Dedication

To my family, my teachers,

Friends, and to the

Rural people

Of Sudan

Acknowledgements

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List of Acronyms

BS……Bare Soil

CCRST……Canada Centre for Remote Sensing Tutorials

ETM……Enhanced Thematic Mapper

FNC……Forest National Corporation

GCPs……Ground Control Points

GIS……Geographical Information System

GPS……Global Positioning System

Ha……Hectare

HDF……High Density Forest

ISODATA.....Iterative Self-Organizing Data Analysis

LULC.....Land use and Land cover

NDVI.....Normalized Difference Vegetation Index

NIR.....Near Infrared

R.....Red

RS.....Remote sensing

SF.....Sparse Forest

TM.....Thematic Mapper

USGS.....United Sates Geological Service

UTM.....Universal Transverse Mercator

WB.....Water body

WGS.....World Geodetic System

Abstract

Forest cover change detection based on remotely sensed data has been established as indispensible tool for providing suitable and wide-ranging information to decision support system for forest management and sustainable development. In this research an attempt is made to study the change of forest cover in Abugeili forest over 24 years period (1987-2011), using multi-temporal RS data and GIS based techniques.

For this study, LANDSAT TM and ETM+ imagery of 1987, 1999, and 2011 were used and supported by field work through which

data were collected and used for image registration, classification process and discussion of the results. ERDAS Imagine, ArcGIS and Microsoft excel software have been used for image processing and data analysis. After performing unsupervised classification on these images, a total of four forest covers classes were identified and mapped. These were water body (WB), sparse forest (SF), high density forest (HDF), and bare soil (BS). The classified images have been used to produce the change detection maps and indices of change dynamics. An NDVI and vegetation change matrices were used for accuracy assessment and verification. The results of change detection analysis revealed that, the forest has remarkable change, from 1987-2011 the HDF was decreased by 34.2%, and 47.16% respectively. A significant forest covers reduction by 84.8% of HDF in year 2011 when compared with the SF in that period. The study and field investigation it has been found that, the problem of forest cover changes are directly linked with anthropogenic activities such as human pressure, new construction, as well as demand of forest products for different purposes. In order to old back the problems of forest cover change and identification of areas under risk of invasion corrective measures were suggested.

خلاصة

ملاحظة التغير في غطاء الغابات إستناداً علي بيانات الإستشعار عن بعد أصـبح أداة لا غني عنها في توفير المعلومات المناسـبة والشـاملة لـدعم نظـام إتخـاذ

القرار فيما يخص إدارة الغابات و التنمية المستدامة. هذه الدراسة عبارة عن محاولة لإستخدام تقنية الإستشعار عن بعد و نظم المعلومات الجغرافية في ملاحظة التغير في الغطاء الغابي بغابة ابوجيلي للفترة من (1987-2011). إعتمدت الدراسة علي بيانات إختبار عبارة عن صور أقمار صناعية ماخوذة بنظام لاندسات في كل من العام 1987, 1999 والعام 2011م. ودعمت الدراسة بمسح ميداني تم من خلاله جمع معلومات إستخدمت في تصحيح صور الأقمار الصناعية, إنشاء العلاقات الإرتباطية و مناقشة النتائج.

البرامج (ERDAS Imagine, ArcGIS, Microsoft Excel and Microsoft Access) إستخدمت لتحليل البيانات و معالجة الصور. بعد إجراء عملية التصنيف غير المراقب علي هذه الصور قسمت الي اربعة أقسام هي: أماكن تجمع المياه, الغابات المتفرقة, الغابات الكثيفة و الارض الجرداء. الصور المصنفة إستخدمت لإنتاج الخرائط و المعلومات الخاصة بالغطاء الغابي و ديناميكية التغير. مع ذلك أستخدم مؤشر الفرق العام في الغطاء النباتي و متطابقات التغير في الغطاء الغابي لتقييم صحة المعلومات و تحقيقها.

خلصت الدراسة الي وجود تغير كبير في الغطاء الغابي خلال الفترة من (1987-2011), حيث تقلصت مساحة الغابات الكثيفة بنسبة 34.2% و 47.16% علي التوالي. كما اوضحت الدراسة ان اعلي معدل تناقص بنسبة 84.8% للغابات الكثيفة في العام 2011. بشكل عام وضحت الدراسة من خلال المسح الميداني ان التغير في الغطاء الغابي مرتبط ارتباطا مباشر بالنشاطات البشرية, الإنشاءات الجديدة بالإضافة الي الطلب علي منتجات الغابات للأغراض المختلفة. وعليه من اجل تقليل مشاكل التغير في غطاء الغابات و معرفة المناطق تحت وطأة التغير اوصت الدراسة بتطبيق بعض الإجراءات التصحيحية وكذلك بضرورة توسيع مجال البحث العلمي في مثل هذه الدراسات.