

Keynote Address presented at the AfricaGIS 2017 Conference  
United Nations Economic Commission for Africa, Addis Ababa, Ethiopia  
Tuesday, 21<sup>st</sup> November 2017

# **Geo-information:**

## **A Key Pillar for Modern-day Decision Makers**

Presented By:

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Governor Vihiga County  
Kenya

&

**Erick Khamala**

Managing Director, LocatIT Ltd  
Kenya

# PRESENTATION OUTLINE

- ❖ Introduction
- ❖ Trends and Opportunities in EO, GIS and allied Geo-ICTs
- ❖ Talking Development: Examples of role played by GI Technologies in planning and decision making:
  - Africa
  - Emuhaya Constituency, Kenya
  - Vihiga County, Kenya
- ❖ Conclusion

# INTRODUCTION: MODERN-DAY DECISION MAKER



**Geospatial technologies**  
(EO, Navigation & Positioning, and  
Communication), **and allied**  
**ICT technologies**



# Information for Planning, Policy and Decision Support



# Transformative Interventions

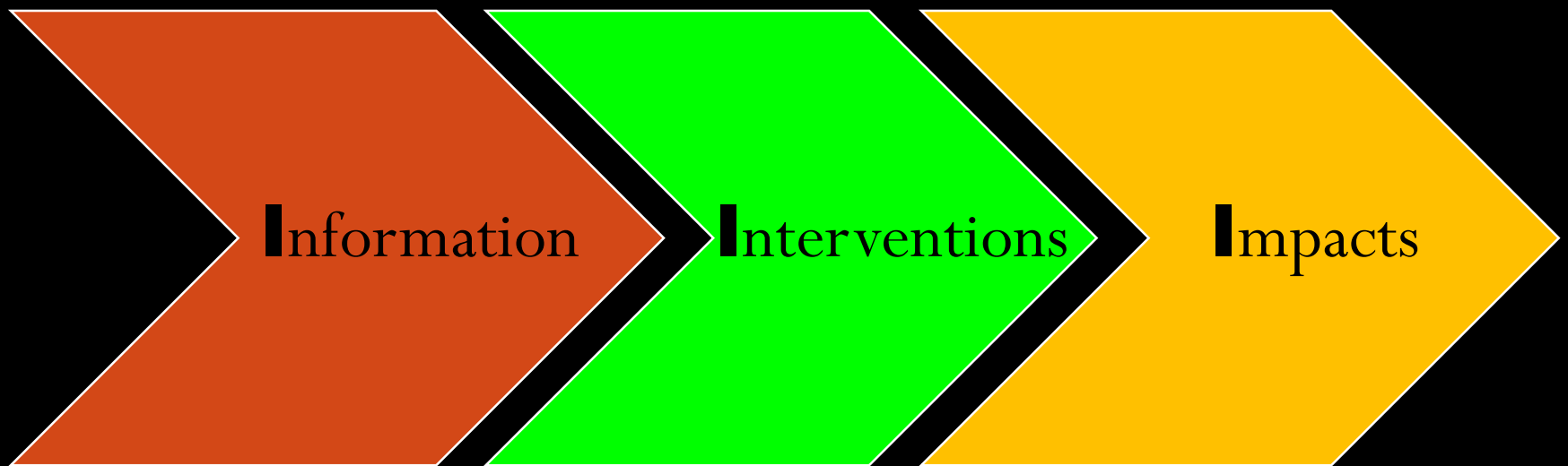




# Societal Impacts



# The 3is Framework™





# TRENDS AND OPPORTUNITIES

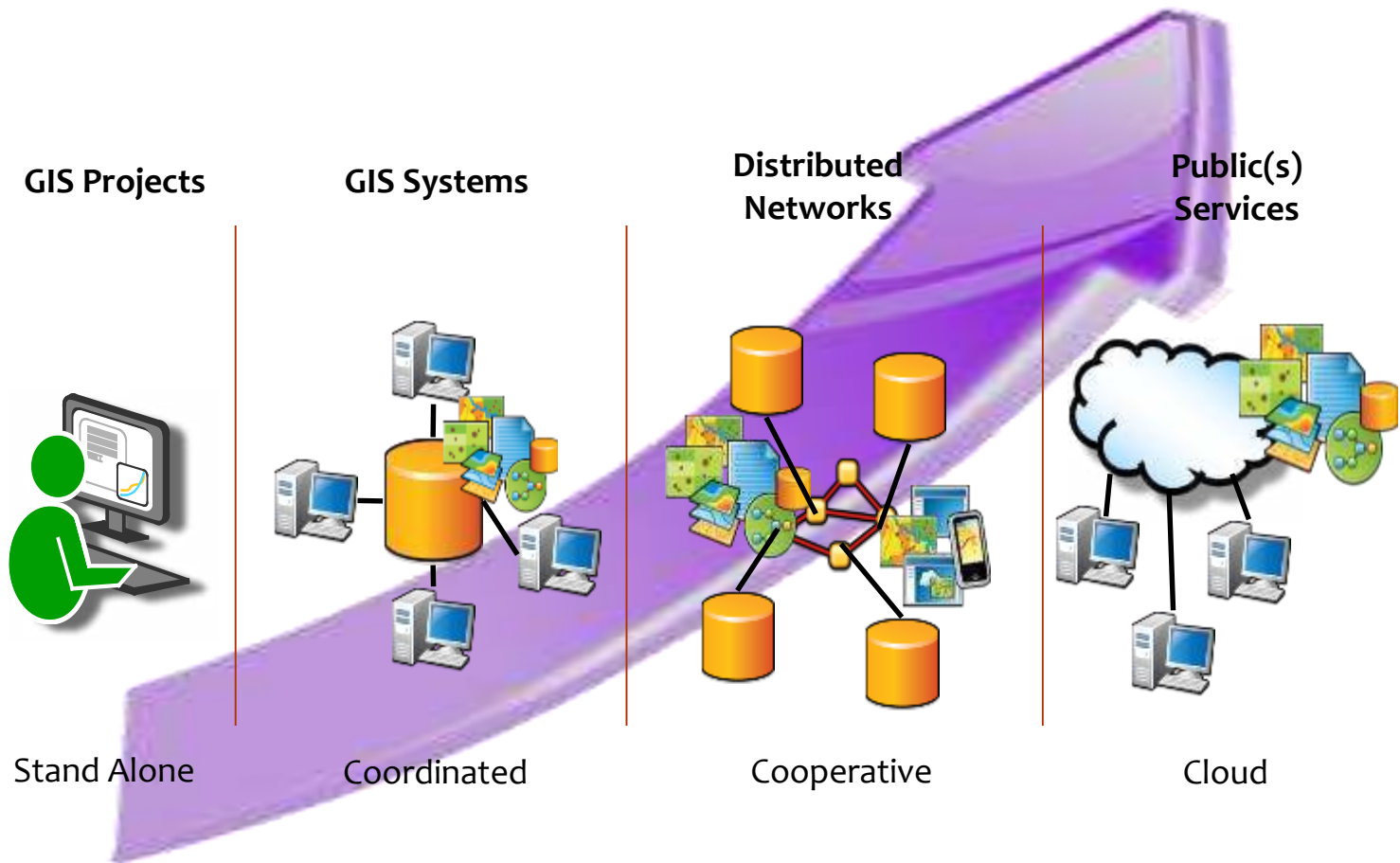
In Earth Observation, GIS and allied Geo-ICTs

# Trends & opportunities in GI

*with focus on Africa*

- 
- ❖ Increasing number and variety of EO satellites and airborne & in-situ sensors
  - ❖ Reducing costs of EO data
  - ❖ Increasing number of freely available EO data (e.g Copernicus, Landsat, etc.)
  - ❖ Increasing integration and number of supportive technologies (e.g. cloud computing, mobile telephony, etc.)
  - ❖ Increasing number of continental GI programs (e.g GMES & Africa, SERVIR-Africa, Horizon 2020, etc.)
  - ❖ Increasing number of international and national policy and legal frameworks supporting GI applications (e.g African Space Policy, SDGs, Paris Agreement, etc.)
  - ❖ Emerging GI application areas (e.g crop and livestock insurance, Internet of Things, etc.)

