

**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





REGIONAL CENTRE FOR MAPPING OF RESOURCES FOR DEVELOPMENT



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

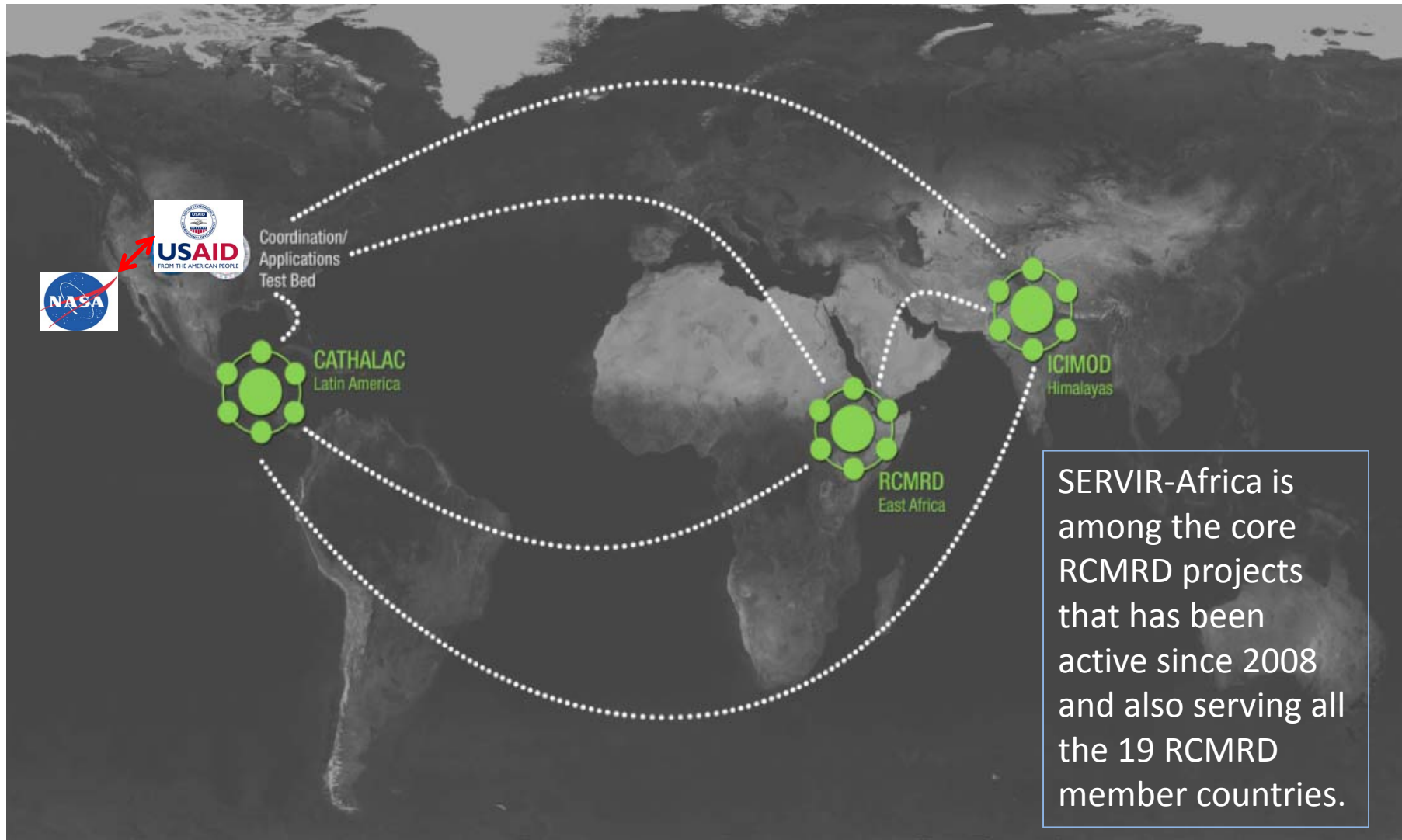
MISSION | To promote sustainable development through generation, application and dissemination of Geo-information and allied ICT services and products in the Member States and beyond

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 GLOBAL HUBS AND REGIONS OF INTEREST



