Land Cover Mapping for Sustainable GHG Inventory Development East and Southern Africa

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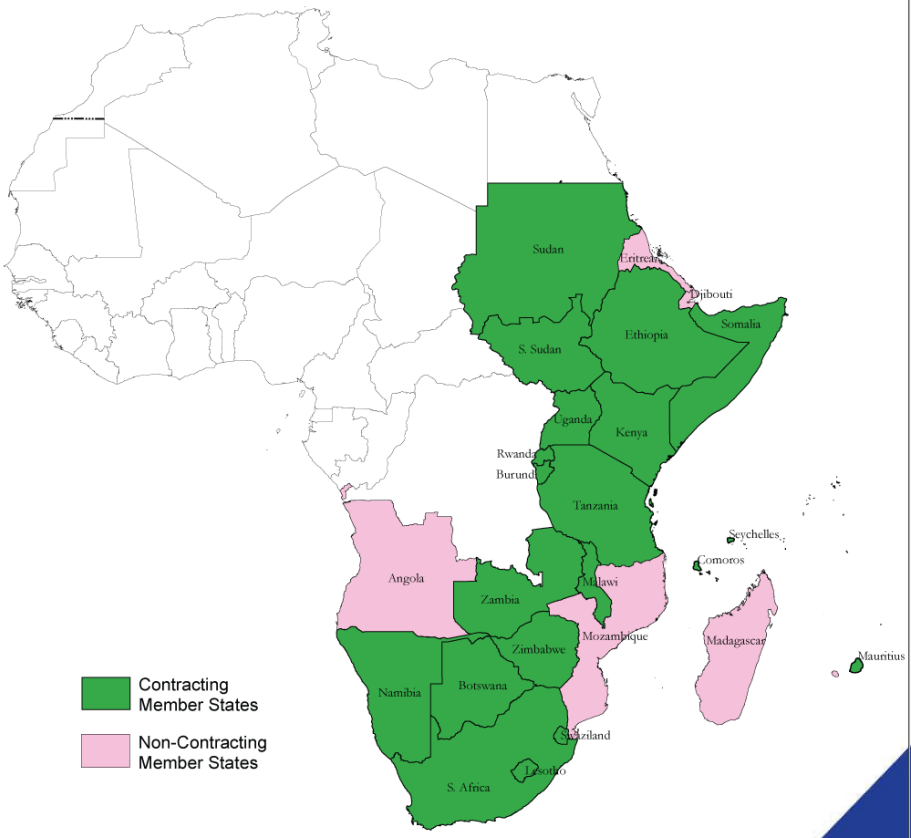
SERVIR Eastern & Southern AFRICA

Regional Center for Mapping of Resources for Development (RCMRD)

Introduction

- Established in Nairobi, Kenya in 1975
- 20 Contracting Member States in the Eastern and Southern Africa Regions



Objective

- Promotes the application of geo-information towards sustainable development in member countries.