**Technology advances over the years made it technically possible for more people and organizations to be connected.....**



**.... Allowing a myriad of applications in all sectors**

*Smartphones have GPS gadgets*

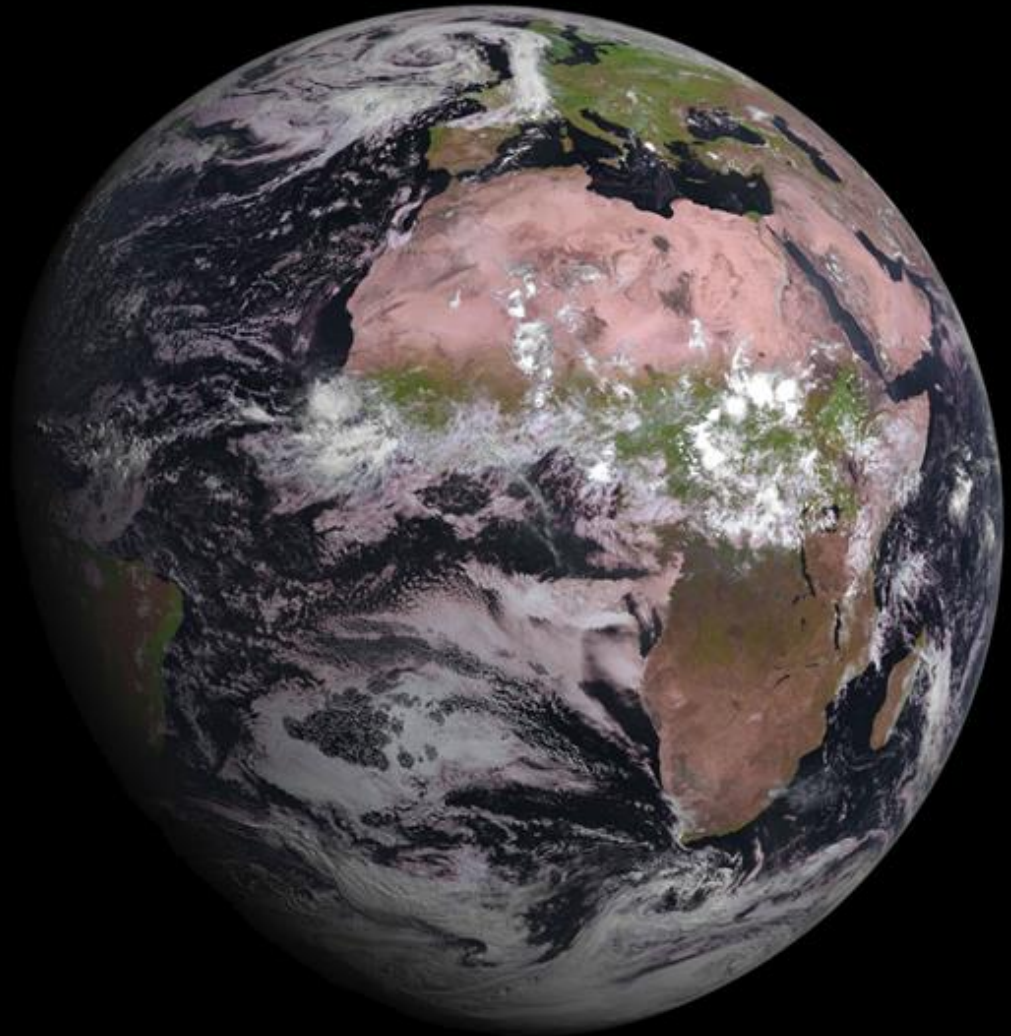




# TALKING DEVELOPMENT

*Examples of role played by  
Geo-information Technologies  
in planning & decision making*

- *In Africa*
- *In Emuhaya Constituency*
- *In Vihiga County*



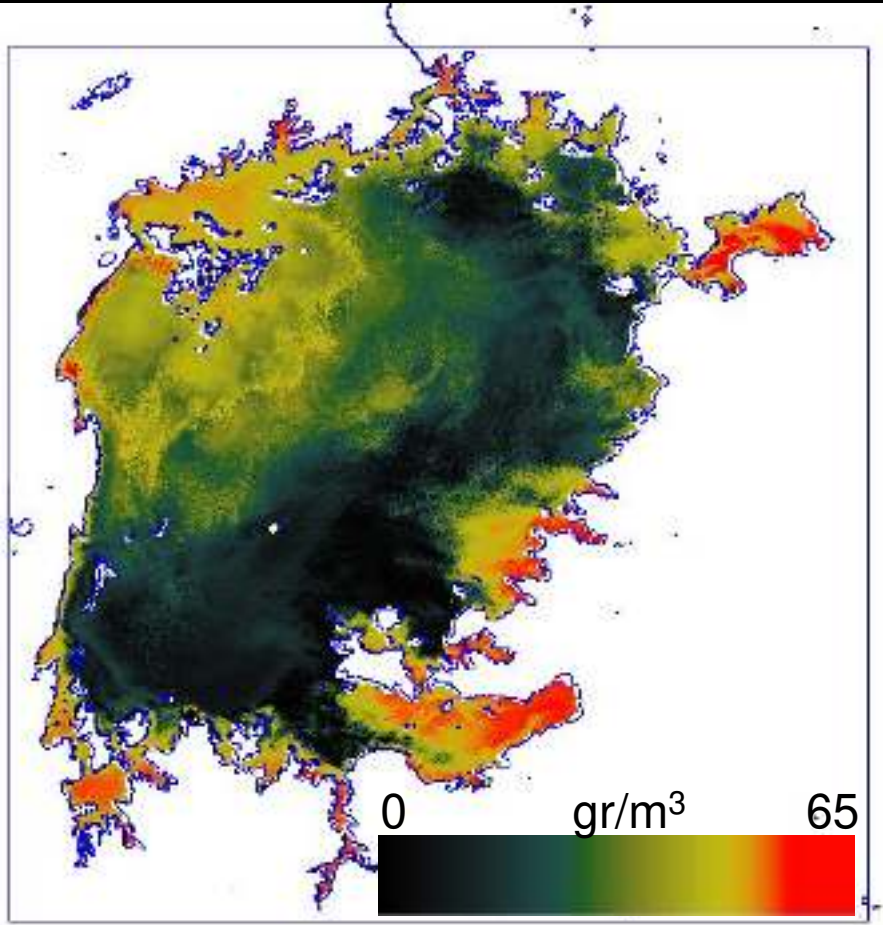
MSG 4 SEVIRI First Image  
4<sup>th</sup> August 2015 10:00 UTC

In 2014, the Lake Turkana Wind Power Project, the largest renewable energy project in Sub-Saharan Africa was launched in northern Kenya and today has 365 turbines installed at Loiyangalani in Marsabit, Kenya

