Satellite based Forest Monitoring for REDD+ and other related purposes – State of Play and Future Perspectives, 04th October 2012, Bonn

GAF AG

REDD Project Implementation Experiences in the Congo Basin and SADC

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Presentation Outline

- Four main areas of work
- Overarching Objectives
- Key Project Activities
- Conclusions

REDD+ Activities/Experiences

4 main areas of development and implementation:

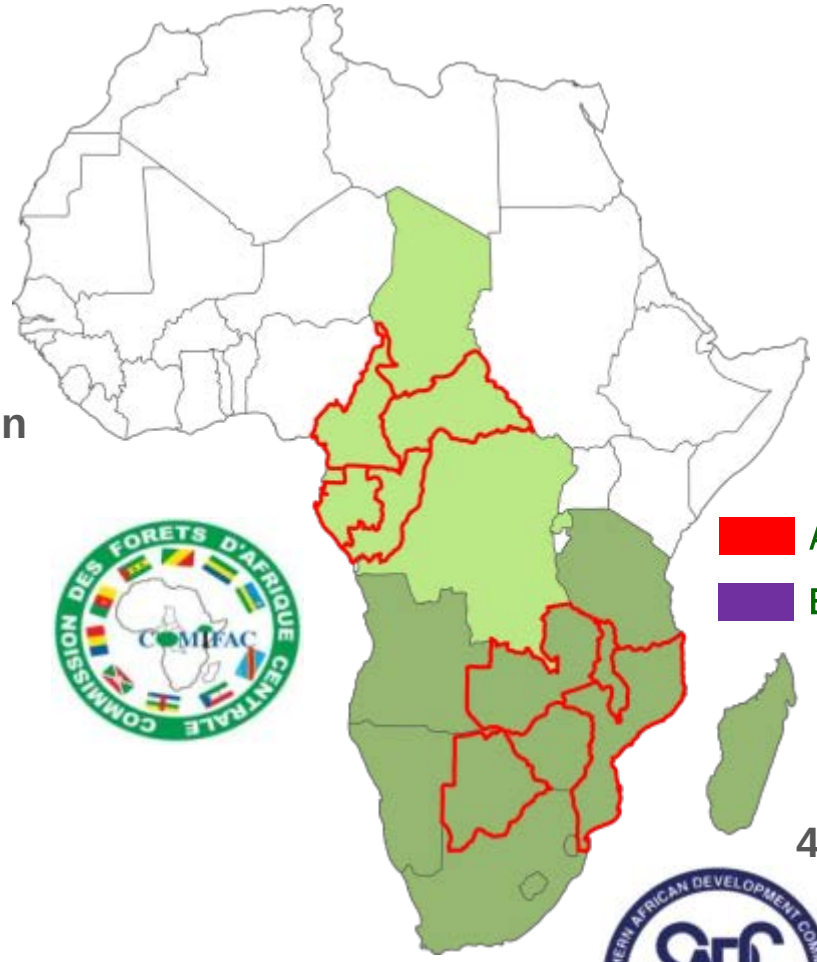
- **REDD Pilot Study in Cameroon –** *ESA and KfW supported*
- **Developing pre-operational MRV systems at national level Congo Basin countries –** *ESA supported*
- **Undertaking R&D for specific technical issues Congo Basin countries –** *EU FP7, REA co-financed*
- **Developing a regional REDD MRV (ecosystem approach) in SADC -** *GIZ with BMU funds*

