A GIS & REMOTE SENSING APPROACH IN REDUCING VULNERABILITIES TO CLIMATE CHANGE IMPACTS IN AFRICA

RCMRD – SERVIR AFRICA

LEG Regional Training Workshop on Adaptation for Anglophone African Least Developed Countries LCD's

Rwanda Kigali, 29 July 2013 - 3 August 2013

SERVIR

RCMRD

ICIMOD

USAID FROM THE AMERICAN PEOPLE

NASA

REGIONAL CENTRE FOR MAPPING OF RESOURCES FOR DEVELOPMENT

RCMRD

RCMRD

Current member states are 19 with latest inclusion of South Sudan.

VISION — To be a premier Centre of Excellence in provision of Geo-information services

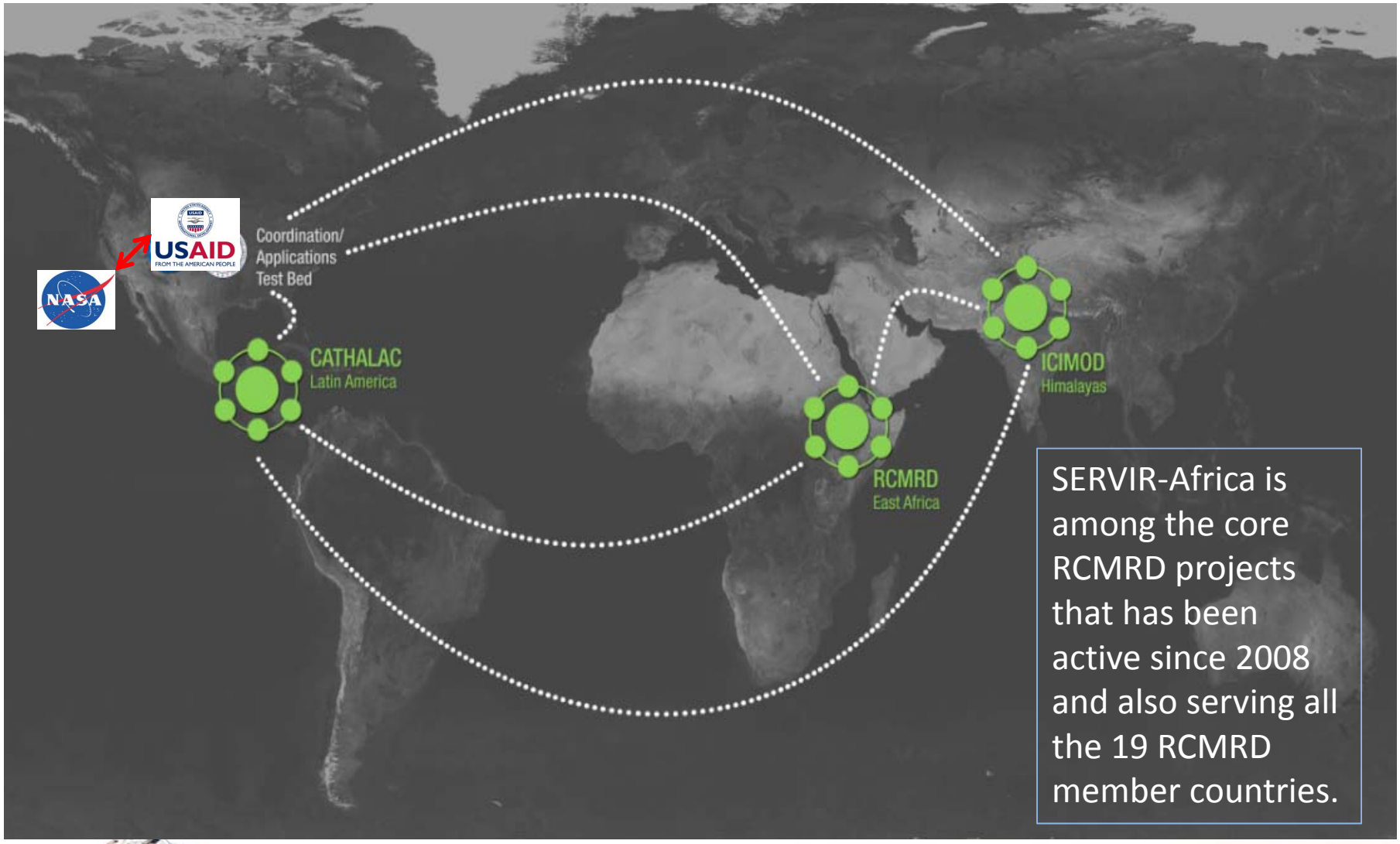
MISSION — To promote sustainable development through generation, application and dissemination of Geo-information and allied ICT services and products in the Member States and beyond

SERVICES — Geographic Information Systems | Surveying & Mapping | Capacity Building: IT, GIS, RS, GPS etc. Remote Sensing | Repair of Surveying Equipment

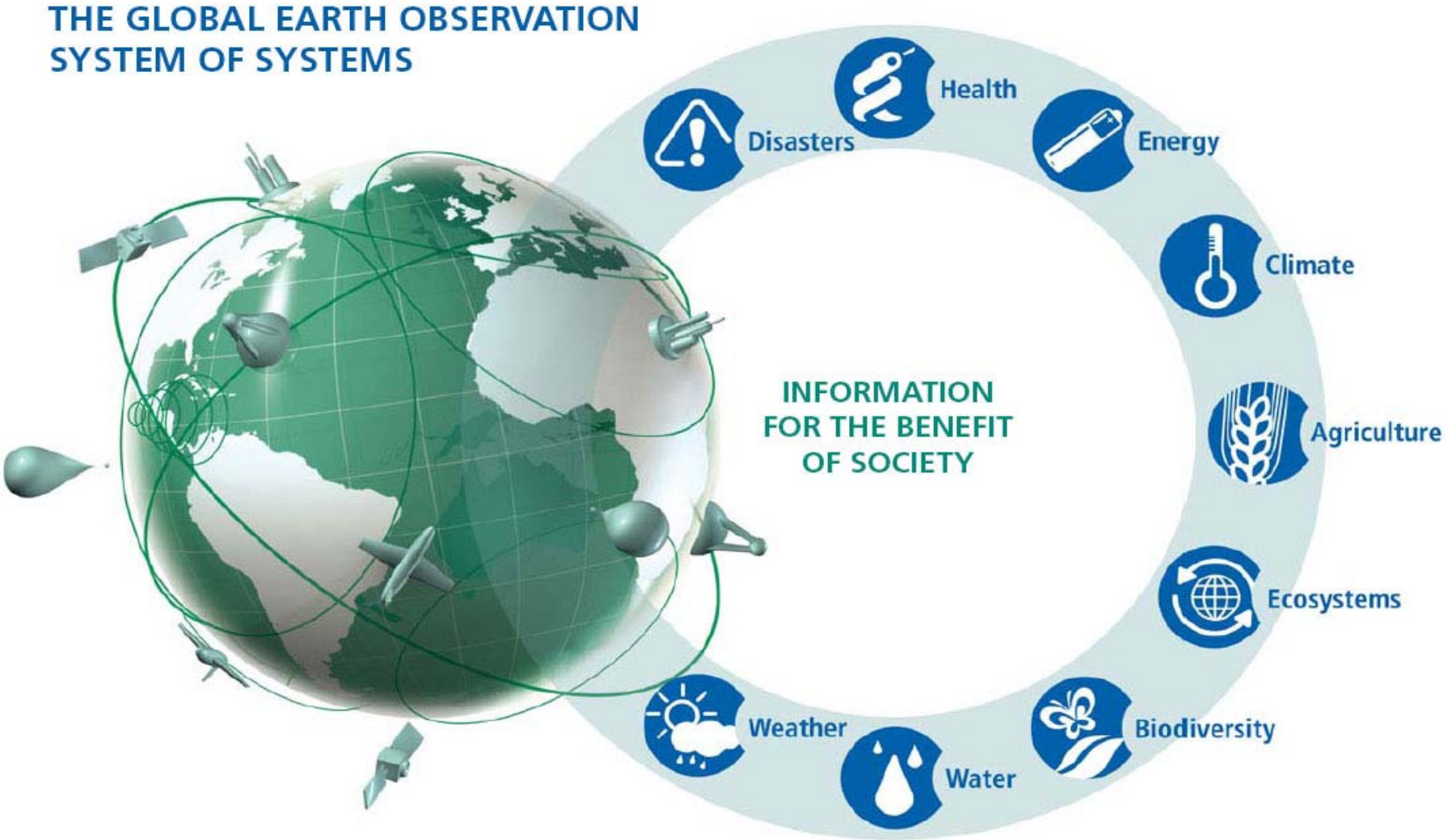
APPLICATION — Disaster Management | Health | Energy | Climate Geology | Agriculture Ecosystems | Biodiversity Water