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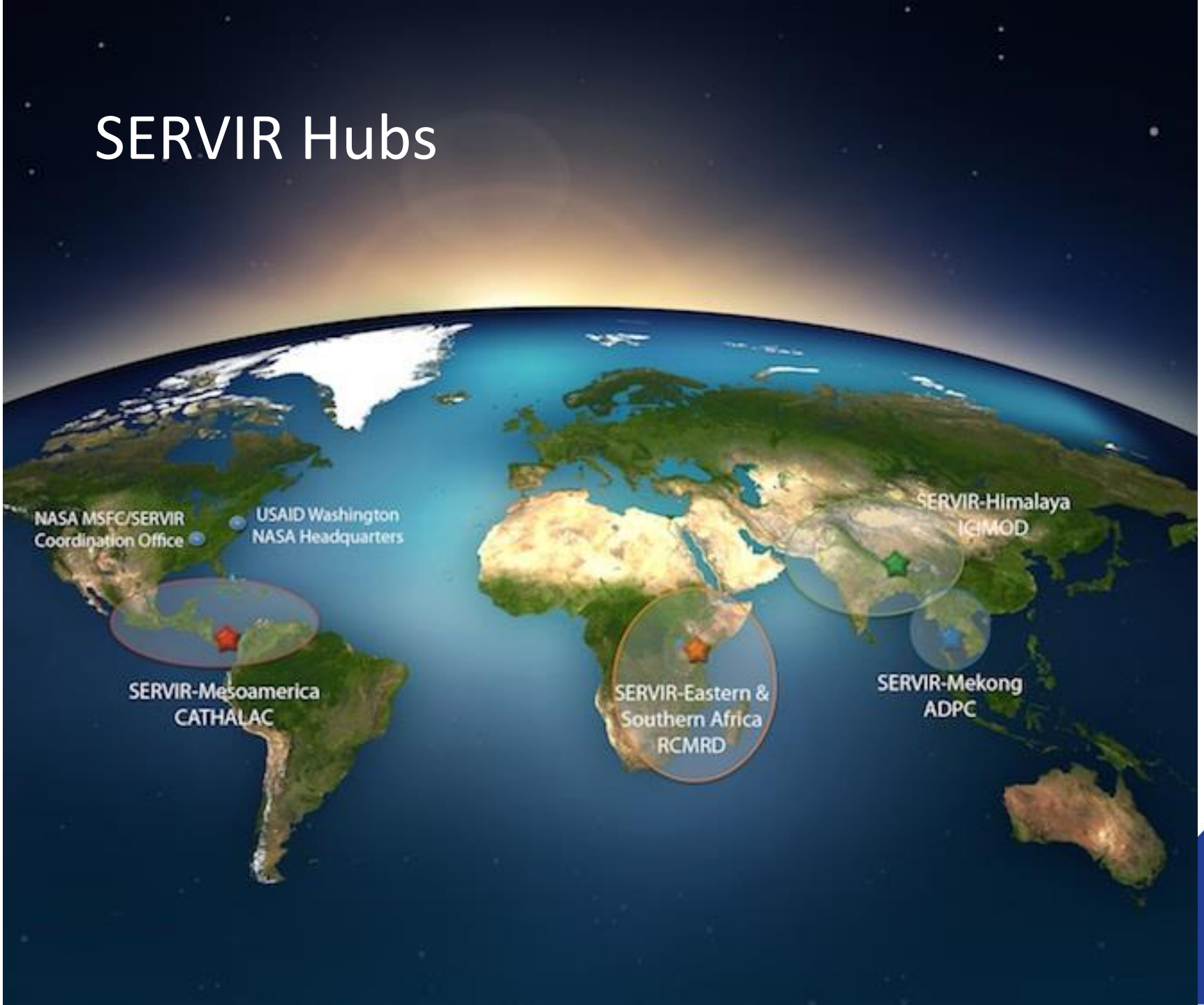
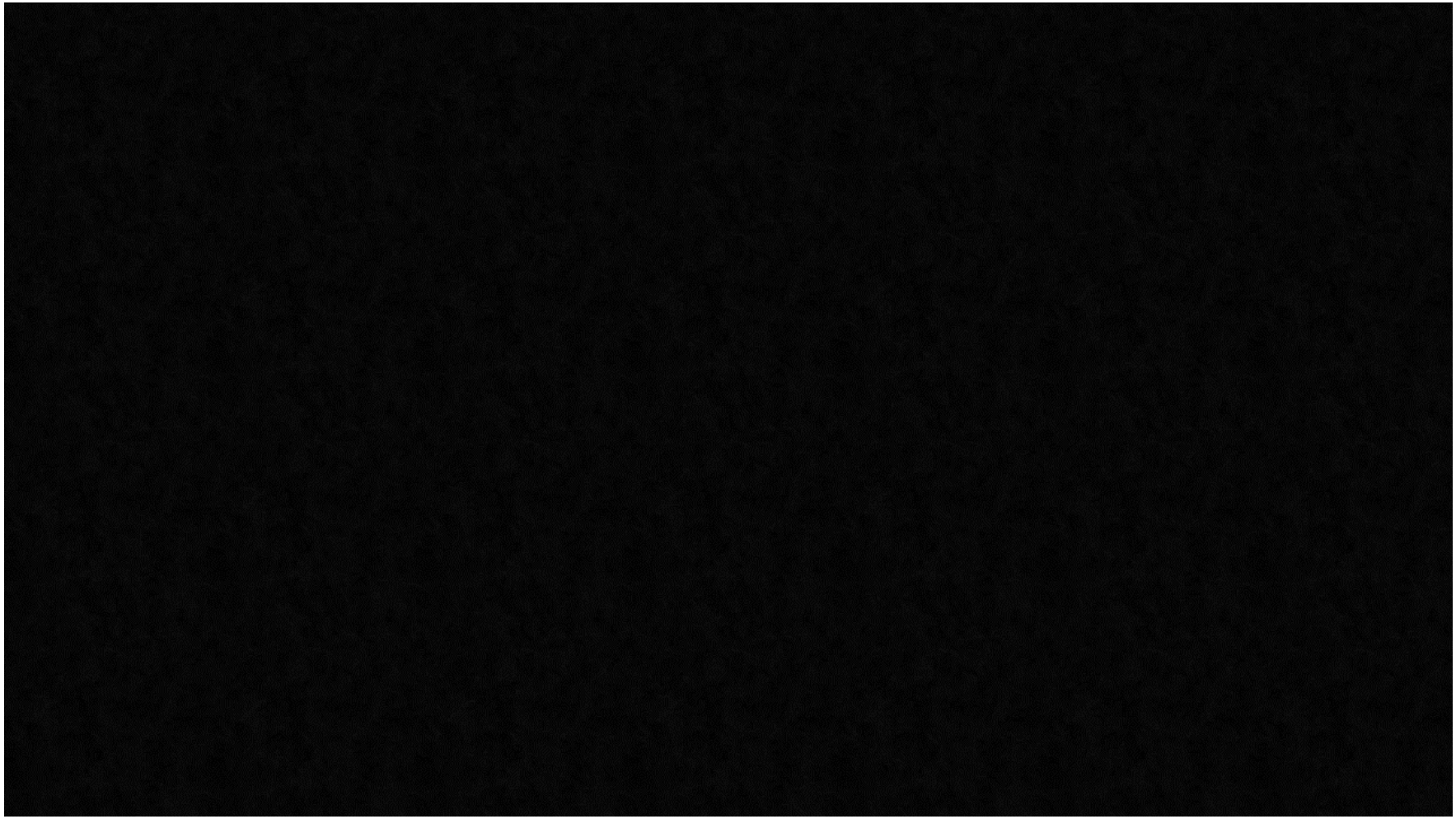
SERVIR Hubs


NASA MSFC/SERVIR
Coordination Office
USAID Washington
NASA Headquarters
SERVIR-Himalaya
ICIMOD
SERVIR-Mesoamerica
CATHALAC
SERVIR-Eastern &
Southern Africa
RCMRD
SERVIR-Mekong
ADPC