Experiences in SADC & COMIFAC Activity Data Mapping

1. REDD Pilot Cameroon

2. GSE REDD Extension in RoC and Gabon

3. R&D REDD for Africa Cameroon and CAR



4. REDD+ MRV for SADC

On behalf of Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany

Experiences in SADC & COMIFAC Emission Factor Assessment

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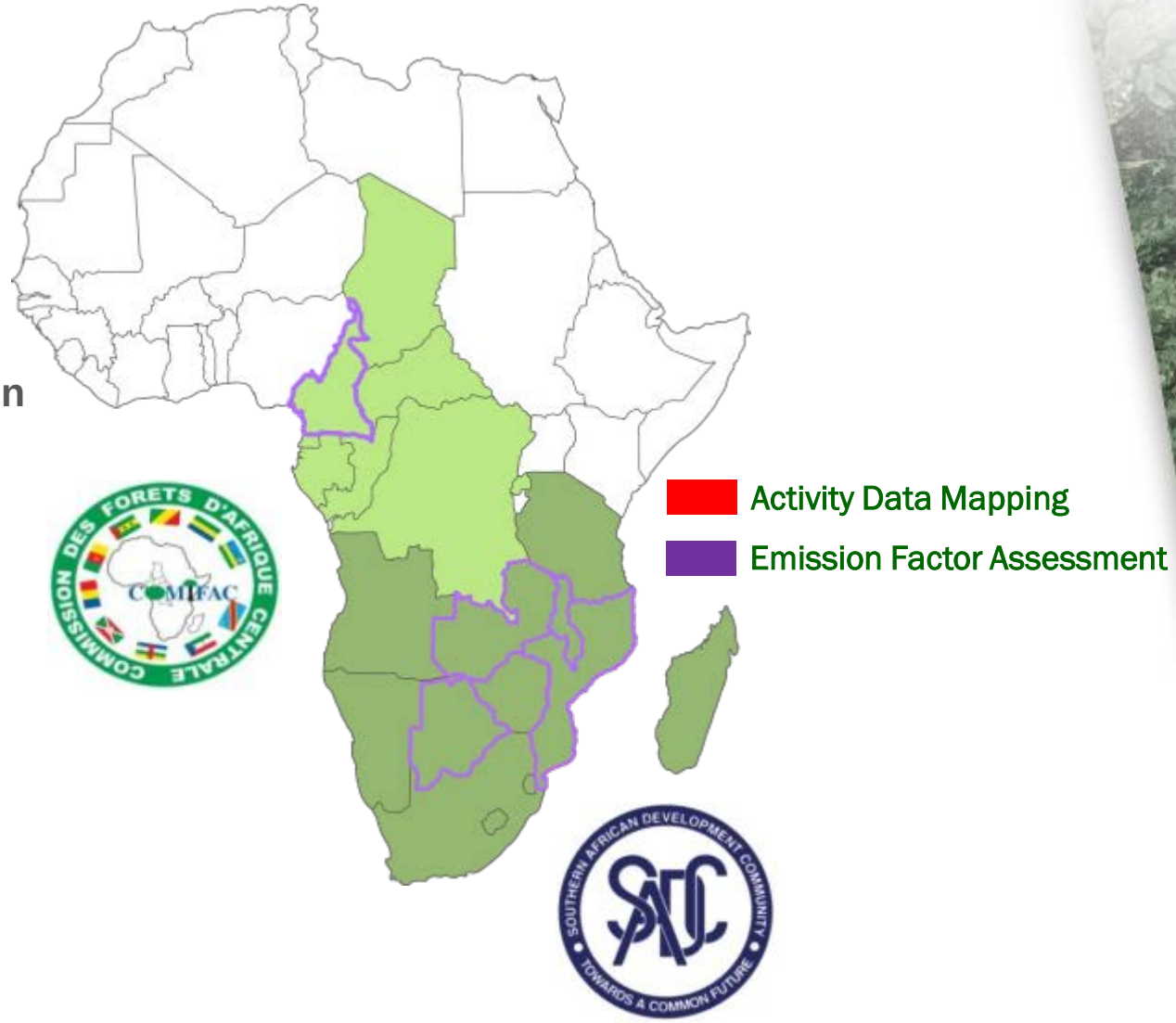