SERVIR

SERVIR GLOBAL HUBS AND REGIONS OF INTEREST



GEOSS THEMES: SERVIR Thematic areas



RAW DATA SOURCES

- More than **3000 satellites** are orbiting the earth;

  Some are owned by commercial/private agencies &

  others by government agencies such as NASA

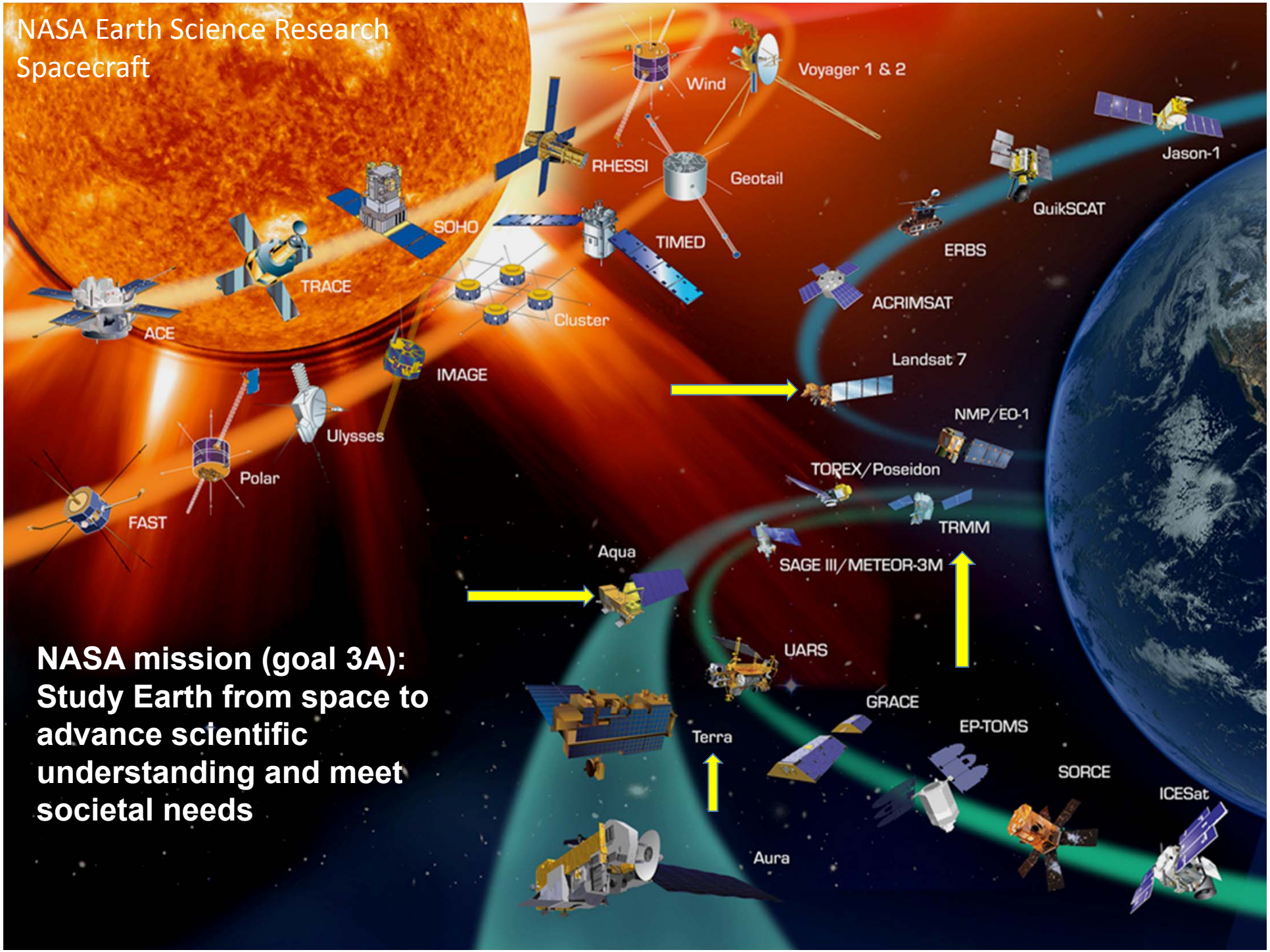
- Example of **agencies** providing satellite data include:

✓ National Aeronautics & Space Agencies (NASA)

✓ US Geological Survey (USGS)

✓ European Space Agency (ESA)

✓ Japan Aerospace Exploration Agency (JAXA)

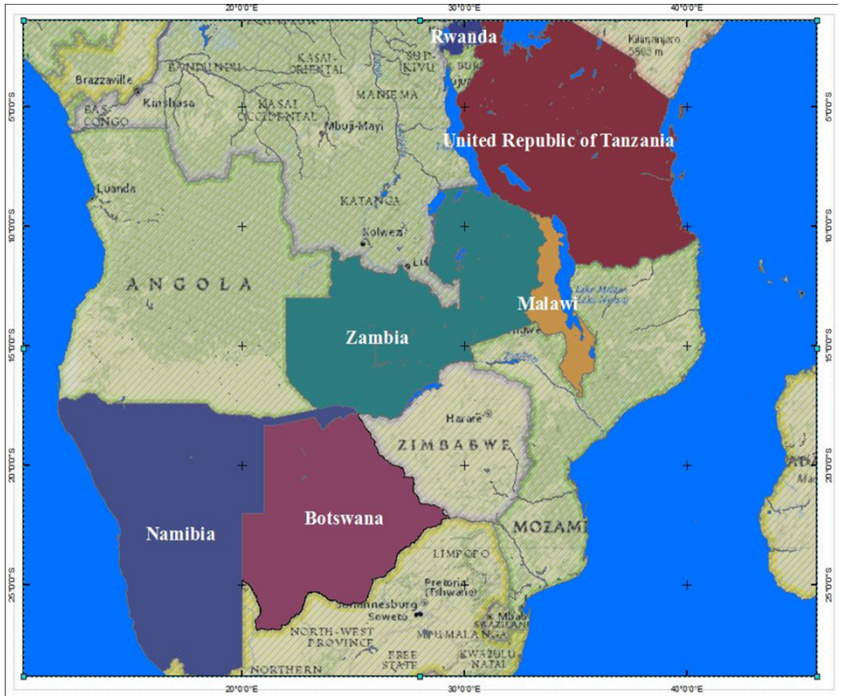

NASA Earth Science Research Spacecraft
Wind
Voyager 1 & 2
Jason-1
RHESSI
Geotail
QuikSCAT
SOHO
TIMED
ERBS
TRACE
ACRIMSAT
ACE
Cluster
Landsat 7
IMAGE
NMP/EO-1
Ulysses
TOREX/Poseidon
Polar
TRMM
FAST
Aqua
SAGE III/METEOR-3M
UARS
GRACE
Terra
EP-TOMS
SORCE
ICESat
Aura
NASA mission (goal 3A): Study Earth from space to advance scientific understanding and meet societal needs

