barriers against women exist, laws to protect these rights are not always available. This is combined with various issues such as the present situation of wars, conflicts and poverty, and other social and cultural factors. Females and children are the most vulnerable group in society. Protein Energy Malnutrition (PEM) and Micronutrients deficiencies are the most common problems that affect children under five years of age and women. The health services in Sudan is almost distributed and delivered equally to both male and females with some imbalance in favor to females, especially concerning availability for. The majority of the population of the Sudan is living in rural areas with rural – urban drain

and the nomads are forming the minor group of the society. Women especially those living in rural areas, are suffering from inability to access safe water, health services and educational opportunities. They also suffer unequal access to land credit and other agricultural services, although they participate heavily in agricultural works (Japan International Cooperation Agency, 2012).

Sudanese women contribute to the household economy through both formal and informal work, in rural as well as in urban areas. They also have a considerable contribution in agricultural work, in handcraft making and in many informal activities. With the pressure of domestic responsibilities and the cultural barriers to work, to education and labor market, women are confined to low social status, lack of empowerment, lack of opportunity to access land and other resources and thus social recognitions. Combined with decade of conflicts have further created social issues concerning Internally Displaced Peoples (IDPs) and both internal and external refugee and migrants. Many of them show their willingness to return to their own home, but instable economic, lack of infrastructure maintenance and other social problems are main factors for difficulty for their return (Japan International Cooperation Agency, 2012).

Eastern Sudan suffers from marginalization, underdevelopment and economic inequities. The region is also plagued with issues of lack of basic services, employment opportunities and some of the worst Millennium Development Goals (MDG) indicators in the whole of Sudan. The health crisis and lack of access to economic opportunities, especially among women and youth, are endemic. Disasters, caused by frequent droughts and severe environmental degradation have been responsible for the increasing impoverishment of people, depletion of assets and depopulation of the rural areas. The overwhelming majorities of hired agricultural laborers are highly disadvantaged and suffer lack of access to basic services. Additionally, the consequence of the protracted refugee situation has generated many outstanding issues particularly in the host communities where services are worse compared to those in the refugee camps (UNDP / UNHCR, 2012).

## **1.2 Research problem**

There were several programs and activities of extension forestry in Gedaref state implemented by several organization including (CARE, CORE, FAO, NGOs, etc.....) by collaboration with FNC and Ministry of Agriculture and others governmental and non-governmental institution. These programs targeted all forestry activities that related to rural people, refugees and rural woman because the woman are playing great and effective role in the rural area.

The activities that implemented by the organizations including (education, adult education, health and nutrition, provide drinking water, crops production, planting trees, production of seedlings in the nurseries, distribution of gas units and improve stoves and plant of communal forests and shelterbelts). All these activities aimed to increase the environmental awareness among the villagers and women in the rural area and training to some skills and benefits from forests products specially non-wood forests products like food and medicine, all these programs developed in complementary manner to meet the needs of families in the rural area with the preservation of the environment and forests, but there were not sufficient studies indicate the contribution of rural women in these programs in the rural area to investigate the level of achievement of the objectives of these programs.

## **1.3 Objectives**

### **1.3.1 General objective**

The study aims basically to indicate the contribution of rural woman in forestry extension activities and its impact on knowledge level.

### **1.3.2 Specific objectives**

- To indicate the general characteristics of rural women in the study area including (education level, family size, previous work, income, etc.....).
- To identify the forestry extension programs and activities implemented by FNC, Ministry of Agriculture and several organizations in the study area.
- To study the role that women played and their contribution in the forestry activities and their adoption and implementation of innovation.



## **1.4 Research questions**

To tackle the research problem and obtain the specified objectives, broad research questions were formulated under the assumption that finding answers to these questions will automatically solve or enhance solving the problem of the research.

These questions are:

1/What are the general characteristics of rural woman in the study area?

2/What are the forestry activities that implemented in the study area?

3/Are the women interact and participate in the forest programs?

4/Are the implemented programs in the study area beneficial to the rural women?

## CHAPTER TWO

### Study Area

#### 2.1 Location and Area

Gedarif state is located in the eastern part of the Sudan (Map 1), and it lies between longitudes 36°- 33°E and latitudes 14°-16°N. It is bordered by Nile state from the north, Blue Nile from South, Gezira and Sinar from the west and Kassala and Ethiopian border from the east (Map2). It covers an area of 71000 km<sup>2</sup> (Ministry of Agriculture, Gedarif, 2002).

#### 2.2 Population and Administrative Localities

The state's total population is estimated to stand at some 1.35 million people with an annual growth rate of 3.87%. Over two-thirds of the populations live in rural areas and population density on a state-wide basis stands at around 19 persons per km<sup>2</sup> (Sudan Census, 2008)

Locality	Male Population	Female Population	Total Population
Al Butana	38 375	32 990	71 365
Al Fashaga	60 005	60 830	120 835
CentralAl Gedarief	56 239	55 430	111 669
Al Gedarief City	136 434	132 961	269 395
Al Faw	86 850	89 812	176 662
Al Rahad	96 671	99 767	196 438
Qalaa Al Nahal	31 373	34 749	66 122
Western Galabat	44 768	47 107	91 875
Al Goreisha	40 059	43 335	83 394
Eastern Galabat	79 043	81 580	160 623
<b>TOTAL</b>	<b>669 817</b>	<b>678 561</b>	<b>1 348 378</b>

Source: 5<sup>th</sup> Sudan Population and Housing Census 2008

## **2.3 Climate**

The climate zones of Gedaref state were described by Atta el Moula (1985). Travelling from the North to the South through Kassala province one passes through six climatic zones from the desert in the far North to the wet monsoon climate in the Southern part of the state.

## **2.4 Soil**

Soil is mainly dark cracking clay soil, covering almost the whole area of the state, ten million feddans of which are exploited by rain-fed mechanized farming for cultivating sorghum and sesame. The irrational exploitation of the existing natural forest stand resulted in an obvious decrease in rainfall amount and hindering its distribution, decreasing soil fertility and in turn crops productivity (Gedarif state Strategic Planning Committee, 2005).

## **2.5 Rainfall**

Gedaref state lies within the semi-arid zone. The annual rainfall ranges between 400 mm in the north to 900 mm in the southeast, with the rainy season extending for about four months from May to October. The prevailing wind during the wet season is from southwest and from north direction in the dry season (Mechanized Agriculture Corporation-Gedaref, 2003).

## Annual Rain fall between 2011-2015 Of Gedaref state

Station	Season	Total per (mm)	Average(mm)
Gedarif	2011	501.5	314.0625
	2012	517	73.85714
	2013	570.4	81.48571
	2014	783.8	111.9714
	2015	405.5	57.92857
Al shawak	2011	369.1	92.275
	2012	432.4	108.1
	2013	469.6	117.4
	2014	565.8	141.45
	2015	307.4	76.85
Doka	2011	821.6	205.4
	2012	1015.8	253.95
	2013	507.6	126.9
	2014	836.8	209.2
	2015	839.9	209.975
Al gedumbliia	2011	367	91.75
	2012	779.6	194.9
	2013	305.5	76.375
	2014	574.8	143.7
	2015	687	171.75
Wed El shaerr	2011	327.9	81.975
	2012	537.7	134.425
	2013	351.1	87.775
	2014	510.8	127.7
	2015	531.1	151.7429
Al hoary	2011	677.9	169.475
	2012	676.9	169.225
	2013	614.1	153.525
	2014	692.8	173.2
	2015	521.5	130.375

Source: Mechanized Agriculture Corporation (Gedaref state, 2015)

## **2.6 Economic Activities**

Gedaref state is the most important state regarding agricultural production. The state is boasted by its large, flat, and fertile soil, which is suitable for cultivation of different crops (sorghum, sesames, sun flower, cotton, Guwar, millet ets.....) besides Gum Arabic production. About 90% of the populations of Gedaref state are involved in agricultural sector, the state produce about 28% of the total production of sorghum crops, and 30% of the total production of the sesame of the whole country. The total area that is cultivated annually under (mechanized and traditional rain fed farms) is about 5-6 million fedddans, this represents 17% of the total area cultivated in Sudan by mechanized rain fed .The state is divided into four agricultural sectors :-

- Mechanized and traditional rain fed sector, it represent the backbone of the economical activities for the state and the country.
- The livestock sector, the state is characterized by large, flat and rich grazing land, covering an area of more than 5 million feddans, with 8 animal routes; the numbers of livestock are approximately 5.5 million animals.
- Forestry and shelterbelt sector, which represent about 15 % of the total area of the state.
- The irrigation and horticultural sector. Is an important sector for production of horticultural crops for the local consumption .The excesses are transported to the other states of Sudan.

(Gedaref state Encyclopedia, 2004).

## **2.7 Forests and vegetation cover**

El Gedarif State lies in the low rainfall woodland Savannah belt on clay soil.

Nonetheless, according to Harrison and Jackson (1958) the area is sub-divided into the following:

1. *Acacia mellifera* thorn land where the species grows associated with *Commiphora africana*, *Boscia senegalensis* and *Acacia seyal* and others with 200-500 mm rainfall.
2. *Acacia seyal*, *Balanites aegyptiaca* savanna alternating with grass area with rainfall of 570-800 mm in the area south of *Acacia mellifera* belt.
3. *Anogeissus-combertum hartmannianum* savannah woodland, with rainfall above 800 mm. The dominant trees are *Acacia seyal* and *Balanites aegyptiaca* in the area of Doka, Fazra, Samsam, Gala'a ElNahal, Hawata and Mafaza.

Forest in El Gedaref state as stated by (Gism Alla, 2008), cover an area of 3,363,722 feddans, which represents 19.6% of the total state area. Generally, El Gedaref state forests are classified as follows:

1. Dahara forests: dominated by *Acacias* such as *A. seyal*, *A. senegal* and *A. mellifera* in the north and broadleaved trees in the south parts of the state. Other species available are *Balanites aegyptiaca*. *Ziziphus spinichristi*.
2. Riverine forests: including the vegetation of Atbra and Rahad basins that are dominated by *A. tortilis*, *Capparis decidua*, *Combretum glutinosum*, *Anogeissus lieocarpus*, *A. nilotica*, *A. seyal* and *A. mellifera* wood land on highly eroded soils.
3. Karab forests: this used to protect the watershed sources on the banks of Atbara, Basalam and Seitit rivers.

## **2.8. The Eastern Galabat Locality**

This study was mainly conducted in the Eastern Galabat Locality (Doka), in three villages namely: Rashid, Al Hamra, Um Rakoba.

