How the Problem of Degradation, Desertification, Protection, and Natural Resources Management are Addressed at RCMRD

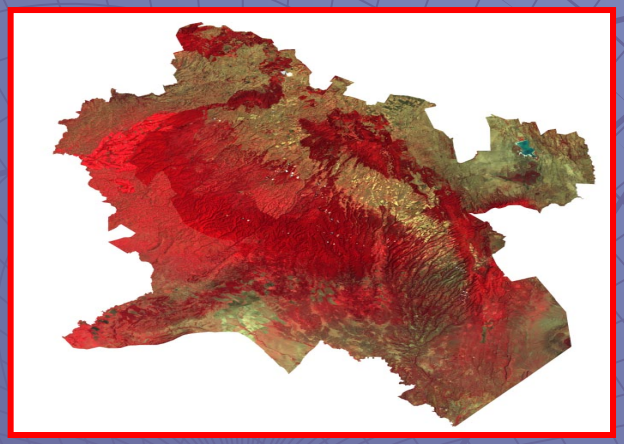


Image of Study area: 1986

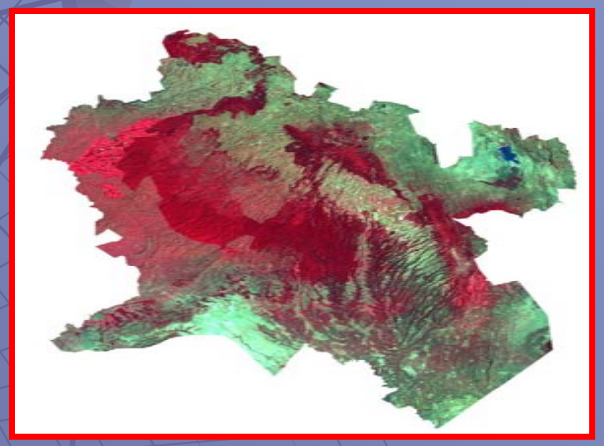


Image of Study area: 2000

Training Center

Regional Centre for Mapping of Resources for Development (RCMRD)
Nairobi, Kenya

U.S. Geological Survey
Center for Earth Resources Observation and Science (EROS)
Sioux Falls, South Dakota, USA

Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

How the Problem of Degradation, Desertification, Protection, and Natural Resources Management are Addressed at RCMRD

Erick Khamala, RCMRD, Nairobi, Kenya

Bamako , Mali

6 - 17 February, 2006

RCMRD does this through:

- Awareness creation
- Capacity building
- Spatial Data Infrastructure Development
- Projects
- Research and Development

Awareness Creation

To decision makers and Professionals through Seminars, Workshops, Conferences

Capacity Building

- Formal Training (regular and tailor-made courses)
- On the job training (joint implementation of projects)
- Data distribution (especially free datasets)
- Partnering with stakeholders to setup functional GIS Units
- Providing technical backstopping

Development of Spatial Data Infrastructure (SDI)

- Spatial datasets (vector, raster)
- Satellite data distribution
- Socio-economic information
- Other important information

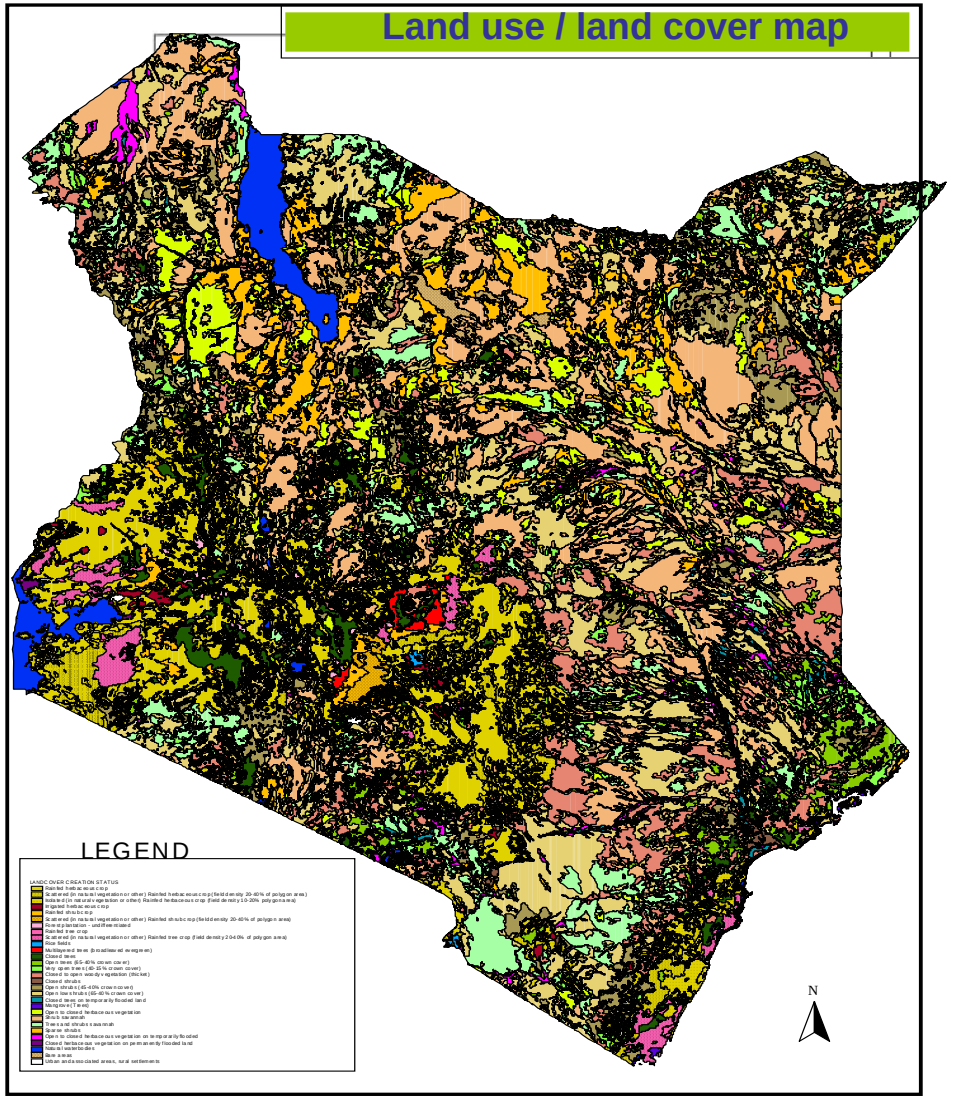
Datasets Available at RCMRD

1. Topographic maps

Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Datasets Available at RCMRD (Cont....)

2. Thematic maps



Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Datasets Available at RCMRD (Cont....)

3. Satellite Data

Projects

- Early Warning Systems
  (Short-term and Long Term EWS)
- Resource Mapping
  (natural resources, urban mapping etc)
- Digital Spatial Database Development
  (especially map automation – scanning and digitization)
- Sector based Solutions
  (e.g for Agro-based industries, Communication sector)

Projects (Cont…)

1. Early Warning Systems

- For Drought monitoring & Food Security
- For Environmental Monitoring (e.g land cover change
- For Disaster Prediction (e.g floods)
- For Disease mapping and Prediction
  (e.g Rift Valley Fever, spread of HIV/AIDS)

Continuous Early Warning Systems

US Partners

- United States Agency of International Development
- Chemonics International
- Foreign Agricultural Service, USDA
- National Aeronatics and Space Administration
- National Oceanic and Atmospheric Administration
- United States Geological Survey

