

## **DEDICATION**

To: my Parents, who encouraged me to continue my education during their  
life.

To my wife, who always encourages and sacrifices her precious time for  
supporting and assisting me. Also I dedicate this work to my children and  
brothers.

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With all my heart I thank my relatives and close friends who accompanied me in my trips.

## **Abstract**

### **THE IMPACT OF REFUGEES ON FOREST- TREE COVER At GEDAREF STATE**

Gedaref State is an important area for Ethiopian and Eritrean refugees, because of proximity and availability of security and natural resources. The influx of refugees was high during the previous forty years. The number of refugees at Gedaref State reached approximately 360000 persons. The study area was consisted of three camps: Um Rakuba in El Galabat province, Um Gargur in Seitait province and El Tinedba camp at El Rahad province. The study areas lie between latitudes  $12^{\circ} 30' - 16^{\circ} 30' N$  and longitudes  $33^{\circ} 35' - 36^{\circ} 35' E$ .

The objectives of the study were to assess the impact of refugees on forest-tree cover at the settlement areas and to investigate the impact on the other natural resources, so as to formulate recommendations that will help to recover the deforested areas.

The field visits were carried out in 2003, 2004 and 2005. Different methods had been applied to identify the change of forest- tree cover, in the study areas mainly: -

-Questionnaires in order to define ways to illicit cutting of natural forests around and far away from the camps. There were questions about the factors that caused deforestation in large areas around the settlements.

- Satellite imageries covering the whole study areas for the years from 1975 to 2000 were carefully studied. The images were introduced to computer for processing, enhancing, analysis and classification. The results assist in comparisons between the changes of forest-tree cover that have taken place over the different years in forms of percentage and area in ha. The results show that the rate of changes and the degradation of forest-tree cover are very clear after the settlements of refugees in the areas.

- The point- centered quartered method (PCQ) was used to calculate the density of trees per hectare in the natural forests. At Um Rakuba site the density is 46 trees / ha, while at El Tinedba site the density is 11 trees / ha. However, at Um Gargur site the area is void of trees.
- The plantations at Um Gargur and El Tinedba were also measured and the impact of refugees was assessed and the future of the plantations was predicted. The study showed that the plantations would disappear within few years unless the factors that are threatening the forest degradation are stopped.
- Other techniques were used to evaluate the soil seed bank of tree species at the study sites; seeds of *Acacia seyal* were only found in the soil at Um Rakuba but none-at the other two sites. Soil fertility in the agricultural lands is less than in the forested areas because the rainfall and wind eroded the top soil due to the absence of any green cover in the area.

This research is showing that, there is a grading deterioration in forest- tree cover. Wildlife and non-wood forest products were not observed. The negative effect of refugees will increase more than before, because there are extra numbers of refugees resettled in Um Gargur camp from other camps. The resettlement of refugees in the study areas increases the demand for building materials, crops, grazing land as well as source of energy. The high demand of forest products encouraged the refugees to put more pressure on the existing reserved forests and plantations.

Urgent remedy measures followed by serious positive decision should be taken to recover the affected areas by planting trees and protecting them from cutting in order to stop deterioration and improve the degraded areas.

## بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

### الخلاصة

#### تأثير اللاجئین على الغطاء الشجري في ولاية القصارف

لولاية القصارف أهمية خاصة لداللاجئین من الجارتین أثيوبيا وإريتريا، حيث شهدت تدفق أعداد كبيرة من اللاجئین خلال الأربعة عقود الماضية وذلك لقربها من بلديهم ووفرة مواردها الطبيعية إضافة للاستقرار والأمن . وقد بلغ تعدادهم أكثر من 360000 لاجئ داخل وخارج المعسكرات بالولاية موضوع الدراسة التي شملت ثلاثة معسكرات . الأول معسكر أم راکوبة بمعتمدية القلابات والثاني معسكر أم قرقور بمعتمدية سيتيت والثالث معسكر الطنيدبة الواقعة في معتمدية الرهد.

تقع منطقة الدراسة بمعسكراتها الثلاث بين خطي عرض  $30^{\circ} 12'$  -  $30^{\circ} 16'$

شمالاً وخطي طول  $35^{\circ} 33'$  -  $35^{\circ} 36'$  شرقاً .

الهدف من الدراسة هو تقييم أثر اللاجئین على الغطاء الشجري بمناطق الدراسة المختارة وانعكاسات ذلك الأثر على بعض الموارد الطبيعية والوصول إلى مقترحات تساهم في إعادة الغطاء الشجري الذي أزيل.