### **2.8.1. Physical and socio – economic description**

The area is about 431 Km southeast of Khartoum. The north part of the area lies in the semi-arid zone, while the southern part lies in the dry monsoon zone. The topography of the area is dominated by a series of mountains and plateaus declined toward the

east. The geological formation is mainly basement complex volcanic and sediment rocks. With the soils of the area described as dark cracking clay soils in the flat plains, with transferred soils around mountains. In addition, alluvium soil around Atbara River. The average annual rainfall ranges from 500 – 900 mm, while the temperature ranges from mean minimum 20 – 25 c° to mean maximum of 40c°. The main villages in the area are: Hemera, Elsaraf Ahmer, Saboni, Fagali, Madac, Tawareet, Umrakoba, Rashid, and Umthawani (Gedaref locality,2004).

The main activities in the study area are focused on traditional farming, mechanized rain-fed agriculture, animal herding and utilization of the forest products. With the main crops of: sorghum, sesame, millet and groundnut (Eastern Galabat Locality, 2017).

# **CHAPTER THREE**

## **Literature Review**

### **3.1 Background**

Rural men and women have always depended on forest for some of the more important inputs into their life systems (FAO, 1985).

Over the past decades, heightened concern with energy supplies, rural poverty, environmental degradation and food shortage have all contributed to a better awareness of the magnitude and importance of the contribution that outputs of forests and trees make directly to the well-being of rural people in none industrialized countries. This increased awareness has led to a growing concern as to the impact of deforestation on local availabilities of such needed goods and services of the forest as fuel wood, fodder, food, and protection of agricultural land. Under pressure of expanding rural population, increasing areas of forest are being put under shifting cultivation or cleared for settled agriculture (FAO, 1985).

Rural men and women in many areas have long being involved in the conservation and cultivation of trees on agricultural lands and forested areas. Until recently, there has been a tendency to discount these indigenous activities. The main focus of forestry efforts has been on management of trees for environmental protection or for industrial timber production. The shift in emphasis toward forestry in partnership with rural people is, therefore, a significant departure from earlier perception, policies and practices (FAO, 1985).

### **3.2 Women, Poverty and Environmental Degradation**

Widespread and growing poverty in many developing countries, due to persistent economic recession and debt, combined with limited access to productive resources among the poor, is increasing pressure on farm and forest lands. In Latin America, 35 million of the region's poorest people, because they lack access to other land and resources and to alternate sources of income, must practice subsistence agriculture on fragile lands that are highly susceptible to further erosion. Similar conditions prevail in



many parts of Africa where growing poverty is contributing to the destruction of forests and leading to desertification. These factors, in turn, further threaten the economic survival of large numbers of poor people in the future. Approximately 27 percent of the world's land which has experienced moderate, severe, and extreme soil degradation is located in Africa. The rate of desertification has accelerated in recent years; many regions are experiencing falling groundwater levels, drying surface water, rangeland degradation, and deforestation. In order to meet their survival needs, the poor in Central Africa cultivate steep marginal lands and contribute to the reduction of forest and vegetative cover. Such practices are expected to accelerate the rate of erosion and soil degradation (Mehra, 1993).

Among the poor in developing countries, it is often women who are responsible for providing a significant share of household income and subsistence needs such as food production, fodder, fuelwood, and water collection all of which impact biological and natural resources (Mehra, 1993). In areas of increasing natural resource scarcity, women may be forced to contribute to further resource depletion in order to meet their responsibilities for ensuring household survival. Increasing deforestation, for example, often compels women to use dung for fuel rather than for fertilizer. As a result, soil fertility is reduced and future farm yields may be undermined. In fact, output losses from the use of dung for fuel in developing countries are quite substantial—a shortfall estimated at 20 million tons of food grains annually. An interrelated and often worsening cycle of growing poverty, environmental degradation, and resource depletion limits women's employment and subsistence opportunities, increases their workloads, and undermines their health and productivity. In parts of Burkina Faso and Mali, fodder scarcity has compelled women to give up their domestic animals, thereby reducing food availability and removing a source of income. Fuelwood scarcity in West Africa, by raising processing costs, has affected food processing and fish smoking, both important income-generating activities for women. With growing fuelwood shortages, women's workloads increase; in some Indian villages, women spend up to five hours a day in fuelwood collection and cooking in a total working day of 13.6 hours. Ten years ago, in Bara, the Sudan, women were able to gather fuelwood

within a walking distance of 15 to 30 minutes of their homes. Today, women must walk one to two hours in order to find fuelwood. As time is an important and sometimes binding constraint for poor women in developing countries who commonly work very long hours, increasing resource scarcity that requires them to spend even more time on survival activities means less time available for enhancing their productivity and incomes and enabling them to overcome poverty (Mehra, 1993).

A prevalent view in the decade from the mid-1980s to the mid-1990s was that poverty and environmental degradation were intimately connected, so that poverty was seen as both a cause and an effect of natural resources depletion, in a down ward spiral. An early statement of this view captures the link of thinking that it involves. Those who are poor and hungry will cut down forests, their livestock will over graze grassland, they will over use marginal land, and in growing numbers they will crowd into congested cities (Ellis, 1974).

According to some studies, poor female – headed households account for 24 – 26% in rural areas. The marginalization and poor status of displaced women staying in the host community, mostly urban, is perpetuated by their lack of education, training or skills compatible with the urban market and, consequently earning no or low incomes. In addition to in accessible labor market, women's economic empowerment has also been constrained by unequal access to, and control over means of production, particularly land, and credit (Hassan, 2002).

### **3.3 Dimensions and determinants of rural poverty**

- Changes in the structure of production towards large-scale farming has displaced subsistence farmers and nomads from their land and transformed them into wage laborers, thereby depriving a large number of families of their main source of livelihood.
- Deforestation is increasing due to the continuous clearing of land for crops and cutting of wood for energy, resulting from the introduction of large scale farming and the displacement of farmers.

- The growing number of female-headed households (about 25 to 35% depending upon region), due to male migration to large-scale mechanized agricultural schemes and the emerging urban industrial sector, suffer labour shortages and greater poverty.
- A general lack of access to agricultural resources and services is particularly acute in the case of women. Women in the traditional sector have access only to low-paying, low status, seasonal work.

The negative effects of Economic Structural Adjustment Programs (ESAPs) are affecting the poor sectors of the population, especially women subsistence farmers (FAO, 1994).

### **3.4 Women and Rural development**

#### **3.4.1 Environmental training and information**

Women in developing countries already have a wide knowledge of their environment, energy quality, the location of water springs, seed selection, gardening and the use of medicinal plants, for example, they are the potential cornerstone of sustainable development programs and projects, but they need training, in such areas as soil sciences, particularly soil survey and land evaluation and assessment of soil degradation and desertification. Agricultural training needs to include the assessment of land – use potential from an agro–ecological perspective and evaluation of population supporting capacities .other areas where women need to be trained are: forestry management botany, silviculture, pisciculture, hydrology, land use planning, management of the aquatic ecosystems, economics and sociology (RODDA, 1991).

Locally, once trained, women farmers can play a key role. As extension workers they could disseminate information to those who need and can use it, training sessions of two to four weeks could be set up. To carry out this works, these women would need adequate teaching aid, such as guide books, filmstrips and posters, such men are provided with in recognized extension programs (RODDA, 1991).

Implementing such integrated conservation and development projects (ICDPs) is not, however, a simple matter. Apart from an enabling policy environment, at least five components are involved in developing an ICDP strategy, including:

(1) research for planning, monitoring, and evaluation; (2) conservation and environmental management; (3) economic development; (4) institutional strengthening; and (5) brokering and balancing the interests of stakeholder groups. Among stakeholders, mainly local participants, there is often a wide range of interests, differing access to and use of resources, and variation in social status, power, leverage, and even participation in community life. In order to design and implement effective ICDPs, these differences must be taken into account (Mehra, 1993).

### **3.4.2 Women in rural Sudan**

Women make a sizable contribution to Sudan's agricultural sector, and most Sudanese families depend on women's farming for their food and income. Gedaref is no different – the state provides a large portion of Sudan's sorghum, millet, groundnuts and vegetables through an agricultural economy driven to a large extent by the contributions of women farmers whose role is severely undervalued. While women farmers in rural areas play an active role in sustaining the region's agricultural economy, they are routinely neglected by policy makers and excluded from accessing the services and resources they need to manage their land effectively. Critically, women have a difficult time securing land tenure and property rights, a significant challenge given the composition of the agricultural workforce. Women constitute more than 80 per cent of the labour force in the traditional (non-irrigated) agricultural sector yet hold only one per cent of registered land titles. Only five to six per cent of land titles are held jointly by men and women. As a consequence, the majorities of women farmers are unable to use their farms as collateral and, therefore, are unable to access credit. Without access to finance, women cannot purchase the farm inputs necessary to manage their farms – never mind make balanced and informed choices that prioritize sustainable practices – or pay for hired labor to assist in land preparation and harvesting (UNDP, 2013).

In Gedaref, it is common for men to migrate to cities in search of employment, leaving women to provide for their families and manage their land. Women, in fact, have few economic opportunities outside of agriculture; it is the occupation of 97 per cent of women in the state. For lack of mechanized equipment, women tend to weed, sow and

harvest by hand, while fertilizers, pesticides and herbicides are generally unaffordable for them. Despite these barriers, women farmers manage the majority of food crops, as well as retaining responsibility for collecting fresh water and fuel wood (UNDP, 2013).

Women carry out a major portion of agricultural activities and bear almost the entire burden of household work, including water and fuelwood collection and food processing and preparation. According to a Ministry of Agriculture baseline survey of the rainfed traditional sector in 1989, both men and women participate in land clearance and in the preparation, harvesting, transporting and marketing of crops, while women carry out most of the planting, weeding and food processing. In the livestock sector, men have the primary responsibility for cattle and sheep rising, while women participate in milking and processing milk products. Both men and women are involved in raising goats and poultry. In fisheries, women participate in processing and marketing. In the agro-forestry sector, women participate in all aspects of the work and have the major responsibility for seedling preparation and weeding. Men and women are sometimes responsible for different types of trees. Women represent 49% of the farmers in the irrigated sector and 57% in the rainfed traditional sector. Women in the rainfed sector are primarily subsistence farmers but they also work as seasonal wage laborers in the rainfed mechanized sector, and as hired or unpaid family laborers in the irrigated sector. Although women play a crucial role in agriculture, contributing to both the GDP and to household food security, their contribution to agriculture and the overall economic development process continues to be undervalued (FAO, 1994).

### **3.4.3 Women participation in developing projects**

Women with basic knowledge of the environment deserve to be trained in environmental management and in development project design at all levels, including university level and job opportunities in accordance with training and experience should be made available for them. Efficient training to recognized technical and professional levels would enable women to obtain greater access to responsibilities for designing projects that accord with sustainable development. It is increasingly realized that, in Africa, alleviation of the food crisis depends on the productive potential of

women farmers. Traditionally, in most Africa countries, women are responsible for providing food to the family, while the men have been trained by international development agencies to produce cash crops. Consequently, women produce at least 80 percent of all the food in Africa. Most of Africa's small-scale farmers are women, many of whom do not have the same advantage of legal title and access to credit as do men farmers (RODDA, 1991).