GEOS THEMES: SERVIR Thematic areas



THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS

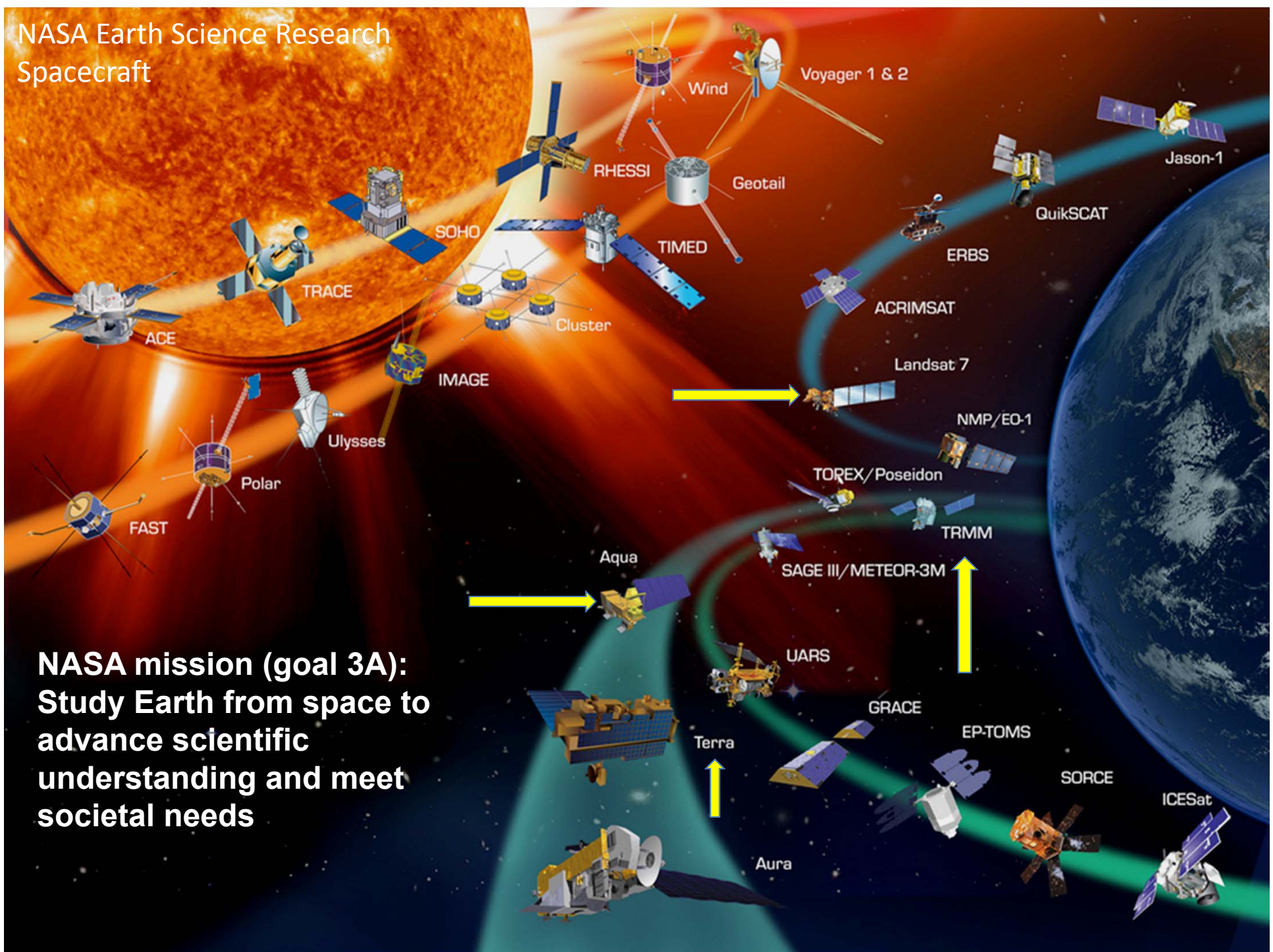


RAW DATA SOURCES

- 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



**NASA mission (goal 3A):
Study Earth from space to
advance scientific
understanding and meet
societal needs**

Projects & Products

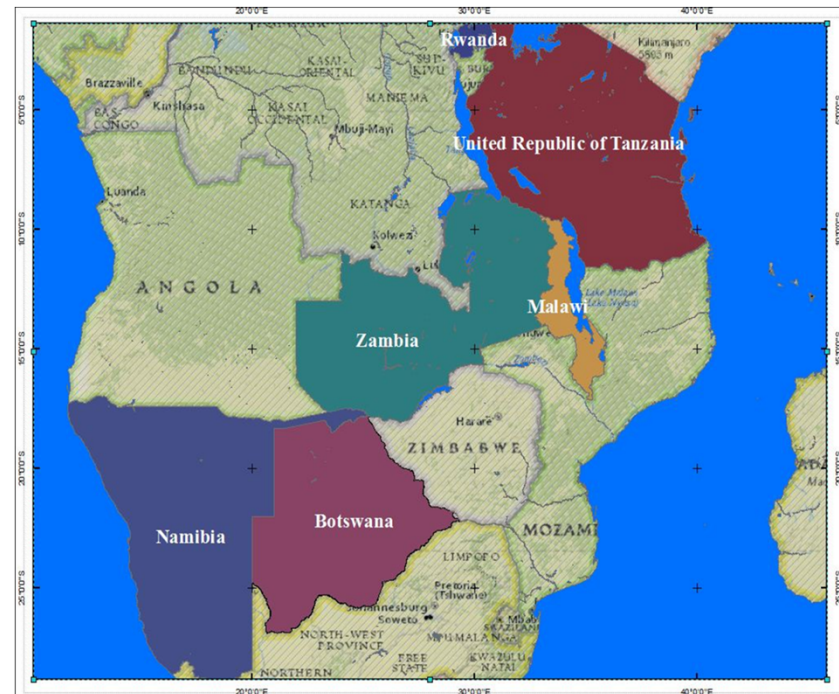
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LAND USE LAND COVER MAPS FOR EASTERN AND SOUTHERN AFRICA



- 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.



