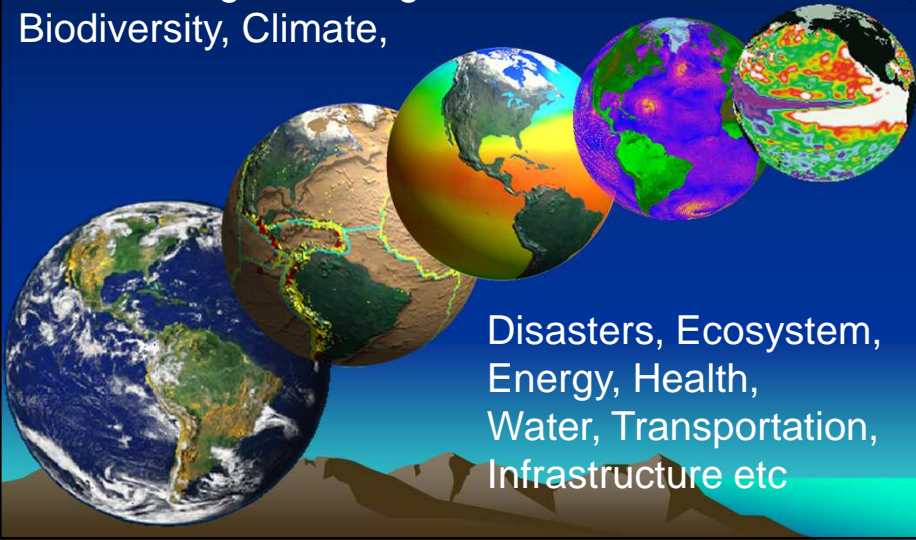


Geoinformation for Societal Benefit

Land Management, Agriculture,
Biodiversity, Climate,



Disasters, Ecosystem,
Energy, Health,
Water, Transportation,
Infrastructure etc

Geoinformation

- Positioning
- Earth Observation
- Analysis, Visualization and Production
- Sharing and Exchange

Global Navigation Satellite Systems(GNNS)



GPS

⇒ operational since 1994



GLONASS

⇒ fully operational again since 2012



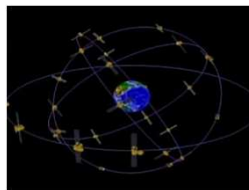
GALILEO

⇒ operational from 201?



COMPASS

⇒ operational from 201?



User Segment: Hardware



GPS-only
Single Frequency
Code measurements only
Meter level positioning accuracy

GNSS and SBAS
Single Frequency
Code and phase measurements
Sub-Meter level positioning accuracy



GNSS
Dual Frequency
Code and phase measurements
Centimeter level positioning accuracy

GNSS
Dual Frequency
Code and phase measurements
Decimeter level positioning accuracy



(Kadaster, 2012)

Positioning made simple



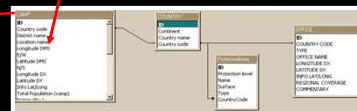
Field staff records geographic locations (camps, road networks, transit centers etc.) using hand-held Global Positioning System (GPS) receivers.



Features of interest are plotted on a map, here: refugee camps, in Ethiopia and Djibouti. Refugee camps are symbolized as red tents

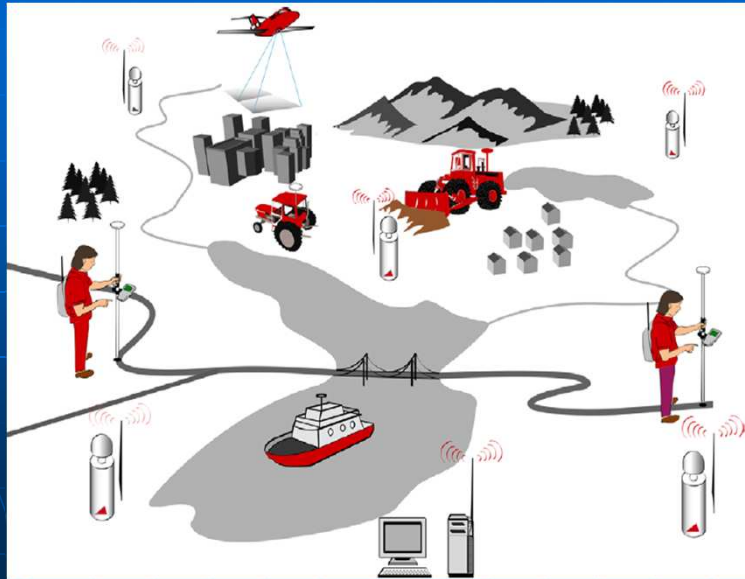


GPS receives geographic location from positioning satellites.



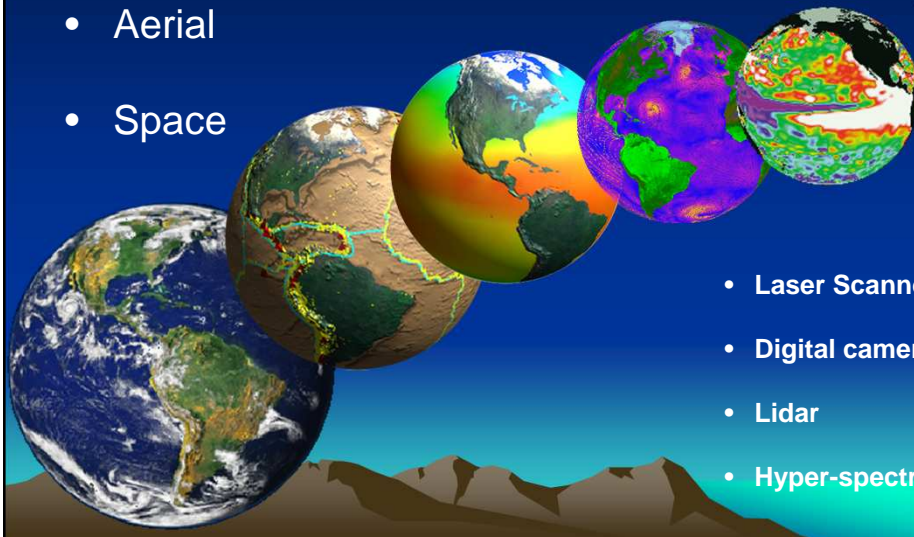
RCMRD presentation.