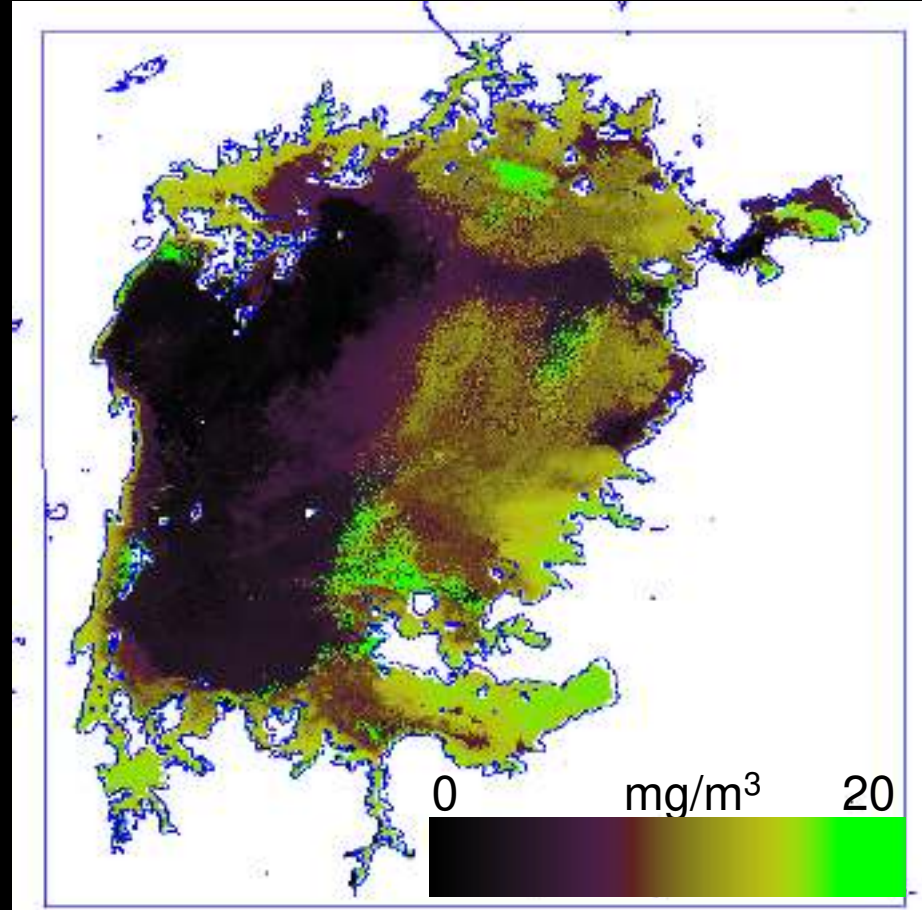




# Mapping Suspended Matter, Chlorophyll and Yellow Matter from Space



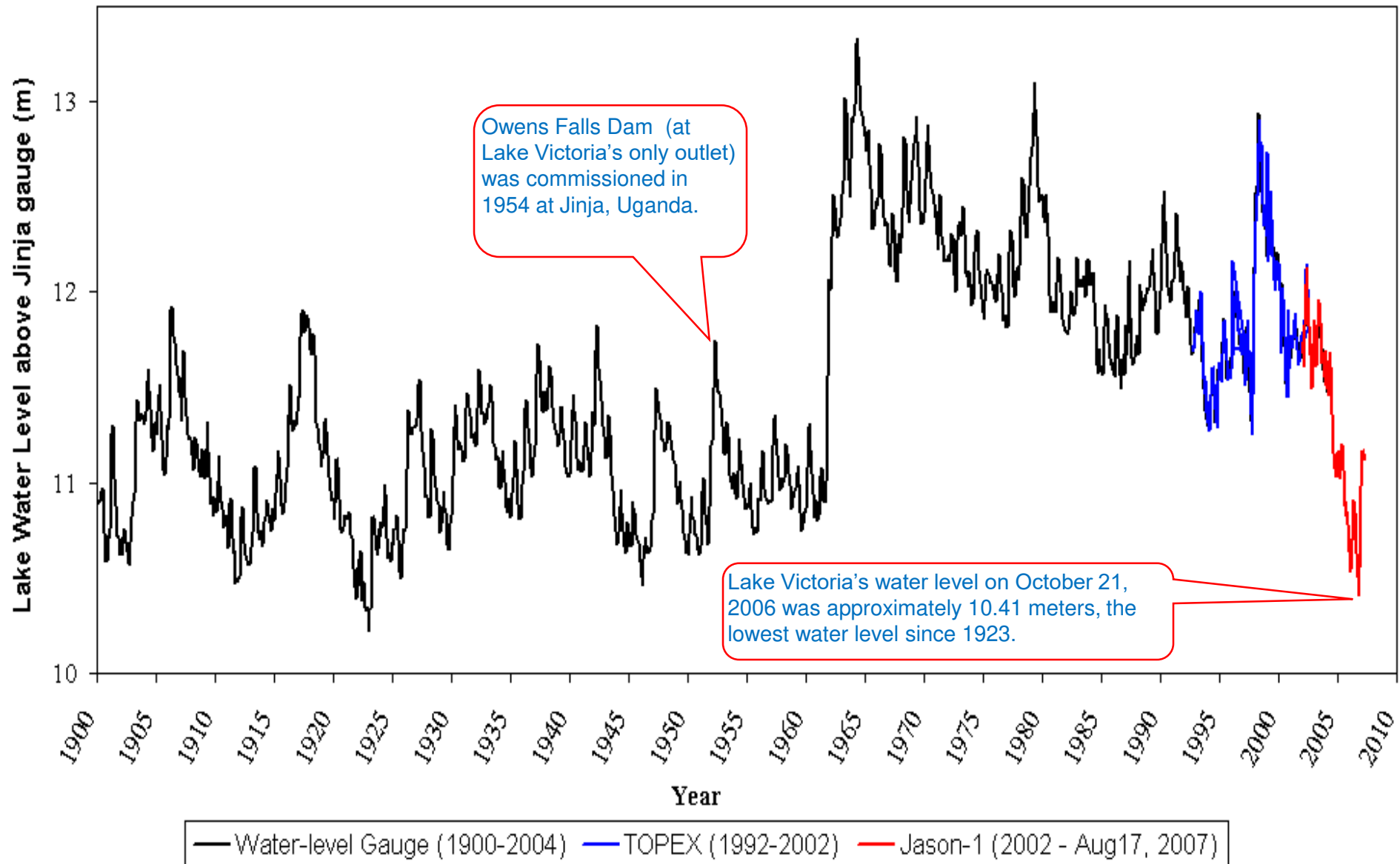
Total suspended matter derived  
from Envisat-MERIS Sensor