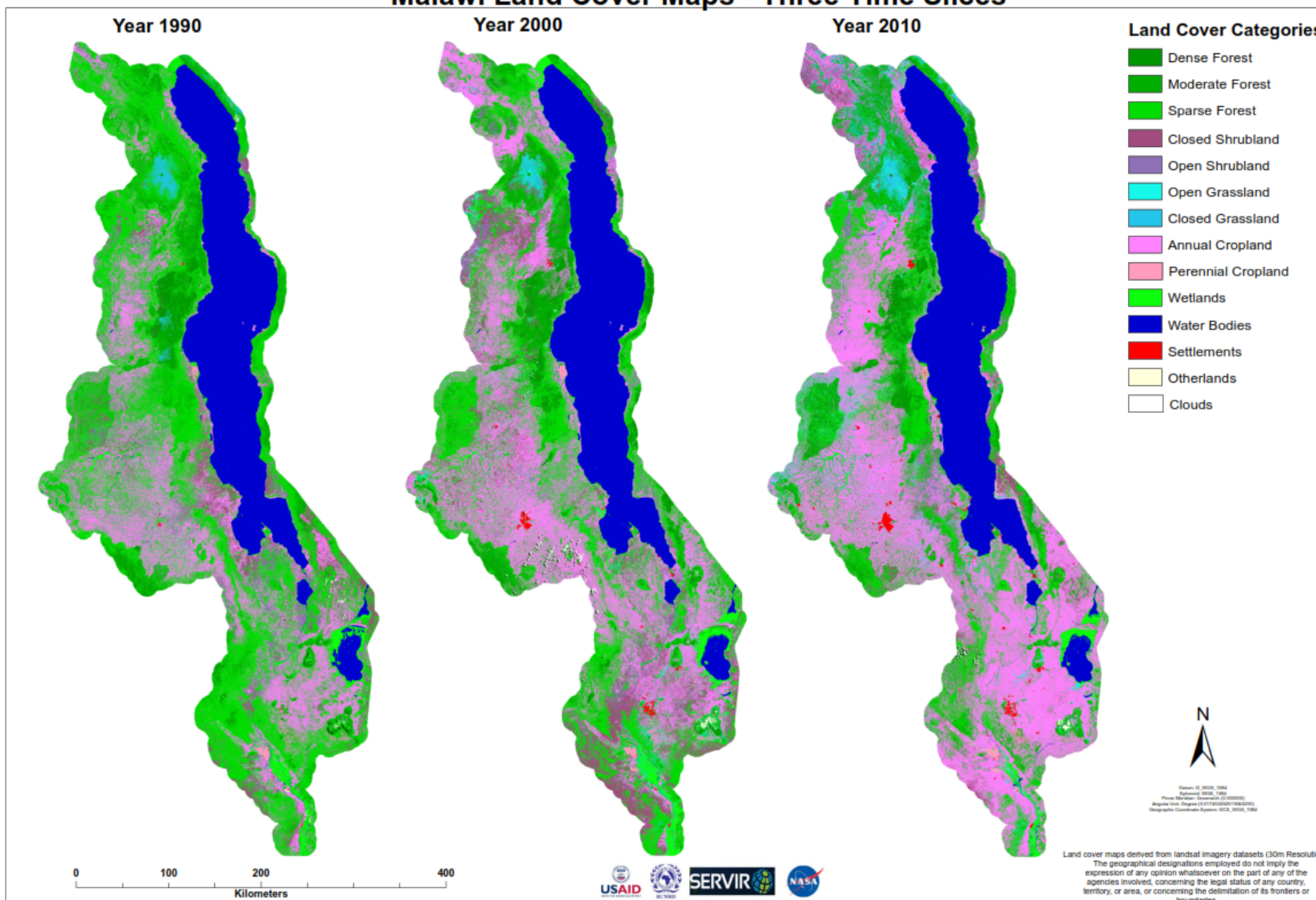
Participating countries

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

Landsat Derived Maps: Malawi Schema II (country classification)