International/ Regional Partners

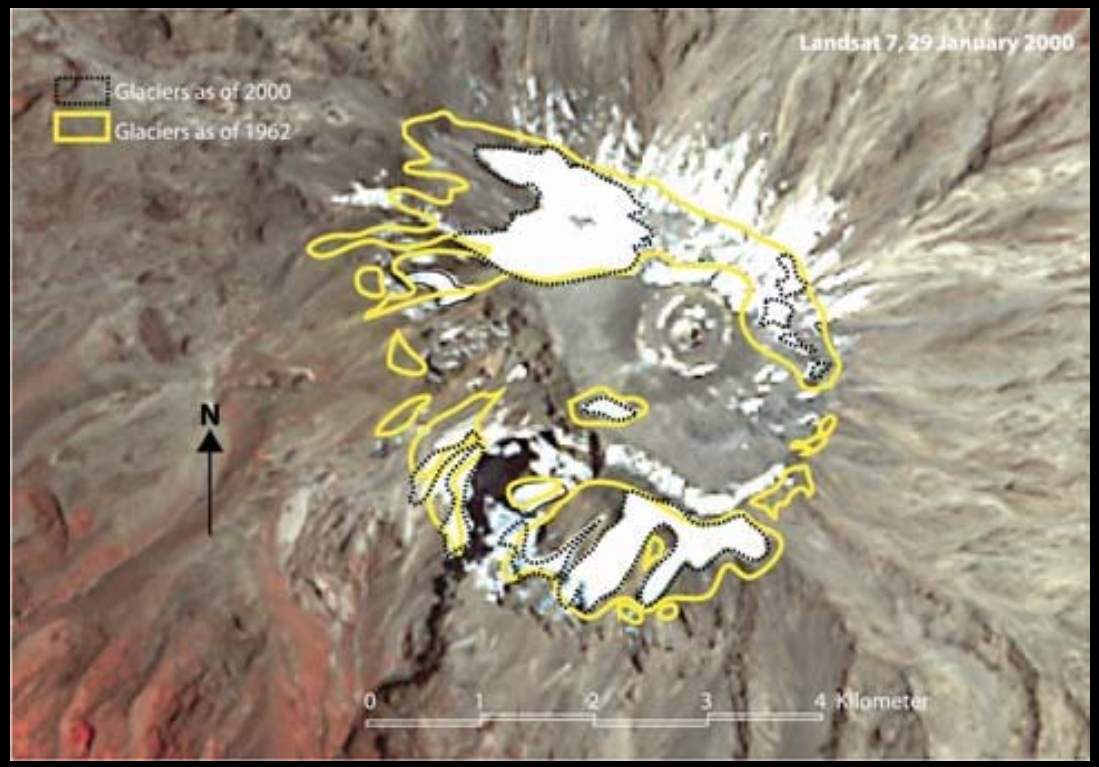
- Food & Agriculture Organization
- World Food Programme
- IGAD
- FEWSNET
- LEWS
- Regional Centre for Mapping of Resources for Development

Environmental Monitoring and Prediction

The case of Mt. Kilimanjaro

The case of Mt. Kilimanjaro (Cont..)

The glaciers of the Kilimanjaro have been shrinking due to regional climate changes... some 82% of the glaciers have disappeared between 1912 and 2000.



Reduced precipitation and higher temperature appear to be the underlying causes for the disappearance of the glaciers.

The case of Mt. Kilimanjaro (Cont..)

- Drastic shift downwards of the upper forest line… from 3,700 to 3,100 meters also between 1976 and 2000.
- 130 km**2** of Erica forest have been destroyed, in about 25 years.

The case of Mt. Kilimanjaro (Cont..)

- Reduced precipitation and higher temperature have increased the vulnerability of the forest to fires.
- Fires frequency and intensity in the Erica forest have increased significantly beyond the regenerating ability of the forest.

The case of Mau Forest, Kenya

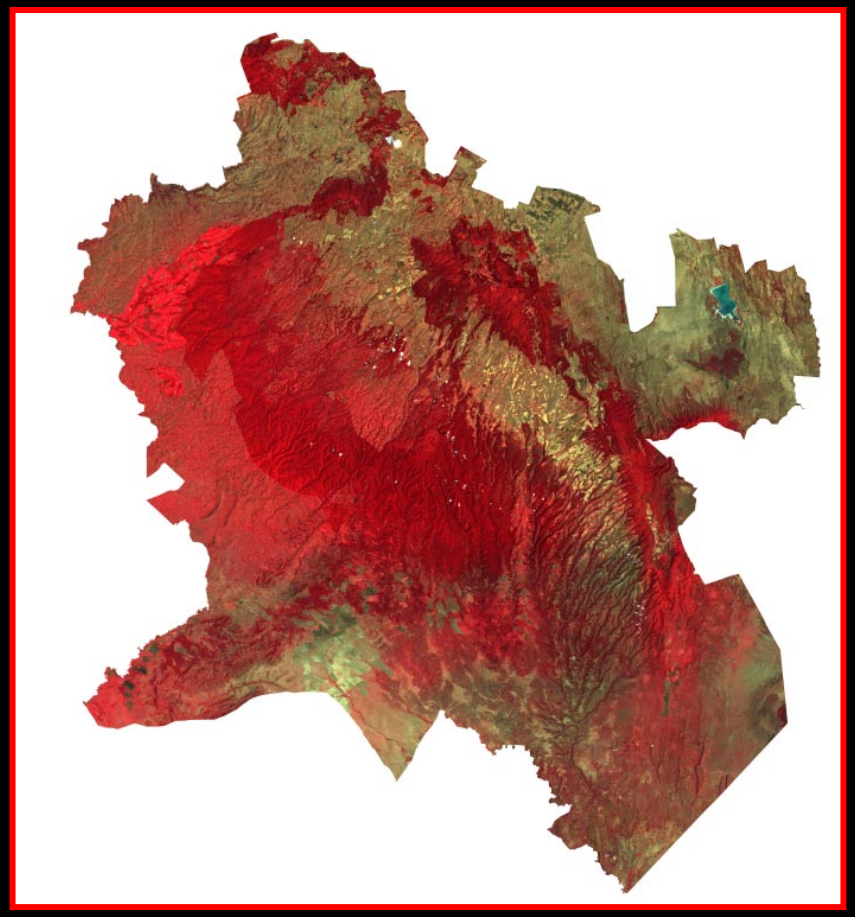


Image of Study area: 1986

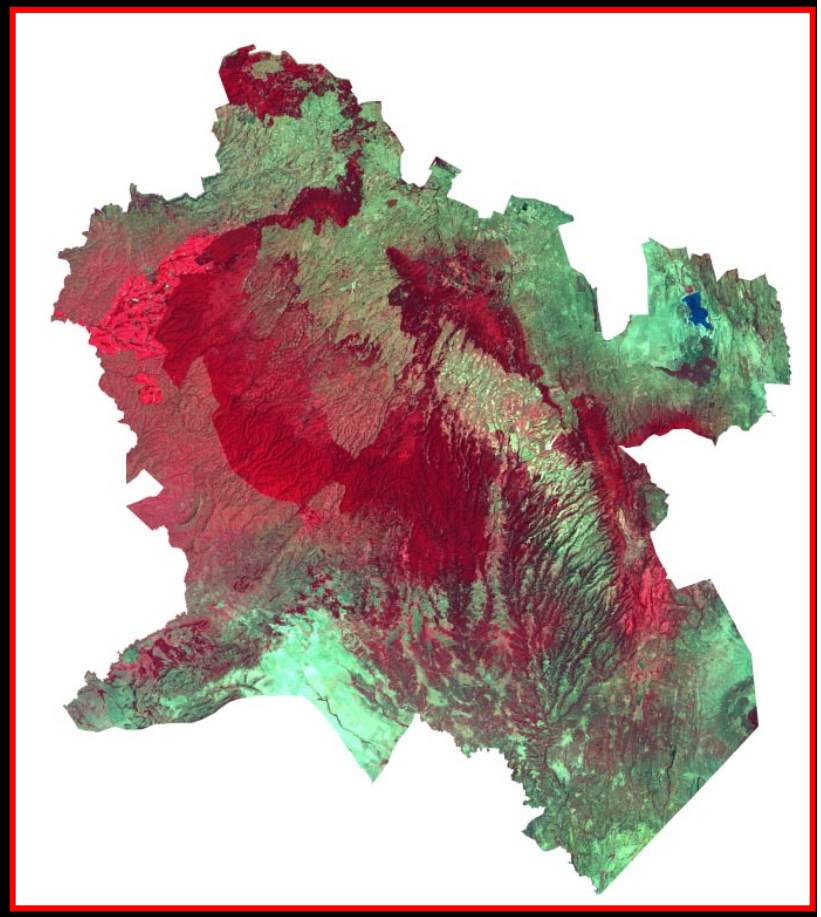
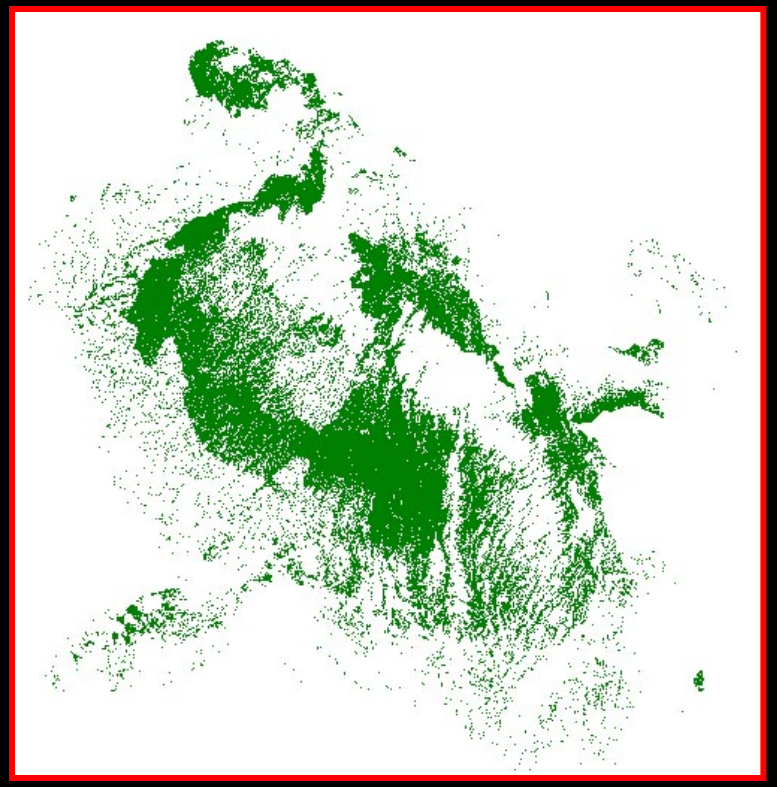


Image of Study area: 2000

The case of Mau Forest (Cont..)