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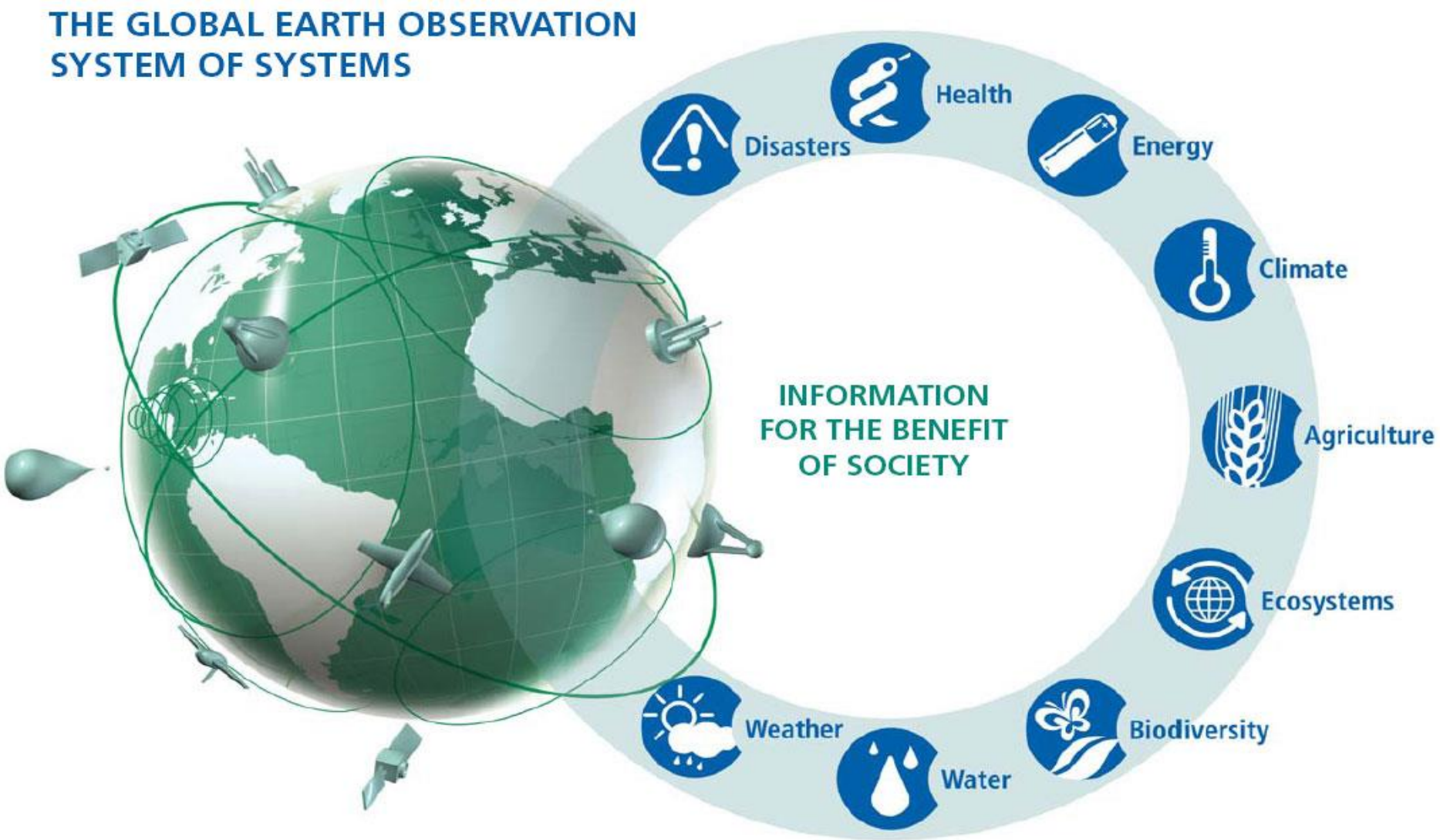
GEOSS THEMES: SERVIR

Thematic areas



GHG Project: Introduction

- UNFCCC oversees the development of GHG Inventories as provided for in Article 8 of the Convention.
- Six countries: **Botswana, Malawi, Namibia, Rwanda, Tanzania** and **Zambia**; requested for UNFCCC' s support in GHG Inventory development
- UNFCCC is working with RCMRD, SERVIR, USAID, NASA, USEPA and ICFI to build capacity of the countries to sustainably develop GHG Inventories.

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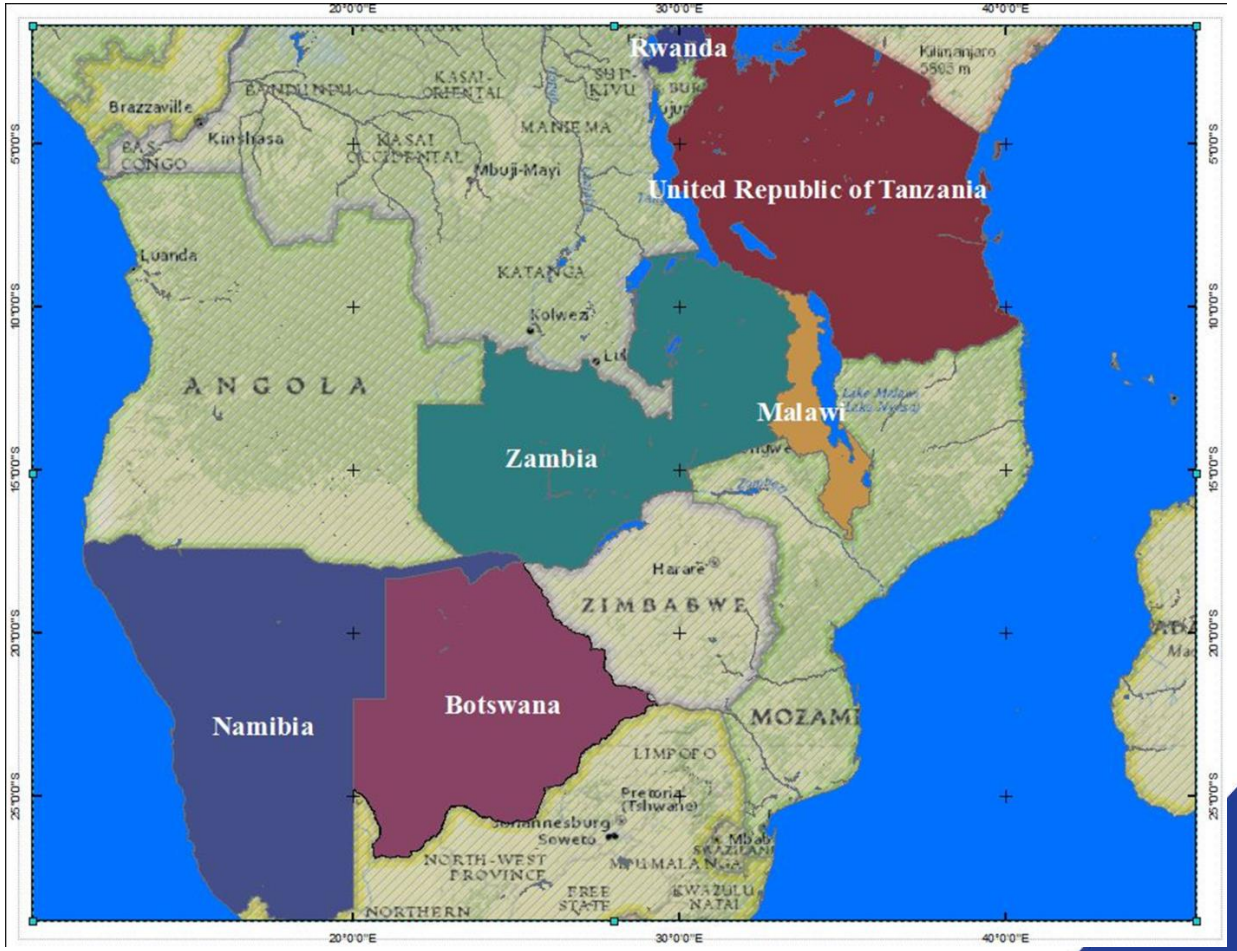
Project Countries