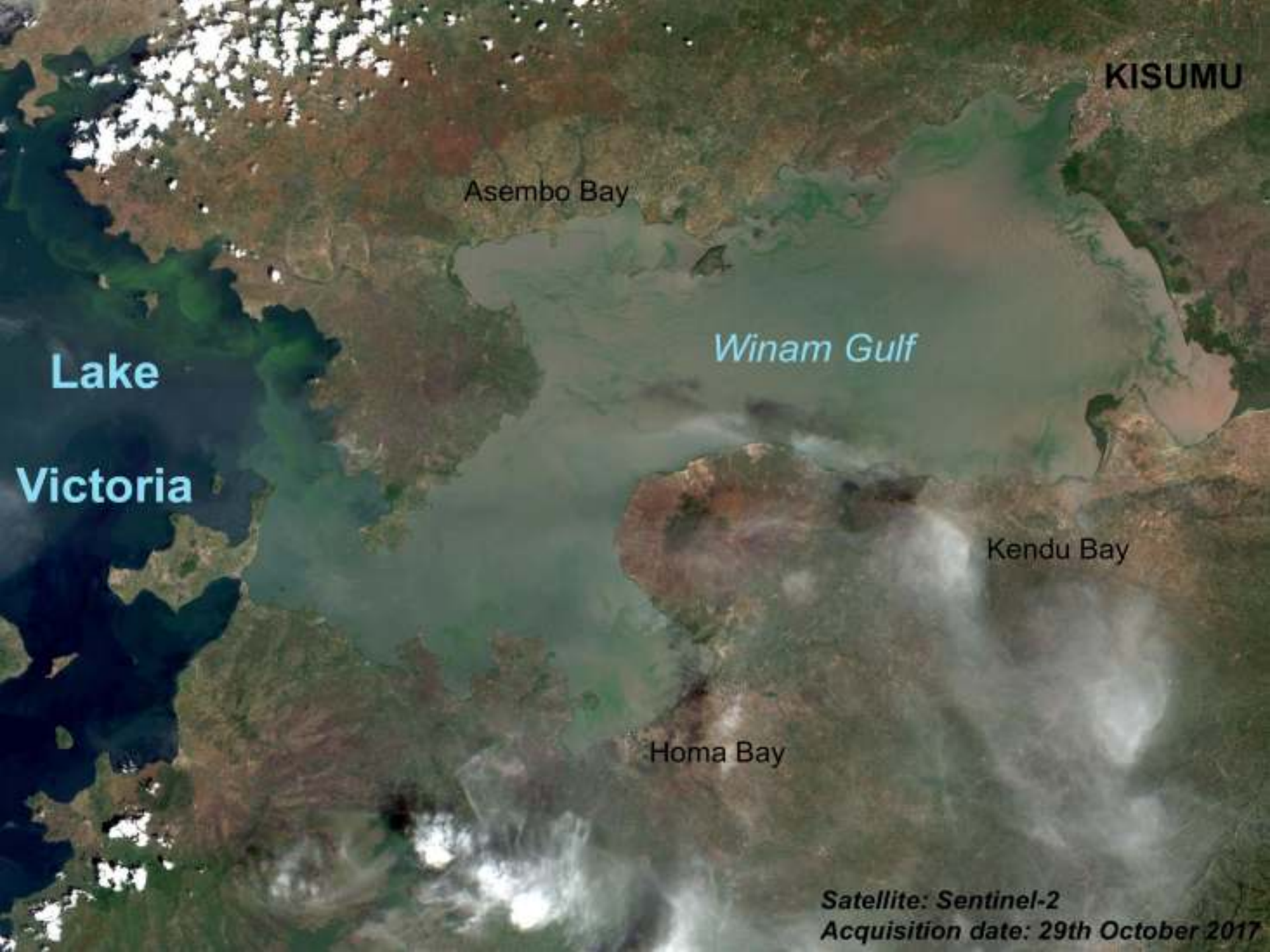


Total Chlorophyll derived  
from Envisat-MERIS Sensor



# Lake level fluctuation monitoring from Satellite





KISUMU

Asembo Bay

Lake

*Winam Gulf*

Victoria

Kendu Bay

Homa Bay

Satellite: Sentinel-2

Acquisition date: 29th October 2017

# **The Devolved System of Governance in Kenya**

- ❖ Constitution provides for devolved Government system
- ❖ New Government system ushered on March 4<sup>th</sup> 2013:
  - National Government
  - 47 County Governments
- ❖ Parliamentary system at national level comprising:
  - The National Assembly (349 Members of Parliament)
  - The Senate (67 Members of Senate)
- ❖ County Governments comprise:
  - The Executive (Governor & ministers)
  - The County Assembly / Parliament (elected ward representatives)
- ❖ Constituency Development Fund (CDF): a fund that supports development at constituency level
- ❖ County Government Budget for recurrent expenditures and county development

**Note: Counties in Kenya comprise between 2 – 17 Constituencies**



# **Emuhaya Constituency**

*Pleiades image, 3<sup>rd</sup> Feb. 2016*





*Examples from the Education Sector*

# **EMUHAYA CONSTITUENCY: PUBLIC EDUCATION FACILITIES BY BUILDING TYPE**







# *New Education Infrastructural Projects: Ebunangwe High School*



# Status of Electricity in Public Education Facilities





34°34'0"E

34°36'0"E

34°38'0"E

34°40'0"E

# **EMUHAYA CONSTITUENCY: PUBLIC EDUCATION FACILITIES BY MAIN SOURCE OF ENERGY**

0°6'0"N

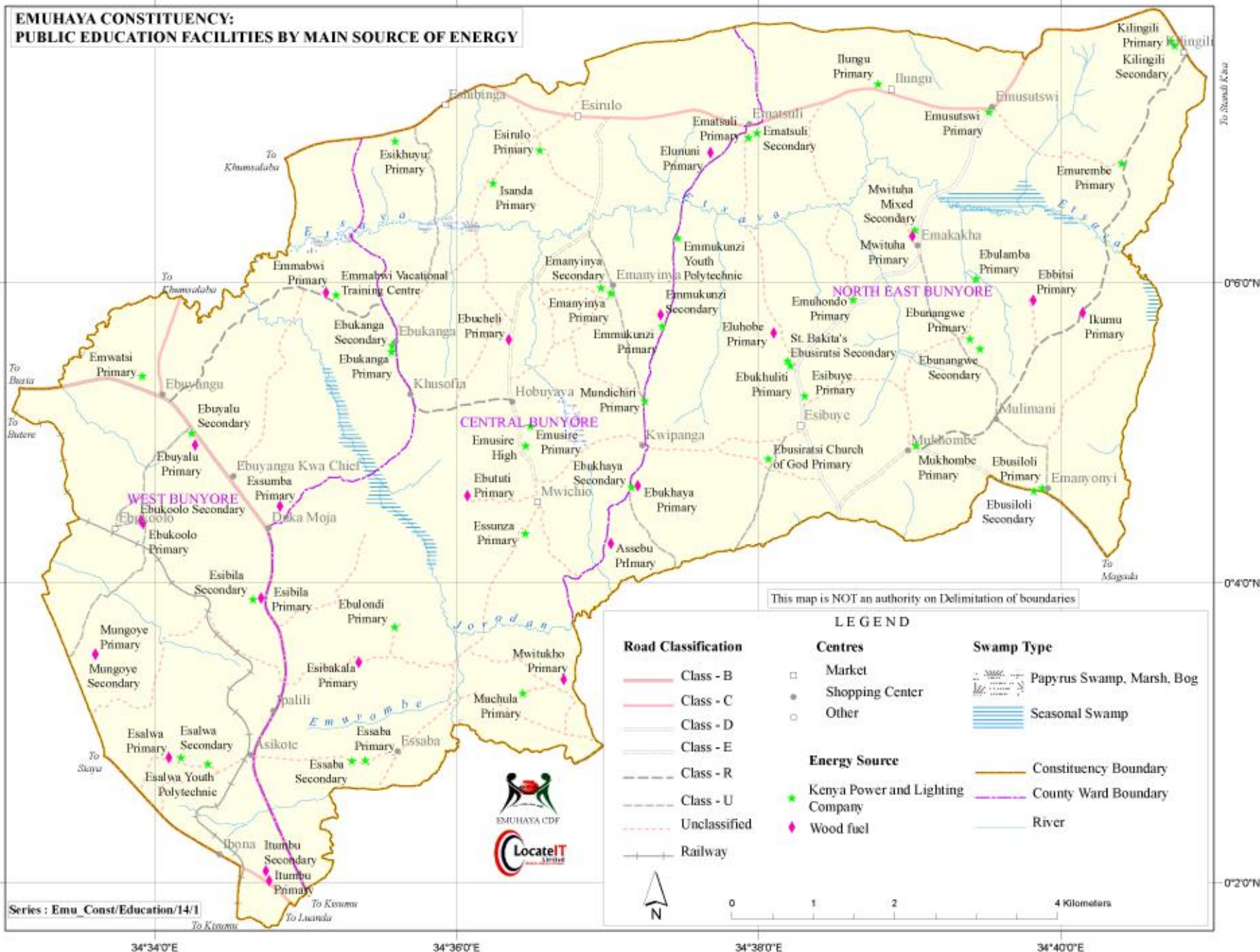
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0°4'0"N