### **3.5 Forest Projects**

In Sudan like many other countries, rural women are involved in all aspects of fuel-wood use. But women's relationship with forest resources extends beyond that, as they are also involved in many activities like the collection of gum Arabic, dates from their date palm trees, and fruits from other trees. From that background we went to the field with the following perspectives:

- The impact of changes in forest resource management situations in Sudan on women is different from that on men. Consequently, women develop different perceptions and attitudes; create suitable management institutions for themselves; and undergo different knowledge transformation processes.
- Even the smallest social actor category e.g. a household does not constitute a homogeneous group. In reality, every social actor has intra/inter-specific characteristics which make it liable to differential responses to stimuli (Sulieman, 1996).

Gradually it has been recognized that even the community forestry label is generic and that the social development norm of such forestry projects does not refer to one specific objective, but rather to a group of objectives. A number of broad aims can be distinguished. Generally, these projects have been intended to:-

- Provide the means so rural families can supply, or have better access to, certain basic needs in the forms of essential forest and tree products.
- Increase the participation of the rural people in managing forest and tree resources as a means of increase the self- reliance.
- Use human resources to better manage degraded and managing lands thereby counteracting the process of deforestation and environmental degradation.

- Contribute to the general socio- economic development of rural people through employment generation, institution building and promoting economic growth.
- Help meet the needs and aspiration of both women and men in specific under privileged groups within the rural population, such as subsistence farmers, migrant herders and the landless.
- Increase the overall production of wood or other tree products to counter growing deficits (FAO, 1985).

Forest extension agents meet their greatest difficulty when trying to involve women in tree planting schemes. Many projects are now involved in encouraging women to participate in forestry. Committee for American Relief Everywhere (CARE) Eastern Refugees Reforestation Project has found that the most effective way of drawing women into their forestry programs is through the adult education service, which traditionally provides nutrition, sewing and literacy classes for women in rural areas. The department has trained adult educators, but it lacks adequate resources with which to encourage women to plant trees. CARE supplied the needed materials and gave additional training to the female extensionists in women crops, tree production and maintenance. Women who have established nurseries in their homes, grown trees for their compounds and sold surplus trees to neighboring villages. It is important for the extension service to offer a variety of skills and training to the women that will fulfill their diverse needs. Women have many priorities which must be met before they can direct their attention to tree planting (Abdullah and Holding, 1988).

### **3.5.1 Integrating local and indigenous communities in sustainable forests management**

Integrating local communities in sustainable forest management has been achieved through community forestry programs namely; tree planting campaigns, Gum Arabic production campaigns; improved cook stoves programs, alternative energy programs (LPG and Kerosene).

Forest policy historically recognized the local people's rights, privileges and benefits from the forests. These included rights of water, grazing, wood collection, right to roads and others (FNC, 2003).

Forestry authorities respect local people rights and privileges. During the 80's some forestry projects integrated local communities in sustainable forest management (SFM). To mention some: SOS-Sahel project in Elain forest/ Northern Kordufan; Forestry Development project in Rawashda and WadKabo forests /Eastern Sudan; and Rehabilitation of Gum Arabic Belt project /Kurdofan. The projects of community forests and village woodlots encouraged the integration of local communities in decision making regarding the management of forests. Participation of local communities in SFM is encountered by some constraints of disputes on resources like land and water resources. Forestry being a long term investment does not encourage involvement of local communities in production and management. Effect of drought on nomads and the local people dependency on forest to provide fuel and building material are also factors that negatively affect SFM (FNC, 2003).

Capacity building and technology transfer was achieved through training of trainers and extension campaigns targeted to beneficiaries.

Establishment of Gum Arabic producers' Societies largely contributed to strengthening local farmers and served as a key factor in organizing them. This enabled them to play a crucial role in decision-making, crop marketing and technology transfer cook stoves (FNC, 2003).

### **3.5.2 Strengthening the role of women in sustainable forest management**

The involvement of women in forestry activities dates back to the late seventies and early eighties. They played an important role in rural areas where women do most of the agricultural practices. They worked in the forest nurseries, village nurseries, extension campaigns, training of trainers and formation of community based organizations. Progress is apparent from the increase in the numbers of women involved in forestry practices. Recruitment of women graduates for work in forestry started in 1981. They worked in different fields of work at headquarters and states



level. Women foresters participated in forestry activities of extension, training, inventory, management, planning, afforestation, utilization and energy. They largely contributed to raising the level of awareness and forest protection. From the amount of the FNC workforce in the headquarter 140 of whom 40% are women (FNC, 2003).

Community based organizations greatly contributed to strengthening the role of women in sustainable forest management. Women joined unions and societies and established women committees. These organizations enabled them to participate effectively. The following are some examples of such successful women organizations:

- The Women Union, Belail Community Forest, Southern Darfur State; A total membership of 460 women in a remote area. They succeeded in establishing two women woodlots for productive and protective purposes, digging two wells for provision of water, producing gum arabic and establishing a tree nursery.
- Hmadnalla Women Rural Development Project; Sennar State, three phases (1994 – 2000); the project covered areas of illiteracy, awareness in techniques of combating desertification, establishing community forests, social development and training.
- Matataib Women Woodlots, Kassala State; Women societies established woodlots for production of building poles and fuel.
- Women Forestry Project, River Nile State; Gained experience in involving the women in forests planting and protection in the area. Implemented training courses for women, established home nurseries and disseminated improved cook stoves.
- Gum Arabic women societies, Northern Kurdofan; increased the production of gum Arabic and contributed to the welfare of the community (FNC, 2003).

Constraints encountered included; the increased family burden on women; lack of appropriate training; problems of desertification and its impacts on the agricultural production; access of women to land; shrinkage of international support to women projects; security in some areas and problems of displacement (FNC, 2003).

## **3.6 Example of local committees work in rural development**

### **3.6.1 Zenab for Women in Development**

The central role of women in both economic development and food security is undervalued in Gedaref, as it is across much of Sudan. Agricultural extension services provided by the government are also anemic, leaving women with few options for agricultural training, technical services or access to credit and savings programs (UNDP, 2013).

Zenab for Women in Development was founded in 2000 to improve the status of women in Sudan, with the stated objectives of improving the livelihoods of women, enabling women to advocate for their rights, and contributing to sustainable development in rural areas and those regions affected by complex conflicts and natural disasters. The initiative began as the work of a local academic, and was named in honour of her mother, Zenab M. Nour, a pioneering native of Gedaref who was the first woman from the state to receive a formal education. Carrying on the efforts of Zenab, the initiative's work was initially supported by a number of small project grants from organizations such as the African Women's Development Fund, UNIFEM (now UN Women), the international women's rights NGO MADRE, and the Irmas Foundation, as well as private donations from within Sudan and the international Sudanese diaspora, from its outset, the initiative has taken a multidimensional approach to empowering women, identifying appropriate funding opportunities and entry points for interventions across the human development scale. In practice, this has meant a broad portfolio of program areas, incorporating: projects to improve women's literacy; infrastructure investments in rural primary schools; improving livelihood opportunities and food security for women in marginalized areas; enhancing access to rural health services with a focus on women (including combating harmful social practices such as FGM and violence against women, awareness-raising on HIV/AIDS, and providing information on reproductive health); providing legal aid services and logistic support for vulnerable communities, including the promotion of women's rights; civic education encouraging women's participation in political processes, as community leaders, and in conflict-resolution; and programs that aim to foster values

of peace and democracy. Since 2000, Zenab's work across these programs areas has spanned a diverse range of partnerships, target beneficiaries, and geographic focuses: although the organization began its work in Gedaref, it has expanded to work in other parts of Sudan, including Darfur, as an indication of its broad range of impacts across the development spectrum (UNDP, 2013).

### **3.6.2 Women Farmers Unite**

Since 2005, Zenab's flagship program has been its women farmers' union, the first of its kind in Sudan. This initiative – 'Women Farmers Unite' – has been supported by MADRE, a US-based international women's movement that partners with grassroots initiatives around the world in support of women's empowerment. Zenab began by conducting a needs assessment survey of 20 rural communities in Gedaref to get a sense of the predominant challenges facing women farmers and village primary schools. This survey highlighted the interconnected challenges of climate variability, droughts, post-conflict recovery, and the disempowerment of women that were acting to restrict the livelihoods and wellbeing of women farmers, (UNDP, 2013).

Agricultural training activities coordinated by the women farmers' union focus on improving soil and water quality so that women farmers can improve the productivity of their land, much of which has been degraded through years of poor management and overuse. Population growth in Sudan and in this region in particular, has put a serious strain on soil quality and water resources. Land and soil are under significant pressure to produce enough food to keep pace with local demand, Zenab encourages the planting of a diverse range of vegetables and crops, with a particular emphasis on those that return nutrients to the soil. The group also promotes crop rotation and the use of groundnut as an organic fertilizer to ensure that the land does not become depleted. Training is provided in soil preparation and maintenance, and workshops have been given on environmental conservation and the value of trees in maintaining soil quality and water functions. Tree planting constitutes an important aspect of the organization's overall conservation practices and environmental stewardship. Zenab for Women in Development works with women farmers to maintain 'green belts', planting trees in areas where deforestation is most clearly affecting soil and water

quality. The growing network of women farmers also plants trees near schools, in household gardens and along main streets. In the village of Hamra, for example, a group of women have established a tree nursery, which is being developed to expand to the point where it will be capable of feeding tree-planting efforts across the state. The organization also actively distributes propane gas stoves and trains local women in their use. The stoves are promoted as an alternative to wood burning stoves, which are the most common form of cooking stove amongst the local population, but which require significant inputs of time and energy to locate fuel and which have a negative impact on health when used indoors. The use of propane gas stoves, by contrast, has reduced pressure on local forests, which were being overharvested (UNDP, 2013).