Countries participating in the project

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

In2014/2015 The project was extended to cover three more countries:

7. ***Ethiopia***
8. ***Uganda***
9. ***Mauritius***



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Overall GHG Project Aims

- **1) Strengthen the institutional arrangements** and inventory management systems, its functions, and ability to sustainably oversee the compilation of regular national GHG inventories for submission to the UNFCCC;
- **2) Enhance the technical capacity of designated personnel** to produce at minimum a complete Tier I level, or where achievable move to Tier 2 level, well documented/transparent GHG inventory for the Agriculture and LULUCF sectors.
- **3) Improve national methodologies, activity data and emission factors** through a combination of hands-on training designed to meet the individual needs of the countries, use of GHG inventory management tools specifically designed for the Agriculture and LULUCF sectors, assistance from experts with specific knowledge on these source/sink categories, guidance on developing land use maps and regional networking

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Objective

- To collect ancillary and ground reference data for validating land cover maps derived from satellite imagery for each country
- To develop Land Cover maps from Landsat satellite images using remote sensing techniques.
- To build capacity of the countries through training on Land Cover mapping for GHG Inventory Development in the ESA Region

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Image Classification

Classification Schema

- Classification scheme used was informed by country specific interest, definitions, descriptions, mapping goals and policy statements and documents based on IPCC guidelines.
- Classification Scheme:
  - Scheme I: IPCC defined
  - Scheme II: defined by the country
- Classification is such the Scheme II category can be rolled back to scheme I category.

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Ancillary Data Collection

Classification Scheme Development Workshops : Zambia

Classification Scheme Development Workshops : Botswana

Ancillary Data Collection and Classification Scheme Development Workshops: Malawi