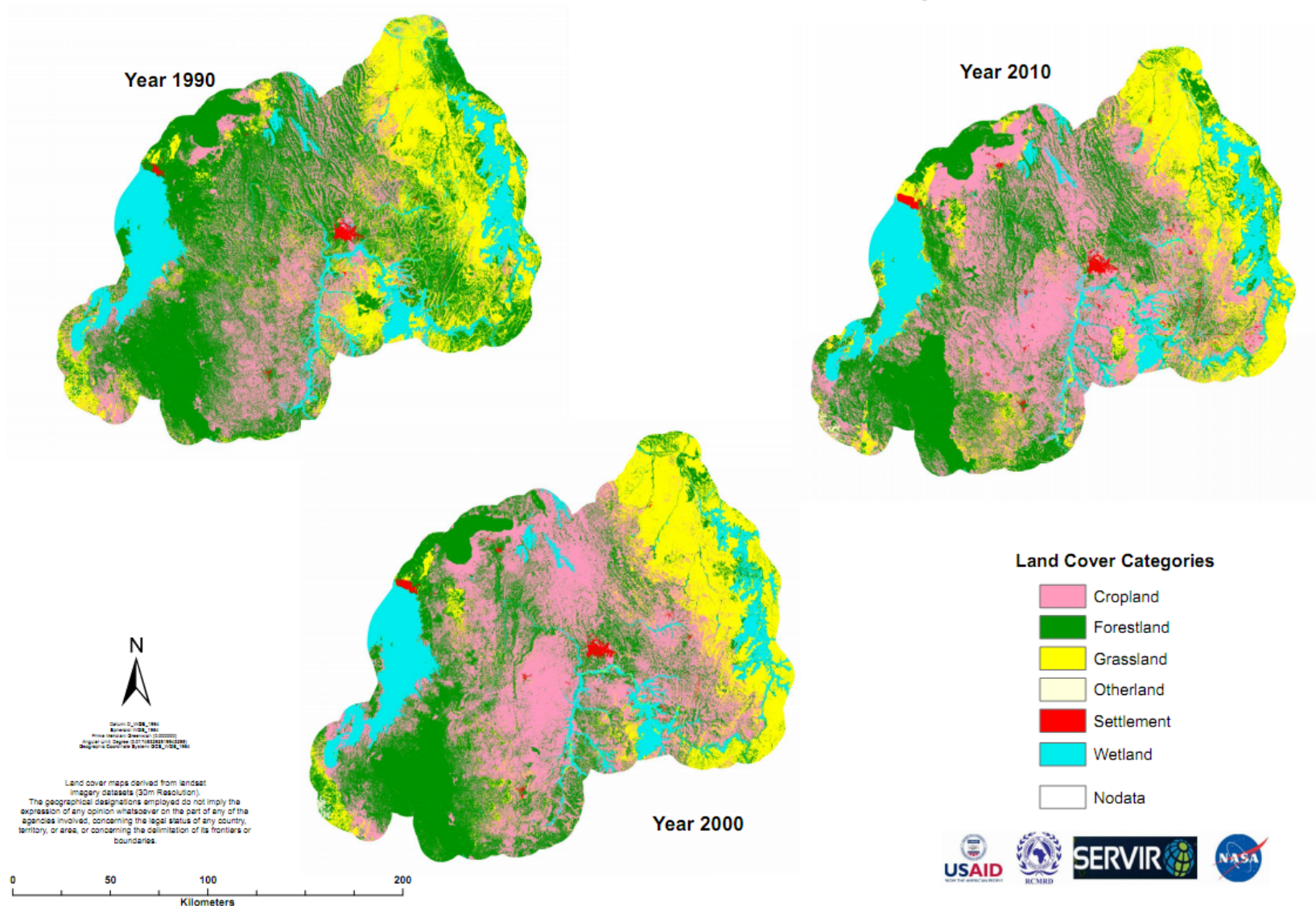
Malawi Land Cover Maps - Three Time Slices



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



Rwanda Land Cover Maps for GHG Inventory Development



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.

Accuracy Assessment

Key Stakeholders

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

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 course 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)**