Applications

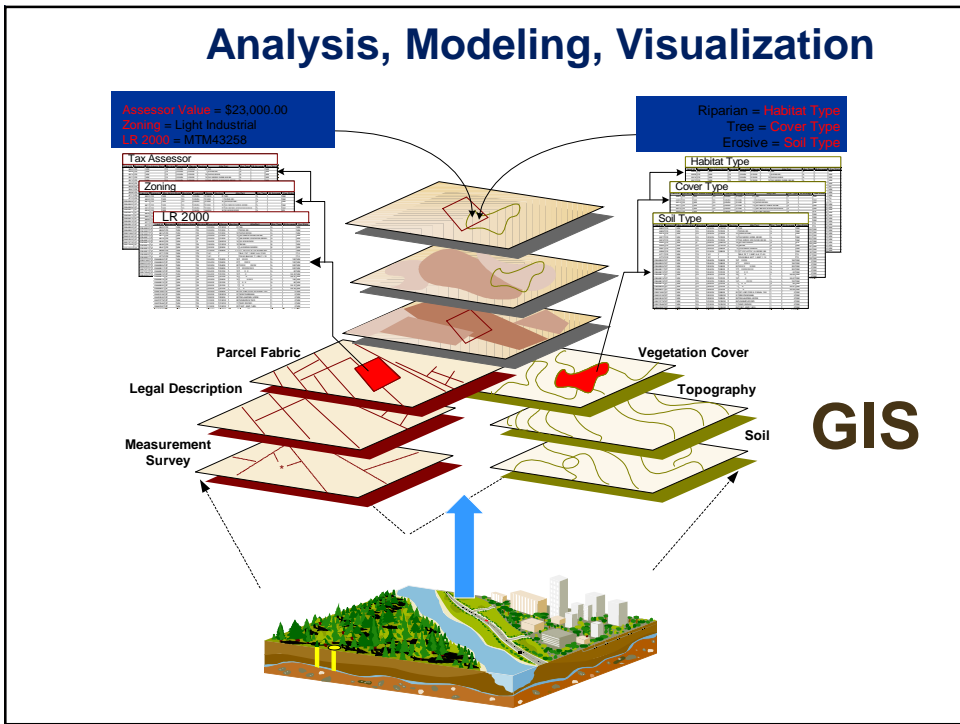
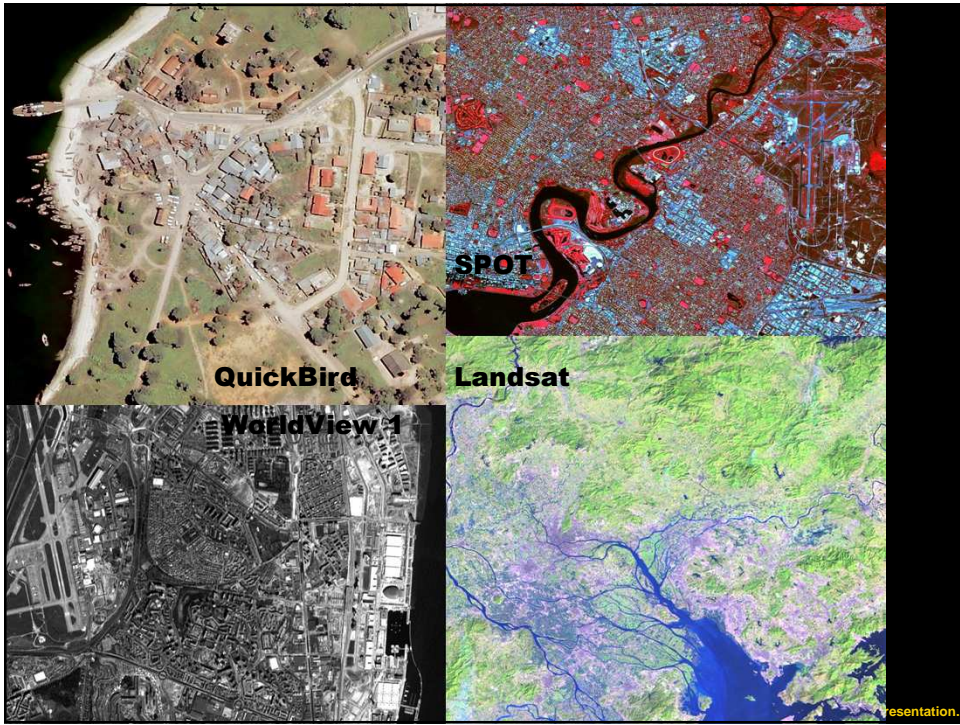