Classification Scheme Development Workshops : Rwanda

Methodology

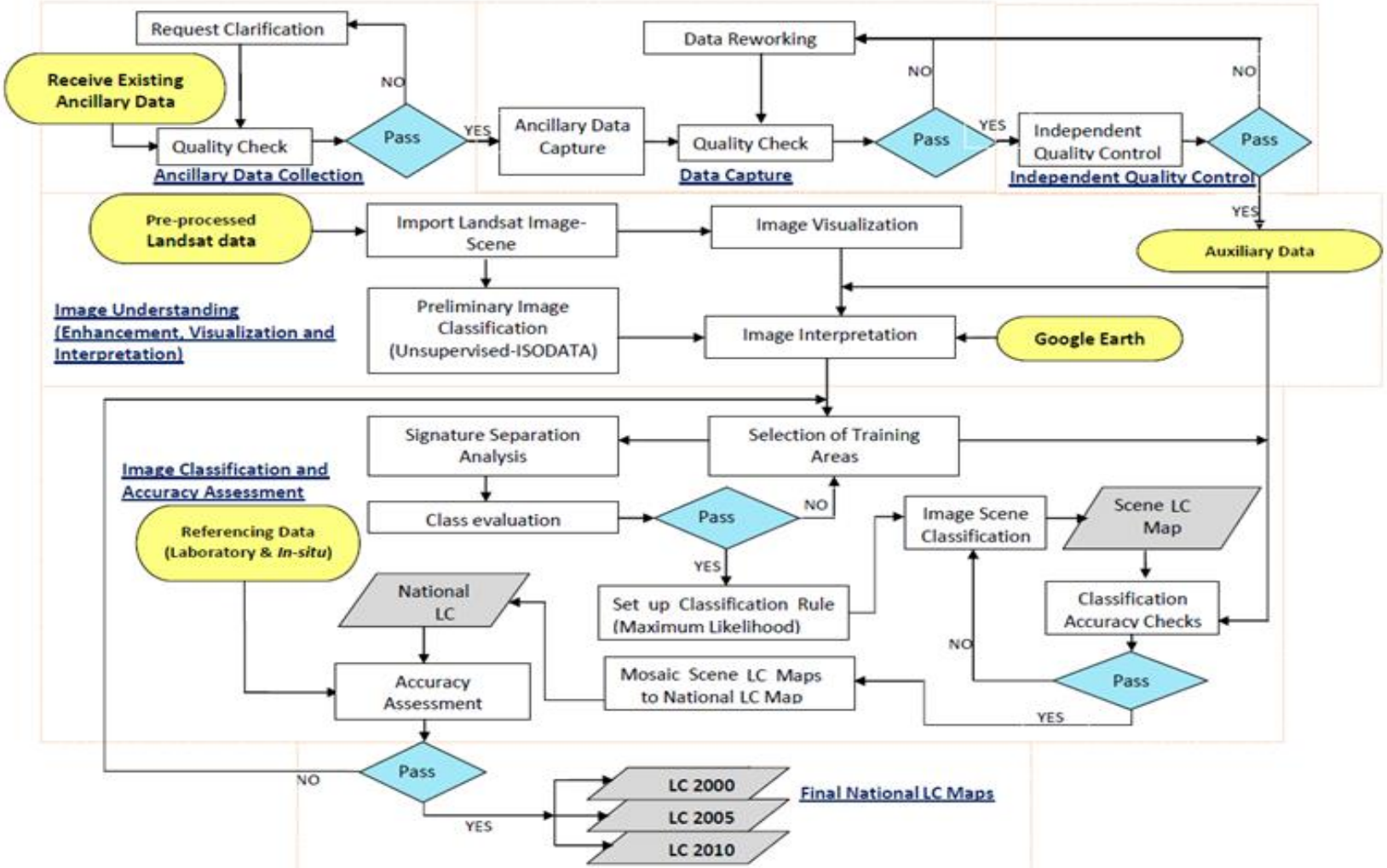

Figure 2: Workflow for Land Use Land Cover Classification

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Capacity Building

Group Photo: Namibia and Botswana Capacity Building

Capacity Building for Botswana and Namibia at RCMRD

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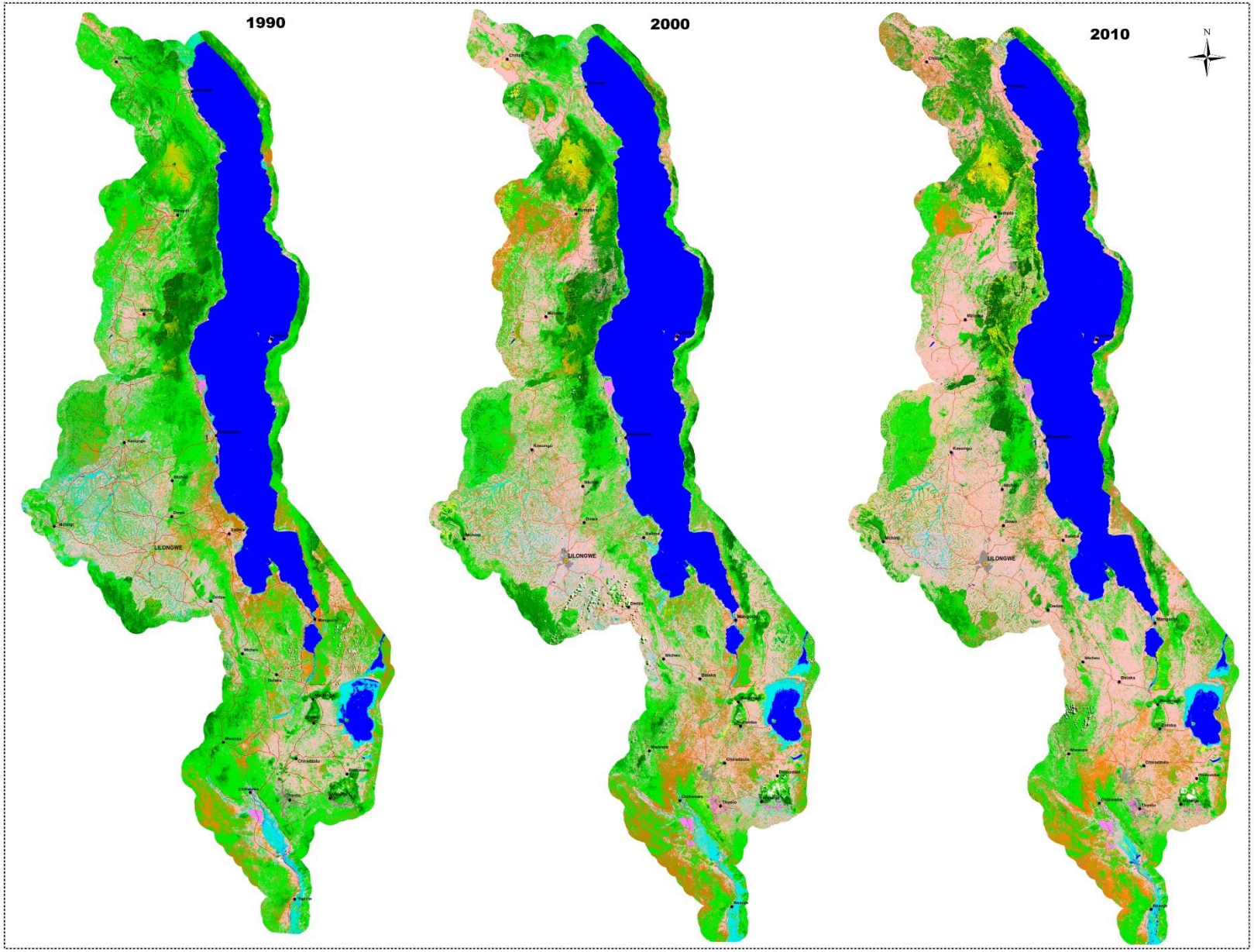
MALAWI SCHEME II LAND COVER



DATA AND MAP INFORMATION SOURCES

The land cover map was derived from LandsatTM and ETM images of1990, 2000 and 2010 acquired from the USGS.
Roads, boundaries and towns were compiled from Department of Surveys and Mapping.

Map data input/output parameters

Projected Coordinate System: WGS 1984 UTM Zone 36S
Projection: Transverse Mercator
false_easting: 500000
false_northing: 10000000
central_meridian: 33.0
scale_factor: 0.9996
latitude_of_origin: 0
Linear Unit: Meter

Geographic Coordinate System: GCS WGS 1984
Datum: D WGS 1984
Prime Meridian: Greenwich
Angular Unit: Degree

Scale 1:1,050,000

0 25 50 100 150 200 250 Kilometers
0 25 50 100 150 Miles

LEGEND

Dense Forest	Closed Grassland	Open Shrubland	Wetland	Otherland	Major Towns
Moderate Forest	Open Grassland	Perennial Cropland	Water Body	Cloud	Capital
Sparse Forest	Closed Shrubland	Annual Cropland	Settlement	Shadow	Major_roads

Disclaimer
The geographical designations employed do not imply the expression of any opinion whatsoever on the part of any of the agencies involved, concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries.

Prepared and produced by Regional Centre for Mapping of Resources for Development (RCMRD)
October 2014.