### **3.7 Challenges of conservation and development projects**

Conservation and development projects in many developing countries lack adequate staff, especially female staff, to provide information and training to women. Understaffing can be a particular impediment to women's involvements, as studies show that extension and training staff tend to favor men. A survey in Nigeria's Ogun State Agricultural Development Project revealed that extension agents visited just 10 percent of women farmers every week, whereas 70 percent of the men received weekly visits. Moreover, extension staff often tends to be overloaded with work, having responsibility for management, training and extension visits over large areas. Under such conditions, they are unlikely to be responsive to any directives to expand outreach to women. Lack of female staff in development and conservation projects and agencies also poses a problem in reaching and training women; it exists at all levels—extension workers, forest rangers, and policymakers. The shortage of women foresters, in particular, is quite severe and some countries have no trained women foresters at all. The Indian Forest Service, a very large government agency, appointed its first three female professional staff members as recently as 1979. In cultures where women are secluded and interactions between women and men are customarily disapproved, such as in Muslim societies, lack of adequate numbers of female staff may be a limiting constraint that effectively precludes women's participation. In other cases, the problem may not be so severe, although female extension agents and

foresters are sometimes more effective in working with women. This was found to be the case in forestry projects in both Cameroon and Mali. Lack of training in working with women is yet another constraint that affects both male and female staff of development and conservation agencies. Staff generally lacks understanding and appreciation of the roles women play in environment and development, of the importance of including women in projects and of appropriate techniques to reach and to involve women. Fortunately, there is a growing body of literature on what works in drawing women into conservation and development projects. A few examples are provided below, along with the project and policy lessons that can be learned from them (Mehra, 1993).

### **3.8 Forestry Extension Programs**

#### **3.8.1 Definition of forestry extension**

In recent years a number of different terms have been used to describe the basic activities of forestry extension. This diversity of terms has not necessarily clarified the issues. The important point, however, is not the particular term used but the acceptance by those concerned of an attitude of approach to the matter. Extension should be regarded as a process of Integrating indigenous and derived knowledge, attitudes and skills to determine what is needed , how it can be done, what local co-operation and resources can be mobilized and what additional assistance is available and may be necessary to overcome particular obstacles (Sim, D.&Hilmi, H,A. 1987).

The term forestry extension is used to cover any situation in which local people are directly and willingly involved in forestry activities from which they will derive some recognizable period of time (Sim, D.&Hilmi, H,A. 1987).

#### **3.8.2. Purpose of forestry extension**

The main purpose of forestry extension is to help people to examine problems which are affecting their lives and to consider if they may be solved, or at least alleviated, by using forestry techniques within the range of their skills and financial resources (Sim, D.&Hilmi, H,A. 1987).

### **3.8.3. Function of forestry extension**

The function of forestry extension, therefore, is not to move into an area and meet, to some extent, what appears to the extension staff to be a need, and then hope that the people will adopt and extend the activity until the problem is finally solved. In such cases a token amount of involvement by the local people may be required initially but the direction and driving force of the activity remains outside the control of the people and is often of little real interest to them (Sim, D.&Hilmi, H,A. 1987).

### **3.8.4. Philosophy and methods of forestry extension**

The basic philosophy of extension; working with people; developing self - reliance; establishing organization to promote development, definition of local problems and the barriers to their solution by discussion or by survey methods; review of possible solution to identified problems, sources of information and support; selection of an appropriate solution and definition of steps necessary to implement this; development of a program of activities with defined targets and responsibilities; leadership, sharing burdens and learning by evaluation (FAO, 1988).

### **3.8.5. Design of forestry extension**

The most effective pattern of forestry extension requires a functional approach. That means the designers must, with the cooperation of the people and concerned, define certain goals which are of importance to the people and decide on the steps that must be taken to achieve these goals. The goals themselves must be clearly defined if the process of achieving them is to operate effectively. The goals are often related in some way to national policy (FAO, 1986).

### **3.8.6. Developing a forestry extension program**

On the basic of the information gathered by the procedures suggested above it should be possible to commence to develop a forestry extension program. The planning process should be systematic, but not rigid. Decision at each stage should be based on the increasing amounts of information available, as cooperation develops between the members of the community and the extension staff. Many factors such as weather, the

availability of resources or human responses to situations, cannot be predicted accurately. Both the plan and the approach of all the people concerned must be sufficiently flexible to allow modification in the light of new information or to delay further development when the situation is not favorable to their implementation. In some extension efforts in the past failures have resulted from poor planning and misunderstanding of the work involved. Such losses can in future be reduced by good management. A key factor of this is to identify responsibility for each step in the program. The selection of a suitable community group to plan and carry out forestry extension activities helps in defining responsibility for action (FAO, 1986)

### **3.9. Diffusion and Adoption of Innovation**

#### **3.9.1. Adoption process**

The adoption process is the mental process through which an individual passes from first hearing about an innovation to final adoption. The adoption process should be distinguished from the diffusion process which is the spread of a new idea from its source of invention or creation to its ultimate users or adopters. A major difference between the diffusion process and the adoption process is that diffusion occurs among persons while adoption is an individual matter. The adoption process is conceptualized in five stages or steps: awareness, interest, evaluation, trial, and adoption. At the awareness stage the individual is exposed to the innovation but lacks complete information about it. He then becomes interested in the innovation and seeks information about it at the interest stage. At the evaluation stage the individual mentally applies the innovation to his present and anticipated future situation, and decides whether or not to try it. The individual uses the innovation on small scale in order to determine its utility in his own situation at the trial stage. At the adoption stage the individual decides to continue the full use of the innovation (Rogers, 1962).

#### **3.9.2. Diffusion elements**

##### 1/ The innovation

An innovation is an idea perceived as new by individual. It really matters little, as far as human behavior is concerned, whether or not an idea is objectively as measured by

the amount of time elapsed since its first use or discovery. It is the newness of the idea to the individual that determines his reaction to it.

## 2/ Communication

Diffusion is the process by which is the spread of a new idea from its source of invention or creation to its ultimate users or adopters.

The essence of the diffusion process is the human interaction in which one person communication anew idea to another person.

## 3/ In asocial system

Asocial system is defined as a population of individuals who are functionally differentiated and engaged in collective problem – solving behavior.

## 4/ Over Time

The adoption process differs from the diffusion process in that the adoption process deals with adoption of a new idea by one individual while the diffusion process deals with the spread of new ideas in asocial system, or with the spread of innovations between social systems or societies (Rogers, 1962).



## **CHAPTER FOUR**

### **Research Design and Methodology**

This research was designed to know the participation of rural woman in the forestry extension activities.

#### **4.1 Area of study**

This study was conducted in the eastern part of Sudan, in Gedaref state, more specifically in the Eastern Galabat locality, where international organizations, NGOs, Ministry of Agriculture and FNC have conducted some forests and development activities. The ultimate goal of these activities rehabilitation and developing the area affected by several factors (drought, desertification, climate change, refugees, etc.....).

#### **4.2 Methods of data collection**

##### **4.2.1 Secondary data**

Secondary data was largely obtained through the analysis of various documents relevant to the study, this include books, institutional report, records and papers which provide information for the study.

##### **4.2.2 Primary data**

Different methods and techniques were used during data collection include (structured interview using questionnaire that is designing to collect information at their villages level, observation to judge the reliability of the data).

#### **4.3 Sample selection**

Purposive sample technique was followed to select the state because there are many and several programs implemented in the area, random sample techniques was used to select Eastern Galabat locality and three villages (Rashid, Um Rakoba, Al Hamra), where several and different programs are implemented, simple random sample technique was used to select the respondents include (farmers, leaders, adult women and housewife), the sample size was selected equal 10% from the total families. The sample size distributed in three villages (27.5% Um Rakoba, 32.5% Rashid, 40% Al Hamra) and the number of the respondents was (120) woman.

#### **4.4 Data analysis**

In this study data obtained was processed and analyzed on personal computer using statistical package for social science (SPSS) software , percentage and frequency was used generally to display the differences between the answers of the respondents also (  $\chi^2$  .test ) was used to identify the significant differences.

## CHAPTER FIVE

### Result and Discussion

#### 5.1 General Characteristics of Respondent

##### 5.1.1 The Tribe

The most of the respondent in the villages were belong to Dago, Masaleet and Fur tribes; also there were few tribes like (Abudarag, Bargo, Mahady, etc.....). These tribes have no problem with woman working in agricultural sector beside their domestic work. From the observation the women in the study area were interesting in agricultural Work.

##### 5.1.2 The marital status

**Table (5.1) Marital status of the respondents**

Status	Freq	%
Single	10	8.4
Married	96	80.
Divorce	7	5.8
Widow	7	5.8
Total	120	100

$$\chi^2 = 193.800*** \quad (p < 0.0001)$$

The result in Table (5.1) shows high significant differences at ( $p < 0.0001$ ) between the marital status of the respondents, about 80% of the women answered were married, this indicates the responsibility of these women to participate in providing the basic need of their families that put more burden work on them.

Women are generally less able than men to participate in economic opportunities because they face a work burden that men do not. In most societies, women are responsible for most of the household and child-rearing activities as well rearing of small livestock, although norms differ by culture and over time. This additional work burden is unpaid and limits women's capacity to engage in income-earning activities,

which often require a minimum fixed time before being profitable. Furthermore, the nature of tasks, such as caring for children and elderly household members, requires women to stay near the home, thus limiting options to work for a wage. Time scarcity forces many women to start-up cottage industries, such as handicrafts, which are often characterized by low returns and limited potential for expansion (FAO, 2011)

### 5.1.3 The educational level

**Table (5.2) Education level of the respondents**

Level	Freq	%
Illiterate	50	41.6
Khalwa	45	37.5
Primary	9	7.5
Intermediate	3	2.5
Secondary	11	9.2
University	2	1.7
Total	120	100

$\chi^2 = 117.00^{***}$  ( $p < 0.0001$ )

The result in Table (5.2) shows high significant difference at ( $p < 0.0001$ ) between the respondents according to education levels. The educational level among the rural women was low, about 42.7% of them were illiterate. Also the percentage of learning in Khalwa was high, 37.5% of the women learned in Khalwa. In khalwa women, beside Quran, the learn basics of reading and writing. Above table also showed that only 1.2% of the respondents were university graduates whereas secondary school level was 9.2%. In the field of extension education level is an important criteria because it affect the selection of suitable methods for literate and illiterate people.

Higher education plays a prominent role in Sudan's economic and social development as it focuses on capacity-building as well as scientific knowledge and skills needed in those which can be applied into future professional fields. Education opportunity for higher education is provided equally for both males and females. Opportunity for

female to hold higher degree has been improved from early 1980. The percentage of female students enrolling in universities reached at 68.74% which was significantly higher than male students (31. 25%) between 2010 and 2011 (Japan International Cooperation Agency, 2012).

### 5.1.4 The family size

**Table (5.3) The family size**

Size	Freq	%
Less than 2	11	9.2
2 – 4	6	5.0
4 – 6	27	22.5
6 – 8	30	25.0
8 -10	20	16.6
More than 10	26	21.7
Total	120	100

$\bar{X} = 7$  persons     $SD = 3.02$      $Ch^2 = 19.367^{***}$  (p<0.0001)

The result in Table (5.3) shows a highly significant different between the family size of the respondents at (p<0.0001). The average of family size was 7 persons; about 25% of the respondents were (6 - 8) persons. These increase in the numbers of persons in the family lead women to look for additional work in order to increase the family income.