EARTH OBSERVATION

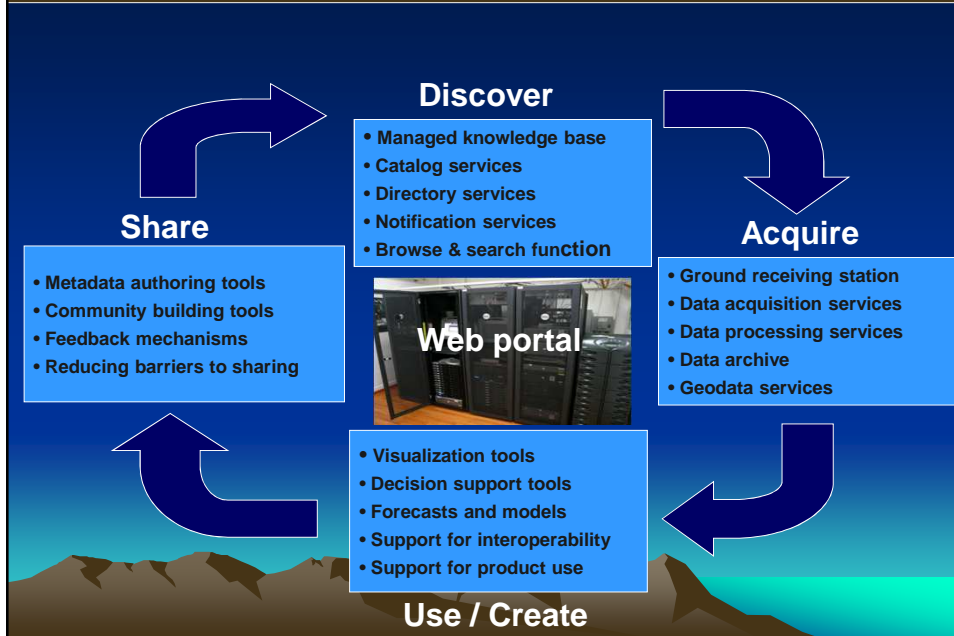
- Ground
- Aerial
- Space



- Laser Scanners
- Digital cameras
- Lidar
- Hyper-spectral



Sharing and Exchange of Data and Information



www.serviglobal.net/africa

SERVIR-EAST AFRICA

East Africa - Interactive Web Maps

The SERVIR Web Mapper allows you to access and display data on functionality from several external sources to create a new service. Using the Web Mapper interface, you can choose specific data sets and information products to type and data, display them on a base map, and further manipulate them for analysis.

Please note, if it is clear in the Interactive Web Map tool that something is not working properly, there is a likely that there are service issues with the Web Map Services (WMS) on the third-party provider's end. We are working on ways to improve our ability to detect issues with our third-party providers services in the future. Please report any issues [here](#). Thank you for your assistance!

— The SERVIR web team

USAID NASA ICIAMOD GEO

<http://horn.rcmrd.org>

Open Data for The Horn

Maps / Horn of Africa: Food Security Projection for Sep 2011 by FEWS (as of July 2011)

Legend

- Overlays
 - WORLD Country Borders
 - AFRICA TANZANIA Food Insecurity Ph
 - AFRICA EAST AFRICA Food Security C
 - WORLD Country Borders
- Base Layers
 - No background
 - bluemarble
 - OpenStreetMap

Sudan Ethiopia Uganda Kenya Tanzania

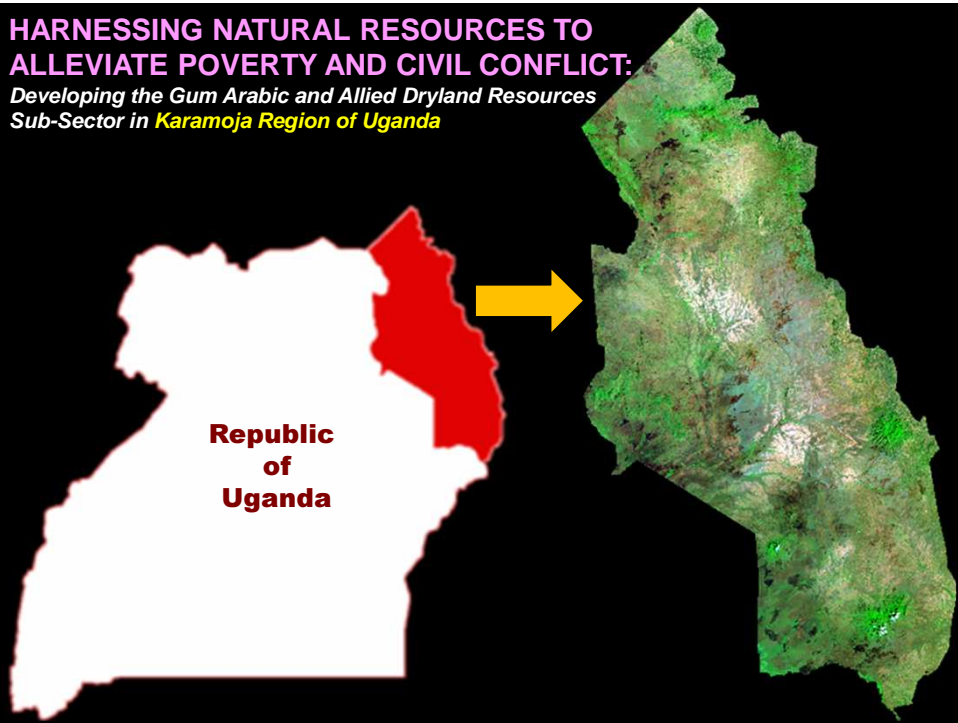
Questions Geoinformation System can Answer:

Location	<i>Where is it?</i>
Condition	<i>What is it ...?</i>
Trends	<i>What has changed since?</i>
Patterns	<i>What spatial pattern exists?</i>
Modeling	<i>What if ...?</i>

RCMRD presentation.

Impacts

- Large increase in geographic data
- Many producers
- Many users
- Better accessibility
- Nature of geographic data



Dryland Resources in Karamoja Region

Gum arabic

- ❖ is used primarily in the food industry as a stabilizer such as in the soft drinks industry (Coca Cola, etc)

Aloe

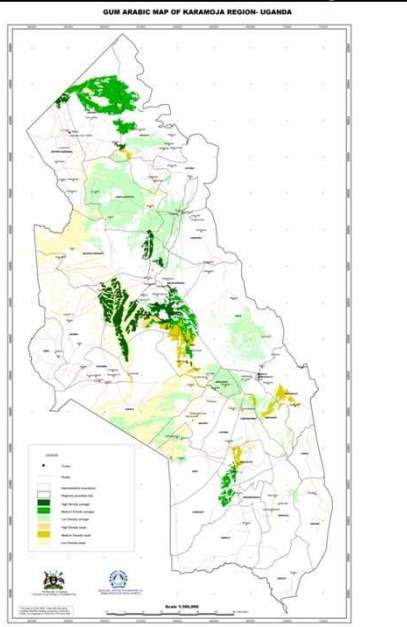
- ❖ Health products help rebuild human skin, hair and digestive health