Extent of Mau Forest in 1986

Area = 435,071.8 Ha (4,350.718 Km^2)



Extent of Mau Forest in 2000

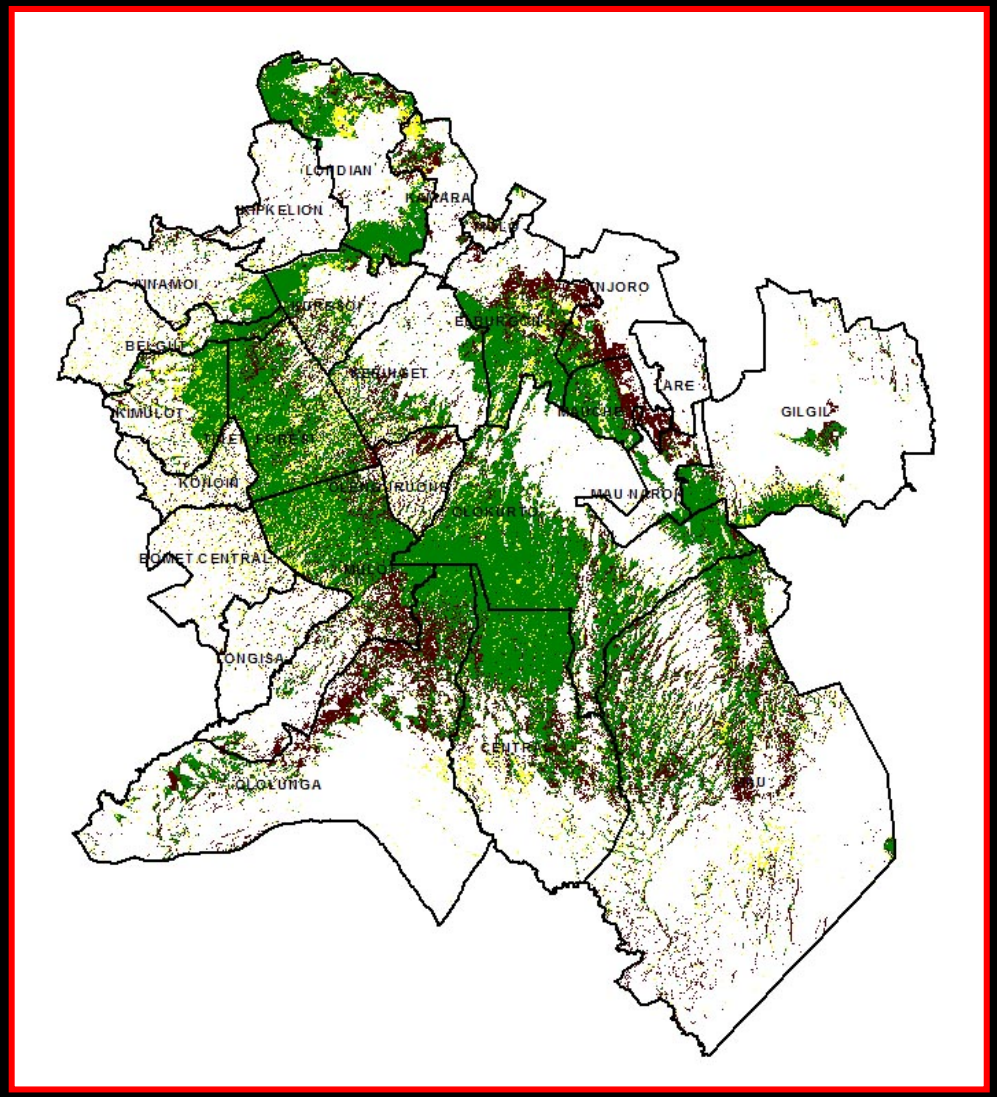
Area = 352,603.5 Ha (3,516.035 Km^2)

Total area of deforested land = 82,468.3 Ha (824.683 Km^2)

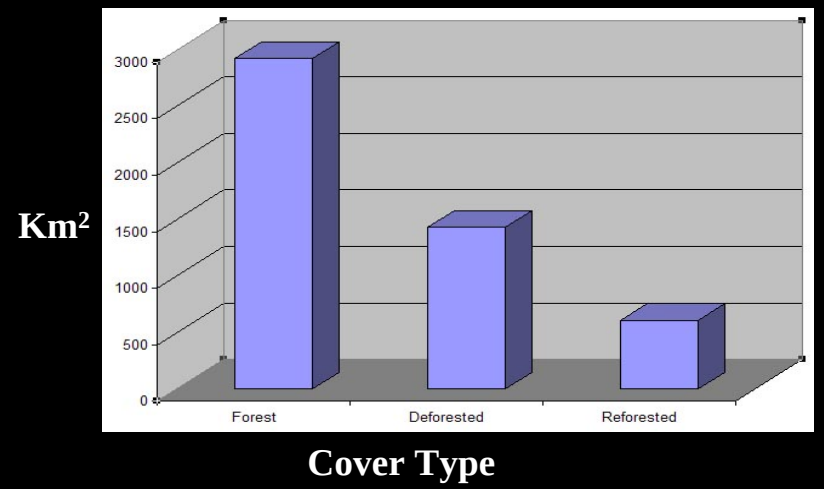
Average rate of deforestation = 5,890.6 Ha per year (58.906 Km^2)

The case of Mau Forest (Cont..)