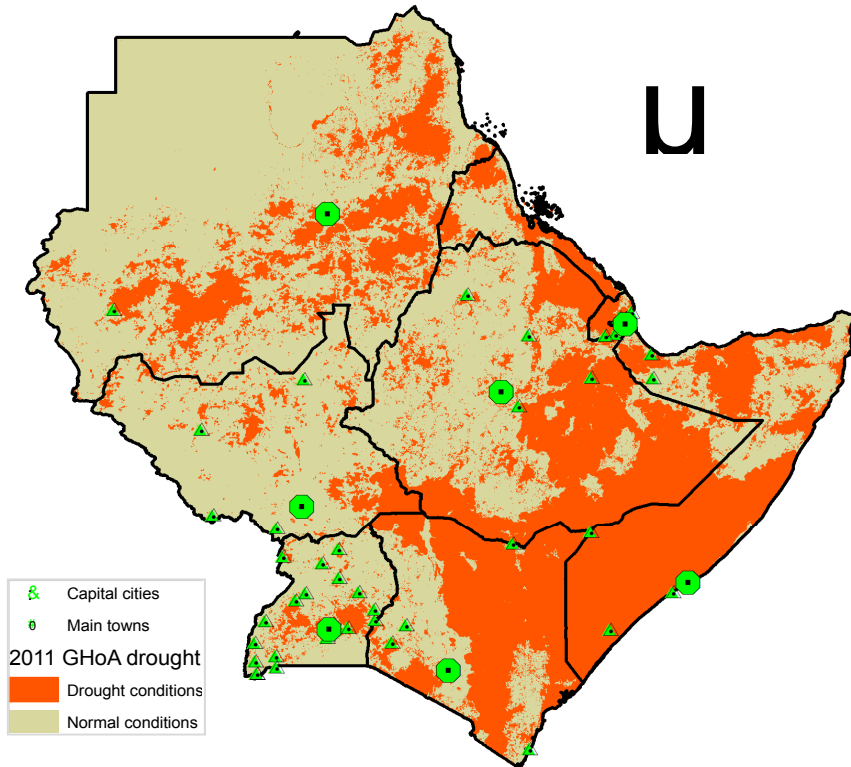




Objectives of developing the hazard maps and atlas

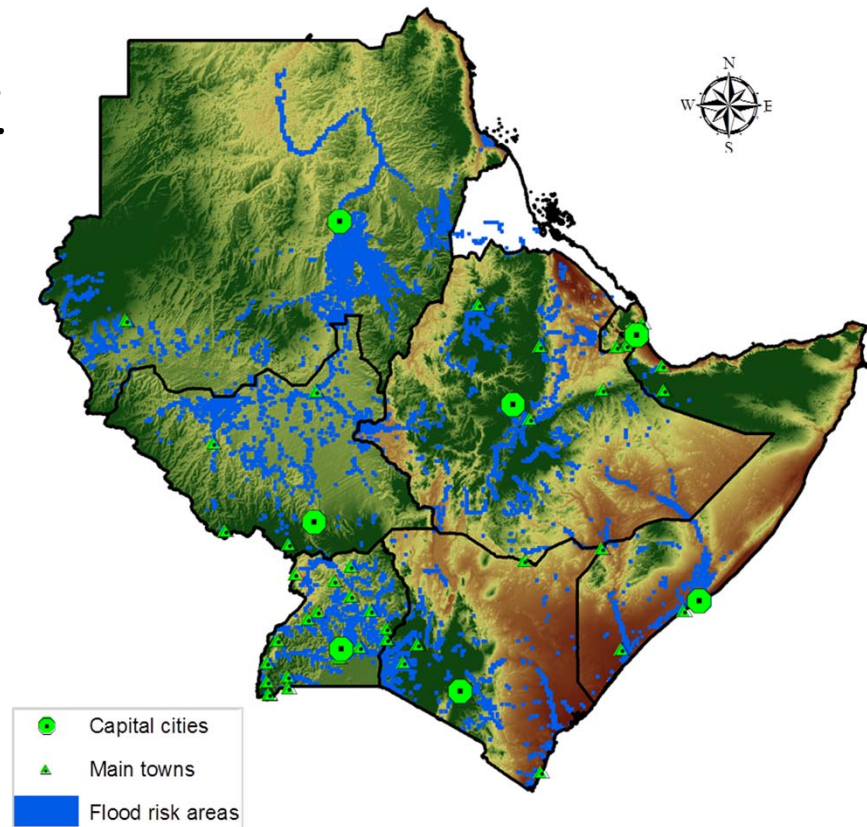
1. To **initiate** the process from the start; no existing maps
2. To **assist** the **decision makers/policy developers** to put into place appropriate policy actions in order to prevent hazards from causing disasters;
3. To assist DRM experts to plan and to take practical activities in mitigating the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

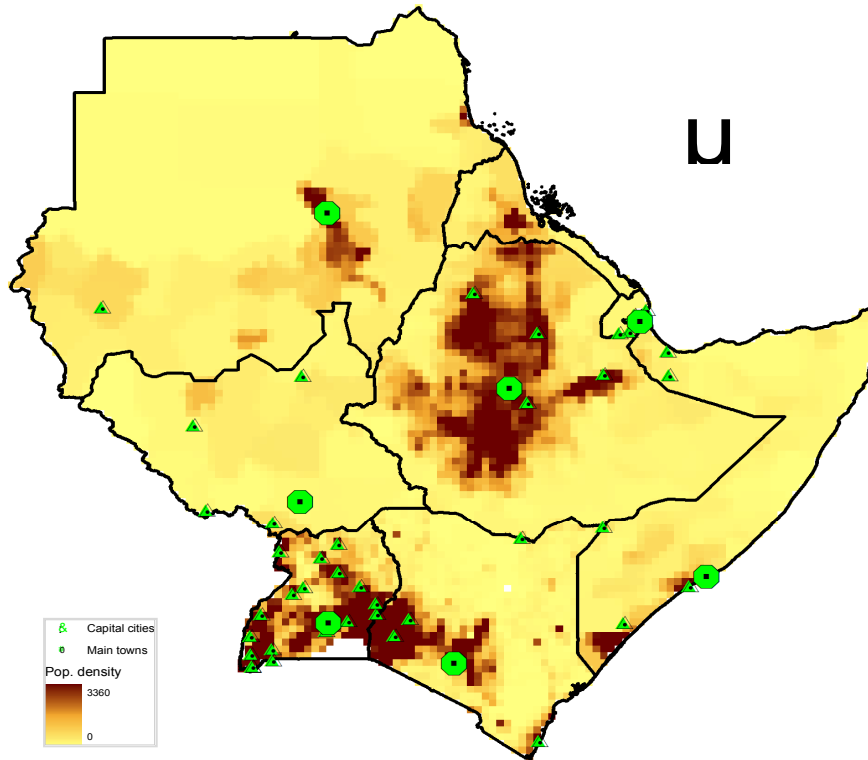
Where is the risk?