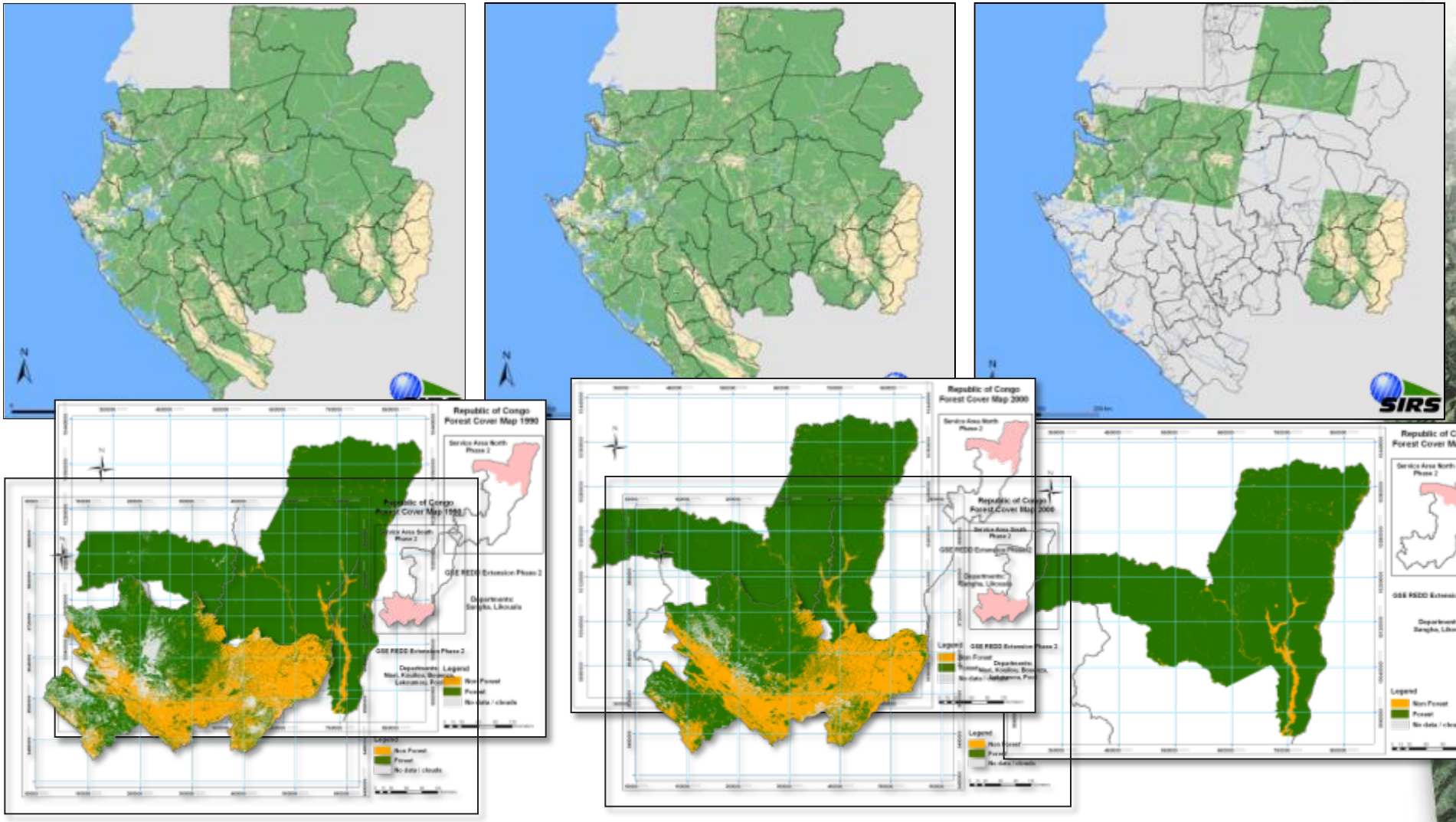
Overarching Objectives

- **Development and implementation of pre-operational system for forest cover monitoring in REDD+ (national and regional)**
  - Activity Data mapping
  - Emission factor estimation
  - Capacity building
- **Development and implementation of cost effective methods of carbon accounting**