The big family size has two effects, may has a positive and another negative; the positive effect lies in increasing the labor force in the farms and another works, and hence increase the family income. The negative effect consists in putting more burdens on women through doing more work to satisfy family needs.

## 5.1.5 The occupation

**Table (5.4) Occupations**

Occupation	Freq	%
Housewife	120	100
Farmer	108	90
Employee	11	9.2
Trader	7	5.8
Other	3	2.5

All of respondents according to Table (5.4) were housewife and about 90% of them were farmers. Governmental jobs are not spread among the respondents in the study area represent only 9.2% this may be attributed to the low education level of respondents. This reflects the importance of education for gaining new skills and raising awareness of the rural women. Also above table showed that women have other jobs like trade, tailor and tea seller.

Most of the women are engaged in agriculture activities as natural practice they are used to and have experience in their household with part of processed food utilized in their meals (FAO, 2011).

Most of the Sudanese still earn their main livelihood from agriculture which remains the most important sector in Sudan. The most of agricultural tasks are carried out by women while men commonly control cash crop.

Women dominate employment in many of the high-value agricultural commodity chains in sub-Saharan Africa and Latin America. New jobs in export-oriented agro-industries may not employ men and women on equal terms, however they often provide better opportunities for women than exist within the confines of traditional agriculture and can also be instruments of change with significant implications for women and rural development (FAO, 2011).

High rates of illiteracy and low levels of education among women have been shown to constrain women's productivity and may affect their receptivity to new techniques and skills in conservation. In agriculture, an important sector for women's employment,

studies show that improvements are strongly linked to education, and that educated farmers tend to be more likely to adopt modern practices, cites evidence that literacy raises the demand for fertilizers, increases investments in draft power and results in increased output. Although no direct evidence is available on the links between education and the adoption of new conservation techniques and practices, it is not unreasonable to hypothesize that education may contribute to improvements in conservation practices. This issue deserves further investigation (Mehra, 1993).

### 5.1.6. The income/year

**Table (5.5) Classes of income of the respondent/year**

Classes of income By /pound	Income from agriculture		Income of trader		Income of salary		Income of freework	
	Freq	%	Freq	%	freq	%	Freq	%
Less than 1000	25	20.8	113	94.2	109	90.8	117	97.5
1000 – 5000	47	39.2	1	.8	1	.8	2	1.7
5000 – 10000	30	25.0	2	1.7	2	1.7	0	0
10000 – 15000	10	8.3	2	1.7	7	5.9	0	0
15000 – 20000	4	3.4	0	0	1	.8	0	0
20000 – 25000	3	2.5	1	.8	0	0	0	0
More than 25000	1	.8	1	.8	0	0	1	.8
Total	120	100	120	100	120	100	120	100

$$\bar{X}=7,344 \text{ SDG} \quad SD = 6,429$$

The women depend on agriculture for their income, and as shown on Table (5.5) the income of 39.2% of them in the range of 1000 – 5000 SDG/year. The income of most women was less than 10.000 SDG/year and the total average income was 7,344 SDG/year. Women mentioned that the income was not sufficient to face their life needs.

Women make essential contributions to the agricultural and rural economies in all developing countries. Their roles vary considerably between and within regions and are changing rapidly in many parts of the world, where economic and social forces are transforming the agricultural sector. Rural women often manage complex households and pursue multiple livelihood strategies. Their activities typically include producing agricultural crops, tending animals, processing and preparing food, working for wages in agricultural or other rural enterprises, collecting fuel and water, engaging in trade and marketing, caring for family members and maintaining their home (FAO, 2011).

National statistics on the economically active population can be of limited value in looking at the extent to which women are economically involved in agriculture, food production and processing, as conventional definitions of the labor-force have-lead to an under-estimation of women's work. These definitions tend to place more emphasis on paid work and introduce gender biases in the distinction between domestic production ' for household consumption and production for sale or exchange. In Africa, it is estimated that only 42% of the economically active population involved in agriculture are' women due to the tendency to register farm women as housewives (FAO, 1990).

## **5.2 Participation in cooperative committees**

### **5.2.1 The membership of respondents in committees**

**Table (5.6) Membership of respondents in cooperative committees**

Kind of membership	Freq	%
No member	9	7.5
Head	13	10.8
Office member	8	6.7
Member	90	75.0
Total	120	100

Ch<sup>2</sup> = 160.467\*\*\* (p<0.0001)



According to Table (5.6) there were highly significant differences at ( $p < 0.0001$ ) between the respondents according to the kind of membership.

Most of the women (75%) were members in the committees, 10.8% of them were head or leaders in their villages and 6.7% of them were office members.

The committees in the villages work in several domains like (social, agriculture, environment, etc.....).The engagement of women in these committees encourages working in the forest development programs.

Involvement of women in the decision making processes, income generating activities, community leaderships, trainings, and promotion of women networks will be undertaken to tackle the problem of low women participation in development activities. It is expected that involvement of women will lead to eventual households being self-sufficient as they often play a crucial role in family management and therefore understand the responsibility of making food, water and fuel supplies for households (UNDP / UNHCR, 2012).

In most developing countries, even if formal membership cannot legally be denied, women are rarely represented in community decision making bodies such as local governments. In producer groups such as cooperatives, women are not usually barred from membership but may be excluded because membership is based on land ownership or reserved for the household head, generally assumed to be a man. In Senegal, although there is no legal obstacle to women's membership, very few of more than 2,000 agricultural cooperatives have women members. Of the 249 members of one cooperative, only four were women. Women constitute just one-third of the membership of producer groups or "Para-cooperatives" that practice both communal and individual farming (Mehra, 1993).

## 5.2.2 The participation of respondents in environmental committees

**Table (5.7) The participation in the environmental committees**

Participation	Freq	%
Yes	44	36.7
No	76	63.3
Total	120	100

$\chi^2 = 8.533^*$  (p<0.05)

The result in Table (5.7) shows significant difference at (p<0.05) between the respondents according to participation in environmental committees, about 36.7% of the respondents participated in environmental committees. Environmental committees are important to increase rural women awareness of natural resources conservation and hence, there is a great need to increase such committees among the societies.

Women face particular challenges in many Eastern Sudanese communities, and empowerment of women is a key output of the joint program. In general, adverse environmental conditions, the occurrence of armed conflict and economic problems in the region have had a disproportionate impact upon this cross-section of the population. This is, in large part, due to the prevailing culture norms, the high rates of illiteracy and absence of vocational training and life skills among women factor which reduce coping capacity and the number of available livelihood opportunities. This position of heightened vulnerability tends to be particularly acute for rural women who are adversely affected by male migration (UNDP / UNHCR, 2012).

## 5.3 The activities of the women in the study area

### 5.3.1 The handcraft

**Table (5.8) Handcraft**

Kind of handcraft	Yes		No		Total	
	Freq	%	freq	%	Freq	%
Basket	58	48.3	62	51.7	120	100
Mat(brish)	27	22.5	93	77.5	120	100
Sareef	0	0	120	100	120	100
Other	18	15	102	85	120	100

Above half of the women mentioned that they work in handcraft activities and some of them sell their products, about 48.3% of them make different kinds of baskets, 22.5% make mats (brish) and hababa, also 15% of the women produce other types like Shiloh sweets and towel of tables. Women in the study area don't make sareef (wall or fence) and it is only made by men.

Collection of forest products and a small-scale private rural enterprise do not necessarily require ownership of or access to land. Under forest-based small/informal sector enterprises are such activities as collection of bamboo, reeds and other non-wood forest products (NWFPs); 'cottage' industries such as basket-making; collection and conservation of wood for fuel; handicrafts based on wood products; production of agricultural implements and treated fence posts for local use; and small-scale wood-products manufacture parallel to mechanized and modern sectors. Some of the small/informal enterprises can benefit through input, market and technological linkages with modern sectors (Glover, 2005).

### 5.3.2 Sources of raw material

**Table (5.9) Sources of raw material**

Source	Yes		No		Total	
	Freq	%	freq	%	freq	%
Town/village market	49	40.8	71	59.2	120	100
Free from the near forest	6	5.0	114	95.0	120	100
alternative	16	13.3	104	86.7	120	100

$\chi^2 = 65.77^{***}$  ( $p < 0.0001$ )

According to Table (5.9) there were highly significant differences at ( $p < 0.0001$ ) between the respondents according to source of raw material. Most of the respondents mentioned that there is some shortage in the raw material for handcraft production. Above table cleared 40.8% of the women buy the raw material from villages and towns markets, and 13.3% of them use other alternatives like plastic, wool, etc....., where as 5% of the respondents get the raw material free from the near forests like *Sericeum purpureo* (anees) which is a type of grass used to make sweeper (mukshasha).

The shortage of raw material is an indication for decrease in the non-wood products in the study area and eventually decreasing in forests area. In the past women get part of the raw material from nearby forests that encourage women to work in handcraft activities to increase their income and sustenance. The depletion of the natural resources made shortage in raw material for handcraft production. Women have to walk long distances to get some of the raw material.

### 5.3.3 Courses of housekeeping

#### 5.3.1 Kinds of housekeeping courses

**Table (5.10) Courses of housekeeping**

Courses	Yes		No		Total	
	freq	%	Freq	%	freq	%
Food processing	74	61.7	46	38.3	120	100
Textiles and weave	28	23.3	92	76.7	120	100
Other	9	7.5	111	92.5	120	100

About 69.2% of the women participated in housekeeping courses. According to Table (5.10) 61.7% of the women participated in food processing courses, 23.3%, in textile and weave courses and part of them work as tailor, while 7.5% of them participated in other housekeeping courses like First Aid. Most women have great desire to these kinds of courses.

#### 5.3.2 Benefits of housekeeping courses

**Table (5.11) Benefits of housekeeping courses**

Benefits	Yes		No		Total	
	Freq	%	Freq	%	freq	%
Increase income	34	28.3	86	71.7	120	100
Home satisfaction	67	55.8	53	44.2	120	100
Save time	19	15.8	101	84.2	120	100
Kind of work	16	13.3	104	86.7	120	100
Other	1	.8	119	99.2	120	100

$\chi^2 = 66.85^{***}$  ( $p < 0.0001$ )

From Table (5.11), it is clear that entire interviewed sample benefited from participation in the housekeeping courses. As a result of participation in housekeeping courses 55.8% of women became able to satisfy their families with some basic needs like preparation of some kinds of food, the income of 28.3% of them increased

through selling their products, while 15.8% benefited by save time and 13.3% of them mentioned that courses provided them with addition work. According to above table there were significant difference at ( $p < 0.0001$ ) between the respondents according to their benefits received from housekeeping courses.