Projects & Products

LAND USE LAND COVER MAPS FOR EASTERN AND SOUTHERN AFRICA

- These landSat derived products were primarily developed for the **assessment of vegetation cover in relation to GHG emissions at National level.**
- However, the maps have **dynamic applications** e.g. can be used to address climate change resilience at **Ecosystem** level by analyzing **shifts** in the main vegetation cover

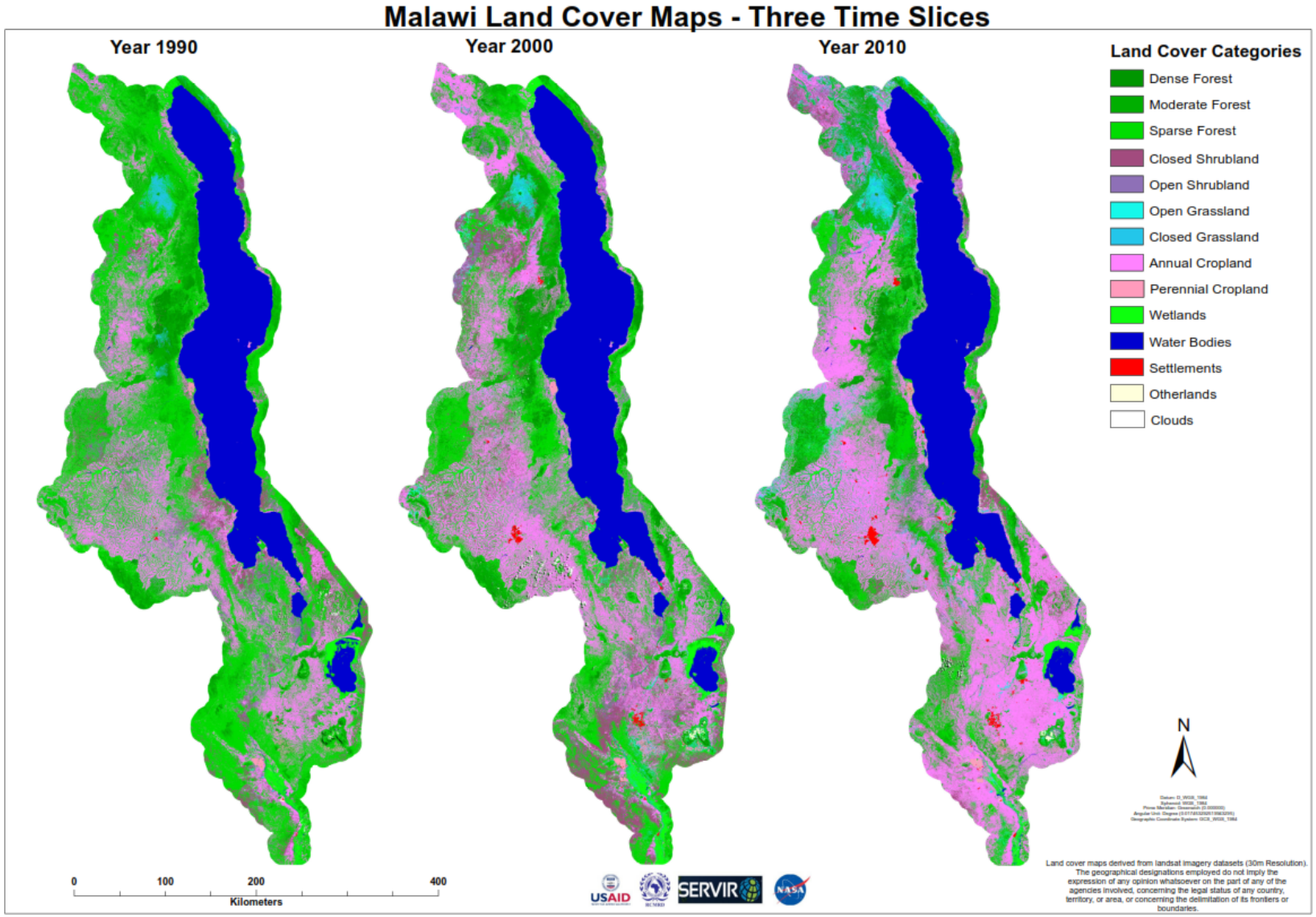
  e.g. Woodland to Savannah, Wetlands to Grasslands etc. Which might be attributed to shift in climatic conditions in a given region.
- They can also be used at a **policy and planning** level e.g. to show areas that require **protective interventions** i.e. rapidly degrading forest cover, **infrastructural development** e.g. hospitals, schools, roads etc.



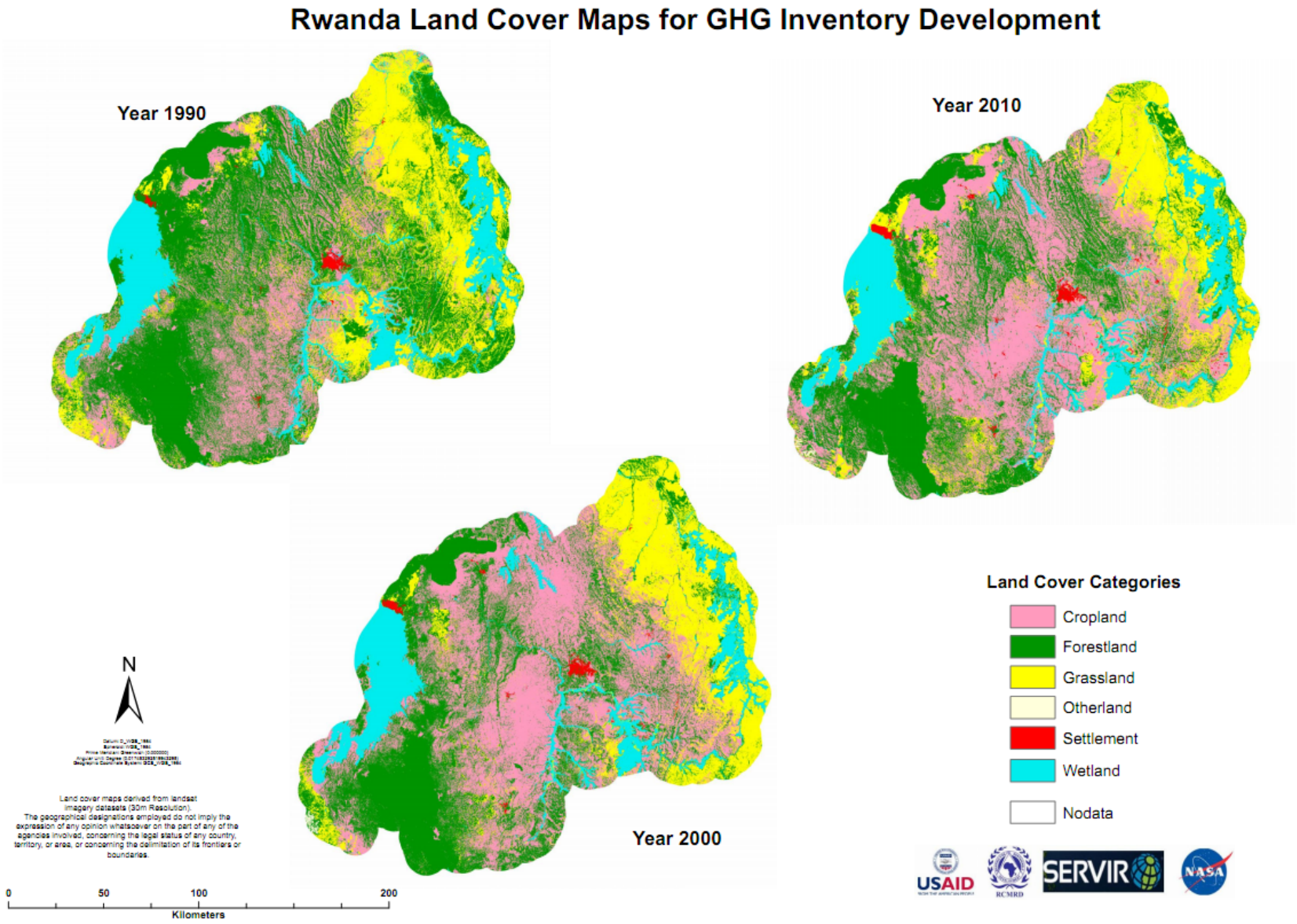
Participating countries

1. *Malawi*
2. *Rwanda*
3. *Tanzania*
4. *Zambia*
5. *Namibia*
6. *Botswana*

Landsat Derived Maps: Malawi
Schema II (country classification)