Map: Changes at Divisional Level



Graph: Land cover areas as at 2000

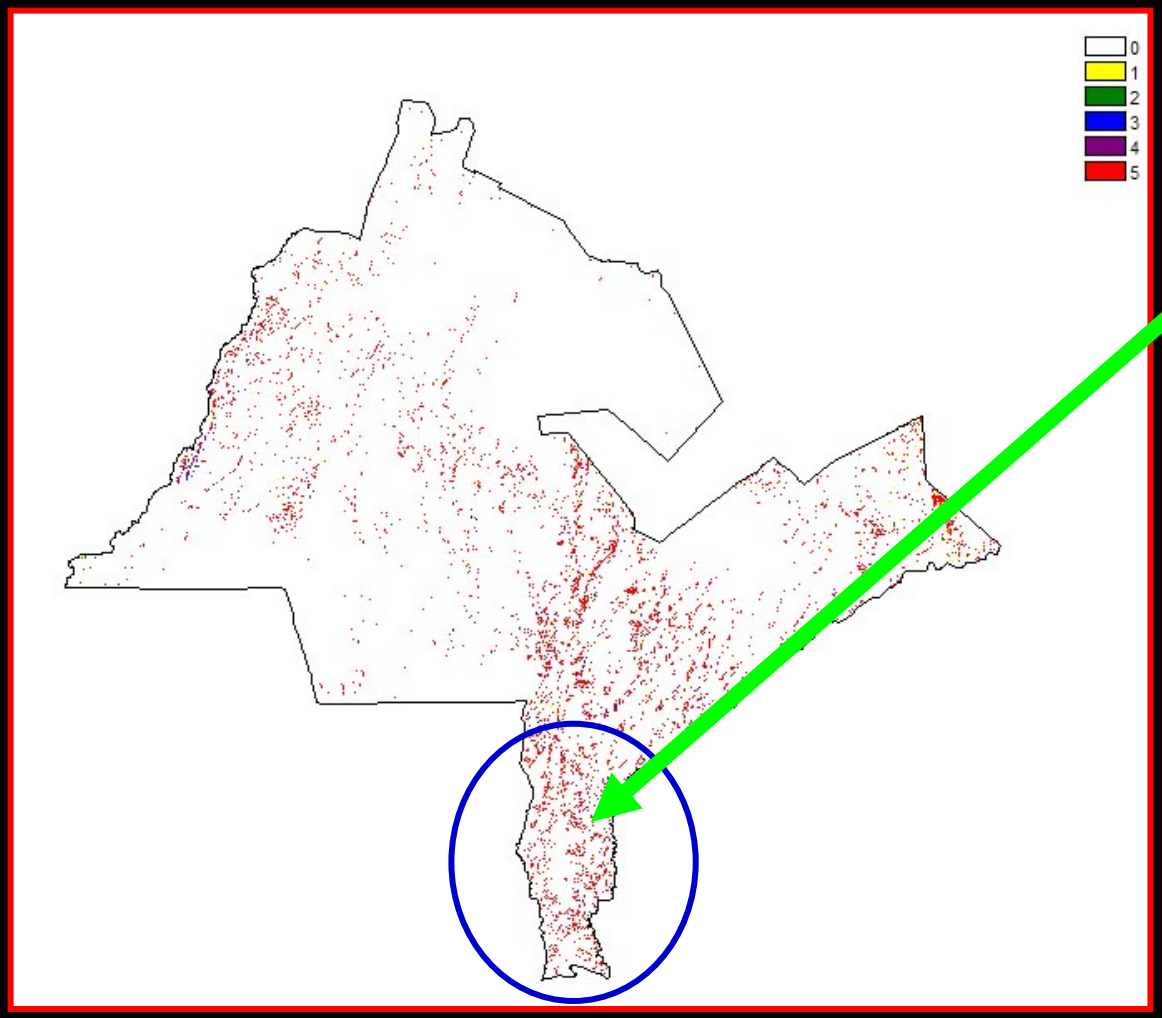


LEGEND

- No change in forest cover
- Deforested areas
- Afforested areas

The case of Mau Forest (Cont..)

Landslide Risk Map of Olokurto Division



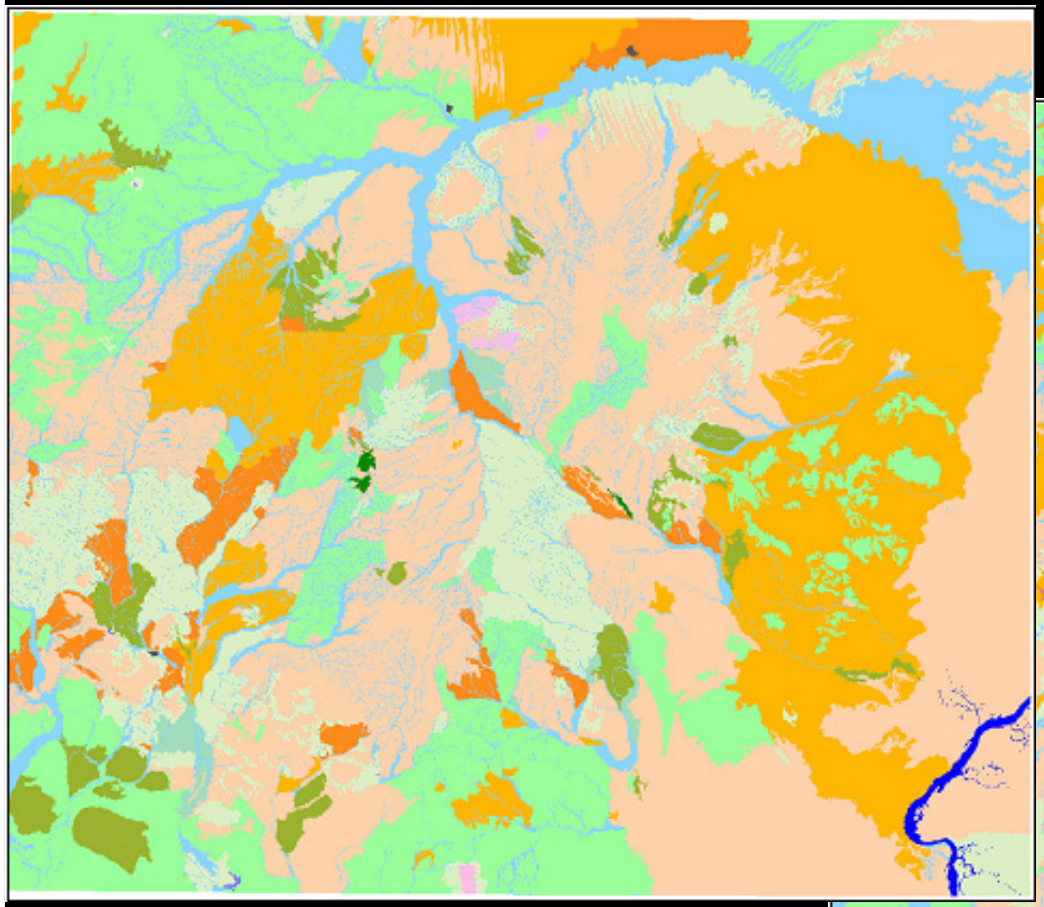
There were reported cases of landslides in this area In 2004

Division's Statistics

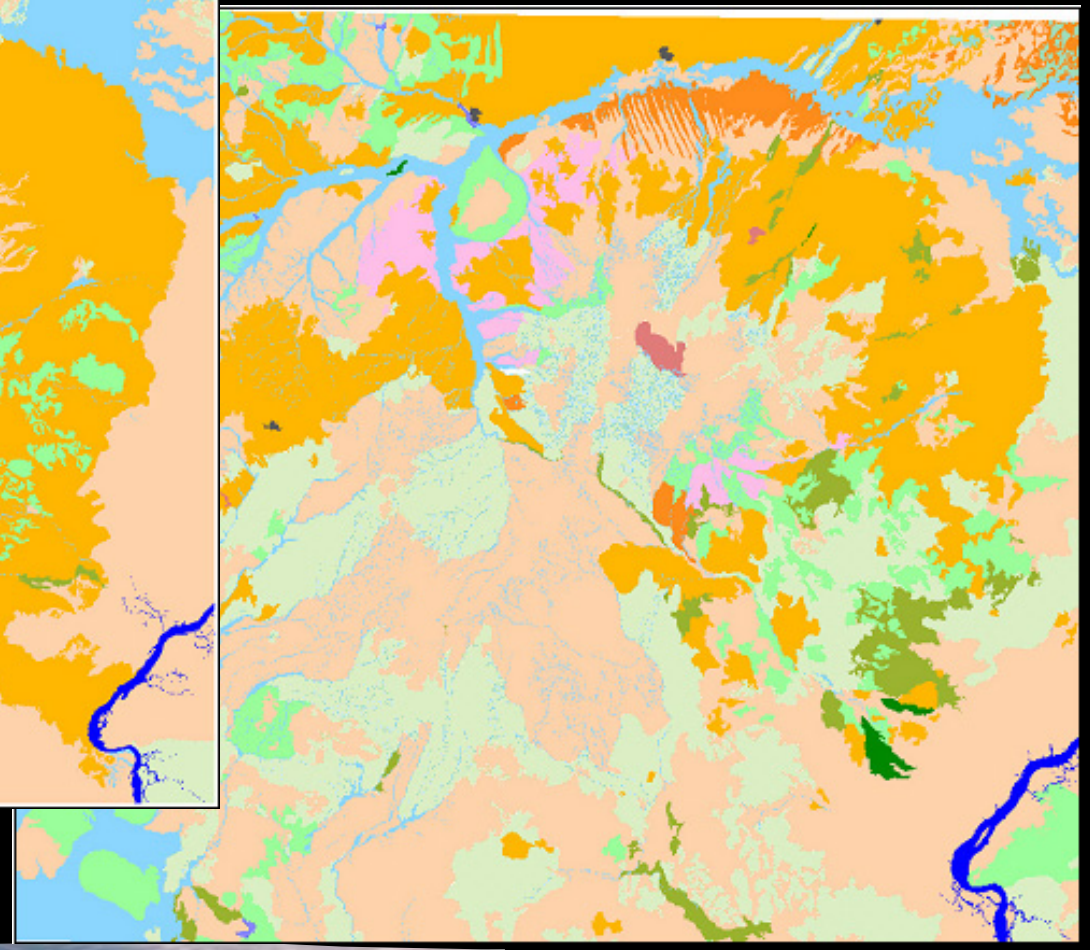
- Area under forest = 57,358 Ha
- Deforested area = 9,332 Ha
- Afforested area = 5,374 Ha