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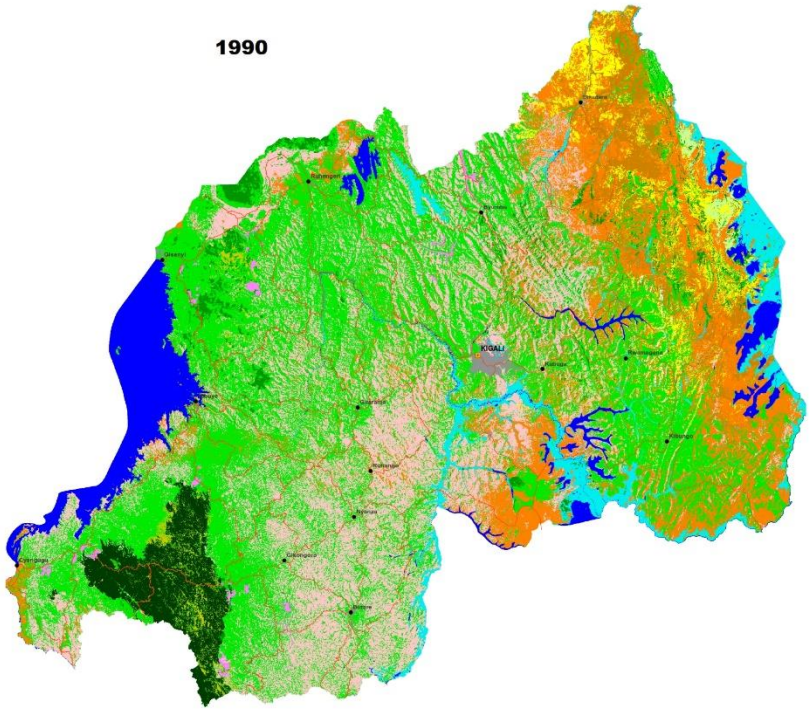
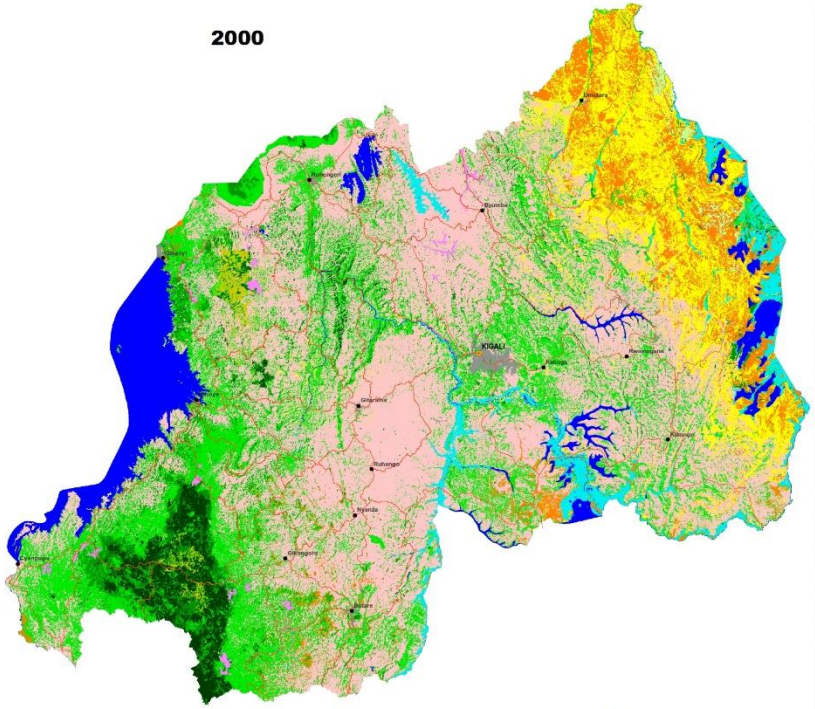
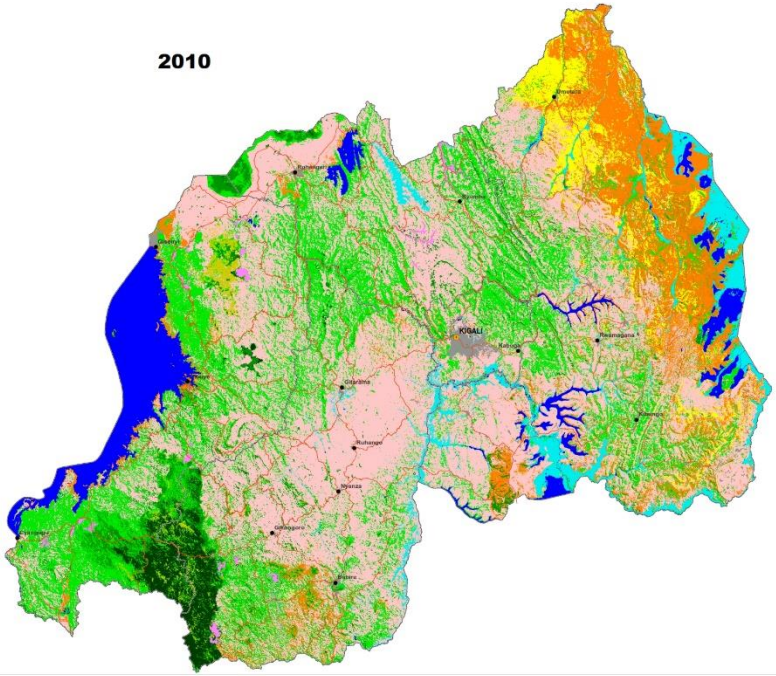
RWANDA SCHEME II LAND COVER







N
W E
S

0 15 30 60 90 Kilometers
0 15 30 60 Miles

LEGEND

Rwanda 1990 Scheme II Land Cover.img

LC_Code

- Dense Forest
- Moderate Forest
- Sparse Forest
- Woodland
- Closed Grassland
- Open Grassland
- Closed shrubland
- Open Shrubland
- Perrenial Cropland
- Annual Cropland
- Wetland
- Water Body
- Settlement
- Otherland
- Capital City
- MajorTowns
- National road

DATA AND MAP INFORMATION SOURCES

The land cover map was derived from LandsatTM and ETM images of1990, 2000 and 2010 acquired from the USGS.
Roads, boundaries and towns were compiled from RNRA.

