Remote Sensing and GIS for Assessing Land Use Land Cover Change: A Case Study of Jos and environs, Plateau State Nigeria

[1]Osunmadewa, B.A; [2]Susan Enokela
Contact: tundeosunmadewa@yahoo.com

[1]Technische Universität Dresden, Institute of Photogrammetry and Remote Sensing, Germany
[2]Federal College of Forestry, Dept. of Horticulture and Landscape Technology, Jos, Nigeria

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Introduction

Changes in land use land cover have contributed substantially to the increase in CO_2 content of the atmosphere, exacerbate loss of vegetative cover and have changed the biogeochemical cycles of the earth. Given current population trends and projections in Nigeria, it is anticipated that substantial intensification of agricultural cropland is certain within the next decades. In the absence of adoption of improved technologies poor rural populations in this region will continue to degrade and mine the natural resources to ensure their livelihood. In response to this, there has been increasing research and development for sustainable land use management. This study was conducted to assess the loss of forests (natural vegetation) and the alteration of land use cover in Jos and its environs using satellite based data.

Results and discussion

The land use and land cover change of the study area (Jos) was generated from the statistical findings of the supervised classification of the three images (Landsat TM, 1986, Landsat ETM, 2002 & Nigeriasat-1, 2007).

Five major primary land cover types were delineated using satellite data viz., bare surface, built up areas, cultivated areas, natural vegetation and water body.

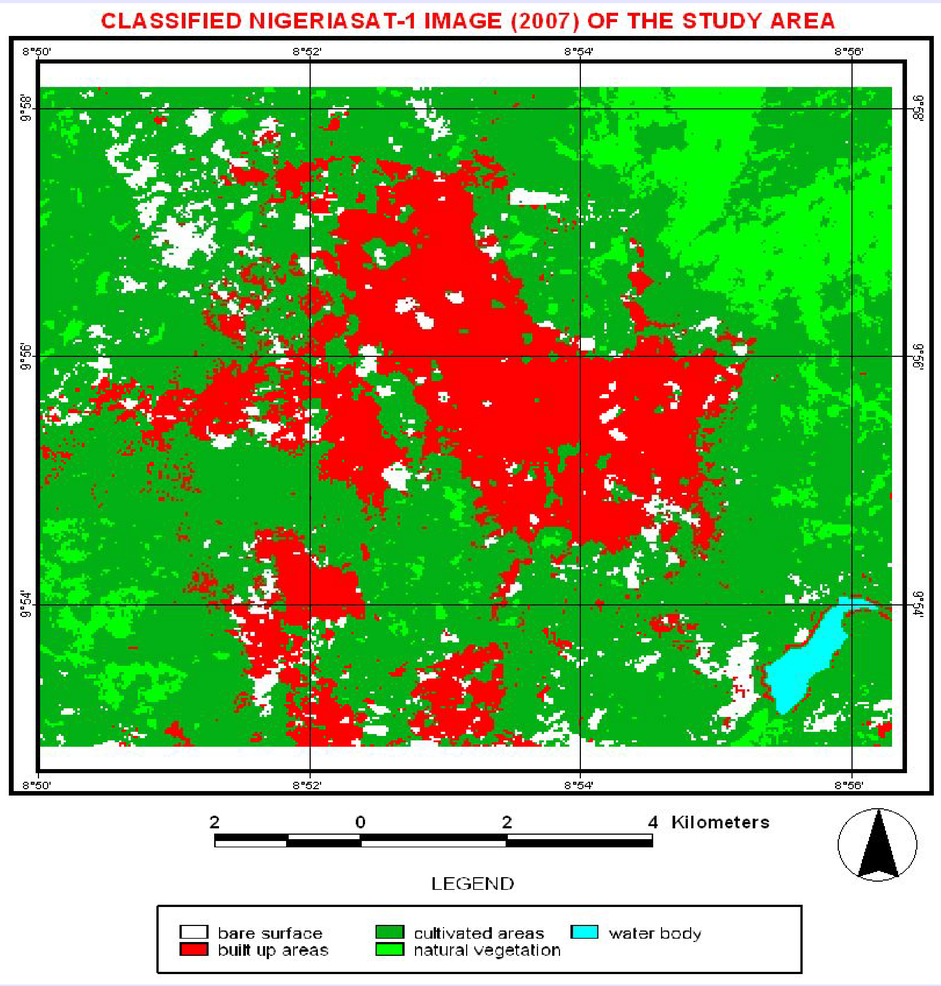

Figure 4. Classified map of Jos and environs showing LULCC

Conclusions and Outlook

• Satellite datasets coupled with field surveys provided accurate information about deforested areas (natural vegetation cover depletion), increase in cultivated areas and built up area

• The study concluded that, remote sensing and GIS is an important and reliable tool for assessing and mapping LULCC

Methodology/ Study Area

Multi-temporal remotely sensed data of Landsat TM (1986), Landsat ETM (2002), and NigeriaSat-1 (2007) covering the study area were acquired, processed and analyzed.