The Case of Land use / land cover changes in South Kordofan Region, Sudan

November 1984



November 2000



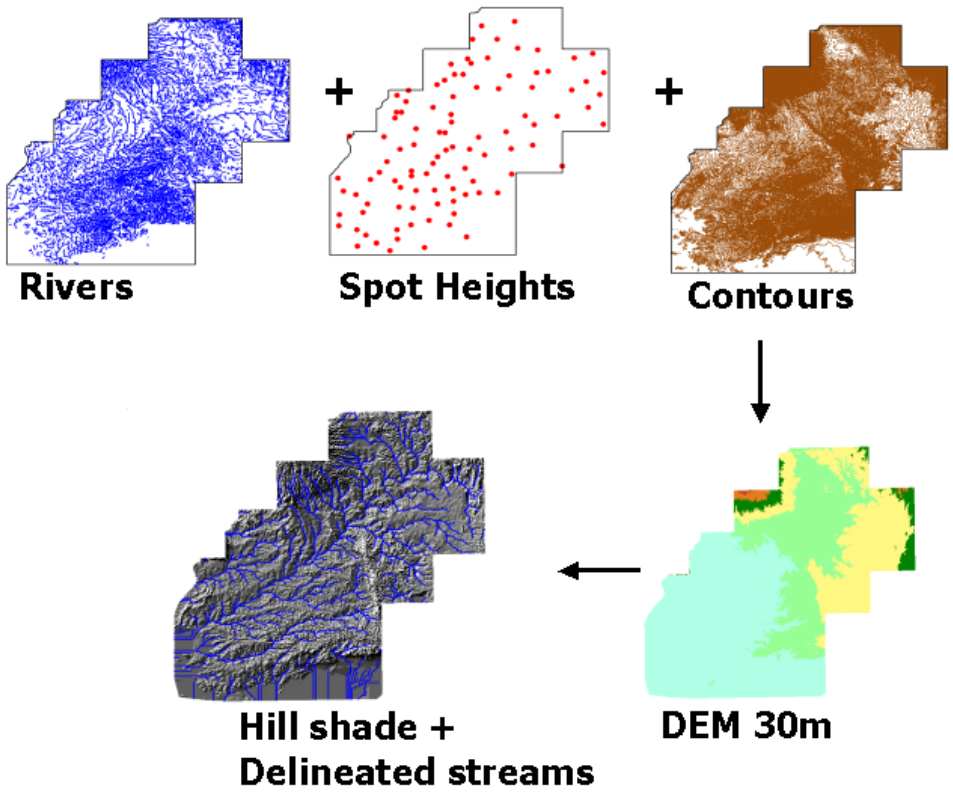
The case of Land use / land cover changes in South Kordofan Region, Sudan (Cont…)

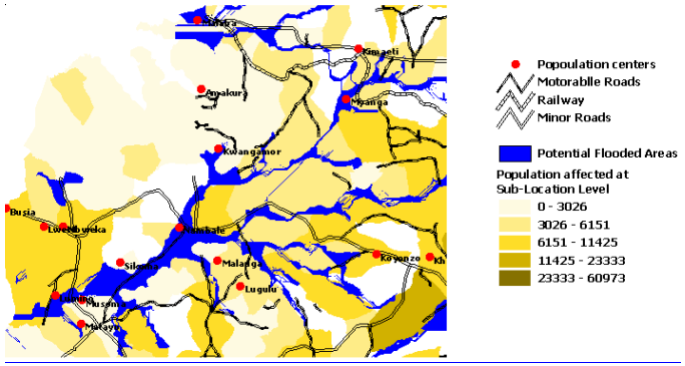
Class	Area in Sq. Km for Nov 1984	Area in Sq. Km for Nov 2000
Closed Forest	70	211
Open Forest	3044	2640
L. Scale Rainfed Agriculture	20415	21876
S. Scale Rainfed Agriculture	3058	1671
Closed Grassland	20455	9390
Open Grassland	9802	19112
Closed Shrubland	225	1818
Open Shrubland	38131	41547
Perenial River	327	424
Seasonal River	11643	9275

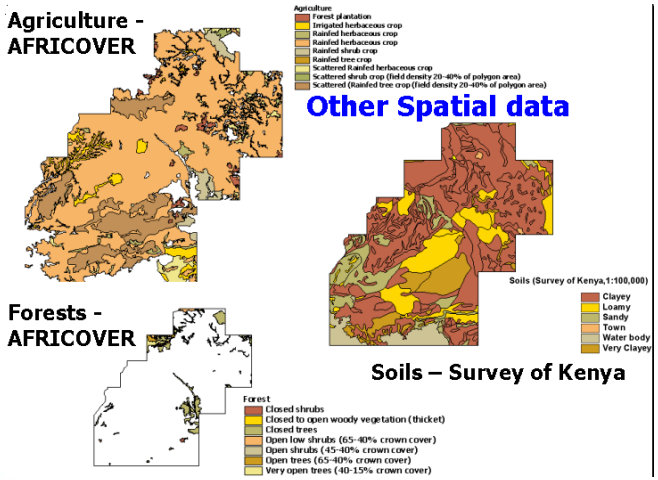
Disaster Prediction

The Case of Predicting Flooding: Nzoia River Basin

(Done in collaboration with USGS to validatethe USGS hydrological model)



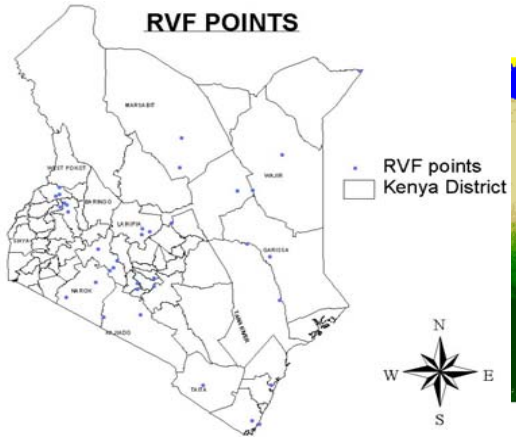




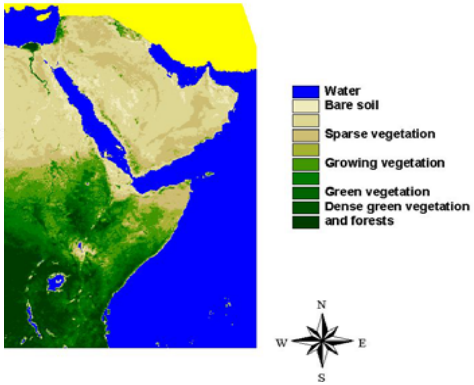
Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Predicting Disease Outbreaks
The Case Rift Valley Fever in GHA