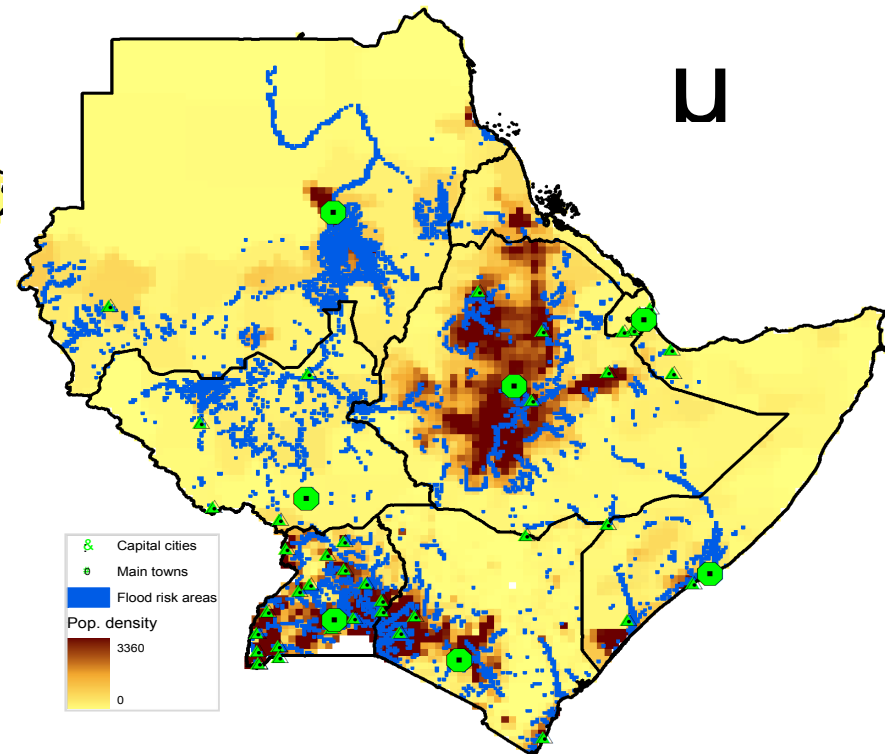
IGAD HAZARD MAPS & ATLAS: Assessing the vulnerabilities



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)

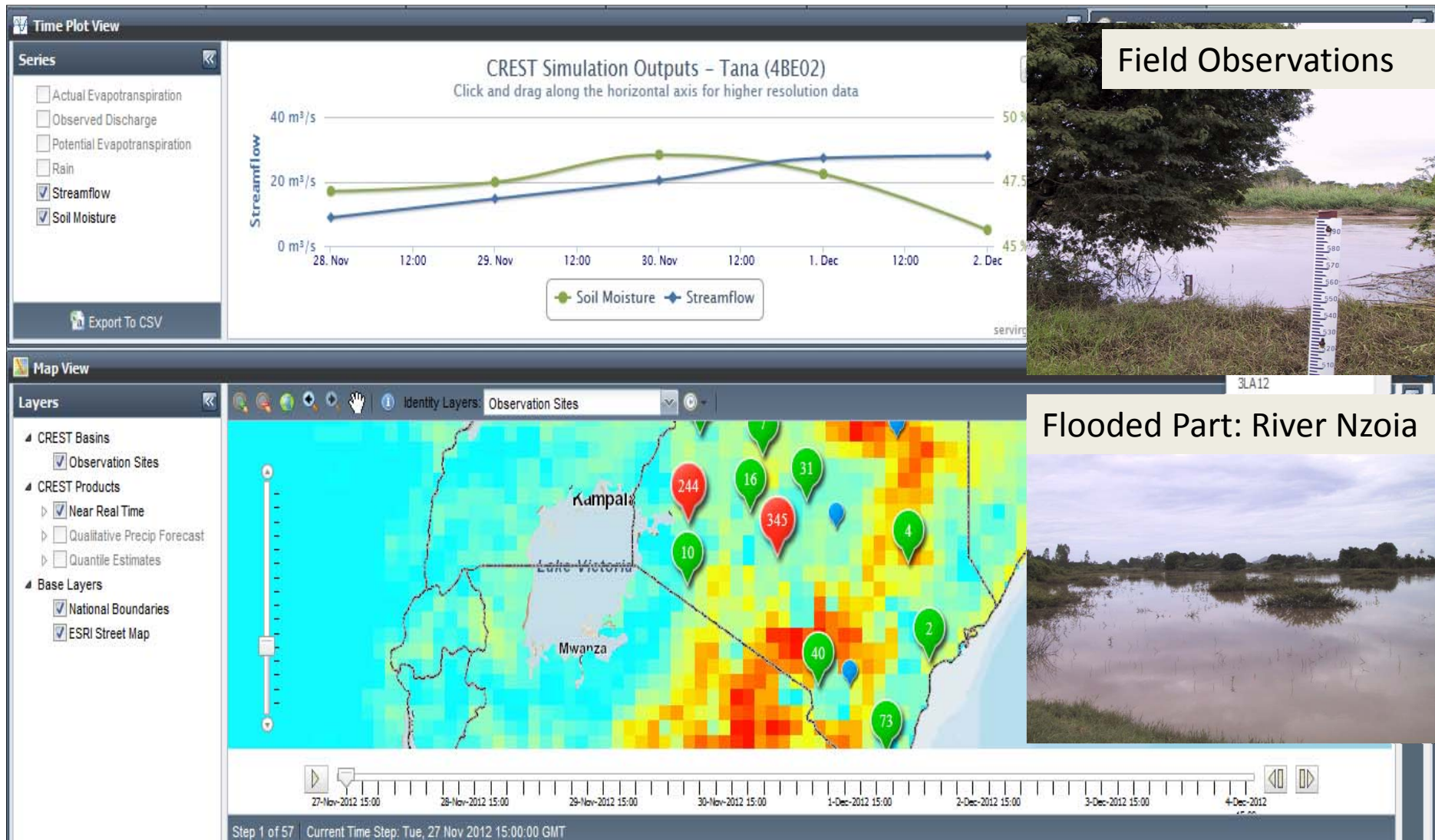
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Flood Prediction Model: using satellite imagery data (TRMM)