Other dryland resources

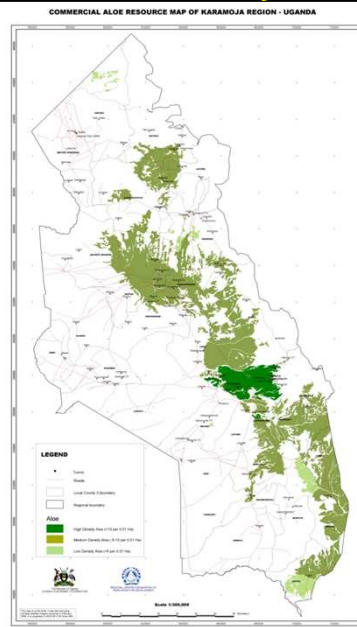
- ❖ Saddlewood – cosmetic industry
- ❖ Shea tree – shea nut butter
- ❖ Amarula – Amarula wine



Resource Maps: Distribution and Density



Gum Arabic

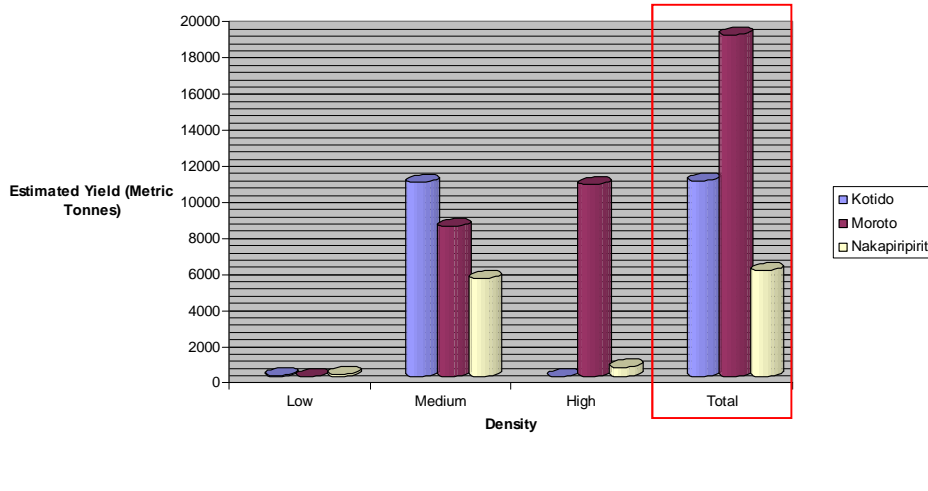


Aloe

Aloe Yield Estimation

DISTRICT	Density Class	Area (ha)	Population (stems)	Estimated Yield (MT)
Kotido	Low	8,295.98	1,451,797	72.59
	Medium	182,529.69	215,658,829	10,782.94
	High	35.00	120,750	6.04
Subtotal		190,825.67	217,231,376	10,861.57
Moroto	Low	324.52	56,791	2.84
	Medium	140,622.87	166,427,167	8,321.36
	High	45,009.33	212,669,084	10,633.65
Subtotal		185,956.71	379,153,042	18,957.65
Nakapiripirit	Low	14715.08	2,575,140	128.76
	Medium	116690.95	108,697,620	5,434.88
	High	2352.80	10,645,832	532.29
Subtotal		133,758.83	121,918,592	5,868.45
TOTAL		510,541.21	718,303,010	35,915.15

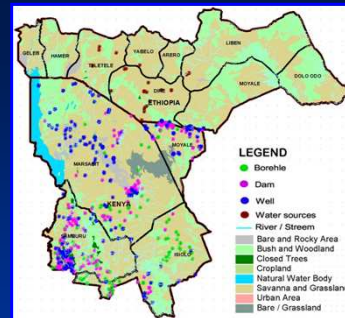
Estimated Yield for Aloe



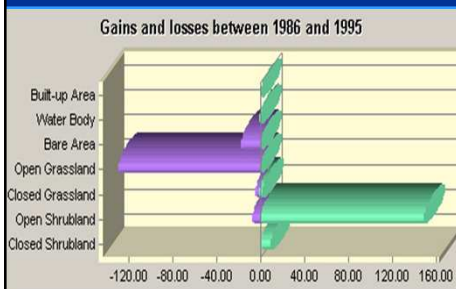
Total yield of Aloe in Karamoja Region = 35,915.15 metric tonnes

Resource & Pastoralist Mobility Mapping to Enhance Drought Risk Reduction in Northern Kenya and Southern Ethiopia

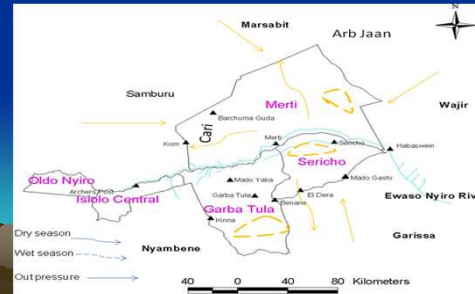
Resources Map



Resources Change Statistics

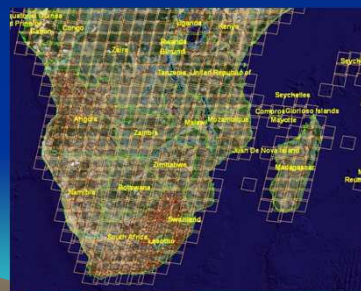
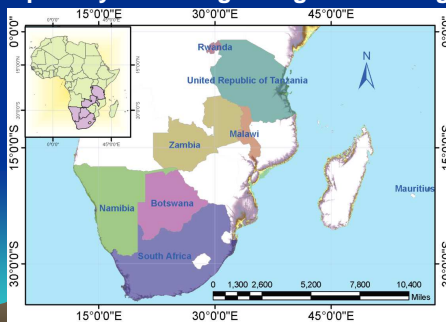


Pastoralist Mobility Map



Land Cover and Land Use Change for Greenhouse Gas Inventory

- RCMRD is working with UNFCCC on providing consistent, reliable, relevant Land Use Land Use change and Forestry (LULUCF) information by harmonizing data compilation at national and regional levels.
- We are using 30m satellite data for assessing the land cover change maps in 1995, 2000, 2005 and 2010. The land cover change statistics will enable us to quantify the changes in greenhouse gas inventory.