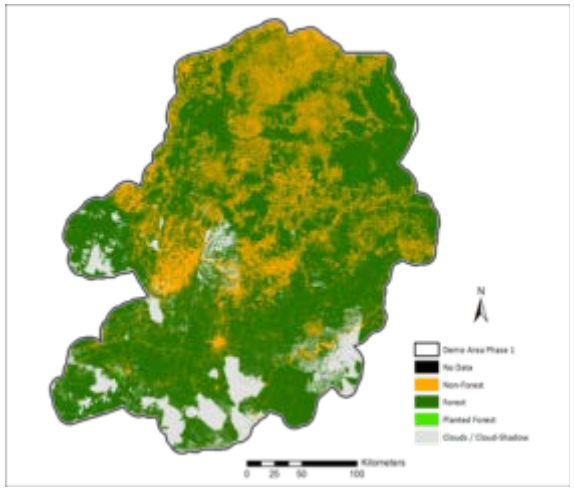
Components of Activity Data Mapping

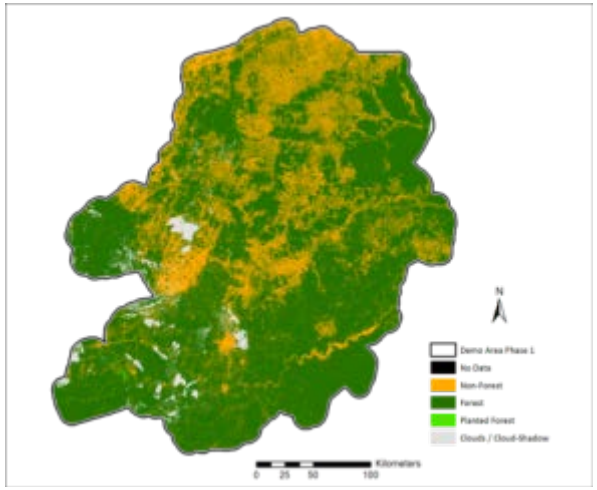
- Wall-to-wall historic mapping (1990, 2000, 2010)
- Optical EO-data and RADAR data for gap filling
- Segment based classification
- Products: Forest Maps; classification of deforested areas into IPCC compliant Land cover/use categories
- MMU 0.5 and 1 ha
- Field missions for ground truthing
- Verification of products: Accuracy assessment based on area frame sampling with VHR data and field missions
- Validation of Processess: end-to-end verification of all project implementation steps including user utillity assessment

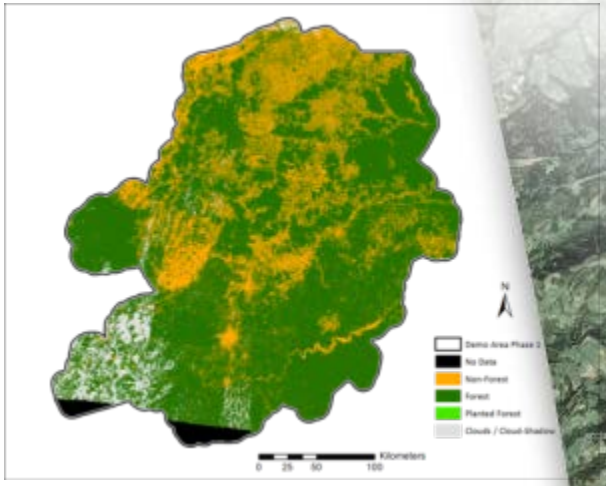
National Wall-to-Wall Mapping: Gabon & Republic of Congo

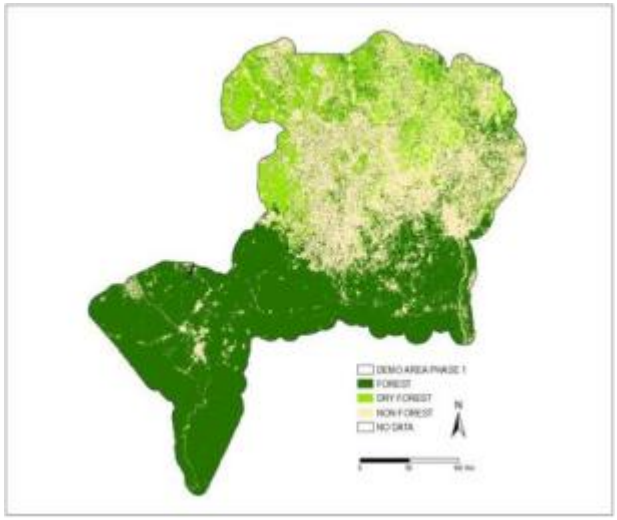


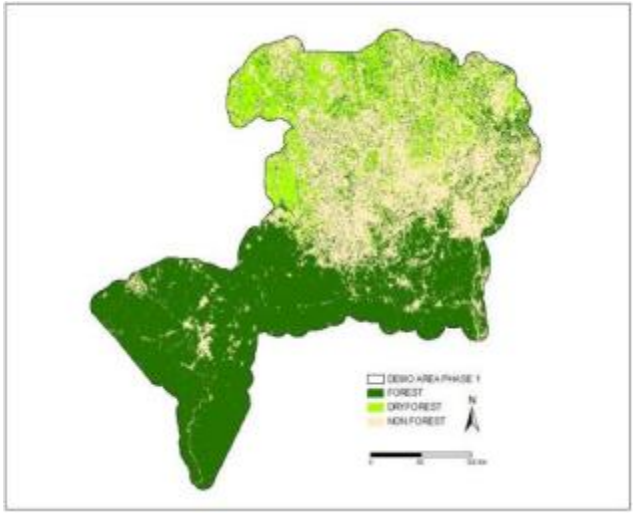
Wall-to-Wall Mapping of Administrative Areas - Cameroon and CAR