0°4'0"N

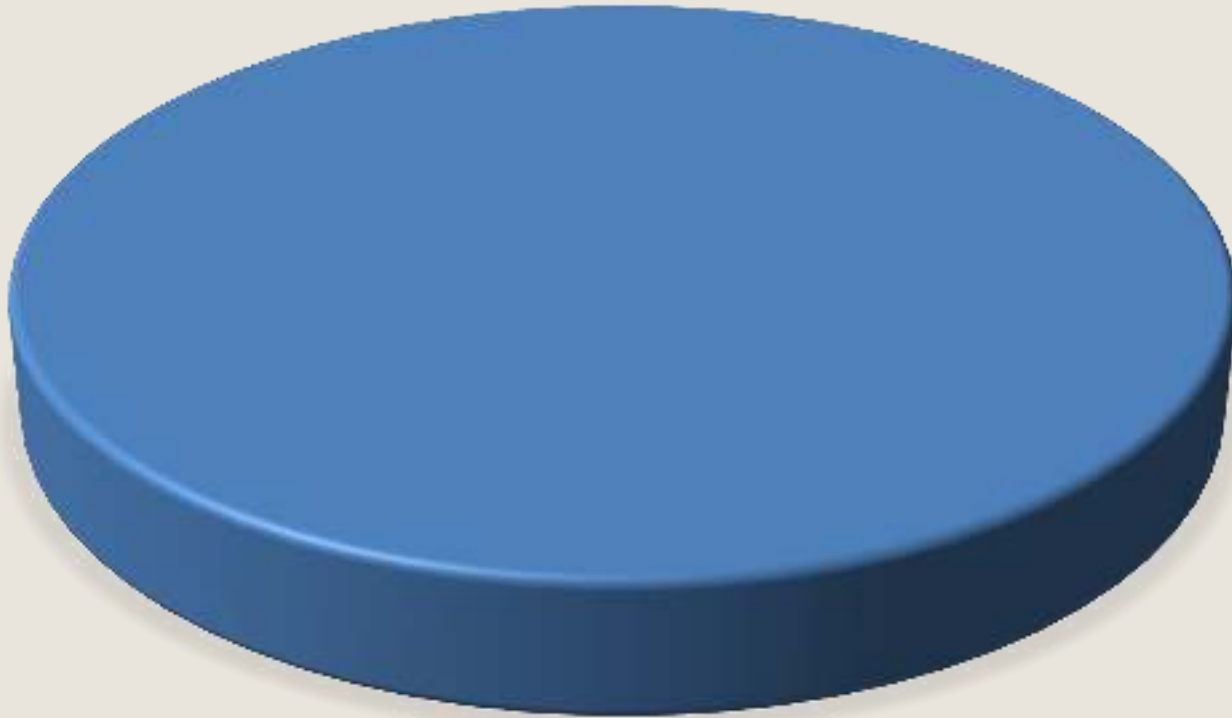
0°2'0"N

0°2'0"N



**Status of electricity connectivity in Education Facilities  
in Emuhaya Constituency in August 2015**

Has electricity - 66 facilities (100%)



Accessing school ● ● ● ● ●







CDF FUNDED 2014

**Ebucheli Primary School**

# Examples from the Health Sector





**EMUHAYA CONSTITUENCY: PUBLIC HEALTH FACILITIES BY AVAILABILITY OF MATERNITY WARDS**

**LEGEND**

**Road Classification**

- Class - B
- Class - C
- Class - D
- Class - E
- Class - R
- Class - U
- Unclassified
- Railway

**Centres**

- Market
- Shopping Center
- Other

**Status**

- Has Maternity Wards
- Has No Maternity Wards

**Swamp Type**

- Papyrus Swamp, Marsh, Bog
- Seasonal Swamp

**Other Symbols**

- Constituency Boundary
- County Ward Boundary
- River

**Map Labels:**

**WEST BUNYORE:** Ebuyangu, Ebuyangu Kwa Chief, Ebukoolo, Duka Moja, Ipalili, Asikote, Essaba, Ibona.

**CENTRAL BUNYORE:** Ebukanga, Ebukanga Health Centre, Emusire Model Health Centre, Hobuyaya, Kwipanga, Mwichio, Jordan, Emuyombe.

**NORTH EAST BUNYORE:** Ematsuli, Ematsuli Dispensary, Emakakha, Ebusiratsi Health Centre, Mulimani, Esiarambatsi Health Centre, Emanyonyi, Emusutswi, Ilungu, Esirulo, Emanyinyia.

**Scale:** 0 to 4 Kilometers.

**Disclaimer:** This map is NOT an authority on delimitation of boundaries.









**Logos:** EMUHAYA CDF, LocateIT.

**Series:** Emu\_Const/Health/18A/1

This map is NOT an authority on delimitation of boundaries

### LEGEND

### Road Classification

-  Class - B  
 Class - C  
 Class - D  
 Class - E  
 Class - R  
 Class - U  
 Unclassified  
 Railway

### Centres

- ☐ Market
- ☒ Shopping Center
- ☐ Other

### Status

- ★ Has Maternity Wards
- ★ Has No Maternity Wards

## Swamp Type

-  Papyrus Swamp, Marsh, Bog  
 Seasonal Swamp  
 Constituency Boundary  
 County Ward Boundary  
 River



0 1 2 4 Kilometers

Series : Emu\_Const/Health/18A/1

34°34'0"E

34°36'0"E

34°38'0"E

34°40'0"E



Construction completed in 2015

Construction completed in  
2016

Land purchased in  
2015

Esirulo Disp.