Water Resources Management

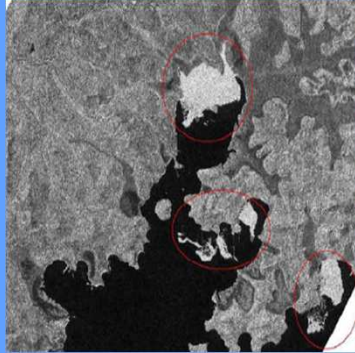
Surface Water:

- Lakes:
 - Water quality monitoring
 - Level Monitoring
- Rivers:
 - Quality Monitoring
 - Discharge monitoring
 - Management of catchment areas

Groundwater :

- Availability of Groundwater
- Monitoring of Water Quality

- Mapping surface water quality using RADAR images



Water Hyacinth

Area Covered by Hyacinth

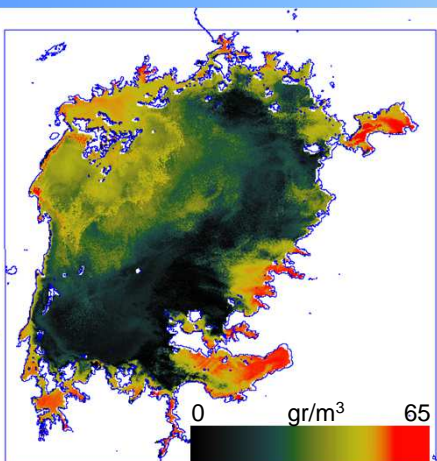
	Surface in ha			Relative surface		
	March 4 th	July 26 th	March 11 th	March 4 th	July 26 th	March 11 th
Waiya Bay	888	551		100.0	62.1	
Murchison Bay	694	731		100.0	105.5	
Gobero Bay	412	320		100.0	77.7	
Napoleon Gulf	556	301	254.26	100.0	54.1	254.26
Thruston Bay	1055	912	948.71	100.0	86.5	948.71
Hannington Bay	985	796		100.0	80.8	
Total	4590	3611		100.0	78.7	

Hyacinth movement

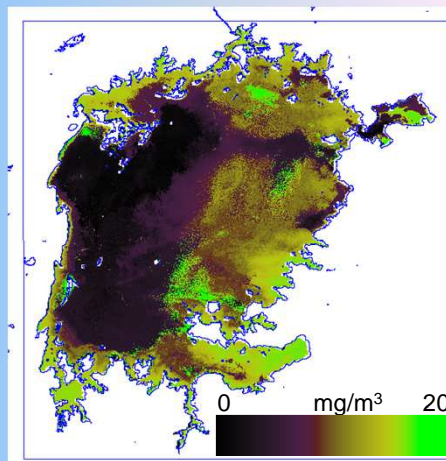


- Total suspended matter
- Chlorophyll

Water quality assessment

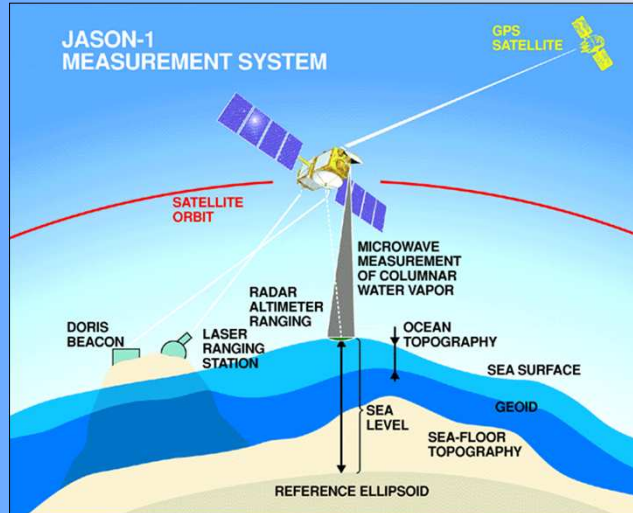


Total suspended matter derived from Envisat-MERIS Sensor



Total Chlorophyll derived from Envisat-MERIS Sensor

Lake level Monitoring using RADAR Altimetry

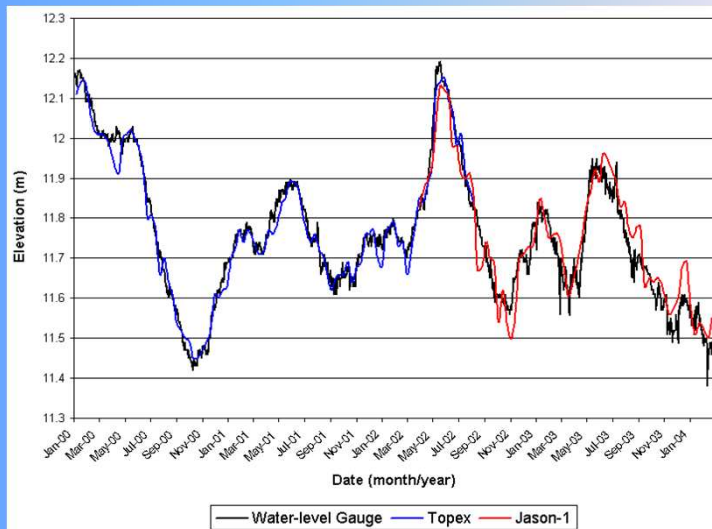


Elevation Accuracy:

- TOPEX/Poseidon data from 1992-2002 has 2-3 cm accuracy.
- Jason-1 data has 15-30 cm accuracy with 4-day time lag and 2-3 cm accuracy with 60-day time lag.