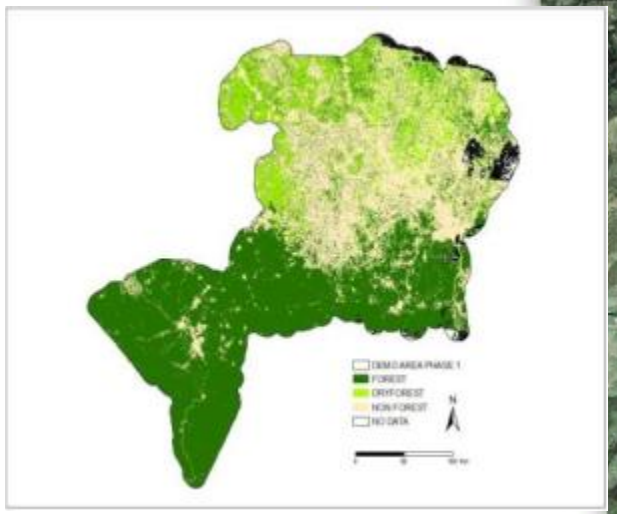










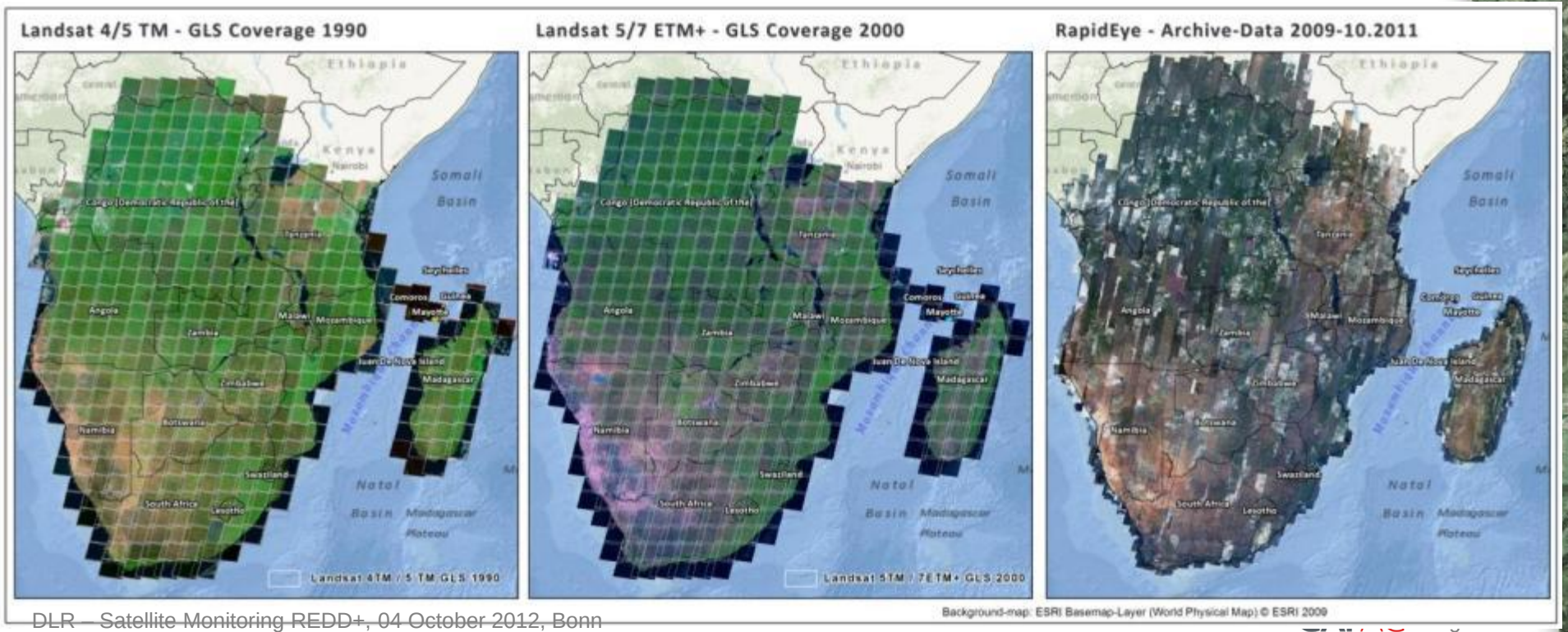


Regional Ecosystem Mapping - SADC

- **SADC (15 countries, 5,5 mio km²) is interested in a Regional ecosystem based REDD+ approach**
- **4 Selected Countries with representation of 3 Main Ecosystems**
- **Test sites of 26,000km² for each ecosystem**
- **AD to be assessed for each using:**
  - the application of multispectral optical and radar remote sensing data, for DD-1990, 2000 and 2010
  - minimum mapping unit of 0.5 hectare
  - a gross error of less than 5%.