Image data' input parameters

Coordinate system:WGS 1984
Projection:Transverse Mercator (UTM Zone 35S)
Datum: WGS 1984
False easting: 500,000
False northing: 10,000,000
Scale factor: 0.9996
Central Meridian:27
Latitude of origin: Equator

Vector data' output Parameters

Coordinate system:TM_Rwanda
Projection: Transverse_Mercator
False_Easting: 500000.0
False_Northing: 5000000.0
Central_Meridian: 30.0
Scale_Factor: 0.9999
Latitude_Of_Origin:Equator
Linear Unit: Meter (1.0)
Geographic Coordinate System: GCS_ITRF_2005
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_ITRF_2005
Spheroid: GRS_1980
Semimajor Axis: 6378137.0
Semiminor Axis: 6356752.314140356
Inverse Flattening: 298.257222101

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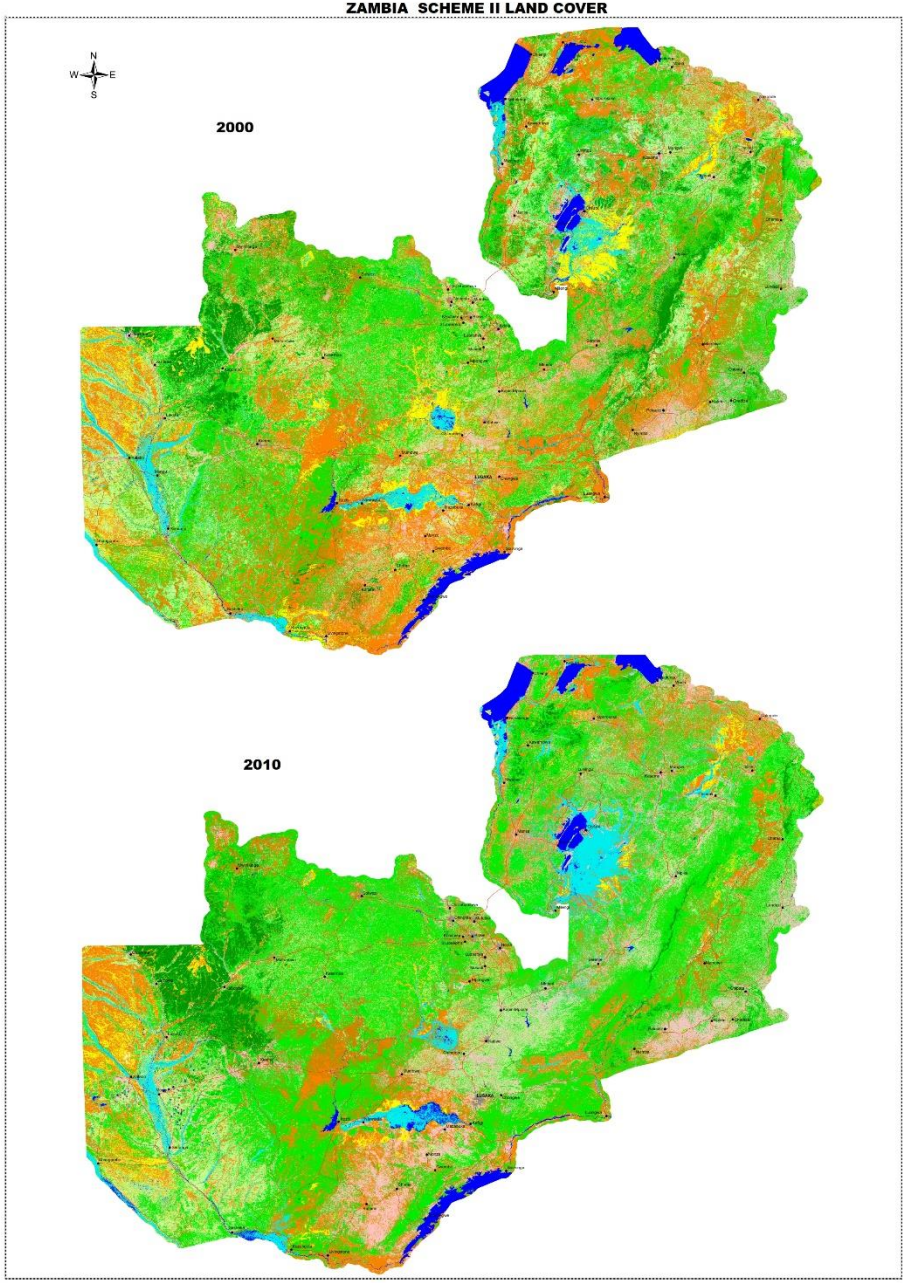
ZAMBIA SCHEME II LAND COVER



DATA AND MAP INFORMATION SOURCES

The land cover map was derived from Landsat NR and 1 Mi images of 2000 and 2010 acquired from the USGS.
Roads, boundaries and rivers were compiled from Zambia Survey Department.

Image data input parameters

Coordinate system: WGS 1984
Projection: Transverse Mercator (UTM Zone 36S)
Datum: WGS 1984
False easting: 500,000
False northing: 10,000,000
Scale factor: 0.9996
Central Meridian: 27
Latitude of origin: Equator

Data output Parameters

Projected Coordinate System: UTM_Zone_36S
Projection: Transverse_Mercator
False easting: 500000.0
False_northing: 10000000.0
Central_meridian: 27.0
Scale_factor: 0.9996
Latitude_of_origin: 0.0
Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_WGS_1984
Spheroid: WGS_1984
Semimajor Axis: 6378137.0
Semiminor Axis: 6356752.314245179
Inverse Flattening: 298.257223563

Scale 1:1,750,000

0 25 50 100 150 200 250 300 350 400 Kilometers
0 25 50 100 150 200 250 Miles

LEGEND

Moderate Forest	Closed Grassland	Open Shrubland	Water Body	Main Roads	
Sparse Forest	Open Grassland	Cropland	Settlement	National Boundary	
Open Dense Forest	Closed Shrubland	Wetland	Otherland	capital	
				Towns	