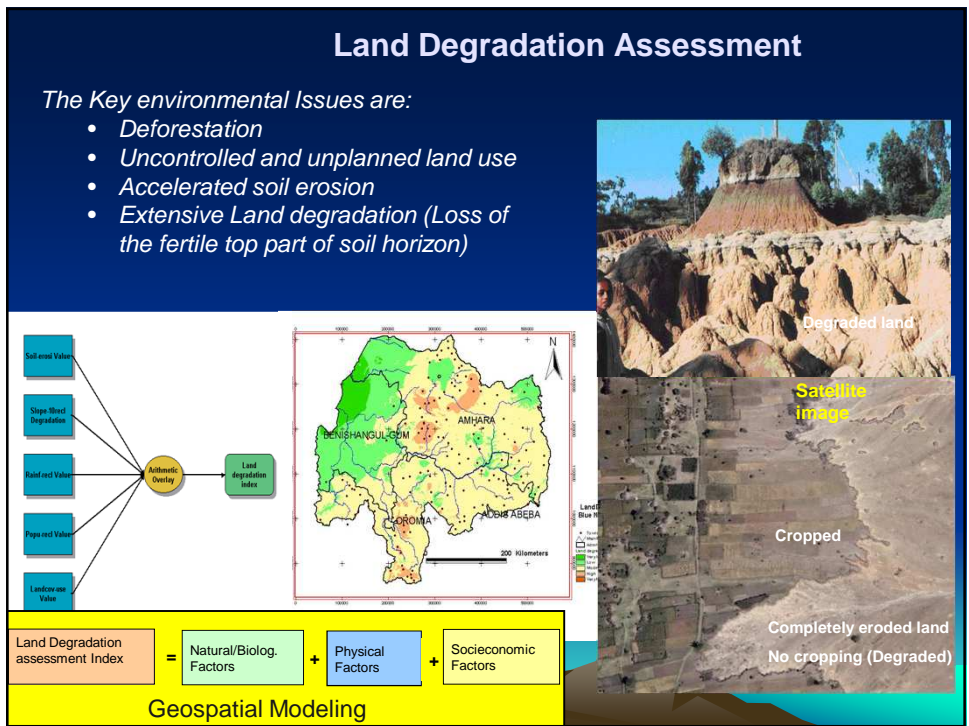
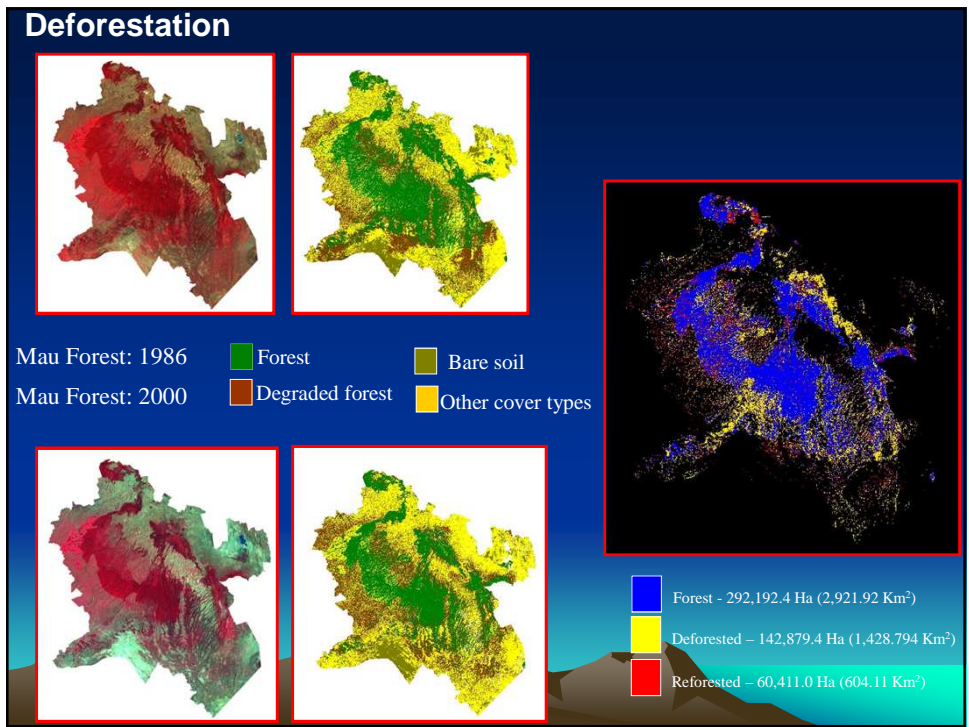
Water-Level Gauge Measurements Compared to Satellite Radar Altimeter Observations



Data Source:
 Water-level gauge data from Jinja, Uganda (near Lake Victoria's outlet)
 Satellite radar altimeter data from USDS/NASA/UMD at:
http://www.pecad.fas.usda.gov/cropexplorer/global_reservoir/

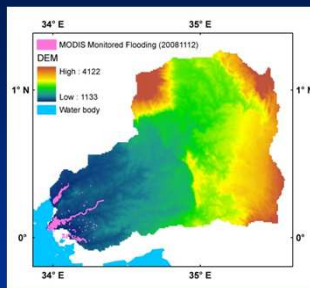


U.S. Department of Agriculture (USDA)
 Foreign Agricultural Service (FAS)
 Office of Global Analysis (OGA)



Disaster Management

Flood Potential/Forecast



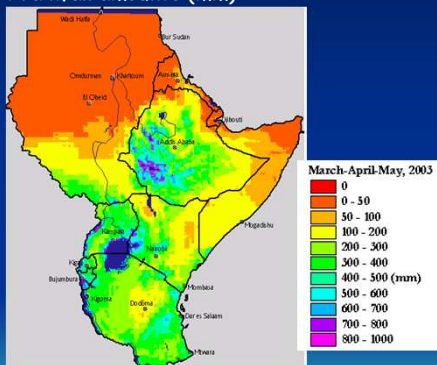
Forest Fires Monitoring



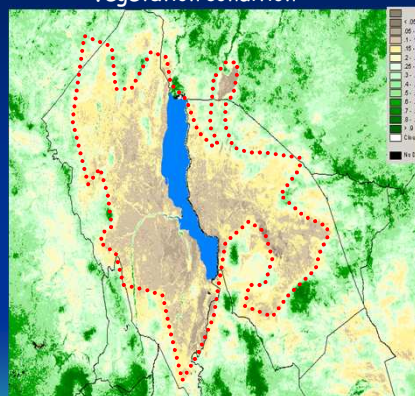
Famine Early Warning

Satellite based rainfall and crop yield forecast

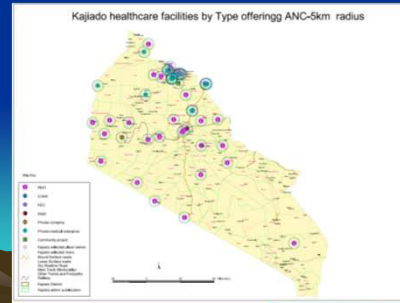
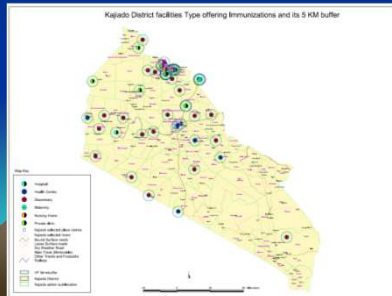
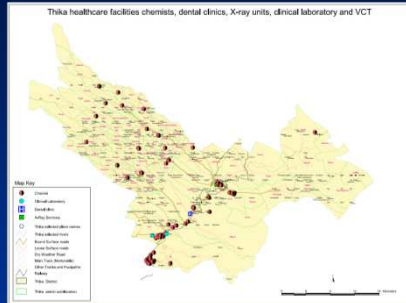
Rainfall amounts (mm)