AD - EO Data Requirements

- Optical EO datasets with VNIR and SWIR bands discriminate forests with a better accuracy than other optical datasets with just the VNIR band and SAR.
- Therefore, Landsat TM and ETM will constitute the basis datasets for the periods 1990 and 2000; while RapidEye with a resolution of 6.5m will form the basis for 2010 epoch.



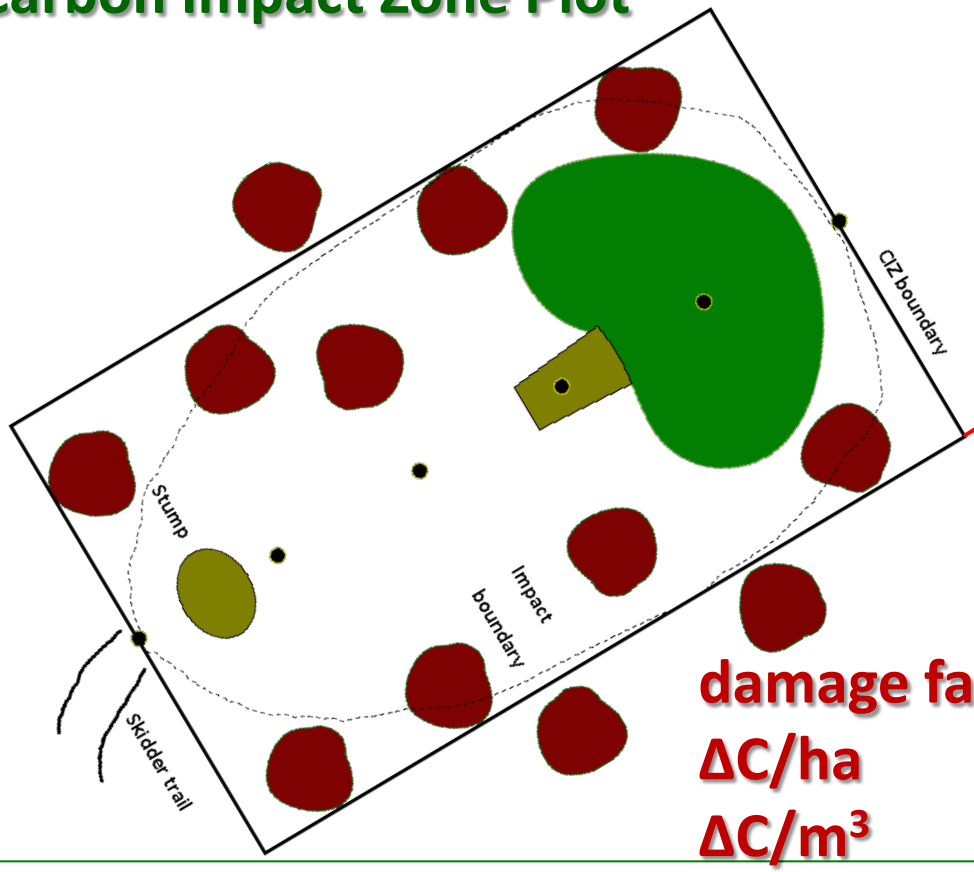
EF - Estimating Emission/ Damage Factors Cameroon

- **All biomass pools measured:**
  - Aboveground
  - Litter
  - Deadwood
  - Below ground
  - Soil
- **Damage Factor estimation**
  - Comparison of collateral damages in two different forest management systems: certified (Pallisco) & uncertified (SCTB) FMUs

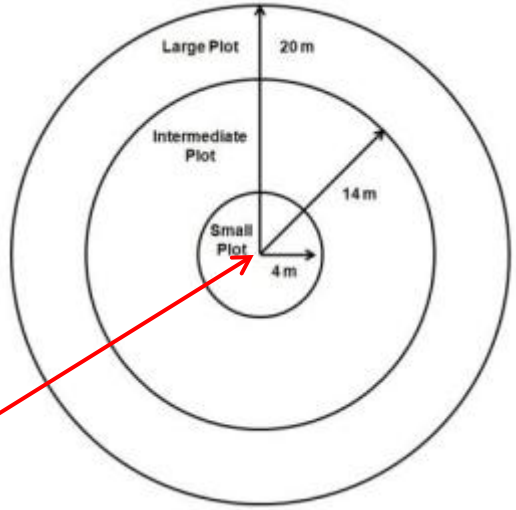
Permanent Plot Design

Developed by Winrock International, modified by FAN

Carbon Impact Zone Plot



Paired Plot



50 m

intact carbon stock (5 pools)

damage factor:

ΔC/ha

ΔC/m³

=> Carbon stock in HWPs

EF: SADC – Emission Factor Estimation

Scope and type of the inventory:

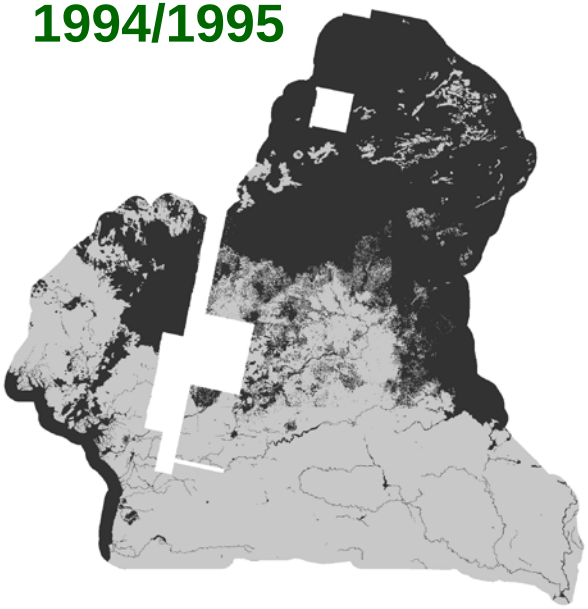
- stratified (restricted) random sampling compliant with IPCC 2006 Guidelines, in test regions of 26.000 km², in 4 pilot countries
- statistical sampling error below 5% at a probability level of 95%,
- inventory will be at Tier 2, some carbon pools will be at Tier 1

R&D: Cloud Gap Filling with SAR Data in Cameroon

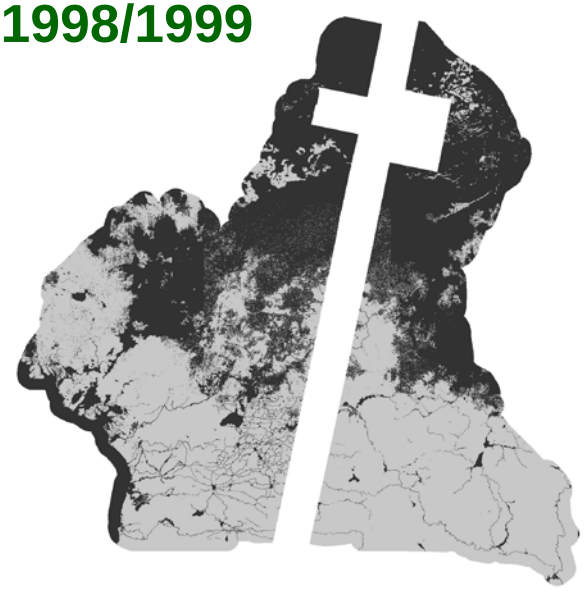
- 348 ERS (1 and 2) scenes used in the two mosaics (1994/1995 and 1998/1999) for gap filling of wall-to wall forest maps

- Accuracy is lower than mapping with optical EO data therefore used only for cloud gap filling (approx. 10 % of the area)