Landsat Derived Maps: Rwanda Schema I (IPCC Classification guidelines)



In Conclusion

- Through the use of LandSat satellite imagery; RCMRD & Relevant government agencies have been able to come up with **accurate LULC** maps.
- The process was duly conducted with active collaboration from various government agencies in respective countries and there after conducted an on the job training to **enhance the capacities** of various government representatives.

Key Stakeholders

- Africa Governments Agencies
- UNFCCC
- USAID
- US EPA
- ICFI
- NASA
- RCMRD SERVIR-Africa
- University of Colorado

Accuracy Assessment

Country	Scheme I	Scheme II
Malawi	Kappa: **0.7871** Overall Accuracy: **85.2399**	Kappa: **0.7439** Overall Accuracy: **79.5203**
Rwanda	Kappa: **0.8077** Overall Accuracy: **86.4253**	Kappa: **0.7643** Overall Accuracy: **80.0454**
Zambia	Kappa: **0.7409** Overall Accuracy: **80.415**	Kappa: **0.7163** Overall Accuracy: **75.5167**

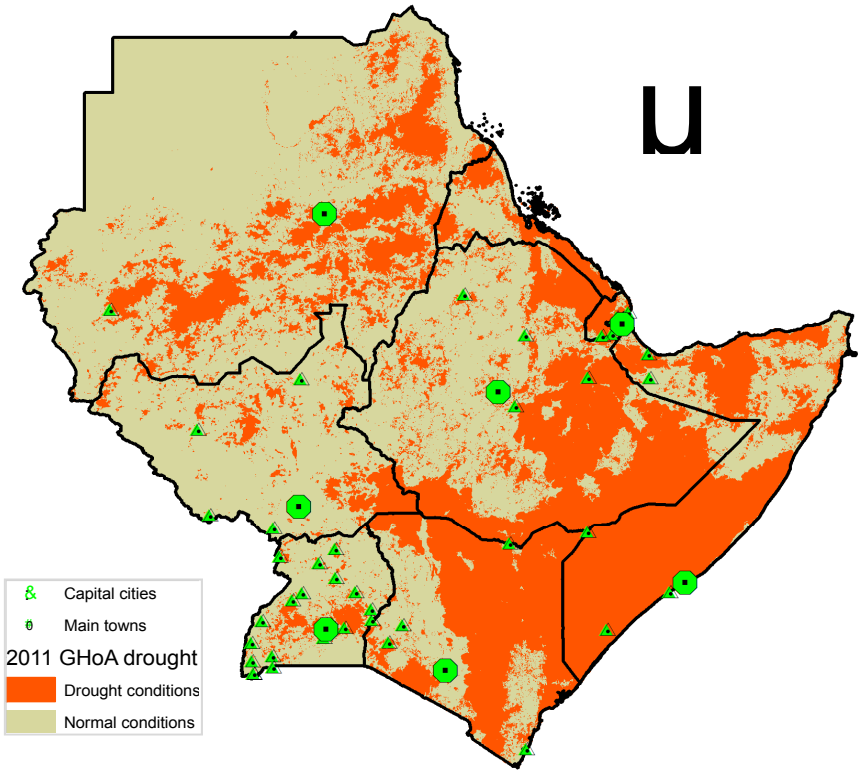
IGAD HAZARD MAPS & ATLAS: Introduction

- IGAD region has lately experienced **recurrent disasters** emanating from various **natural** and **manmade** hazards resulting to enormous negative impacts on human, economic and environmental spheres.
- IGAD Secretariat with the active participation and involvement of the member states has tried to address the causes of disaster where DRM (Disaster Risk Management) was then developed and implemented since the year 2003/2004 with a number of project activities already implemented.
- During the cause of the DRM program implementation, member states decided and recommended that the **IGAD Secretariat** facilitates the development of the **maps and atlas of the IGAD region**.
- A consultation meeting with the experts from member states was held in May 2010 which agreed on the priorities of the hazards mapping as follows:
  - **Droughts**
  - **Floods**
  - **Volcanic and seismic movement**
  - **Pest infestation and epidemic diseases (Human and Livestock)**

Objectives of developing the hazard maps and atlas

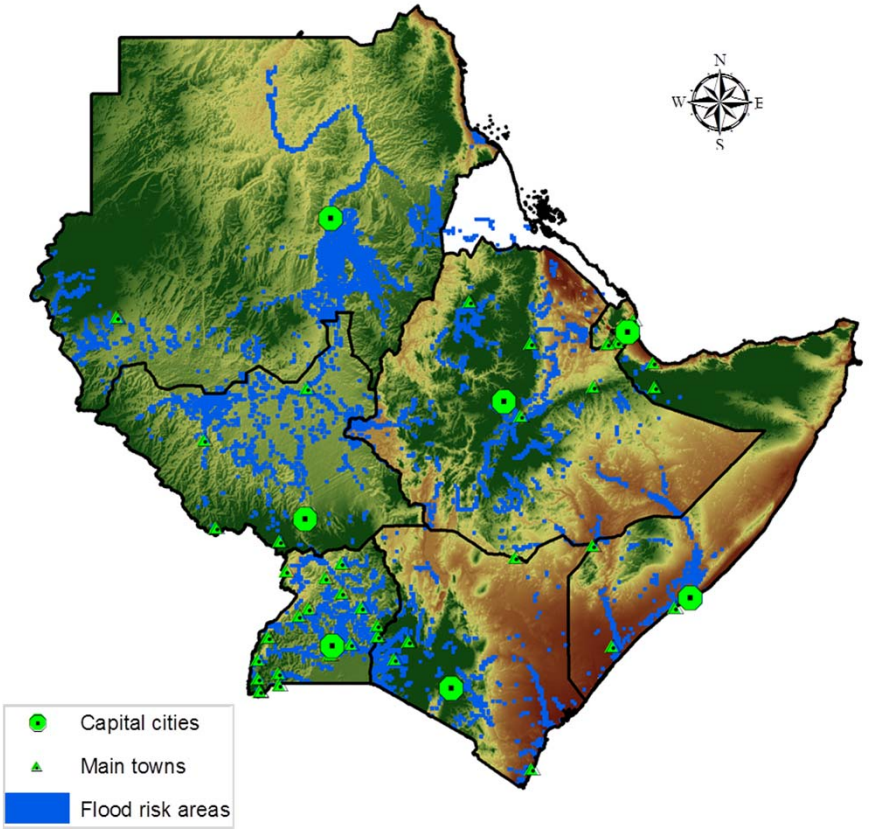
1. To **initiate** the process from the start; no existing maps
2. To **assist** the **decision makers/policy developers** to put into place appropriate policy actions in order to prevent hazards from causing disasters;
3. To assist DRM experts to plan and to take practical activities in mitigating the impacts of hazards;
4. To **create awareness** to the **vulnerable communities** on the hazards surrounding them and
5. To **mobilize resource**s both internally and external partners on how to address hazards which cause disasters.