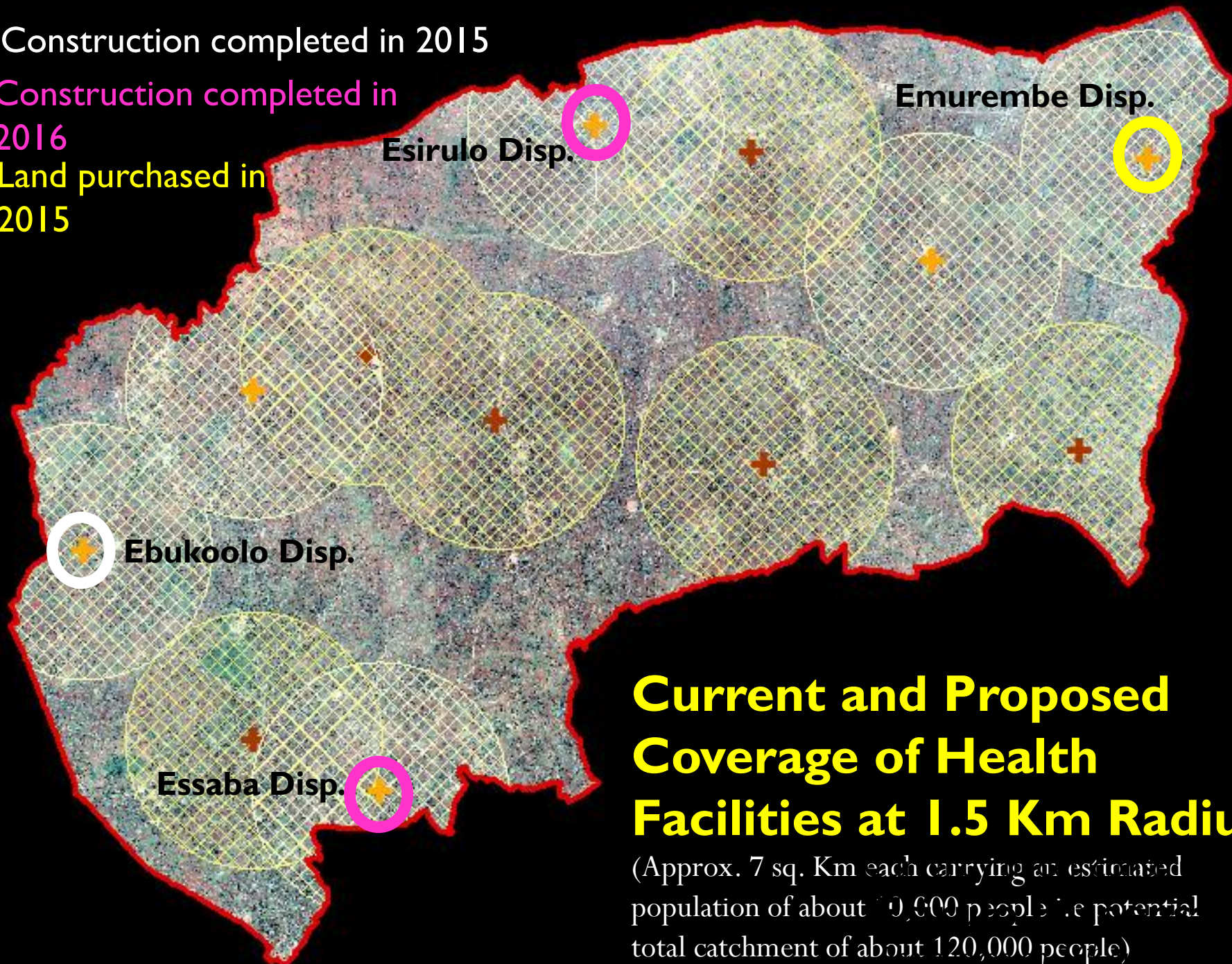
Emurembe Disp.

Ebukoolo Disp.

Essaba Disp.

## Current and Proposed Coverage of Health Facilities at 1.5 Km Radius

(Approx. 7 sq. Km each carrying an estimated  
population of about 10,000 people i.e potential  
total catchment of about 120,000 people)

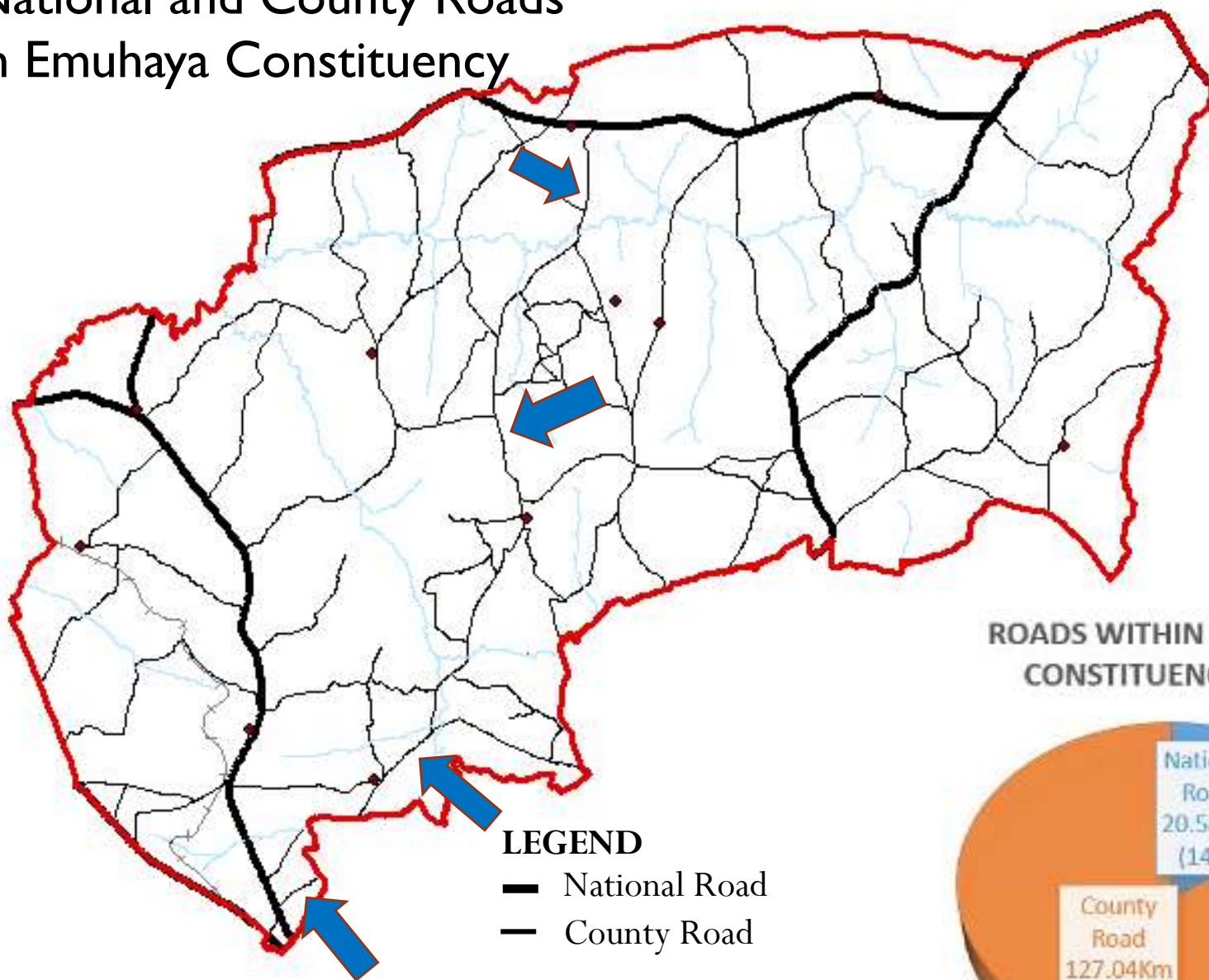




# ROADS



# National and County Roads in Emuhaya Constituency



ROADS WITHIN EMUHAYA  
CONSTITUENCY (KM)





**2016**





**2016**





2016







# Police and AP Posts in Emuhaya Constituency





Dr Wilbur Ottichilo  
for Vihiga County  
Governor 2017

@WKO4VIHIGA

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 write a comment...

😊 📷



Dr Wilbur Ottichilo for Vihiga County Governor 2017

posted 10 photos in Instagram.  
22 June at 12:22 · 🌐

The great people of Emuhondo sub-location in Ebusamia location, N.E. Bunyore Ward in Emuhaya sub-county received 1M shillings today to fund the construction of Mwituha police post from Emuhaya constituency CDF. This comes after they acquired an acre of land through CDF funding. Construction is commencing soon.

Strengthening security and instilling peace in Vihiga county is a priority for my people.

#VihigaAgenda #OttichiloTanoKwanza #MaendeleoBilaCorruption



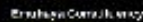


## **Example of Visibility Forum:**

### **Launch of Emuhaya Constituency GIS / ICT Centre**



### Constituencies, Wards and Polling Stations

[illegible]

Dr. J. D. Lindemann, M.D., Director  
Medical Department, U.S. Navy  
1000 19th Street, N.W., Wash., D.C.  
20390-5000  
Telephone: (202) 679-1000  
Fax: (202) 679-1001

[illegible]

白粉川芎

2000

SABTY 6

1. **Introduction**

Sabrina Corbelli

[illegible][illegible]

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Laurinda Coralline et al.