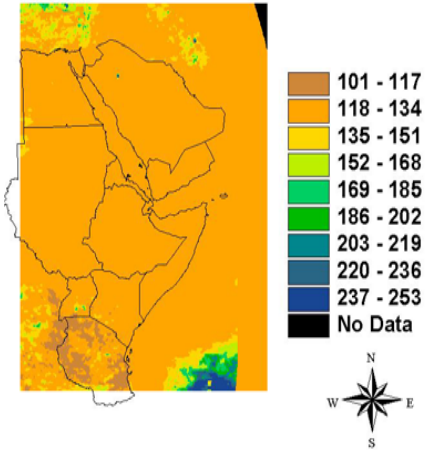
RVF POINTS



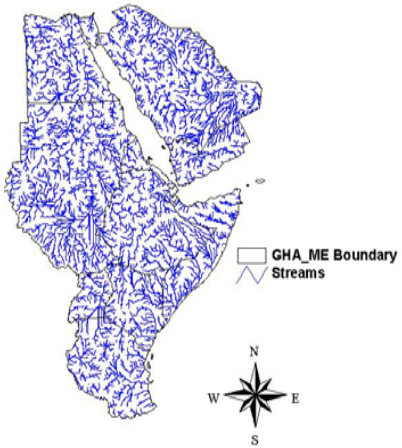
NDVI DATA FOR JANUARY 2003



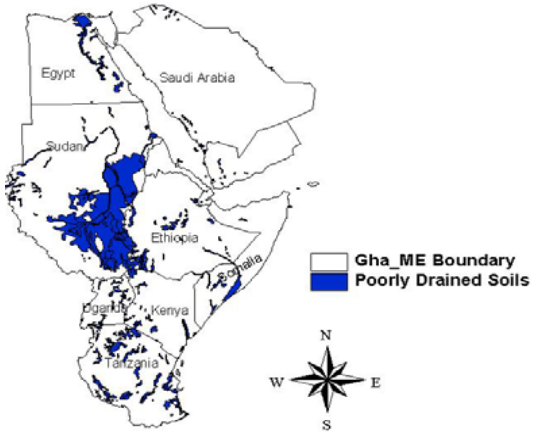
RFE FOR JANUARY 2003



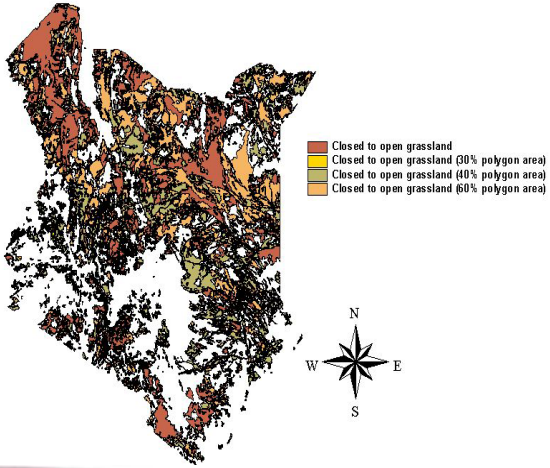
STREAMS OF GHA AND ME



POORLY DRAINED SOILS



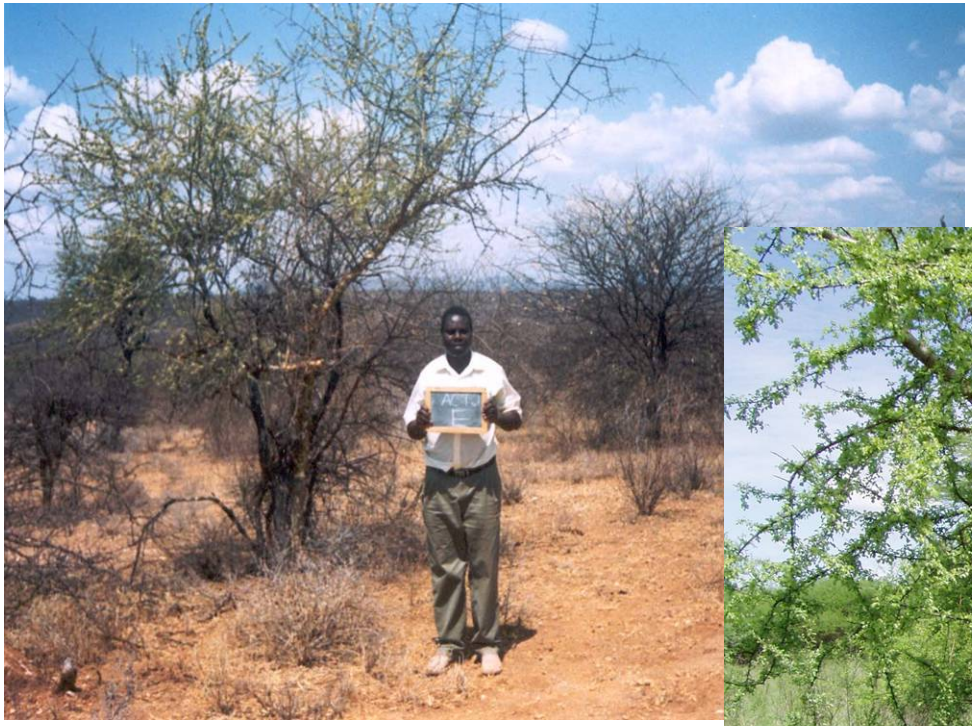
AFRICOVER DATA



Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Projects (Cont…)

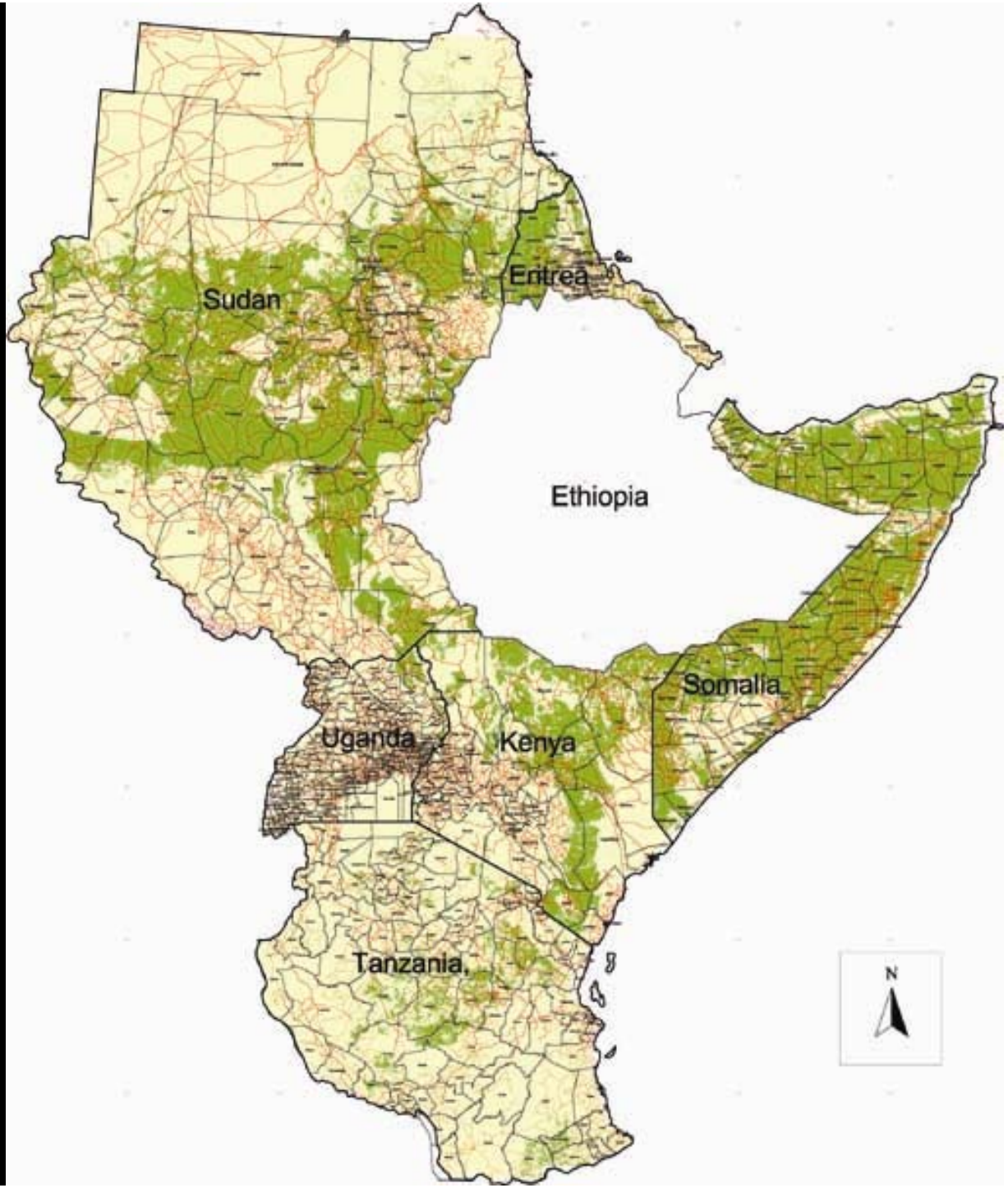
2. Resource Mapping



Mapping Gums & Resins in The GHA Region

Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Eastern Africa Regional Gums & Resins Map



Resource Mapping (Cont..)