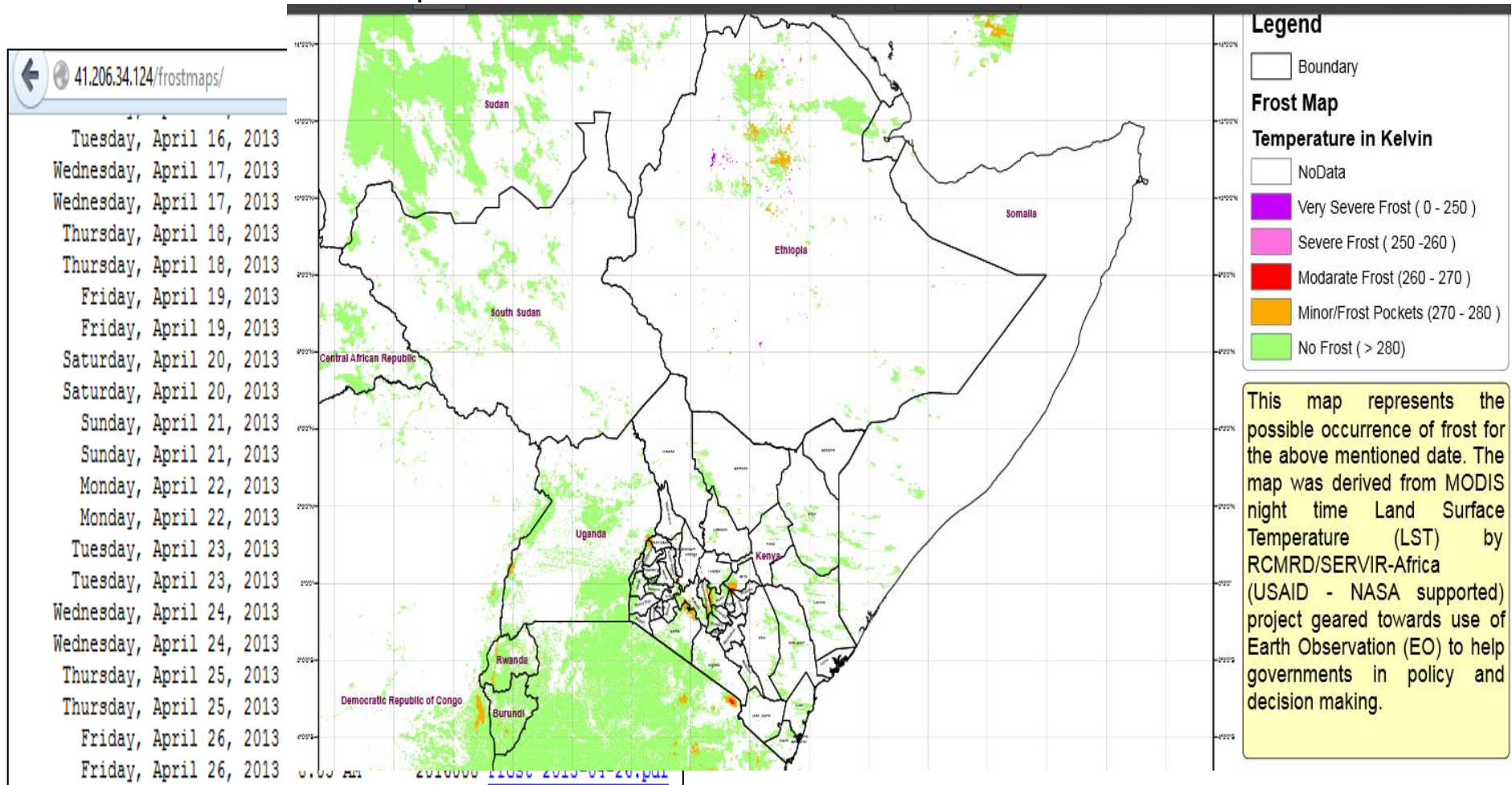
Temporal Maps and Time Series: Stream Flow and Soil Moisture



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

HOME SEARCH BROWSE

[Details](#) [Review](#) [Relationships](#) [Preview](#)

Plants Observation Density Count

URL:

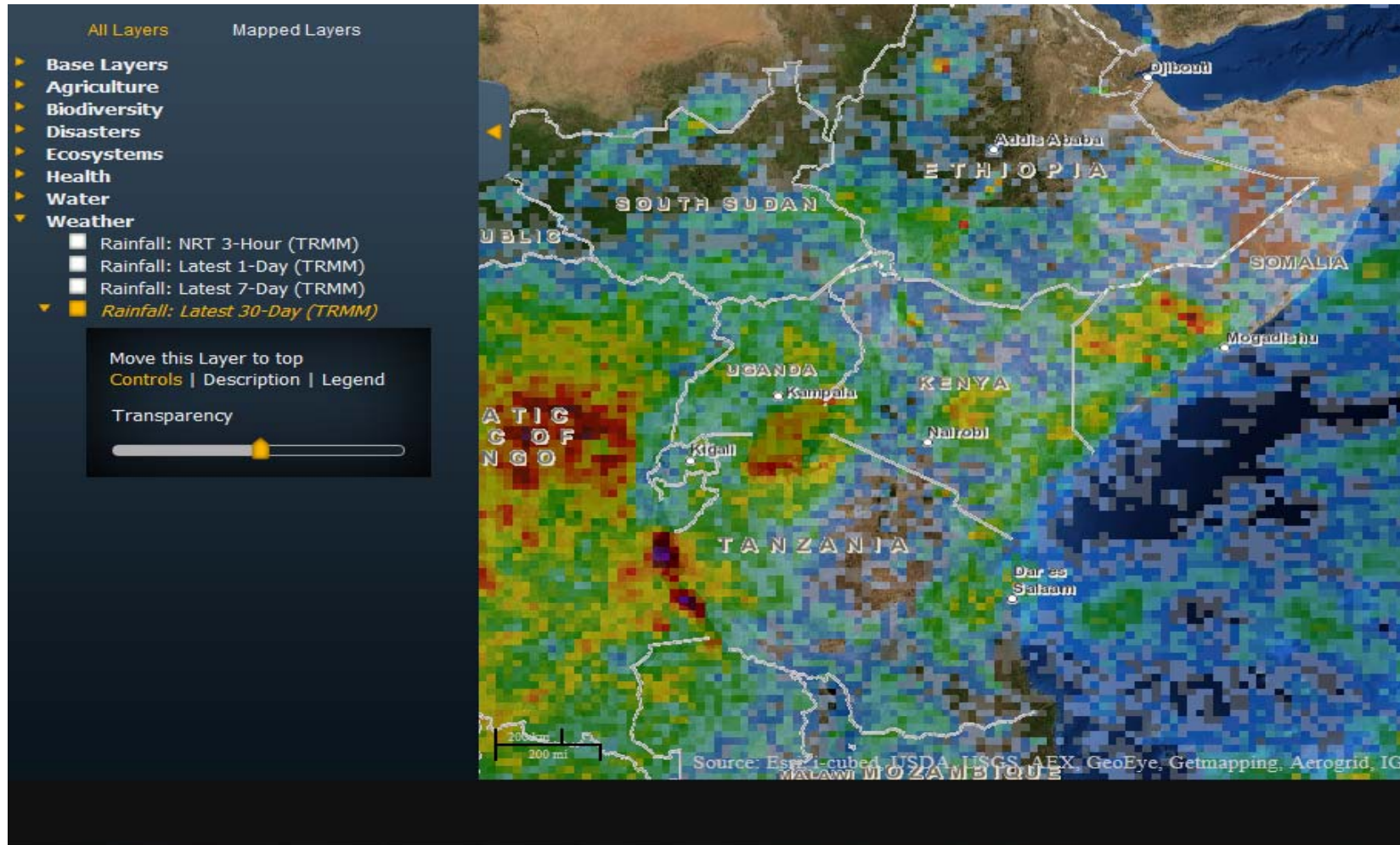
Embed:

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, Health, Demography, Water etc.
- An Online Data Repository that allows upload, download & visualization of geospatial data

The screenshot shows the web interface for "Open Data for The Horn". At the top left, there is a banner with the text "Open Data for The Horn" over a background image of cracked, dry earth. To the right of the banner is a "MEMBERS LOGIN" section with two input fields for "Username" and "Password", a "Login" button, and a link for "Forgot password? Reset it!". Below the banner is a navigation bar with "Data" and "Maps" tabs. The main content area features a title "Horn of Africa: Food Security Projection for Sep 2011 by FEWS (as of July 2011)" and an abstract describing the projection in food security status for September 2011 in drought-affected countries. A map of the Horn of Africa is displayed, showing color-coded regions for food security status. The map includes labels for Sudan, Ethiopia, Uganda, and Kenya. A scale bar indicates 500 km and 500 mi, and a scale of 1:34942660 is shown. To the right of the map, there is a "Download" section with a link to "Download all layers included in this map", a "Layers" section listing the map's layers (geonode:TM_WORLD_BORDERS_0, geonode:EA_1107_ML1, geonode:TZA_Food_Insecurity_Manual, geonode:TM_WORLD_BORDERS_0), and a "Manage" section with links to "View or edit this map" and "Duplicate map".

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.

Clip, Zip & Ship

Download SERVIR datasets by following the steps below.

STEP 1: Enter your e-mail address:

STEP 2: Click the button to activate clipping mode.

START DRAWING ON MAP

Map Contents

- ESRI Street Map
- USGS_Ecosystems
 - Terrestrial Ecosystems
 - Surficial Lithology
 - Land Surface Forms
 - Topo Moisture Potential
- Agriculture
- Biodiversity
- Climate

INSTRUCTIONS

This is a clip, ship & zip testbed.

This tool lets you download Servir datasets for a custom area that you define by drawing on the map. The datasets are zipped and set aside on the server. An e-mail is sent to you containing a link to the zip file. Data is currently only available in ESRI shapefile format.

HOW TO USE

Start by entering your e-mail address in the textbox. Next, zoom to an area of interest on the map (use shift + mouse drag for rubber band).

Click on the button in step 2, then draw a shaded region on the map. This will be the area for which data is downloaded. Double-click to finish drawing. When finished, a background process will zip the data within the area you drew and send you an e-mail containing a link to the zipped file.

NOTE

Only layers that are visible will be included in the download. You can toggle the visibility of individual layers using the Map Contents control. Check the box next to an item to make it visible, and uncheck it to hide the layer.

Important Links (follow up)

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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/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

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SERVIR 