لجمع البيانات تم القيام بثلاث زيارات ميدانية لمناطق الدراسة في الأعوام 2003،

2004، 2005 على التوالي. تم الوصول إلى رصد التغيرات على الغطاء الشجري باستخدام

وسائل وطرق مختلفة . ومن هذه الطرق: الاستبيان ، وبه توصلت الدراسة إلى أن هنالك

قطعا جائراً للغطاء الشجري الطبيعي حول المعسكرات، ثم انتقل القطع وشمل أيضا

المناطق البعيدة من المعسكرات مما أدى إلى فقدان مساحات واسعة من الغطاء الشجري جراء ذلك النشاط غير المصرح به وغير المرشد بقصد بناء القطاطي ، إنتاج الفحم النباتي، وجمع حطب الوقود، النظافة للزراعة والرعي غير المرشد.

و من الوسائل المستخدمة ايضا صور الأقمار الصناعية التي غطت موقع الدراسة لسنوات متفاوتة من عام 1975 وحتى 2000م وذلك بإدخالها الى الكمبيوتر في برامج مختلفة ومن ثم معالجتها وتحليلها وتصنيفها. فقد تم عن طريقها الحصول على نتائج ساعدت في المقارنة بين للغطاء الشجري فى السنوات المختلفة ومعرفة التأثير في شكل نسب مئوية ومساحة للغطاء الشجري. وكان التدهور في الغطاء الشجري واضحاً ومتدرجاً خلال تلك السنوات. تم أيضاً قياس الغطاء الشجري الطبيعي والمزروع بحالته الراهنة مستخدمين طريقة قياس المسافة لأقرب شجرة من النقطة العشوائية وتوصلنا إلى نتائج واضحة وهي أن كثافة الغطاء الشجري الطبيعي حالياً 46 شجرة في الهكتار الواحد لمعسكر أم راقوبة و 11 شجرة لمعسكرالطنيدبة و أثبتت الدراسة عدم وجود أي شجر في أم قرقور ما عدا الغابات المزروعة بواسطة المنظمات.

ولمعرفة مدى تأثير اللاجئين على الغابات المزروعة فى مدة إقامتهم تلك المنطقة , تم قياس الغابات المزروعة وتوصلت الدراسة إلى أنها في تدهور مستمر وزوال بعد سنين قليلة . و استخدمت كذلك تقنيات لمعرفة مخزون التربة من بذور الأشجار وتوصلت الدراسة إلى أن منطقة دوكة هي الوحيدة التي وجد بها مخزون بذور من أشجار الطلح فقط وباقي المناطق وجد بها نباتات فقط مثل القو وحراب هوسا والرامتوك وغيرها. ولمعرفة خصوبة التربة الزراعية تم تحليل عينات مأخوذة منها واخرى من أراضى- الغابات, وتمت

المقارنة بينهما, وكانت الأرض الزراعية أقل خصوبة من قرينتها وذلك بسبب التعرية لانعدام الغطاء الشجري.

توصلت هذه الدراسة إلى أن هنالك تدهورا كبيرا حدث بالتدرج في الغطاء الشجري تؤثر اسبابه على ما تبقى من غابات طبيعية ومزروعة سواء كانت محجوزة أو غير- محجوزة, بالمنطقة. كما لوحظ انعدام المنتجات غير الخشبية واختفاء الحياة البرية. ومن خلال الدراسة يمكن القول إن اختفاء الغطاء الشجري سوف يستمر بصورة أسرع مما كان عليه سابقاً لتزايد عدد اللاجئين وبالذات في معسكر أم قرقور, حيث تم تجميعهم من بعض المعسكرات التي تم قفلها . وبزيادة تعدادهم يزداد الطلب على حطب الوقود والمباني وزيادة المساحات الزراعية وبالتالي يزداد التعدي على الغابات المحجوزة والمزروعة وتزول من الوجود في غضون سنين قلائل إذا لم تقم الجهات المعنية بإتخاذ تدابير مستعجلة في زراعة المساحات التي اختفى غطاؤها الشجري وحمايتها لتساهم في تحسين بيئة المنطقة المتدهورة.





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## **Appendices**

(1): Refugees individual questionnaire.

(2): Data sheet for point- centered- quarter samples.

## Abbreviations

**ADES:** Agricultural Development Eastern Sudan Project  
**CARE:** Corporation of America Relief Everywhere Organization.  
**CBS:** Central Bureau of Statistic.  
**COR:** Commissioner of Refugees.  
**C:** Centigrade.  
**CU:** Cubic  
**ERDAS:** Earth Resources Digital Analysis System.  
**FAO:** Food and Agriculture Organization of United nations.  
**FNC:** Forest National Corporation.  
**GIS:** Geographical Information System.  
**GPS:** Global Positioning System.  
**Ha:** Hectare  
**Kg:** Kilogram  
**Km:** Kilometer  
**mm** Millimeter  
**m:** Meter  
**N:** North  
**NGO:** Non-Governmental Organization  
**OAU:** The Organization of African Unity  
**PCQ:** Point -Centered Quarter  
**R.H:** Relative Humidity  
**SKAP:** Suoth Kassala Agricultural Project  
**SPSS:** Statistical Package for Social System  
**Sq:** Squire  
**Temp:** Temperature.  
**TM:** Thematic Mapping  
**UN:** United Nation  
**UNDP:** United Nations Development Programme  
**UNECA:** United Nations Economic Commission for Africa.