Supervised and Post-classification method were used to detect changes in land cover classes in the area.

Field observations and ancillary data were used in image classification and mapping.

Study area

It lies between latitude 9°55'N and Longitude 8°53'E
High temperature of 22°C & low temperature of 18°C
Annual rainfall 131.75 cm - 146 cm

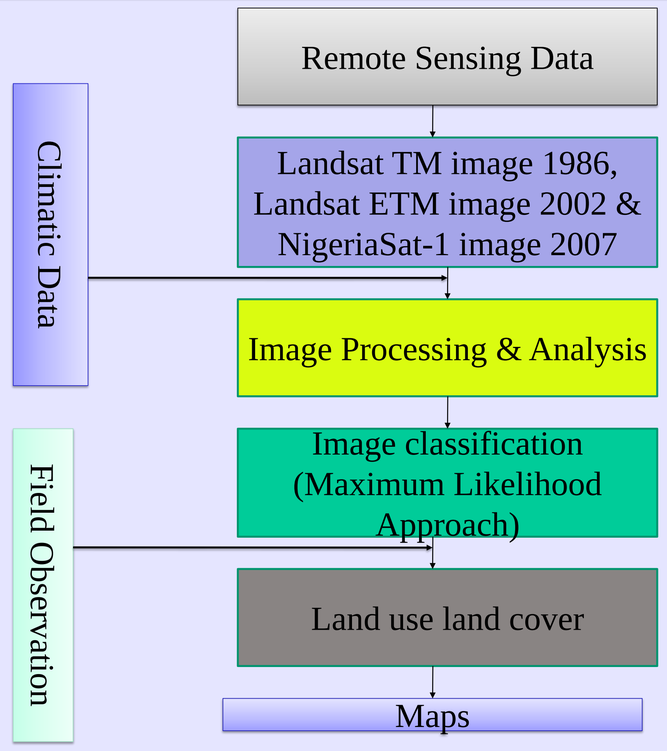

Figure 1. Research methodology flow chart

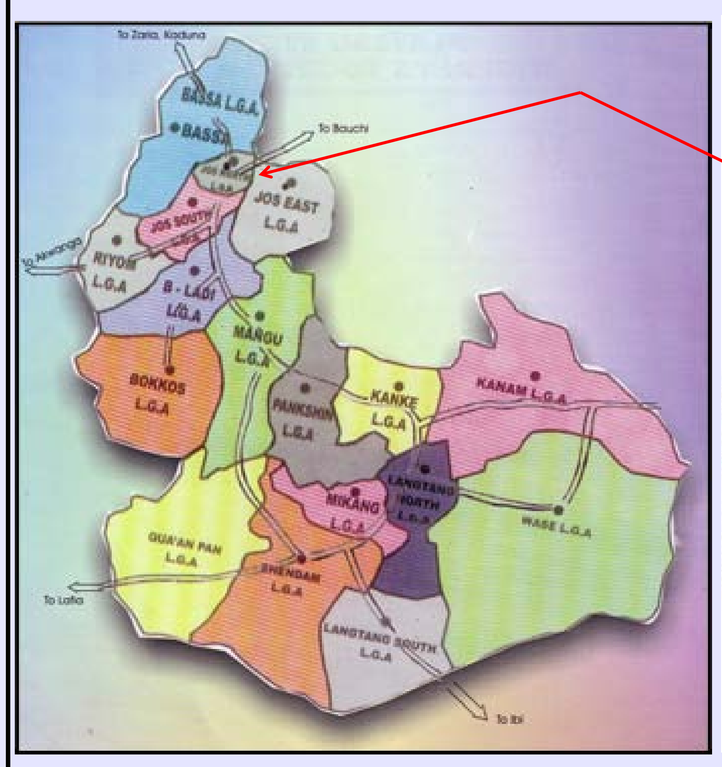

Figure 2. Map of study area

Figure 3. Map of Nigeria showing study area

Table 1 Distribution of land use/land cover areas from 1986 to 2007 (areas in square kilometer)

Land cover classes	1986	% of area in 1986	2002	% of area in 2002	2007	% of area in 2007
Bare surface	38.66	33.61	13.43	11.68	11.43	9.94
Built up area	10.54	9.16	23.33	20.29	42.33	36.81
Cultivated area	26.19	22.77	46.01	40.61	48.01	41.75
Natural vegetation	38.63	33.59	31.15	27.09	11.15	9.70
Water body	0.99	0.86	1.08	0.94	2.08	1.81
Total	115.00	100	115.00	100	115.00	100

• Result of the study showed that, there was a tremendous decrease in natural vegetation from 33.59 % in 1986, to 27.09 % in 2002 and to 9.70 % in 2007, this indicate that there has been a drastic deforestation rate over the three periods due to human interference

• There was an increase in cultivated area from 26.19 km2 (22.77 %) in 1986 to 48.01 km2 (41.75 %) in 2007; this indicate that expansion of farming areas which is as a result of population growth.

ROSA LUXEMBURG STIFTUNG
Federal Ministry of Education and Research