Vegetation condition



Health Service Availability Mapping



Geopolicing Mapping Systems

REPUBLIC OF KENYA
Geo-Policing Database Management Tool
 Service to all Utumishi kwa wote

Buttons: Police Station/Post General details, Crime Details per Station/Post

General details

HR and F form no	
Name of police	Pwani police post
Total staffs	65
Total males	58
Total females	7
Incharge name	Catherine Ringera
Incharge title	Chief Inspector
Telephone (In-charge / office)	0722883236

Record No: 1 of 12

Buttons: Add record, Edit record, Delete record, Refresh records, Search in record, Report builder

Kenya Case

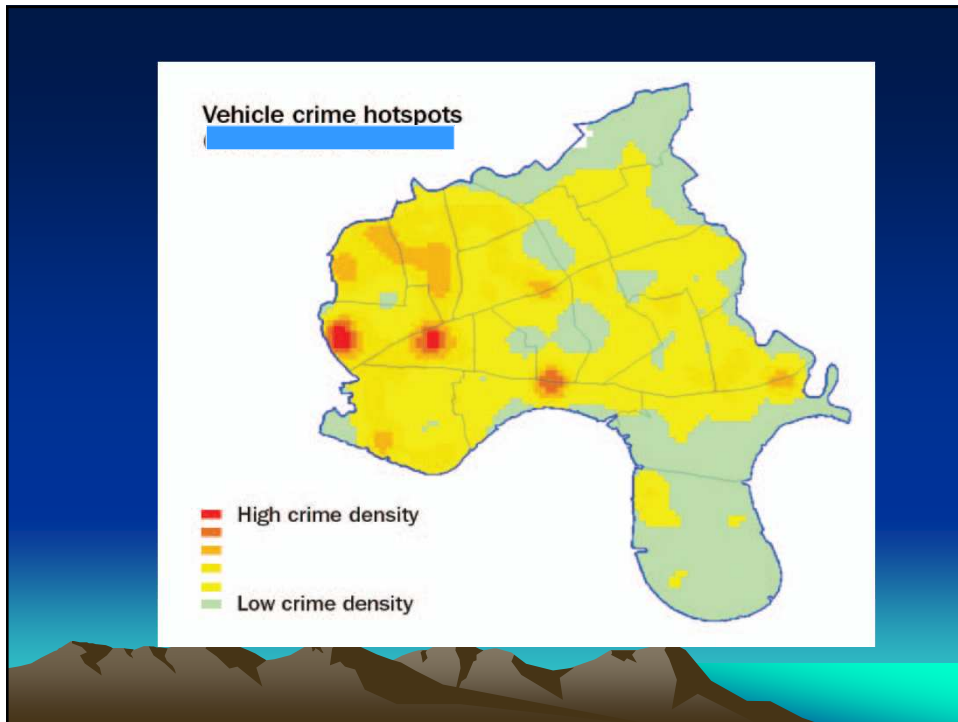
THE MINISTRY OF SAFETY AND SECURITY
GEOPOLICING SECURITY MAPPING SYSTEM (GSMS)

User Name:

Password:

Buttons: Cancel, Log In

Namibia Case



Current Initiatives

- Production of fundamental data sets
- Modernization of Geodetic Networks
- LMIS
- NSDI
- Land Reforms/policy

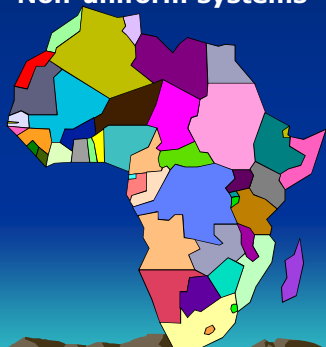
National Fundamental Data Sets

Production and maintenance of :

- Topographic Map Series
- Geodetic Control Network
- Aerial Photography and Satellite Imagery
- Cadastral Maps
- Land use cover maps
- Special Maps

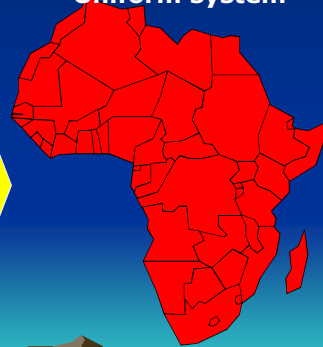
AFRICAN GEODETIC REFERENCE FRAME (AFREF) A Modern and Unified Reference Frame for Africa