## 5.4. Forestry Extension Activities in the study area

### 5.4.1. Kinds of forestry extension activities

**Table (5.12) Kinds of Forestry extension activities**

Extension activities	Yes		NO		Total	
	Freq	%	freq	%	Freq	%
Use gas	22	18.3	98	81.7	120	100
Nurseries	103	85.8	17	14.2	120	100
Shelterbelts	63	52.5	57	47.5	120	100
Improve stoves	44	36.7	76	63.3	120	100
Community forests	39	32.5	81	67.5	120	100

$\chi^2 = 26.01^{***}$  ( $p < 0.0001$ )

The result in Table (5.12) shows a highly significant difference at ( $p < 0.0001$ ) between the respondents according to participation in the forest extension activities. Most of the interviewed sample participated in the forest extension courses. According to above table (85.8%) of the interviewed women participated in the all activities of seedling production in the nurseries, 52.5% participated in the cultivation activities like establishment of shelterbelts and 39% participated in the communal forests, also 36.7% of women learned improve stoves processing. The women recommended that their need several extension programs like (use alternatives energy, rehabilitation for the nurseries, financial and technical support, establishing the shelterbelts and communal forest, training national assistants) and also their need to different kinds of trees (horticulture trees like (Guava (*Psidium guajava*), Limon (*Citrus aurantifolia*),

Gishta (*Annona senegalensis*)), forest trees like Neem (*Azadirachta indica*), Arak (*Salvadora persica*), Barazelia (*Terminalia catapa*).

Improving the efficiency of wood energy conversion through the introduction of household fire management strategies (which might include the use of improved cooking stoves) may allow the household to maintain a constant level of expenditure on fuels (although the price of fuels may be rising) and to lower its consumption of wood fuels, without changing the structure of its end-use energy demand (UNDP/World Bank, 1988).

In the Transitional Areas and Eastern Sudan, FAO has been involved in the implementation of environment-related activities such as the production, distribution and planting of tree seedlings, production and distribution of fuel-efficient stoves, construction/rehabilitation of water points and pastures along migratory routes, and fencing of rehabilitated rangeland to restore and protect the degraded environment. Interventions by FAO and other Food Security and Livelihoods (FSL) actors have been significant but have not met the enormous needs, which have been compounded by desertification, drought and the unsustainable use of natural resources, especially forest products, in areas surrounding IDP camps, trading centers and towns. Concerted efforts are needed to sensitize communities and intervene in ways that will promote the sustainable use of natural resources and the protection and restoration of the environment (FAO, 2010).

From the observation to the views of the study area the women adoption and interaction with different extension programs, and the training programs is very important to improve women skills, increase environmental awareness of them and learning women how to adopt with innovation.

Many governments supply local people with tree seedlings as an attempt to encourage forestry at village level. Farmers' nurseries are an important contributor to them as individuals and to their local communities. They provide significant employment opportunities in their respective regions. The direct beneficiaries of tree nursery projects are the owners/operators of the tree nurseries, who live in these communities

and generate household income through the sale of seedlings. The indirect beneficiaries are the families who purchase and plant the trees to reforest their land and help them to meet their needs for firewood, wood for construction, and fruit for home consumption and resale. Raising nurseries by farmers is therefore seen as a way of encouraging and developing self-reliance among farmers (Glover, 2005).

The involvement of women in forestry activities dates back to the late seventies and early eighties. They played an important role in rural areas where women do most of the agricultural practices. They worked in the forest nurseries, village nurseries, extension campaigns, training of trainers and formation of community based organizations. Progress is apparent from the increase in the numbers of women involved in forestry practices. Recruitment of women graduates for work in forestry started in 1981. They worked in different fields of work at headquarters and states level. Women foresters participated in forestry activities of extension, training, inventory, management, planning, afforestation, utilization and energy. They largely contributed to raising the level of awareness and forest protection. From the amount of the FNC workforce in the headquarter 140 of whom 40% are women (FNC, 2003).

#### 5.4.2 Benefits of application the extension programs

**Table (5.13) Benefits of application the extension programs**

Benefits	Yes		No		Total	
	freq	%	Freq	%	freq	%
Increase income	48	40.0	72	60.0	120	100
Environmental benefits	76	63.3	44	36.7	120	100
No benefits	24	20.0	96	80.0	120	100

$\chi^2 = 18.55^{***}$  (p<0.0001)

According to Table (5.13) there were a highly significant deference at (p<0.0001) between the respondents according to benefits from application the forest extension programs. 80% of the women mentioned that they benefited of application the forest extension programs. From above table about 63.3% of respondents contributed in



improving the environment by planting trees in their houses and by using improved stoves and gas, this reflected the women awareness in the study area. 40% of women mentioned that they income increased after participation in these programs. Approximately the most of the respondents in the study area participated in the extension programs which have clear impact on development in the study area.

Approximately 3 billion people worldwide rely primarily on wood for cooking , residential heating and hot water. In many places, particularly in Africa, it is women and girls who are the main collectors of fuel wood (FAO, 2014).

Conventional centrally-led forestry was based on the idea that forestry as a long term and large scale activity could best be implemented by a professional forest service where forestry provides raw material for industries and thereby contributes to economic growth and rural development. Participatory forest management, on the other hand, is based on the hypothesis that if those whose daily lives are affected by the operation of a forest management system are involved in the decisions controlling the system, efforts can be made to protect the health of ecosystems and meet economic needs at the same time. At the same time, since ecological, social and economic conditions vary from place to place, there must be a wide range of participatory approaches to sustainable forest management (Glover, 2005).

### 5.4.3 Sources of technical and financial support

**Table (5.14) Sources of technical and financial support**

Source	Yes		No		total	
	Freq	%	freq	%	Freq	%
FNC	67	55.8	53	44.2	120	100
NGOS	47	39.2	73	60.8	120	100
Foreign organize	67	55.8	53	44.2	120	100
Zakat	3	2.5	117	97.5	120	100
Ministry of agri	46	38.3	74	61.7	120	100

$\chi^2 = 25.85^{***}$  (p<0.0001)

The result in Table (15.14) shows high significant differences at (p<0.0001) between the respondents according to sources of technical and financial support. 95.8% of

women mentioned that received the technical and financial support from different sources, above table showed that 55.8% of them received support from FNC and the same percentage from Foreign organizations, while 39.2% of the women mentioned that received support from the national Non-Governmental Organizations like Zenab organization, while 38.3% of them received support from Ministry of Agricultural in Gedaref and only 2.5% from Zakat.

FNC has and still provides environmental support projects in both refugee and host communities.

Sudan is one of the first countries in Africa and the Near East, which had an organized forest administration. The wood and forest department established in 1901, now Forest National Corporation (FNC), shoulders the responsibility of forest management in the country. Until the mid-1980s forestry programs concentrated on afforestation, reforestation and reservation of existing forest resources. As well, the forest department used to organize some awareness campaigns from time to time through its information and public relation section (Sulieman, 1996).

The role of national and international NGOs in reaching the rural population in Africa is being increasingly documented. Among their other roles, NGOs often facilitate the exchange of information, train leaders in people's organizations, and promote cooperation among governments and donor agencies on policy issues. The importance of NGOs to rural women varies from country to country, as does their focus on rural issues. In the Sudan, the number of national NGOs working in the area of agriculture has increased to 92, as the number of regional and international NGOs has decreased. These NGOs are implementing 23 projects in the area of food production and processing and 21 projects targeting women in the area of livestock and dairy (FAO, 1995).

#### 5.4.4. Women participation in stages of forest extension programs

**Table (5.15) Women Participation in stages of forest extension programs**

stages	Yes		No		total	
	Freq	%	freq	%	Freq	%
Planning	12	10	108	90	120	100
Implementation	114	95	6	5	120	100
Evaluation	2	1.7	118	98.3	120	100

$\chi^2 = 140.68^{***}$  (p<0.0001)

The result in Table (5.15) shows high significant difference at (p<0.0001) between women participation in stages of forest extension programs, most of the respondents about 95% participated in the implementation stage, but a few of them about 10% participated in the planning stage, while 1.7% only participated in the evaluation stage. This determine the need to involve the women in planning and evaluation stages because the women know what kind of programs are suitable and useful with them, and also reflects the importance of direct local participation in preparation and implementation of forestry extension programs.

The lessons derived above provide an excellent starting point for planners and policymakers begin the respond to gender differences in the use, management, conservation of resources, and the integration of women into the design and implementation of conservation and development studies. Multiplying the number of case studies involving women in conservation and development would go a long way both towards verifying lessons learned and extending them (Mehra, 1993).

#### 5.4.5. Acceptance and diffusion to extension programs

**Table (5.16) Acceptance and diffusion to extension programs**

Acceptance and diffusion	Yes		No		Total	
	Freq	%	freq	%	Freq	%
Acceptance	106	88.3	14	11.7	120	100
Diffusion	85	70.8	35	29.2	120	100

From Table (5.16), it is clear the high percentage (88.3%) of the respondents mentioned that benefited from the forest extension programs. About 70.8% of women spread the knowledge received from extension programs among women in their villages.

The diffusion process is the spread of a new idea from its source of invention or creation to its ultimate users or adopters. The essence of the diffusion process is the human interaction in which one person communicates a new idea to another person. Thus, at its most elemental level of conceptualization, the diffusion process consists of (1) a new idea, (2) individual *A* who knows about the innovation, (3) individual *B* who does not yet know about the innovation. The social relationship of *A* and *B* have a great deal to say about the condition under which *A* will tell *B* about the innovation, and the results of this telling (Rogers, 1962).

Some of the women mentioned they could not spread the knowledge that was learned, according to several factors: they were not involved in the program, also they are other reasons include (tribe tradition, undesirable and no time.

### 5.4.6 Women Participation in the Communal Forests

**Table (5.17) Women Participation in the Communal Forests**

stage of participate	Yes		No		Total	
	Freq	%	freq	%	Freq	%
Seedling production	0	0	120	100	120	100
Planting	33	27.5	87	72.5	120	100
Tending operations	29	24.2	91	75.8	120	100
Awareness	17	14.2	103	85.8	120	100

$\chi^2 = 42.21^{***}$  ( $p < 0.0001$ )

According to Table (5.17) there were high significant differences at ( $p < 0.0001$ ) between participation of women in the communal forest. Some of the women participated in rehabilitation and establishment of communal forests. 27.5% of them

participated in planting operation by seeds, while 24.2% of women participated in tending operations (pruning, thinning, wedding, etc....) and 14.2% of them spread knowledge about the benefits of communal forest among their societies.

Community forestry has received increasing attention throughout the developing world as a major tool in halting environmental deterioration and satisfying forestry related basic needs of rural population (World Bank, 1989).