IGAD HAZARD MAPS & ATLAS:
Understanding the risks: The model



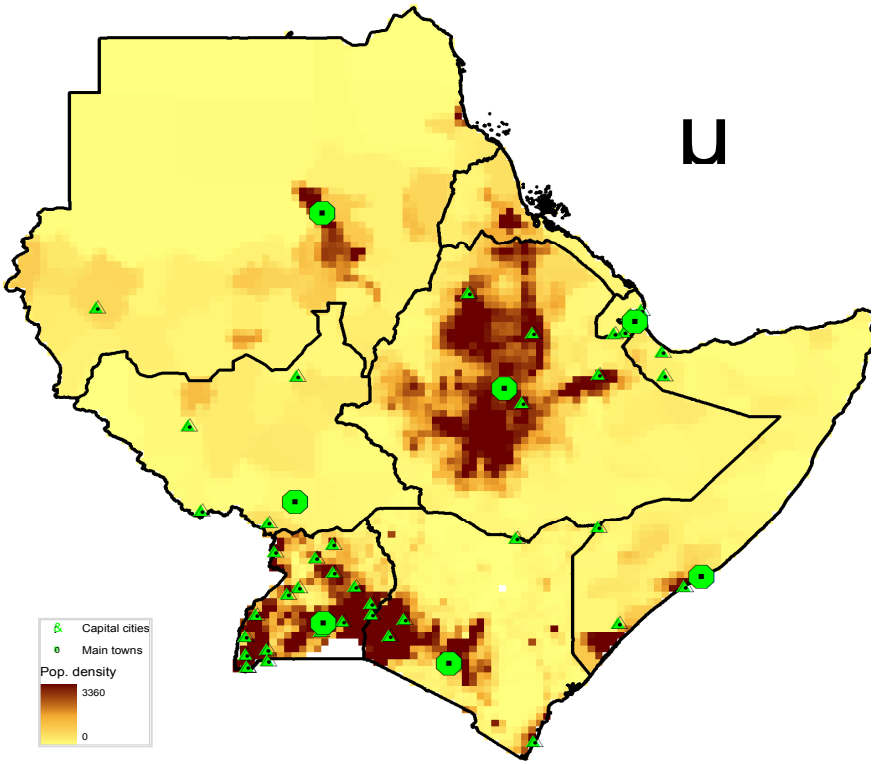
What are the risk?

Where is the risk?

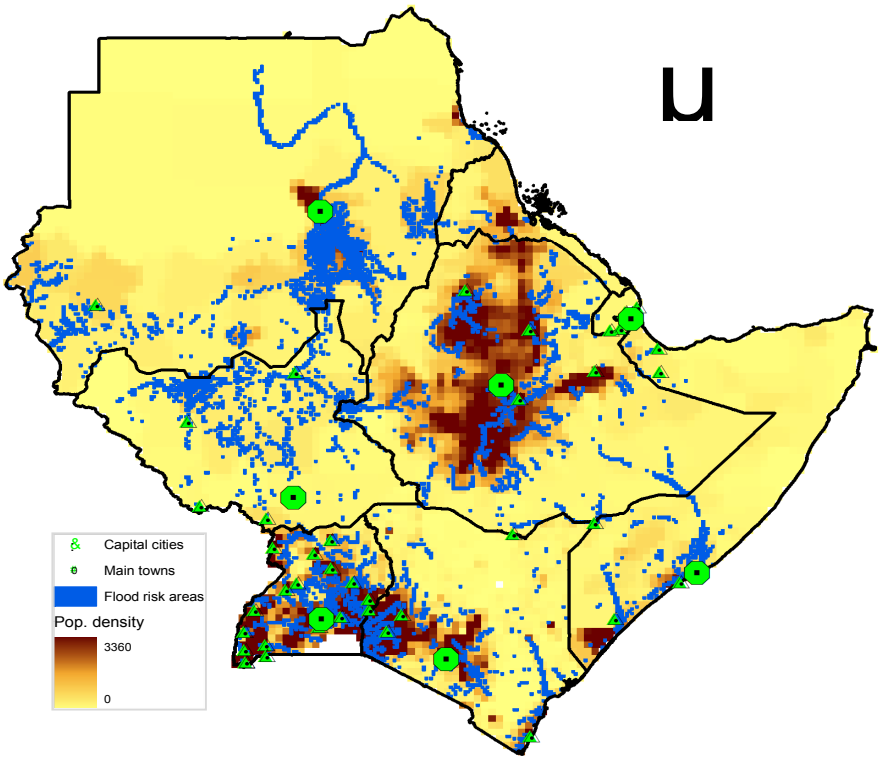


IGAD HAZARD MAPS & ATLAS: Assessing the vulnerabilities

Where are the people living?



What's the level of exposure?

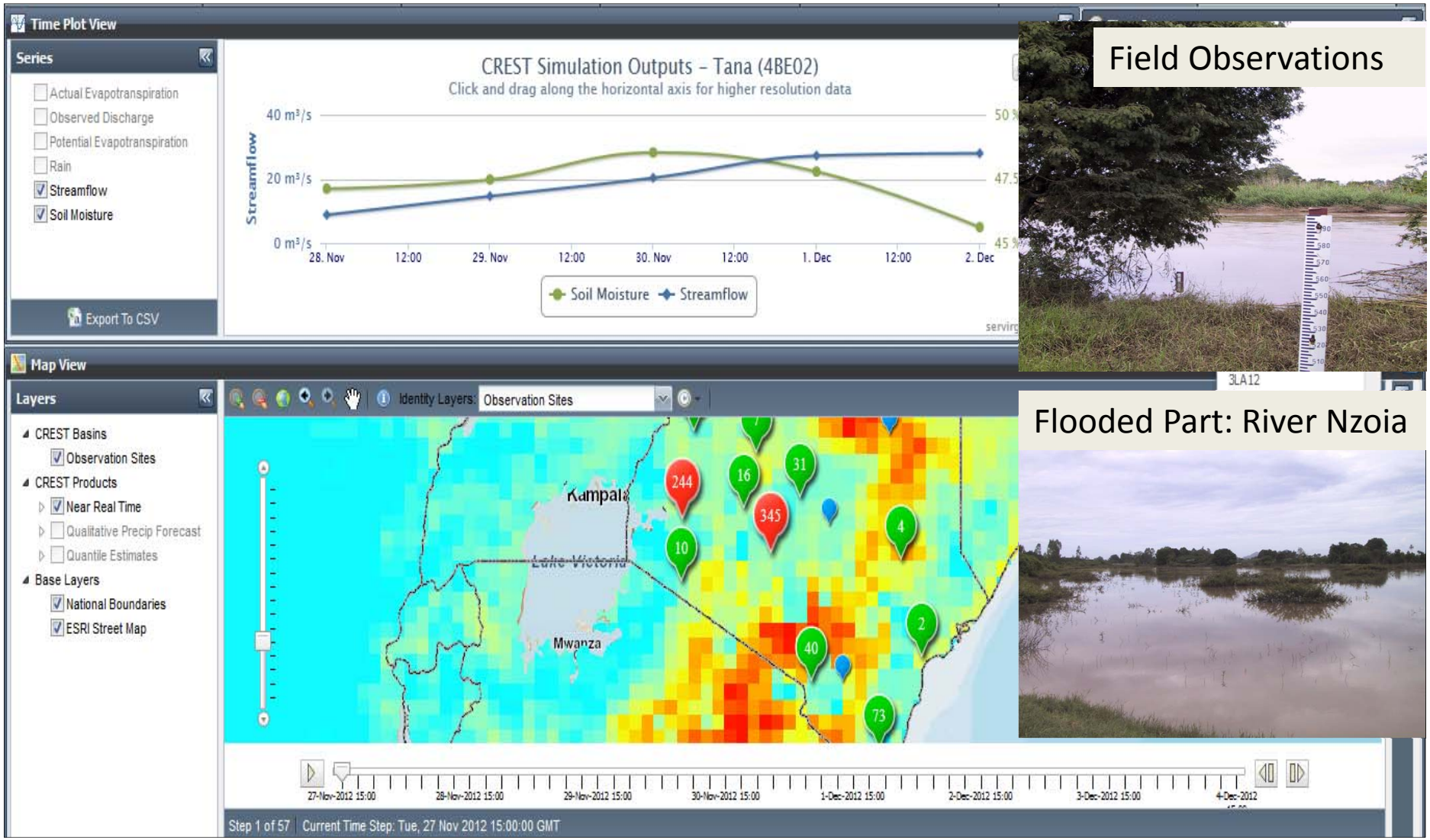


Atlas: file:///D:/IGAD%20Hazards%20Maps%20&%20Atlas/DVD%20Version/atlas/index.html

