

Assessment of Deforestation Process in the Arsi Region of Ethiopia: A GIS and Remote Sensing Approach

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Introduction

Deforestation is a problem in many parts of the tropical world. Ethiopia, and its problem of ongoing deforestation is caused mainly by livestock production, a population growth of 3% per year with an increasing need for agricultural land, and construction timber and fuel wood needs. Deforestation in Ethiopia has many consequences but the most visible is soil erosion. Ethiopia is also a biodiversity hotspot in the world and holds more than 5,770 species of animal life of which 10% are endemic and for flora, it has been estimated at over 10,000 species and some 1,150 species are estimated to be endemic.



Canis simensis

Objectives

This study was conducted to determine whether significant change in forest land cover in the Munessa-Shashemane national forest priority area has occurred over a period of 14 years during 1986 to 2000.

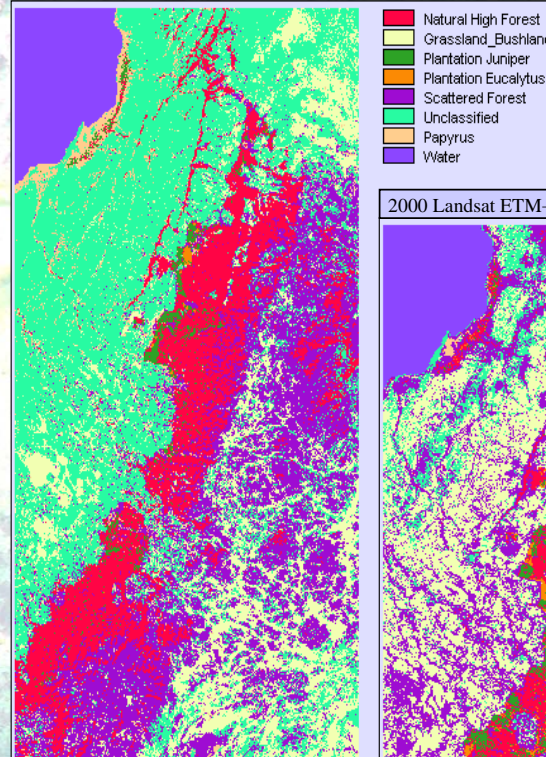
Initial Methodology

- Procurement of best available satellite data for time period of study.
- Initial visit to study site for ground truthing.

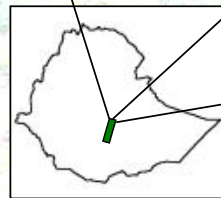
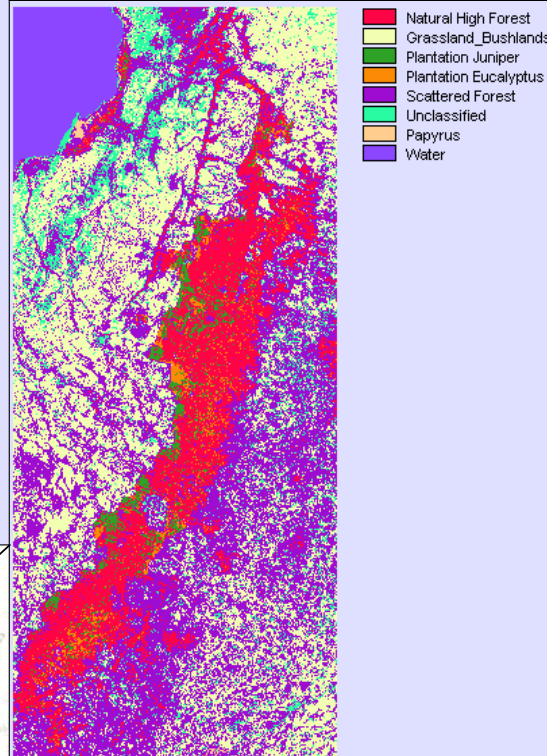


- Located representative examples for known cover type, based on ground truth data, that could be identified in satellite image (called *training sites*).
- Digitize polygons around each training site and assign a unique identifier to each cover type.
- Analyze the pixels within the training sites and create spectral signatures for each of the land cover types.
- Classify entire image using a hard classification method called Maximum Likelihood.

1986 Landsat TM Image Classified using Maximum Likelihood



2000 Landsat ETM+ Image Classified using Maximum Likelihood



Research site location in Ethiopia



Hauling wood for fuel from the Guye Forest. A small forest section within the Munessa-Shashemane National Forest Priority Area.

Future Methodology

- Re-visit research site to ground truth areas that were not given a classification in this initial phase.
- Review historical planting records of plantation forest during second visit to research site.
- Again perform steps 3-4 mention in initial methodology of data.
- Perform a change detection algorithm called post-classification comparison on the two classified images.
- Produce change matrix, a change detection map and Forest Inventory map.
- Import resulting images into a GIS and analyze results to see if any correlation exist with local population increases, transportation network increase, and elevation in research area.

Preliminary Results

- Considerable positive growth was observed at forest boundaries and scattered forest areas.
- Notice area of plantation forest has significantly increased from 1986 to 2000.

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