### 5.4.7. The Benefits of Communal Forests

**Table (5.18). The Benefits of Communal Forests**

Benefits	Yes		No		Total	
	Freq	%	freq	%	Freq	%
Economic benefits	69	57.5	51	42.5	120	100
Environmental benefits	67	55.8	53	44.2	120	100
Social benefits	64	53.3	56	46.7	120	100

$\chi^2 = 0.094$  (p<0.05)

The results in Table (5.18) showed that there is no significant differences between the answers of respondents about benefits received from communal forests, 57.5% of the respondents received economic benefits from establishment of communal forest, while 55.8% of women mentioned that they benefited environmentally and 53.3% of them their benefited socially from communal forests.

The role of forestry in the conservation and development of the environment is more important than the direct productive role. Forestry protects soil from erosion and promotes soil conservation and fertility and hence increases crops productivity (Harrison, 1987).

The thrust of social forestry differs from conventional forestry schemes in three respects. First, it covers the production and use of forest products in a sector of the economy that is mainly non-monetized; second, it involves the direct participation of beneficiaries; and, third, it implies different attitudes and skills on the part of foresters

who have to shed their role as protectors of forest against the people and work with people for growing trees (Noronha & spears, 1985).

According to Wiersum (1991) the advantage and limitation of the communal forestry strategy are as follows:

Advantages: utilization of degraded common/public lands, economies of scale in establishment and maintenance, pilot function in demonstrating suitability of tree growing by private persons, equal distribution of profits, democratic participation, landless may be involved, and contribution to development of local institution to foster communal self-reliance.

Limitations: conflicting local interests and unequal power base participants, gradual privatization of common lands, profits may be used for general development schemes rather than special target groups, requires the presence of suitable policies and institutions, and general lack of enthusiasm for communal enterprises.

#### 5.4.8 Benefits of shelterbelts

**Table (5.19) Benefits of shelterbelts**

Benefits	Yes		No		Total	
	Freq	%	freq	%	freq	%
Crops protection	86	71.7	34	28.3	120	100
Increase soil fertilize	82	68.3	38	31.7	120	100
Soil protection	86	71.7	34	28.3	120	100
Gum production	92	76.7	28	23.3	120	100
Increase rainfall	69	57.5	51	42.5	120	100

According to Table (5.19) most of respondents questioned that the shelterbelts provide some benefits like gum production (76.7%), increase the crops production (71.7%), protecting the soil from erosion (71.7%), increase the rainfall and increase the soil fertility (57.5%, 68.3%) respectively.

Windbreaks are planted mainly for protection against the damaging effects of winds and wind-blown sands. However they have many benefits such as: preventing soil erosion, improving the microclimate for growing crops, vegetables and fruits and sheltering people and livestock. They can also serve other function such as fencing and boundary demarcation. Where wind is a major cause of soil erosion and moisture loss in dry areas, windbreaks can increase and sustain crop productivity. Windbreaks may also supply wood and non-wood products (Rocheleau et al, 1988). The establishment of shelterbelts not only as a form of environmental protection and a means of raising crop yields, but also as a secondary source of income from the sale of poles and energy wood forestry and trees are an integral part of traditional rainfed farming systems in the Sudan. The fallow system uses *Acacia senegal* and other tree species as a key element of an agricultural rotation system (Glover, 2005).

### 5.4.9 Challenges faced the establishment of shelterbelts

**Table (5.20) Challenges faced the establish the shelterbelts**

Challenges	Yes		no		Total	
	Freq	%	Freq	%	freq	%
Low rainfall	23	19.2	97	80.8	120	100
No seeds	19	15.8	101	84.2	120	100
No protection from animals	22	18.3	98	81.7	120	100
focusing on Crops planting	6	5.0	114	95	120	100
Land tenure	9	7.5	111	92.5	120	100

$\chi^2 = 19.56^{***}$  (p<0.0001)

According to Table (5.19) there is high significant difference at (p<0.0001) between the respondents according to challenges faced establishing shelterbelts, about 19.2% of the respondents stated that the low rainfall is one of the main challenges faced establishing shelterbelts, also 18.3% of them said that farms are not protected from animals because the farms near the villages, while 15.8% of women stated that they could not get the needed seeds, while 7.5% mentioned that land tenure is a great

problem in their villages and only 5% stated that they concentrated on crops planting rather than shelterbelts establishment.

A key institutional factor that undermines women's economic productivity and ability to use resources sustainably is lack of access to land. Throughout the developing world, few women own or have title to land although, in many places, they have the right to use land (Mehra, 1993).

## 5.5 Benefits of forests

**Table (5.21) Benefits of forests**

Benefits	Yes		No		Total	
	Freq	%	freq	%	Freq	%
Recreation/shade	118	98.3	2	1.7	120	100
Increase crops production	80	66.7	40	33.3	120	100
Protection	107	89.2	13	10.8	120	100
Provide some needs	114	95	6	5	120	100
Increase income	110	91.7	10	8.3	120	100

According to Table (5.21) most of women mentioned that they benefited from forests like (recreation/shade, Increase crops production, Protection, Provide some need and increase income).

Many of the benefits may be difficult to measure and value. The ready availability of fuel wood and materials for house construction may lead in some instances to improved health and to increased time for cultivation of food crops. This may be reflected in higher agricultural output rather than in returns of forest products. Similarly, the establishment of fodder or shade trees for livestock may lead to higher values of animal products before any measurable benefit from forest products arises. If these situations, however, help people to understand the inter-relation of forestry and agriculture, this may lead to a more favorable overall view of forestry extension activities in future Sim, D. & Hilmi, H.A. (1987).



Women use trees and tree products for a wide range of items such as fuelwood, fodder, fibers for clothing and mats, roofing materials, basketry, and medicines both to earn income and to meet household needs (Mehra, 1993).

Few of the women said that there are many hazards come from trees like hosting birds and insects which causes diseases for people, also a few of them said that the trees shading the crops and decrease the crops production.

In Sudan, the maximum benefit from shelterbelts cannot be obtained unless they are properly maintained and managed. Draws attention to the disadvantages of shelterbelts- reduction of the cropping land to the extent of 1% to 8% of the area, the shading of part of the crop, competition for soil moisture and overheating in the vicinity of the belts in summer, all of which can lead to reduced crop yields. However, certain that the advantages of shelter far outweigh these drawbacks and, with proper management, the deleterious effects can be kept to a minimum, was concerned with a planned shelterbelt system over a large area (Bashir, 2001).

## 5.6 Reasons of Forest Degradation

**Table (5.22) Reasons of forests degradation**

Reasons	Yes		No		Total	
	freq	%	Freq	%	freq	%
Illegal cutting	117	97.5	3	2.5	120	100
Over grazing	89	74.2	31	25.8	120	100
Mechanized farm	38	31.7	82	68.3	120	100
Land ownership	29	24.2	91	75.8	120	100
Climate change	30	25	90	75	120	100

$\chi^2 = 35.03^{***}$  ( $p < 0.0001$ )

98.3% of the respondents mentioned that there is degradation in the forests of the area. Table (5.22) showed high significant difference ( $p < 0.0001$ ) among respondents concerning the causes of degradation. According to the table the main reasons of forest degradation was illegal cutting and over grazing (97.5%, 74.2%) respectively,

31.7% of the women said one of reasons to the forest degradation was mechanized farm, while 24.2% of them said that the main reason was the land ownership and about 25% said the reason was the climate change.

Deforestation is increasing due to the continuous clearing of land for crops and cutting of wood for energy, resulting from the introduction of large scale farming and the displacement of farmers.

Deforestation leads women to collect firewood from increasingly further distances from the homestead (FAO, 2011).

Illegal cutting for fuel wood and excessive clearance for agriculture by mechanized scheme farmers have decimated the forest resources in Gedaref State. In particular, emphasizes that “commercial charcoal production contributed to the wide- spread deforestation in Gedaref State”, about 98% of the charcoal production in Sudan in 1979 – 1980 was from the central and eastern region and about 72% of the total production was from Gedaref State. Wood clearance for mechanized farming and charcoal production has also adversely affected the production of the cash crop gum arabic. Extensive removal of gum trees, *A. senegal* and *A. seyal*, has decreased the annual gum production. The production in Sudan declined from 5,225 tons in 1975 – 1976 to only 585 tons in 1980/81, showing a decrease of about 89% in five years (Glover, 2005).

Within the last six decades, Gedaref State in eastern Sudan lost its status as one of the major sources of food production in the country, due to large-scale degradation of its rich soil as well as other natural resources, mainly through unsuccessful land use policies and practices (Glover, 2005).

## 5.7 Reasons for not using energy alternatives

**Table (5.23) Reasons for not using energy alternatives**

Reasons	Yes		No		Total	
	Freq	%	Freq	%	freq	%
Shortage of gas	7	5.8	113	94.2	120	100
High cost	6	5.0	114	95	120	100
Transport	7	5.8	113	94.2	120	100
No alternatives	22	18.3	98	81.7	120	100

$$\chi^2 = 40.13^{***} \quad (p < 0.0001)$$

The reasons of unused the energy alternatives were presented in Table (5.23). The results show that 18.3% of the respondents mentioned that alternatives unavailable to get it, while 5.8% of them said that is a shortage of gas and also 5.8% of the women mentioned that the transport is the main constraint specifically in the rainy reason and 5% of them indicate that the high cost of gas is reason faced the women. The result in the above table shows that high significant difference at ( $p < 0.0001$ ) between the answers of the respondents, this indicates to the main reason of unused of energy alternatives to solve the fuel problem was lack of these alternatives.

Livelihoods and natural resource management in East Sudan are inextricably linked. Sustainable natural resource interventions would impact favorably on the livelihood situation in the region including, *inter alia*, the use of liquid petroleum gas (LPG) to replace firewood as fuel, the provision of alternative woodless methods of brick construction, the distribution of energy saving stoves, the sharing of water harvesting technologies, the distribution of solar water pumps, reforestation measures and the proliferation of drip or spray-based methods of irrigation. The type of intervention chosen in any given instance will be tailored to fit the particular needs of the target population of both refugees and hosting populations. Considered more broadly, the end goal is to preserve the ability of the natural environment to support livelihoods over the course of many generations (UNDP / UNHCR, 2012).

## CHAPTER SIX

### Conclusion and Recommendation

#### Conclusion

-In the study area woman working in agricultural sector beside their domestic work. From the observation the women interesting in agricultural work, also most of them married and they have large family size, that indicator to increase the responsibility of the woman in her family to provide the basic needs life which she do it by work.

-The educational level among the rural women was low; also the percentage of learning in Khalwa was high. In khalwa women learning just Quran with little learn reading and writing that lead to decrease the governmental jobs among women.

-Women depend on agriculture for their income, most of them their income was less than 10,000/pound/year, and women mentioned that income not sufficient to face their life needs.