Non-uniform systems

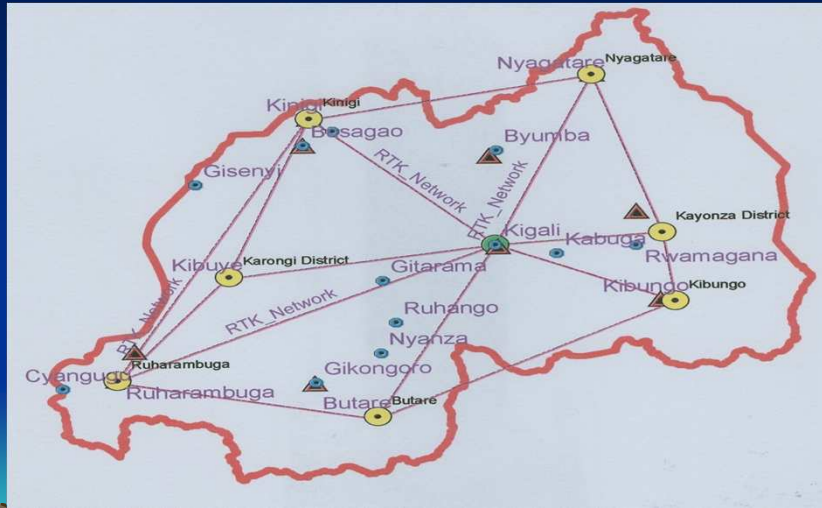


**GNSS
+
ITRF**

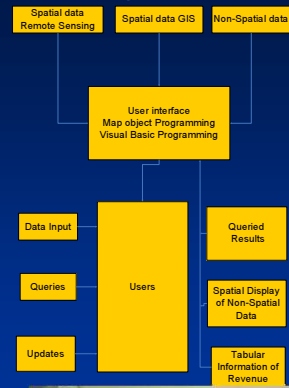
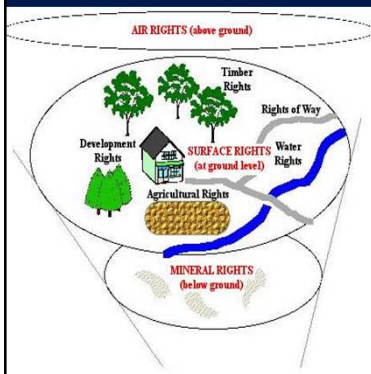
Uniform system



CORS Networks



Land Management Information Systems

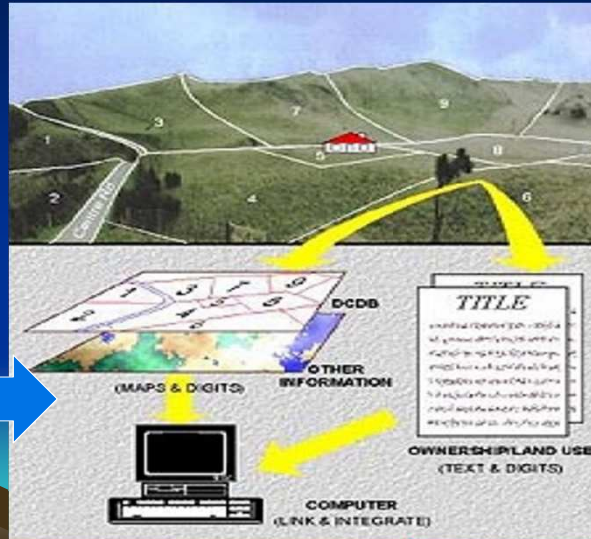


LMIS Conceptualization

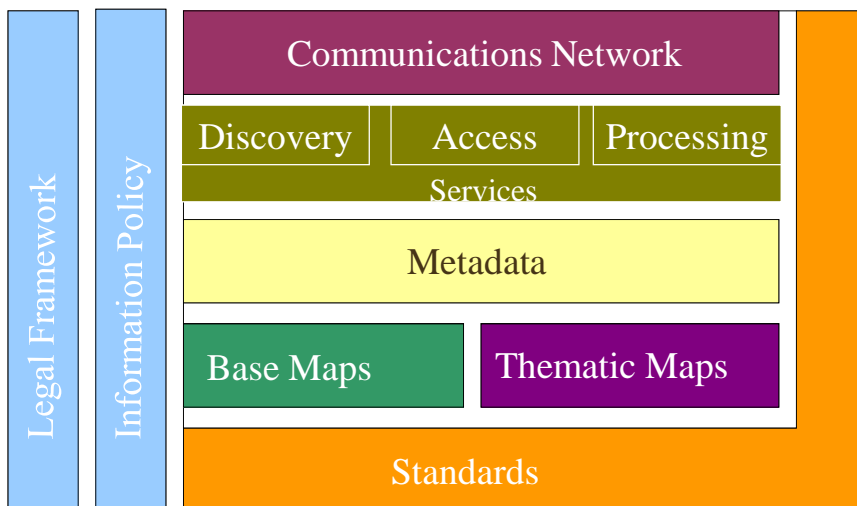
Other Data Sources

- Reports
- LU/LC
- Soil Sampling
- Agriculture
- Water
- Socio-economics
- Land Records

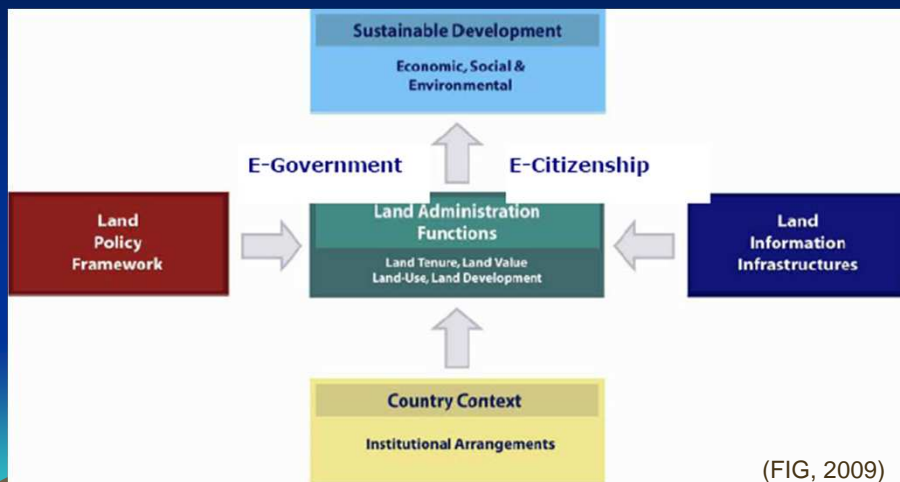
Et al



Key Components of SDI

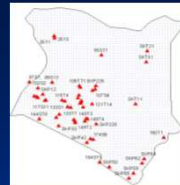


Land Policy & Institutional Reforms



Challenges

- Availability of Fundamental Data Sets
- Out dated Map Production Technologies
- Institutional Frameworks
- Funding
- Human Resource Capacity



Solution

- Modern Technologies



- Institutional reforms



- New Funding mechanisms