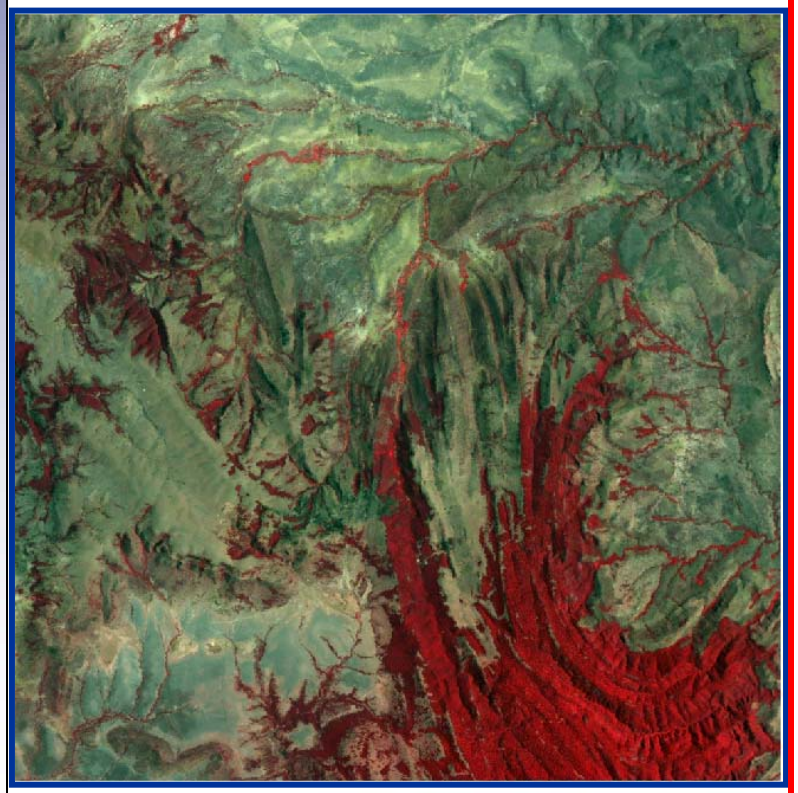
Participatory GIS Mapping:
Forest Mapping: Loita Forest, Kenya

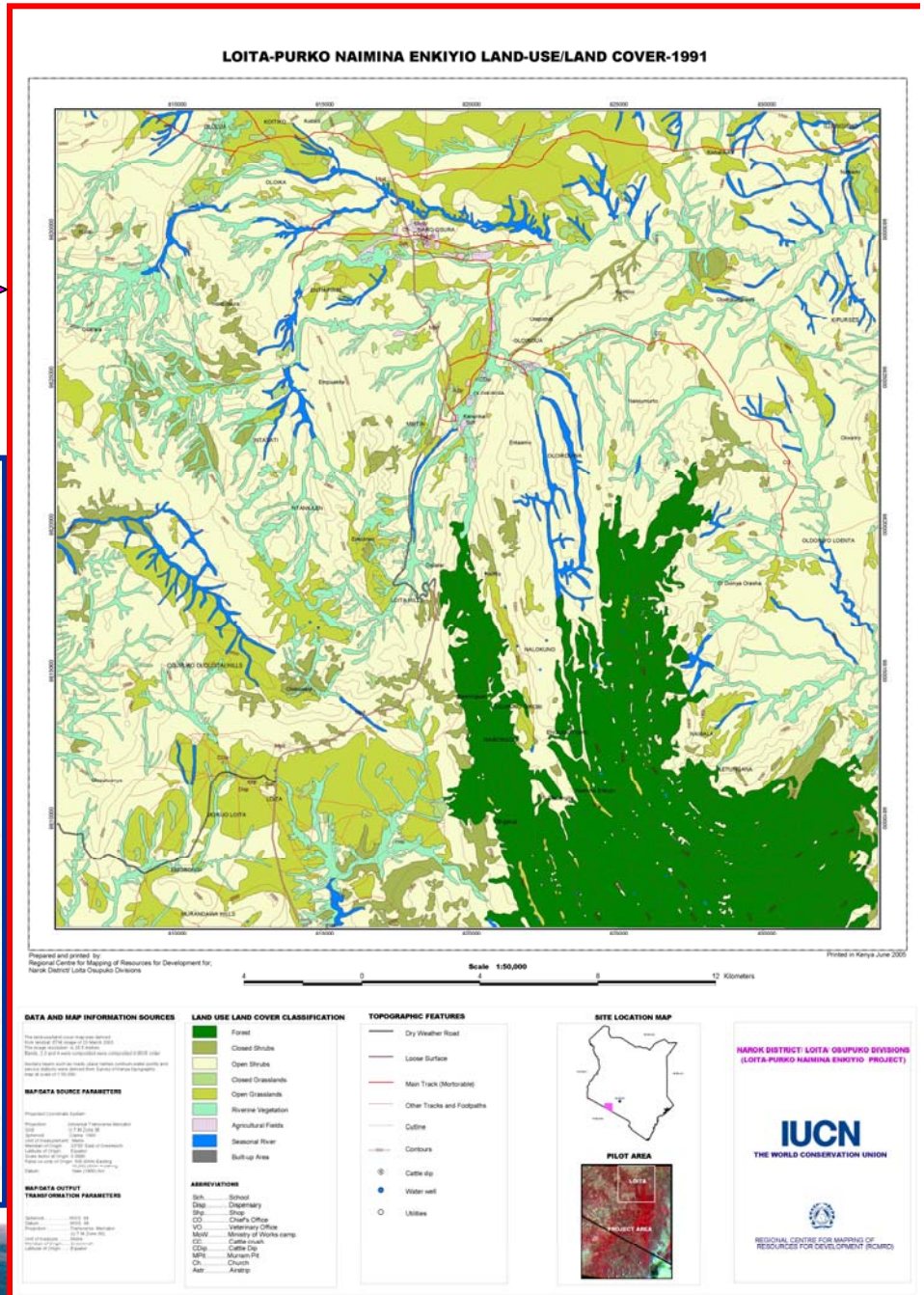
Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Participatory GIS Mapping: Forest Mapping: Loita Forest, Kenya (Cont..)

Final Map

Landsat





Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

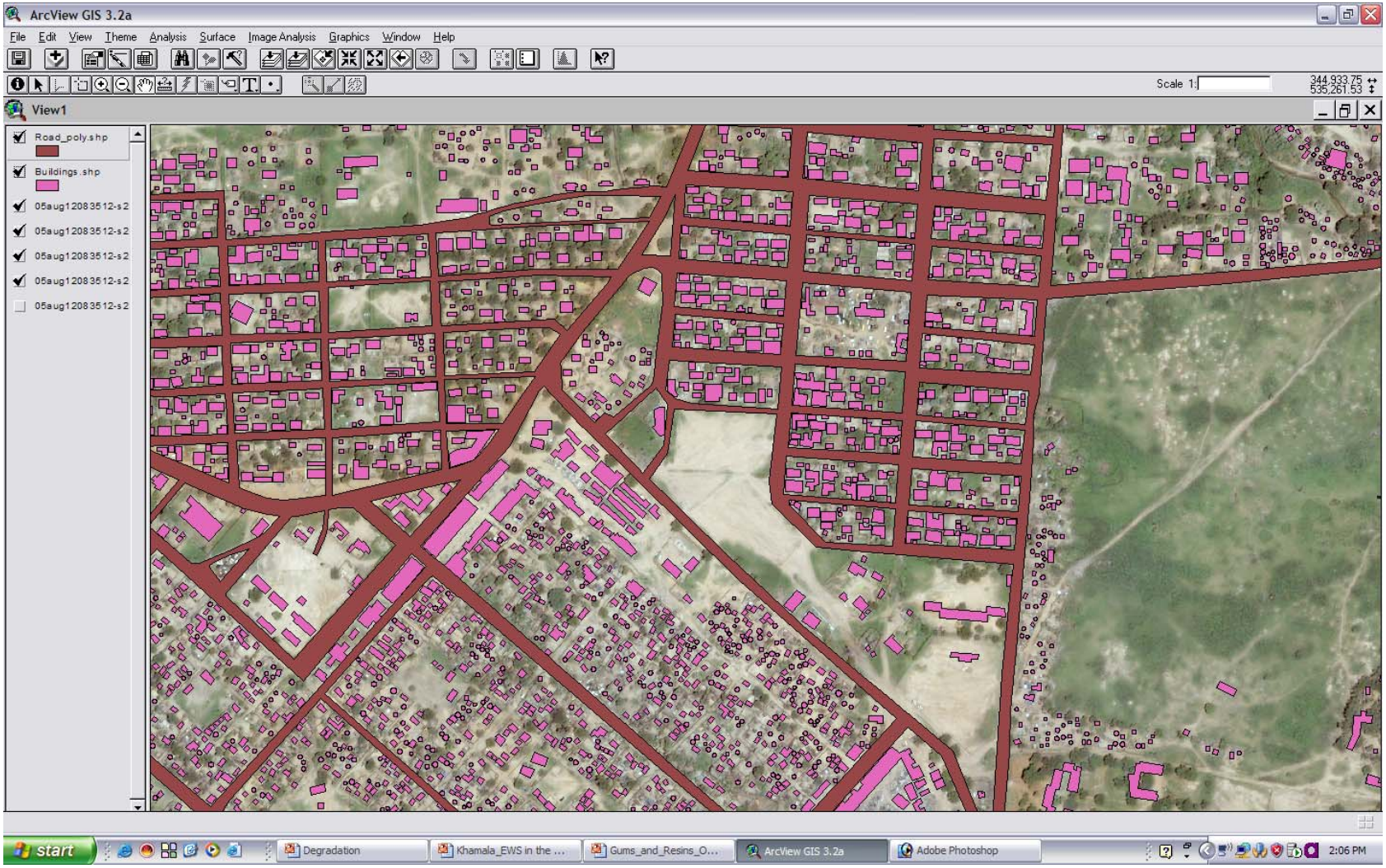
Resource Mapping (Cont..)