-Most of women members in the committees and these committees in their villages working in several domains like (social, agricultural, environmental, etc.....).The high membership of the women and participation in the committees it may encourage the group work and working with women in development and forestry extension programs.

-Some of women in the study area working in handcraft and housekeeping activities and some of them selling the products to increase their income and they benefited of these activities.

-Most of the women in the study area participated in the forest extension programs and they benefited of the application these programs, directly and indirectly, directly the women benefited money, and benefited from use improve stoves by decrease the consumption of fuel wood, indirectly the women benefited environmentally by

growing trees in their houses, this indicator to high awareness of the women in the study area.

-Women access to technical and financial support from international Non-Governmental Organizations, Forest National Corporation (FNC), the Ministry of Agricultural in Gedaref and national Non-Governmental Organizations like Zenab organization.

-Most of women mentioned that they benefited of the forests (recreation/shade, Increase crops production, Protection, Provide some need, Increase income, etc....), but the forest it was degraded as the result of some reasons like over cutting and over grazing, mechanized farm, deforestation and climate change that indicate the shortage of forest products in the study area.

## **Recommendation**

- The study area and the rural women needs more support in the field of social services (education, health, water, income, etc.....).
- Intensification the extension programs at the field of forest (use energy alternatives, seedlings product, etc.....).
- Revising and evaluation the implemented forest programs efficiency.
- Determine the most appropriate activities that can easily adopted by women.
- Increase the researches that relate with rural women and forests in the study area.

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**In the name of Allah the Merciful**  
**Sudan University of Science and Technology**  
**College of Graduate Studies**  
**Questionnaire**

**Participation of Rural Woman in Forestry Extension Activities**

The name : .....

Local: .....

the village : .....

Tribe: .....

Living :

Stable  nomad  refugees

Occupation :

Housewife  farmer  employee  trader  other

Social status :

single  married  divorced  widow

Education:

illiterate  Khalwa  primary  intermediate  secondary

University

number of family members:

less than two  2-4  4-6  6-8  8- 10  More than 10

The annual income :

Source	Agriculture	trade	salary	Free trade					
Income									

Are you a member of any collaborative committees in the village?

Yes  No

If yes, please specify membership type:

Head  Member in implemental Office  Member

Are there environmental committees in your area?

Yes  No

Are you a member?

Yes  No

If no, why?

I did not invite to participate  I did not disire

I do not have time  non-education

Others

Do you do handcrafts at home?

Yes  No

If yes, what is it?

Biscuits, brooms, stalks, dishes, mussels  make mats (brish) and hababa  make sareef (fenc)

Is raw material available to these industries?

Yes  No

If the answer is no where do you get the raw materials?

Town and villages markets  forests near the villages

Use of alternatives (plastic.....)  others

Have you participated in housekeeping courses?

Yes  No

If yes, what is it?

Keeping foods and food industry working

Work of textiles and knitting  Others

Are these courses useful for you ?

Yes  No

If yes, what is the benefit?

Increasing income  is enough of some things

Use of time  Provide other job opportunities

others

Have you participated in courses in forestry extension programs?

Yes  No

If yes in any areas?

Use of gas  to establish nurseries and produce seedlings

establishment of shelterbelts  using energy alternatives

Establishment of communal forests

**Do you implement these programs?**

Yes  No

**If yes, what is the benefit you get?**

Money  Environmental benefit  No benefit

**If no, why did not you keep these programs?**

Lack of potentials  I do not have time

I did not understand  others

**Have you received any financial and technical support to apply these programs?**

Yes  No

**If yes, what is the supporting body?**

Forest national Corporation  Local organizations

Foreign Organizations  Zakat

Others

**Have you participated in the development of outreach programs in your area?**

Yes  No

**If yes, at what stage did you participate?**

Planning  Implementation  Evaluation

**In your opinion, are the programs implemented in your area useful?**

Yes  No

**If no, what are your suggestions for important programs?**

- 1

-2

- 3

-4

**Did you spread experiences and participate in the extension campaigns that trained?**

Yes  No

**If no, why?**

Non-involvement of existing authorities  the customs and traditions of the tribe

Father disagree  Lack of desire  others

**In your assessment, is there a response from the target audience?**

Yes  No  to some extent

**If no, why?**

Lack of real knowledge of the importance of forests  Lack of sufficient work and support aids

Lack of possibilities for carrying out the work (water, seedlings, seeds, ...)

Others

**In your opinion, what are the benefits of trees (village, farm, home)?**

**Provide shade and a place of entertainment that increases crop production**

**Protection from dust and wind Provide**  **some of the necessities of life (building materials, fuelwood, .....)**

**Provide additional income (fruits, treatment, food, .....)**

**In your opinion, is there any harm to the presence of trees in your home, village, farm?**

**Bring the devil**  **to bring the birds on the farms**

**Home to some pests and insects that cause harm to humans and crops**

**Reduce other agricultural areas**  **Others**

**Which tree types do you prefer to grow in your home?**

- 1

- 2

- 3

- 4

- 5

- 6

**Is there a shortage of forest products (firewood, building materials, coal, etc.) in your area?**

**Yes**

**No**

**If yes, what are the reasons?**

**Illegal cutting**  **overgrazing**

**Automatic farming**  **Land ownership problems**

**Climate change, increased drought, and lack of rainfall**

**Others**

**Do you think energy alternatives helped solve the fuel problem?**

**Yes**

**No**

**If no, why?**

**Difficulty in obtaining gas**  **High gas cost**

**The difficulty of the means of movement especially in the fall period**  **The lack of alternatives to become within reach**  **Others**

**Are there any participation in establishing the communal forests?**

**Yes**

**No**

**If yes, what is your participate?**

**Production of seedlings**  **Agriculture**  **Participation in agricultural operations (cleaning, shilling, ...)**

**Protection and awareness of the importance of forests**

**What is the benefits of the communal forests?**

**Economic benefits (firewood, provision of building columns, source of income for the village, .....)**

**Environmental benefits (dust and wind protection, habitat for birds, increase rainfall, reduce temperatures, .....)**

**Social benefits (park for the village, providing shade for human and animal, reinforcing the spirit of teamwork)**

**What are the benefits of planting a tree belt around a farm?**

**Crop protection and increased production**  **Soil fertilization and increased**   
**moisture**

**Protect the soil from erosion and creep**  **production of gum arabic**

**Increased rainfall**

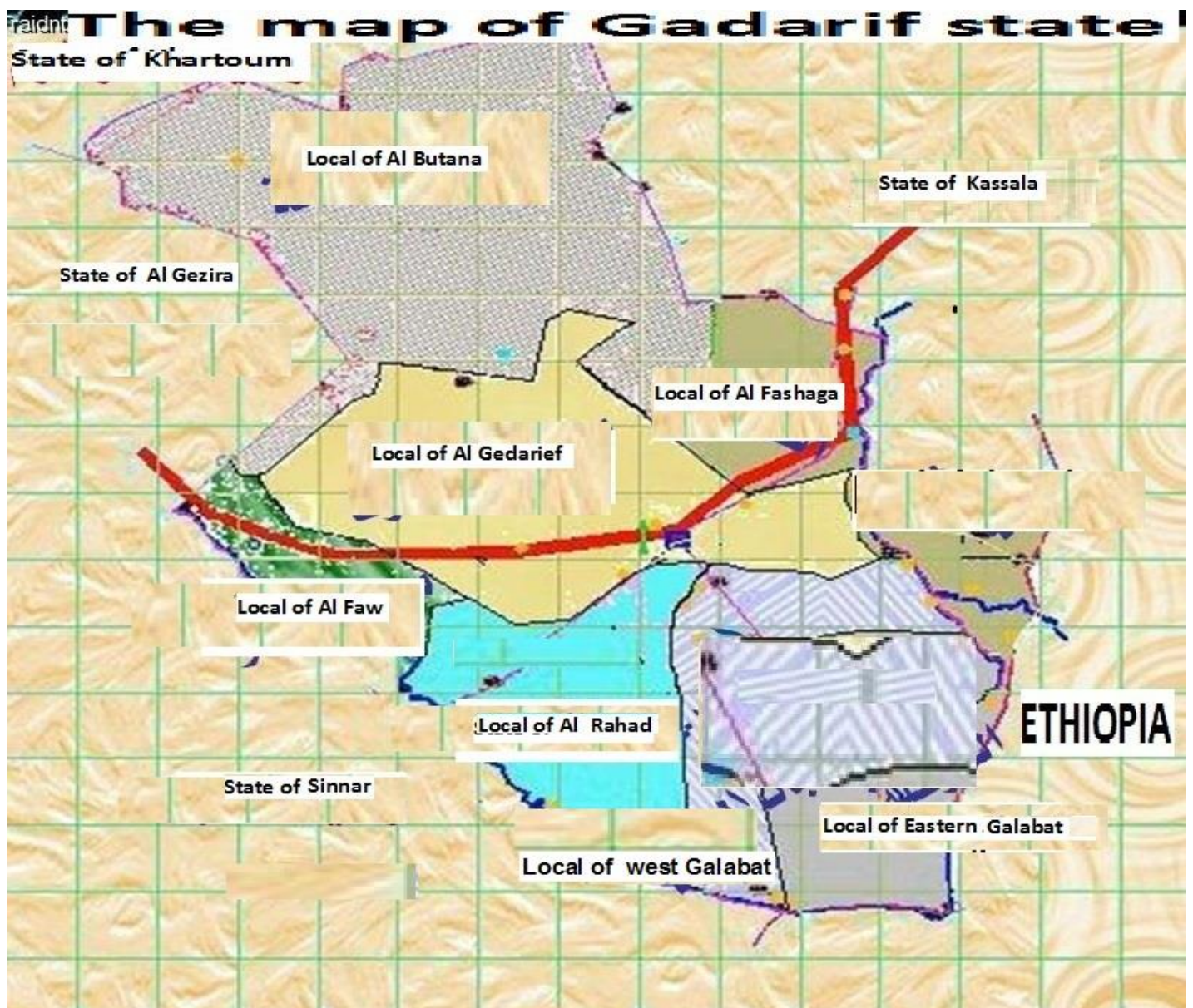
**What are the obstacles to planting tree belts?**

**Lack of rain**  **Lack of seeds**  **Lack of protection from animals**

**Neglect and focus on crop cultivation**  **land ownership**

**What are your suggestions for developing outreach work in your area?**

**(Map2) Clarification of the geographical location and states in the map of Al Gedarif**



**Ministry of Agriculture – Gedaref , Center Information - 2012**

**(Map 1) Clarification of the geographical location of Al Gedarif state in the map of Sudan**



**Ministry of Agriculture – Gedaref , Center Information - 2012**