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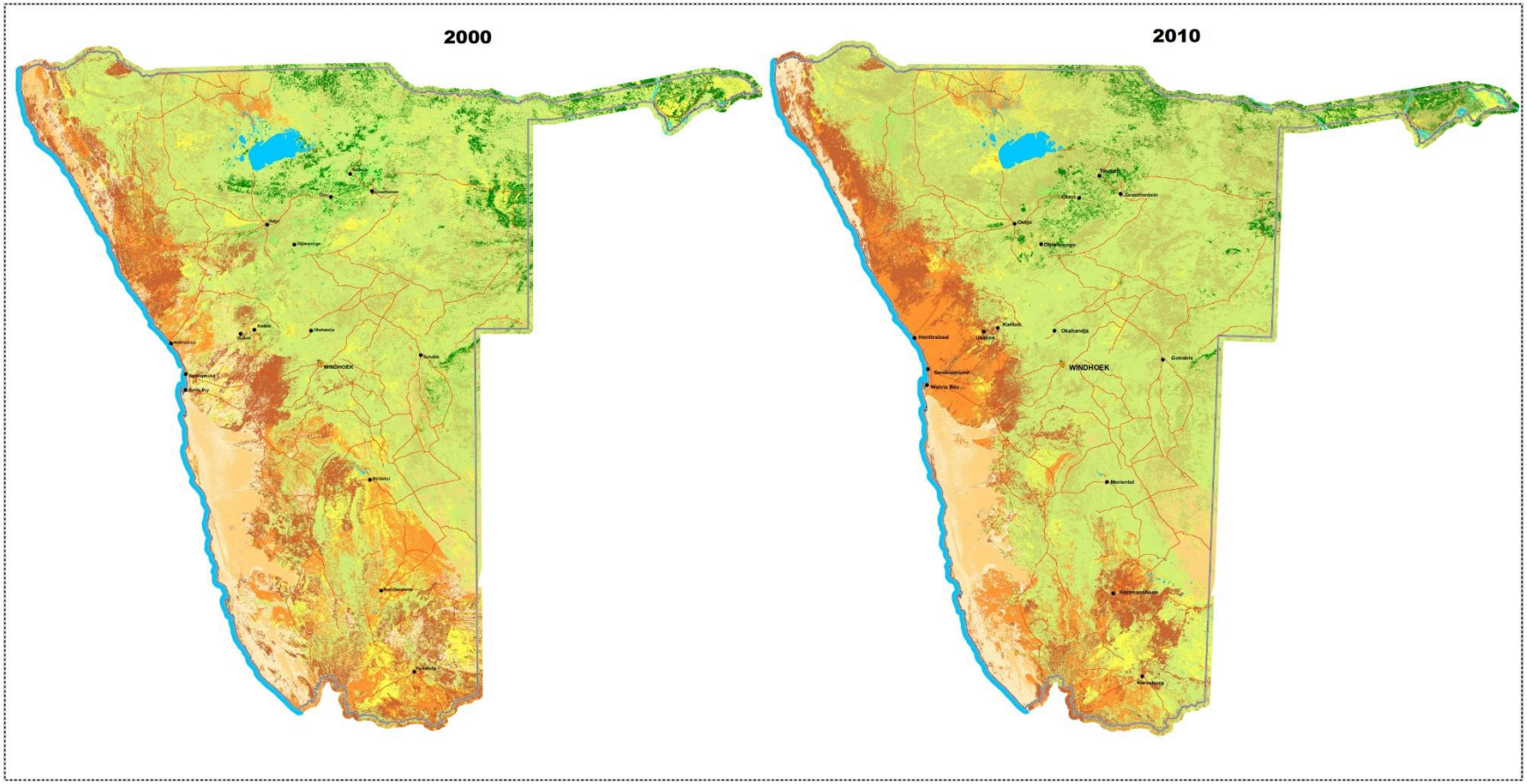
NAMIBIA SCHEME II LAND COVER



DATA AND MAP INFORMATION SOURCES

The land cover map was derived from LandsatTM and ETM images of 2000 and 2010 acquired from the USGS.
Roads, boundaries and towns were compiled from Department of Surveys and Mapping.

Input/ Output parameters

Coordinate System:UTM_Zone_33S
Projection: Transverse_Mercator
False_easting: 500000.0
False_northing: 10000000.0
Central_meridian: 15.0
Scale_factor: 0.9996
Latitude_of_origin: 0.0
Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_Clarke_1866
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_Clarke_1866
Spheroid: Clarke_1866
Semimajor Axis: 6378206.4
Semiminor Axis: 6356583.799999881
Inverse Flattening: 294.9786982

Scale 1:2,500,000

0 50 100 200 300 400 500 600 Kilometers
0 50 100 200 300 400 Miles

LEGEND

Forestland	Shrubland	Vegetated Wetland	Rock Outcrop	Capital
Woodland	Savanna Grassland	Water Body	Bare Soil	Towns
Grassland	Annual Cropland	Settlements	Desert Dune	Roads
			Desert Sand	National Boundary

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Uses of Land Cover maps

Land cover maps are baseline data required for a number of applications:

- Baseline data for quantification of GHG emissions
- Land degradation
- REDD (Reduced Emissions from Degradation and Deforestation) and REDD+ initiatives
- Informed decision making on policy issues affecting climate change and environmental protection
- Environmental monitoring
- Land Use Planning

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Dissemination

Data catalogue includes:

- Land Cover Maps
- Technical Reports
- Training Manual
- Accuracy Reports
- Web portal: http://www.servir.rcmrd.org/geoapss/landcoverviewer/

All this is freely available and can be accessed by a number of open source applications

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Status of the Project

- Land Cover maps for the initial six countries (Malawi, Rwanda, Zambia, Botswana, Tanzania and Namibia) developed.
- Dissemination for four countries(Rwanda, Zambia, Botswana, and Namibia) so far.
- Capacity built for seven countries..
- Land cover maps for Ethiopia currently being developed for 2008 and 2000.

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THANKS

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with

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