**UNFPA:** United Nations Population Fund Agency

**UNHCR:** United Nations High Commissioner of Refugees

**US:** United States

**WFP:** World Food Programme

**WHO:** World Health Organization

## Glossary

**A refugee-** is a person who, owing to well founded fear of being persecuted for race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or owing to such fear, unwilling to avail himself of the protection of that country, or who is not having a nationality and outside the country of his former habitual residence as a result of such events, is unable or owing to such fear is unwilling to return to it (OAU, 1951) .

**A Displaced Person** - is a person who moves from his place of origin to an other region inside his country because of natural disaster, war, or any other reason (WFP, Showak, 1999).

**Anjara-** is Ethiopian bread made from sorghum dough in hot oven.

**Bildat-** are small farms not more than five feddan owned by local people

**Buda-** is a parasitic plant (*Striga hermozthica*).

**Cover-** is the proportion of the ground that has a cover of a certain species and would be shaded by its the individuals, or it is the proportion occupied by a species related to the ground surface, but in woody vegetation.

**Dura-** is a bean crop (*Sorghum bicolor*).

**Density-** is the number of individuals of a species per unit area.

**Demography-** is the scientific study of population. It draws upon several components of population including, size, composition and territorial distribution in order to understand the social consequences of population.

**Fallow period-** is a piece of land where no crops have been planted, so that the soil has a chance to rest and improve.

**Feddan-** is a unit of area measure, equal to 0.42 hectare.

**Forest-** is a continuous stand of trees at least 10 m tall with interlocking crowns.

**Frequency-** is the percentage of a sample of a given size and shape, in which a species has been found.

**Geographical Information System (GIS)** - is a computer system for storage, analysis and retrieval of information, in which all data are spatially refaced by their geographic coordinates (North, East). In addition to primary data, such as climatic and soil characteristics, a GIS can be used to calculate derived values, such as erosion hazard, forest yield class, or land suitability for specified land use types. Data are usually derived from maps and derived values can be printed out as maps

**Global Positioning System (GPS)** - is an instrument, which gives locations in latitudes, longitudes and elevation for an area, by satellite.

**Harig-** is fire burning to reduce or remove the previous grasses in order to clean the area.

**Immigration-** is the a state of a person to enter a foreign country for economic or personal reasons, other than those relating to fear of persecution based on suppression.

**Imagery-** is themes that are represented in visual art such as pictures and status.

**Land sat-** is a United States series of earth resource exploring satellites first launched in 1972. Systematic, repeated digital data on the reflectance of, or radiation from the earth's surface are acquired, and these can be interpreted in terms of land characteristics.

**Ladaia-** is three stones situated to form a triangle used to put the cooking pot on it, using firewood for energy.

**Mangad-** is a container made of iron used for supporting cooking pot, using charcoal for energy.

**Migration-** refers to relatively permanent movement of people with the purpose of changing their place of residence (Prehn, 1981). Usually as a social phenomenon, resulting from variety of factors, such as financial failure in the old country, perception of greater economic opportunities, racial and religious bigotry. Dislike for prevailing political regimes and desire re-unite ones family.

**Pixel-** one picture element of a uniform raster or grid file. Often used synonymously with cell

**Plantation-** is a piece of land, where uniform trees have been planted together.

**Plot-** is a part of the area of forest demarked for be inventory, 100mx 100m in this study.

**Plotless sampling-** is a method, which is based on the assumption that the individuals are randomly distributed, and distance measures can be applied. The two most used methods are the Nearest Neighbors method (NN) and the Point –Centered Quarter Method (PCQ).

**Programme-** a set of interactive synchronized activities or projects aimed at achieving defined objectives by means of ongoing activities.

**Satellite imagery-** including land sat and spot. Images are in specific wave band (visible infrared, etc.), which may be combined for purposes of interpretation. Images look like photographs but are not obtained by photographic methods, hence the term "data from satellite imagery can be interpreted visually or analyzed by computers in digitized form; they can also be entered directly into geographic information systems.

**Sefawa-** is a settlement camp of Ethiopian refugees, south-east of Gedaref town.

**Shrub-** is a woody stem usually branched close to the ground.

**Stand-** is an area of growing trees in forestland, either clear stand, elite stand or full stand (Bertram et al (1980).

**Quadrant-** is a square sampling frame of defined size and shape

**Reception center-** is a place where refugees receive all their food requirements; and from there the refugees are later sent to establish agriculture or wage earning settlements.

**Reforestation-** is the act of replacing the depleted plant cover by forest plantations.

**Regeneration-** the renewal of a forest tree.

**Remote sensing**- refers to the gathering of information through the use of air photographs and satellite imagery. It should be conducted in conjunction with field surveying on the ground.





**Sudan University of Science and Technology**

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**AT GEDAREF STATE (EASTERN SUDAN)**

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