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**SUBJECTS:** Twenty young, healthy, male subjects participated in three experiments. They had no previous experience with the apparatus or task.

Landfill Contribution:

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1. **What is the main purpose of the study?**  
 2. **What are the research objectives?**  
 3. **What is the study design?**  
 4. **What is the study population?**  
 5. **What are the inclusion and exclusion criteria?**  
 6. **What are the variables being studied?**  
 7. **What are the data collection methods?**  
 8. **What are the data analysis methods?**  
 9. **What are the results of the study?**  
 10. **What are the conclusions of the study?**  
 11. **What are the limitations of the study?**  
 12. **What are the implications of the study?**

## ALL LIFE

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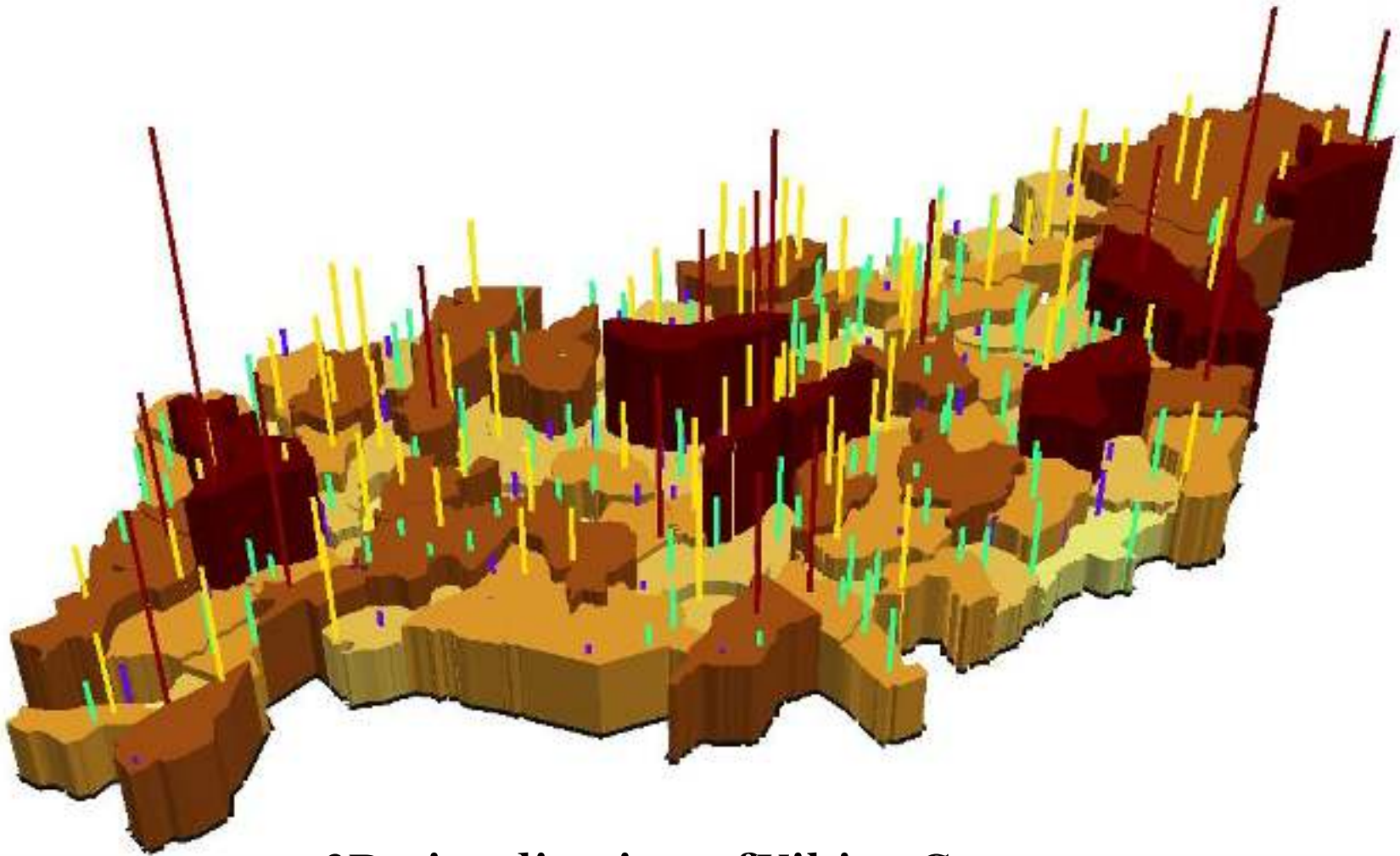
**Authors' disclosures of potential conflicts of interest and author contributions are found at the end of this article.**



# Campaign Intelligence System (CIS)



# Key Voter Statistics



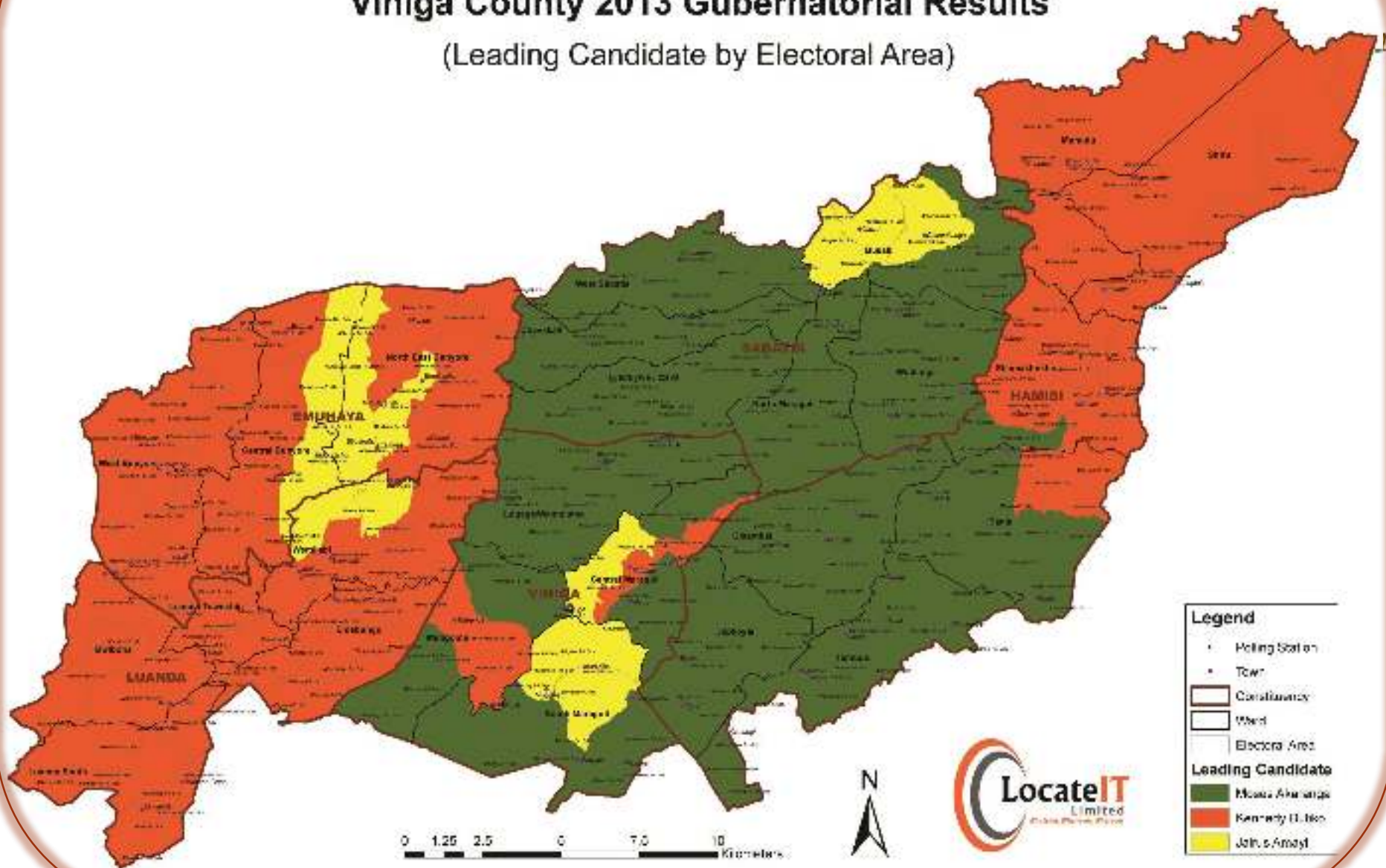
## 3D visualization of Vihiga County:

- Registered voters in 2017 at ward level (blocks)
- Registered voters in 2017 per polling station (lines)

# Competition Analysis

## Vihiga County 2013 Gubernatorial Results

(Leading Candidate by Electoral Area)



# TOWARDS THE VIHIGA CDIS

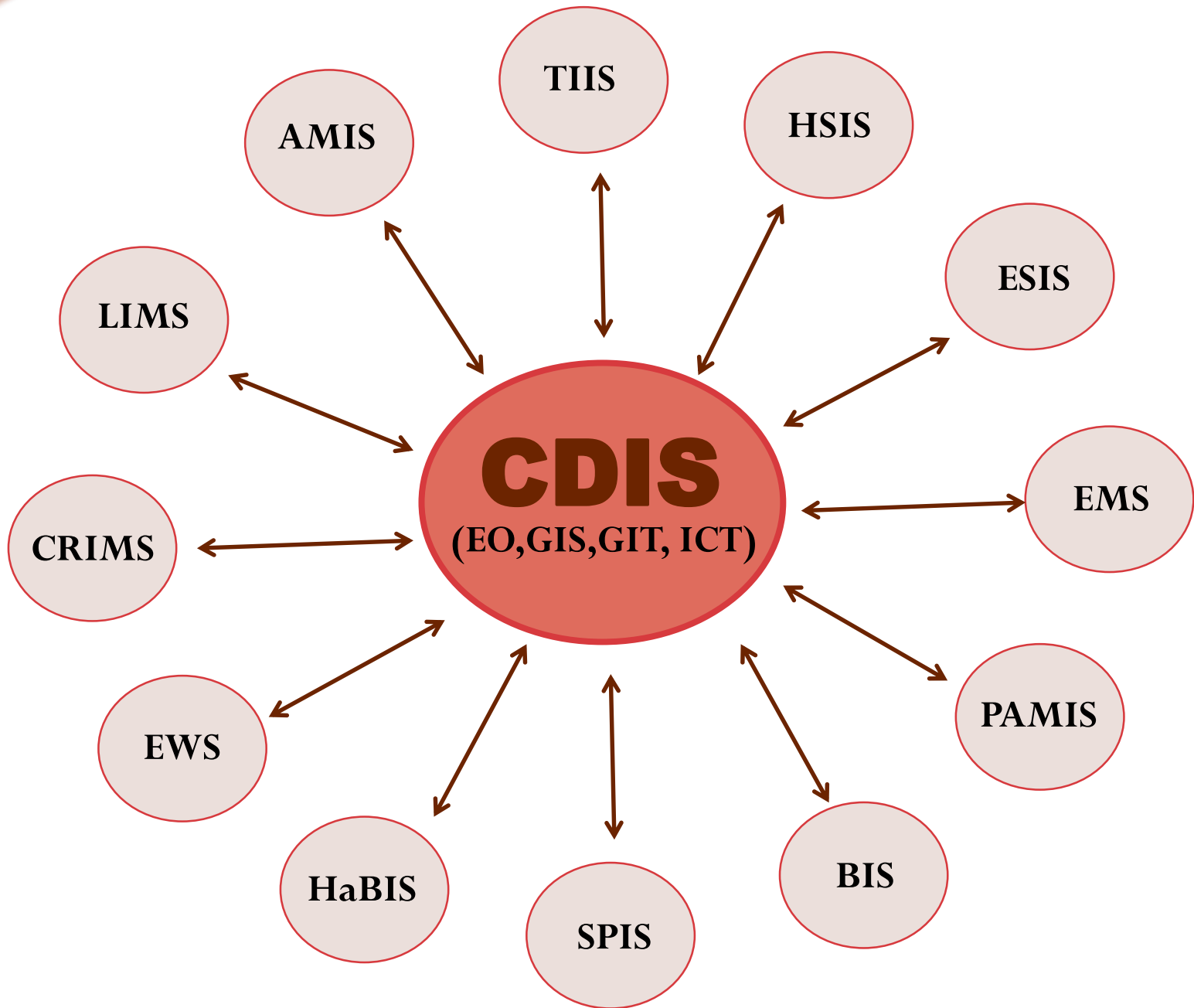
- ❖ GI activities in Vihiga County are coordinated by the Department of Physical Planning, Land and Housing
- ❖ The GI activities have been conceived along the **County Development Information System (CDIS) framework** to effectively support the various functions defined under the Fourth Schedule on Distribution of Functions between National and County Governments. These include:
  - Health
  - Education
  - Infrastructure and transport
  - Agriculture
  - Environment and natural resources
  - Commerce and industry
  - Etc.

The **CDIS** comprises the following sub-systems:

- i. Land Information Management System (LIMS)
- ii. Agricultural Management Information System (AMIS)
- iii. Transport Infrastructure Information System (TIIS)
- iv. Health Services Information System (HSIS)
- v. Education Services Information System (ESIS)
- vi. Environment Monitoring System (EMS)
- vii. Public Amenities Management Information System (PAMIS)
- viii. Businesses Information System (BIS)
- ix. Spatial Planning Information System (SPIS)
- x. Housing and Buildings Information System (HaBIS)
- xi. Early Warning and Response Information System (EWARIS)
- xii. County Revenue Information Management System (CRIMS)

The CDIS will support the **3is Framework** (Information–Interventions–Impacts) in Vihiga County





## Vihiga County to date .....

- ❖ Geo-information needs assessment undertaken to inform the CDIS
- ❖ Establishing the Geospatial Technologies Services under the Department of Physical Planning, Land & Housing
  - ❖ Prepared budget for GIS software, hardware and consultancy
  - ❖ Commenced recruitment of GI staff
  - ❖ Airbus Defence and Space has provided very high resolution Pleiades imagery (50cm) covering the entire County
- ❖ County Government of Vihiga is keen on the following:
  - ❖ Strategic partnerships in the area of GI capacity building,
  - ❖ Strategic partnerships in implementing the various components of the CDIS (*Airbus : Land Information Management System, GMV: Spatial planning, & eHealth*)
  - ❖ South – South and North – South collaboration in research and technology transfer and best practices
- ❖ As Governor, I wish to:
  - Make Vihiga a model county in Kenya in the application of geospatial technologies in the implementation of SDGs
  - Champion GI in all counties in Kenya through the Council of Governors (CoG)

# CONCLUSION

- ❖ The role of Geospatial technologies in facilitating good governance, sound planning, and sustainable development cannot be over-emphasized.
- ❖ Developments and trends in Geospatial and other allied technologies only point to a favorable course for decision makers
- ❖ As a Governor, heading a County Government, and a Geospatial scientist, I purpose to use, demonstrate and champion the application of Geospatial technologies in supporting better planning and decision making in Africa.
- ❖ This is how we will empower Africa to meet Agenda 2063, the Sustainable Development Goals, among other targets

# Thank You