Tools & Applications (At a Glance)

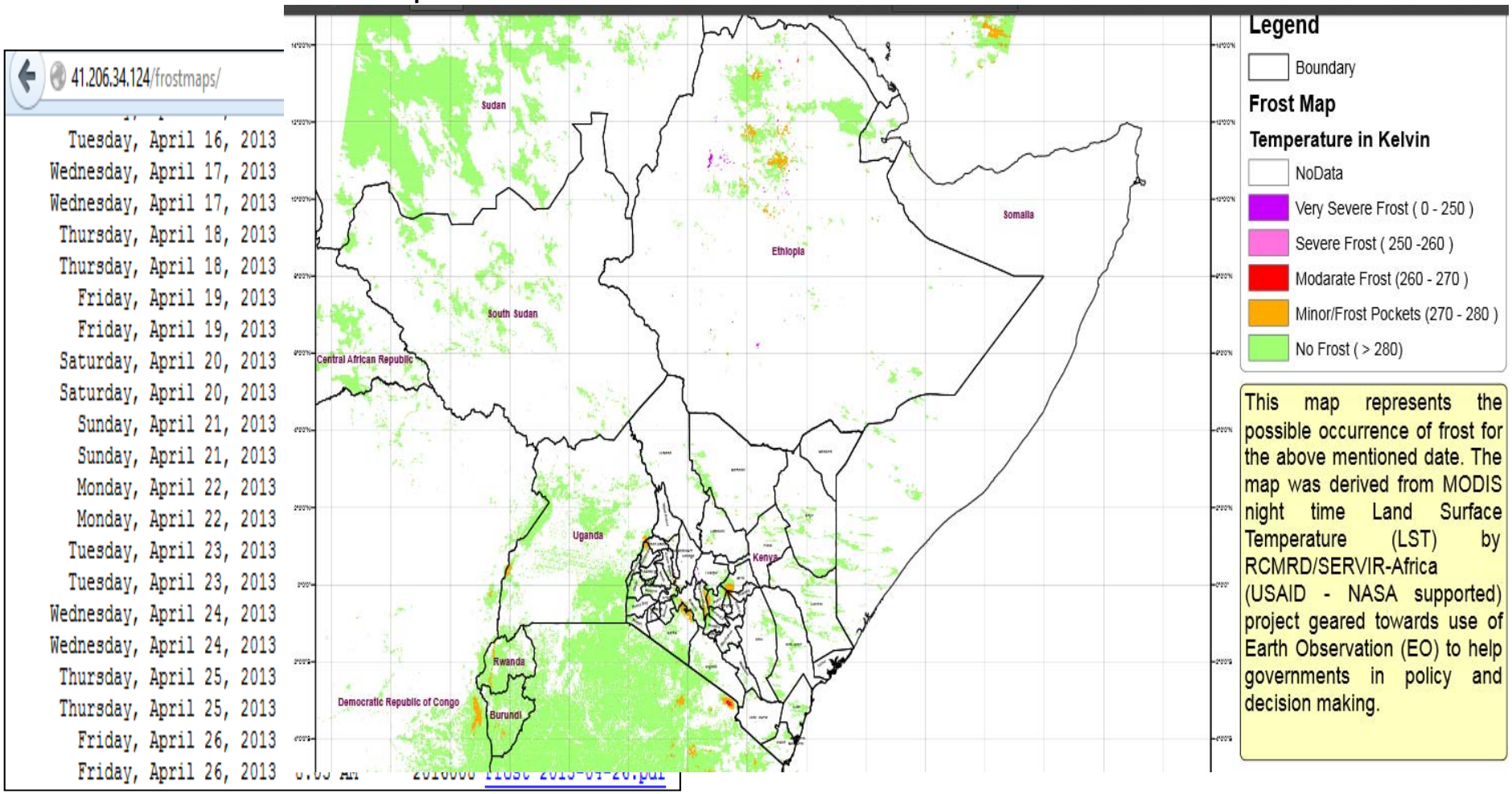
Flood Prediction Model: using satellite imagery data (TRMM)

Temporal Maps and Time Series: **Stream Flow and Soil Moisture**



SERVIR FROST MODEL

- Historical plus Near real time mapping of frost occurrences in Eastern Africa
- Automatically generated and customized frost product: Readily available for download & consumption