1994/1995



1998/1999



Light grey = forest, dark grey = non-forest

Produced by VTT

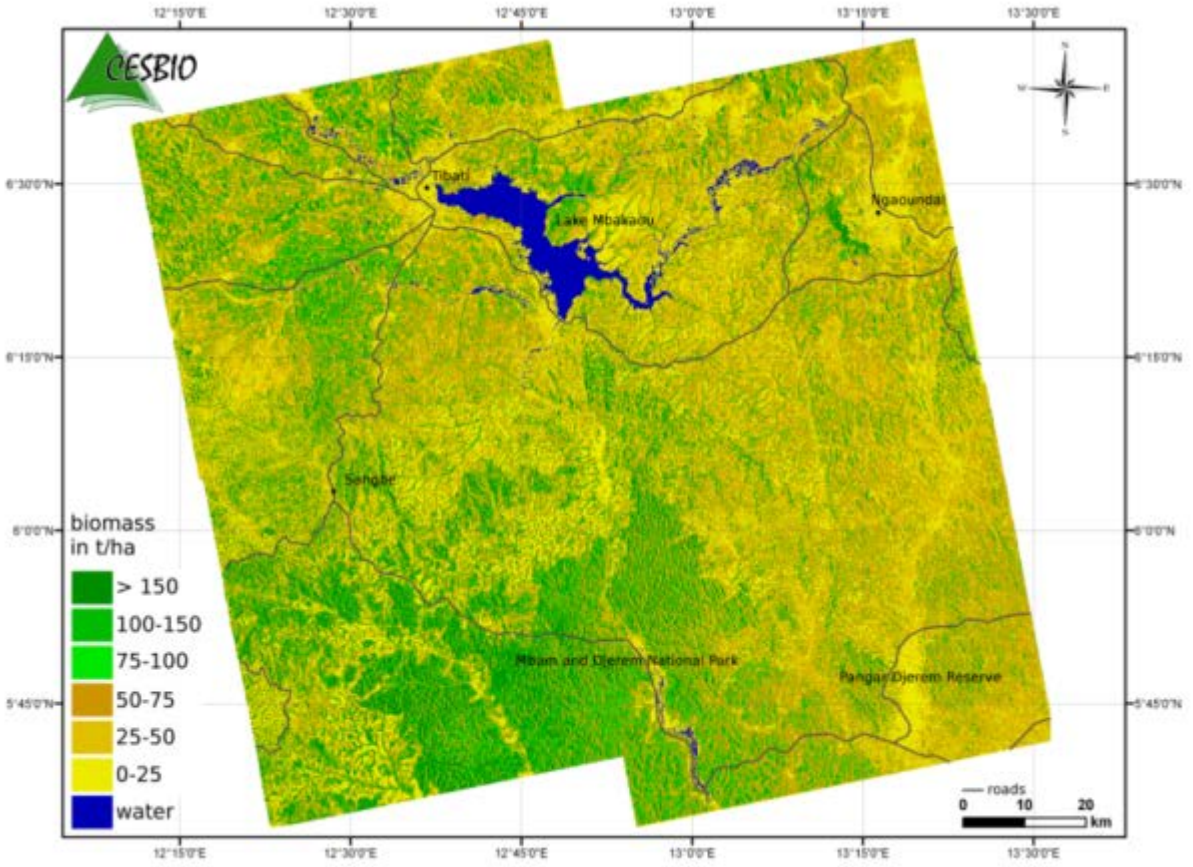
R&D: Direct Biomass Measurements in Low Carbon Forests - Cameroon

- Improving EO-based methodologies to directly assess above ground biomass in the Congo basin.
- Activities aim to develop transferrable methodology using radar data (ALOS-PALSAR) to provide mapping products that contain gridded and geo-referenced values of above ground biomass at resolution of 25 m.
- Current methods are data driven: inversion based on a large number of in situ data

R&D: Preliminary Results

Biomass map:

- **Dense Humid Forests > 150 ton/ha**
- **Gallery Forests in the savanna > 100 ton/ha**

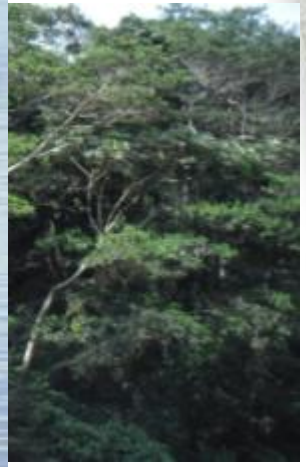


It should be noted that large areas of gallery forests and transitional forests (with biomass reaching 60-80 ton/ha) contain a large amount of carbon stocks, which is often neglected in carbon estimates.

Capacity Building Modules

- Training of Remote Sensing & GIS using open source software to ensure sustainability
- Advanced training on image processing for forest cover mapping in REDD+
- Field surveys for the acquisition of ground truth information
- On-the job biomass field inventory training
- Validation of carbon projects/carbon markets
- REDD Sensitization and MRV workshops

Learning by Doing



Conclusions

- Despite persistent cloud cover in the tropics, it is possible to obtain nation-wide **optical** coverages.
- Future cost free Sentinel 2, Landsat 8, CBERS III will provide basis for AD in MRV REDD+
- Level of Capacity for implementing national MRV systems are varying widely between Countries.
- Capacity building (institutional, infrastructure, personnel) is essential if countries have to drive the process.
- Countries want to be directly involved in the elaboration of EO-data based products and hence technology transfer is critical.


Thank you very much!
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