Urban Mapping
The case of South Sudan

QuickBird image of Juba City, South Sudan, September 2005

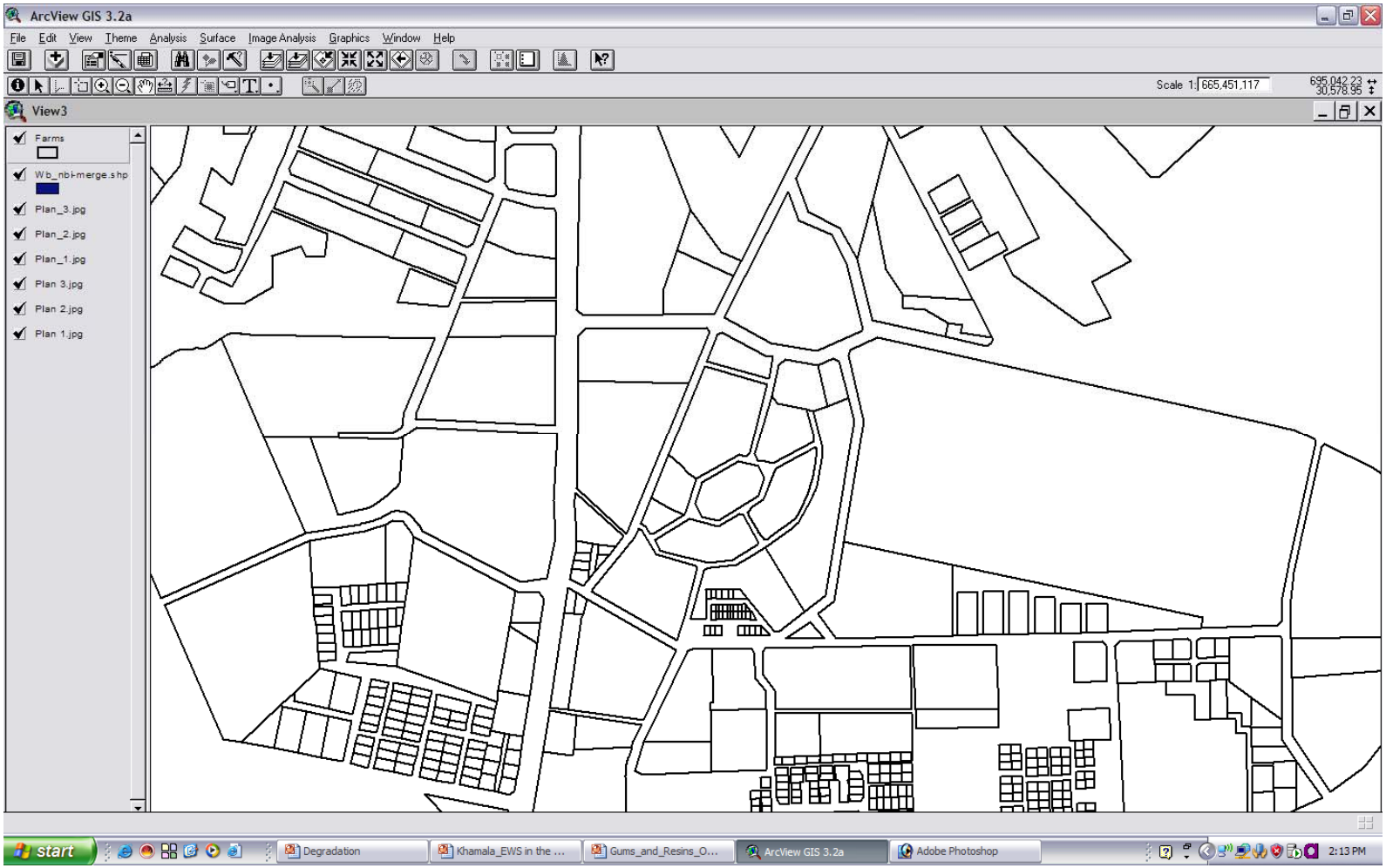
Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Mapped buildings, roads, rivers, land use



Projects (Cont…)

3. Digital Spatial Database Development

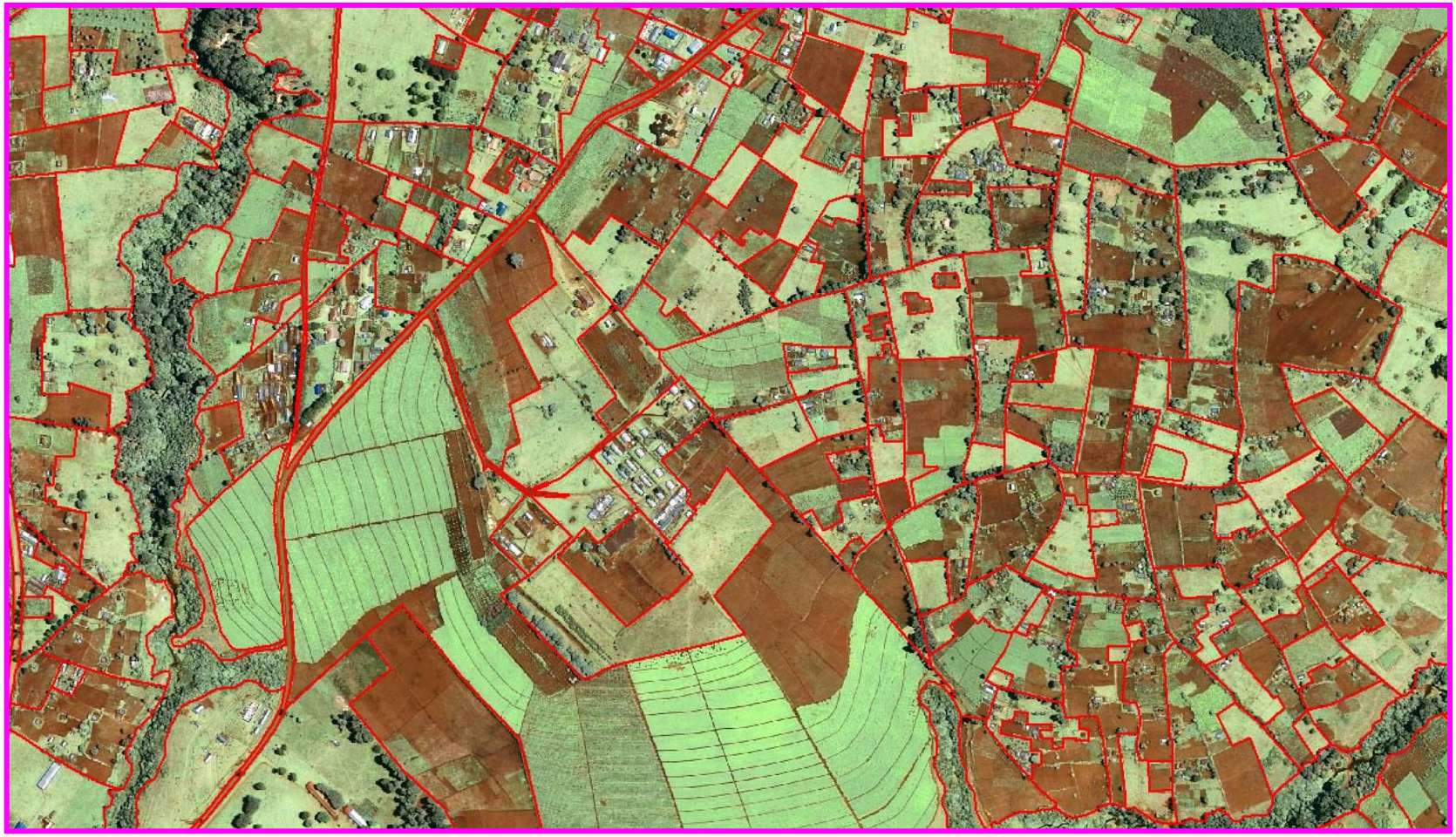


4. Sector Based Solutions

(Case of Agro-Industries)

Projects (Cont…)

Developing thematic GIS layers and solutions



Research and Development

- Early Warning Systems
- Environmental Change Detection and Prediction
- Mapping techniques
- Software & hardware

Live Demo
on
Role of GIS in National Spatial Data Infrastructure Development (NSDI)

Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

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Web: www.rcmrd.org

Thank You
For your attention