Your one-stop for Discovering, Visualizing and Access to Geographic Data

SERVIR-Africa Geodata Portal

Login Register Help About Feedba

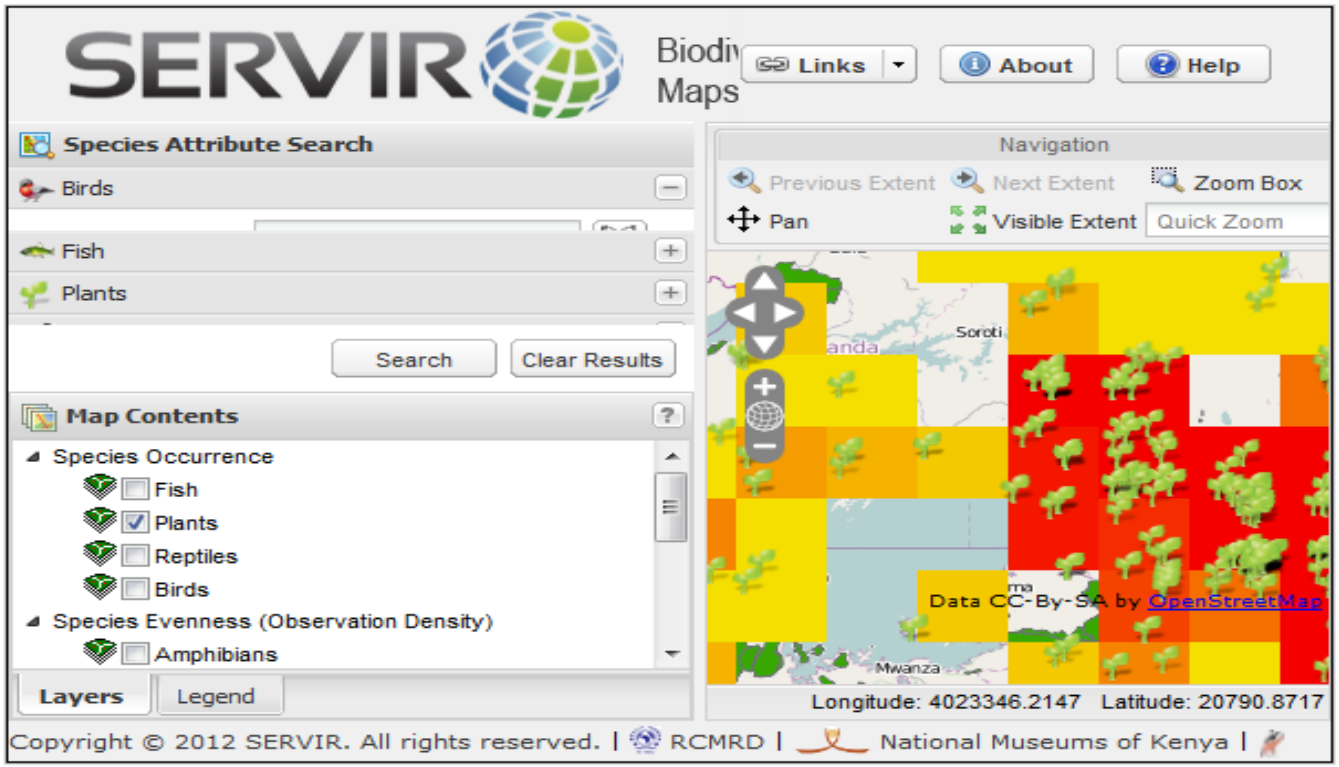
HOME SEARCH BROWSE

Details Review Relationships Preview

Plants Observation Density Count

URL: http://servir.rcmrd.org/geoapps/biodiversity/

Embed: <iframe src="http://servir.rcmrd.org/metacatalog/catalog/livedata/embed.jsp?url=http%3A%2F%2Fservir.rcmrd.org%2Fgeoa



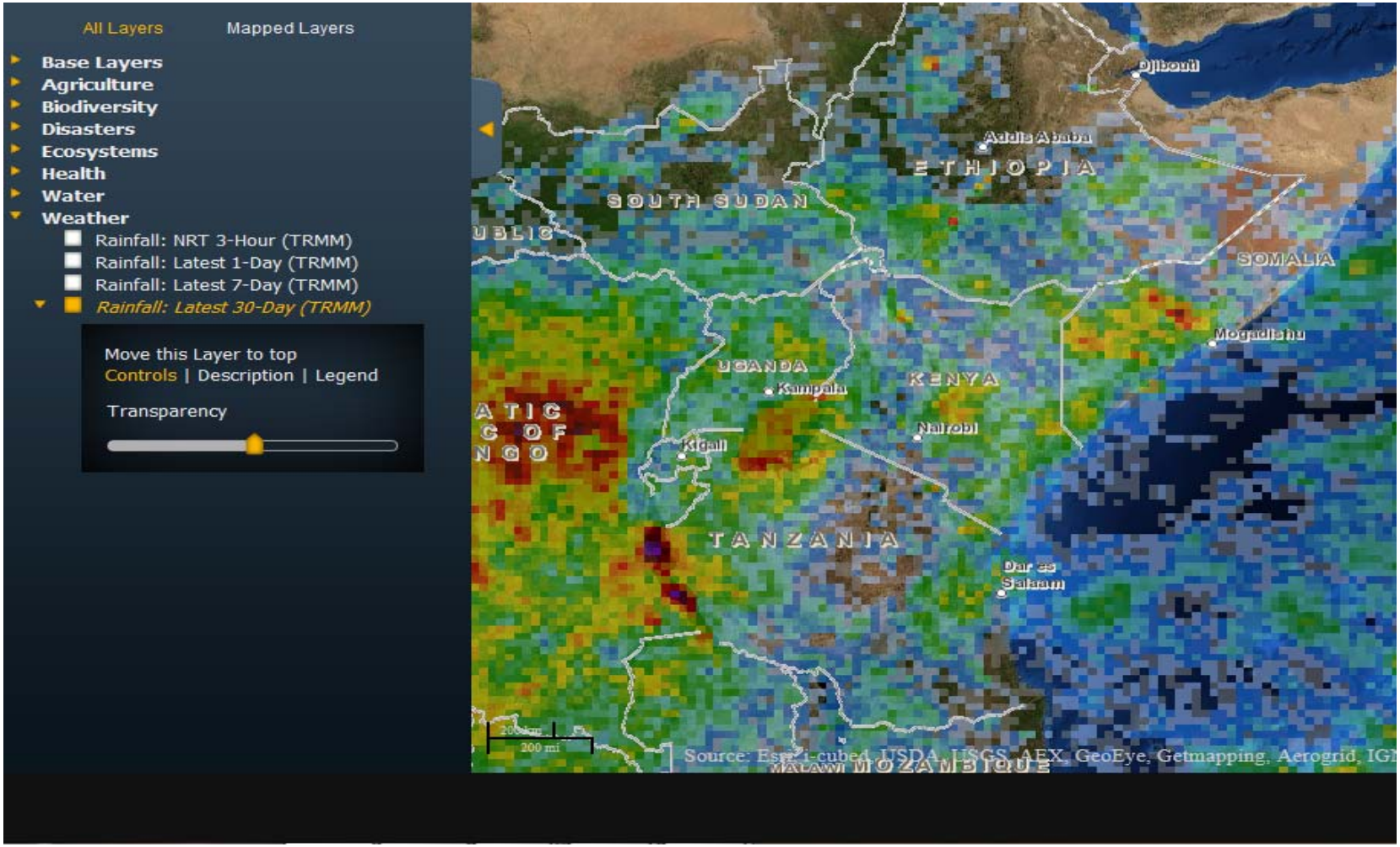
Plants Observation Density Count

This Gridded data set represents density count of different plants species observations present in approximately 50km (0.45 decimal degrees) pixels. This data set has been derived from species occurrence records, digitized from the National Museums of Ken...

Open Preview Details Metadata

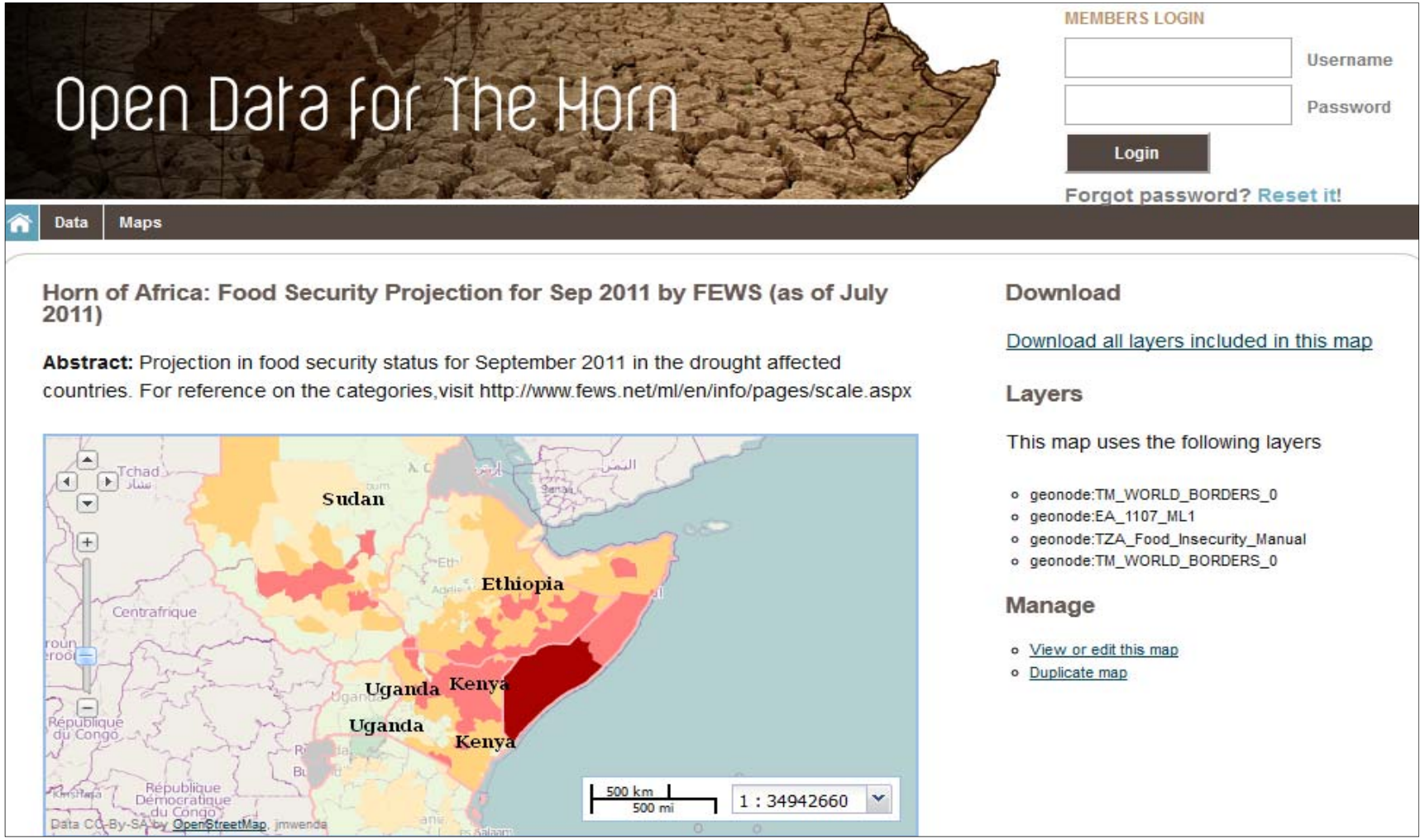
SERVIR INTERACTIVE MAPPER

- An online visualization tool that allows mash up of several data layers and retrieval of same information from multiple external sources.
- Comprises of both time series data like TRMM rainfall data and other still data sets.



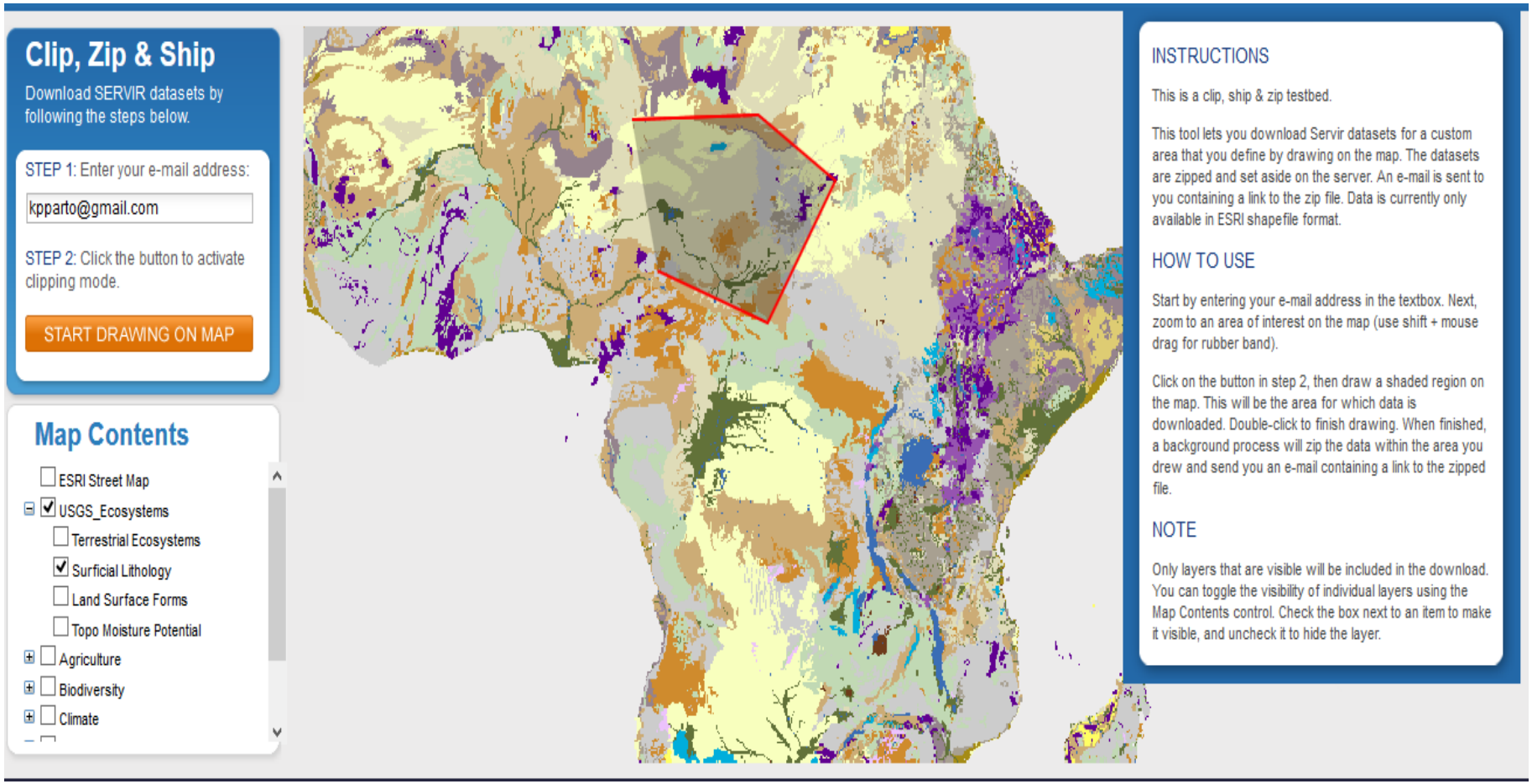
Open Data for the Horn - GEONODE

- Comprises of data focusing on Food security, Heath, Demography, Water etc.
- An Online Data Repository that allows upload, download & visualization of geospatial data



SERVIR-Africa Ecosystem maps & products (Clip, Zip, Ship)

- A simple to use interface for downloading Geospatial Data on various thematic layers.
- Users require to enter email address, draw their ROI and click ok to send zipped data link to their email address. Download has to performed within 48 hrs. of receiving the link.



Important Links (follow up)

RCMRD SERVIR-Africa Online Tools & Applications

1. Interactive Mapper:
Core viewer that enables access and display of datasets from different sources
https://servirglobal.net/EastAfrica/MapsData/InteractiveMapper.aspx

2. Data Catalog:
Interface for discovering geospatial resources using keyword searches
https://servirglobal.net/EastAfrica/MapsData/DataCatalog.aspx

3. CREST Viewer:
Interface for displaying flood model outputs in near real time
http://41.206.34.124/CrestViewer/

4. Biodiversity Maps:
Interface for displaying and querying species distribution maps
http://servir.rcmrd.org/geoapps/biodiversity/

5. Frost maps
Daily frost maps derived from MODIS terra LST products
http://41.206.34.124/frostmaps/

6. Clip/Zip/Ship:
Interface for downloading SERVIR datasets based on a user-defined area of interest
http://servir.rcmrd.org/geoapps/ecosystems/

7. WASH Information Management System:
Designed as an integrated database that provides a systematic way of gathering information about water to assist in decision-making and policy development at different societal levels in South Sudan
http://www.mwri-goss.org/index.php?option=com_content&view=category&layout=blog&id=68&Itemid=49
http://www.mwri-goss.org/wimsapp/index.html

8. SERVIR AFRICA GEODATA PORTAL
Interface designed for discovering, visualizing and access to Geographic data.
http://servir.rcmrd.org/metacatalog/catalog/main/home.page

9. OPEN DATA FOR THE HORN: Battling Hunger in the Horn of Africa
This site lets you upload, manage, and browse geospatial data for the Horn of Africa. These data sets focus mostly on food security
http://horn.rcmrd.org/

SHUKRANI

http://www.rcmrd.org

www.servirglobal.net

Patrick Kabatha

Pkabatha@rcmrd.org