



Bénin Burkina Faso Cap Vert Côte d'Ivoire Gambie Guinée Guinée Bissau Mali Mauritanie Niger Sénégal Tchad Togo

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Monitoring Land Use Land Cover Change in West Africa and Chad (LULC)

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Summary

- **Overview of CILSS Organisation**
- **Environmental issues and its consequences**
- **Programme Land Use Land Cover (LuLc)**
- **Valorisation of LuLc products**





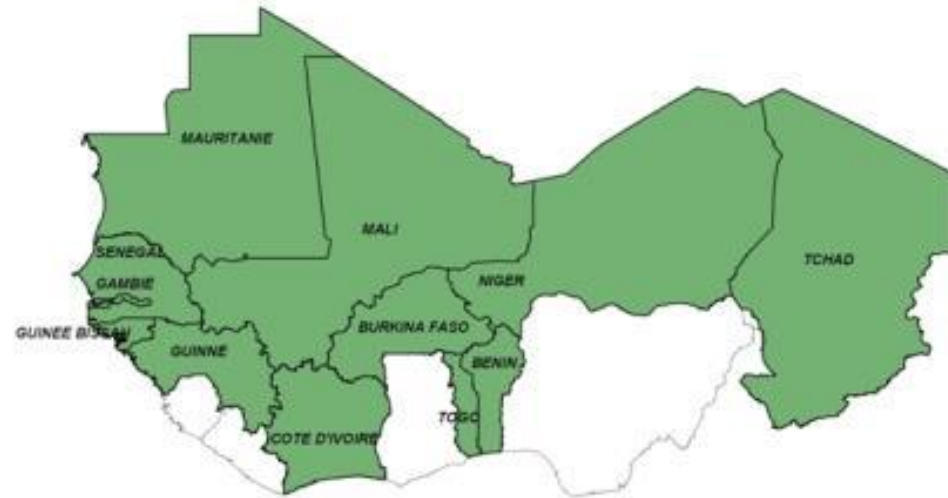
OVERVIEW OF CILSS ORGANISATION

Created: 12-09-1973

13 Member States

"Engaging towards food security and desertification control for a new ecological balance in the Sahel"

CAP VERT



2006 = Activities extended to ECOWAS region

3 sites

- The Executive Secretariat, Ouagadougou (Burkina Faso)
- The Regional Centre Agrhymet, Niamey (Niger)
- The Sahel Institute, Bamako (Mali)

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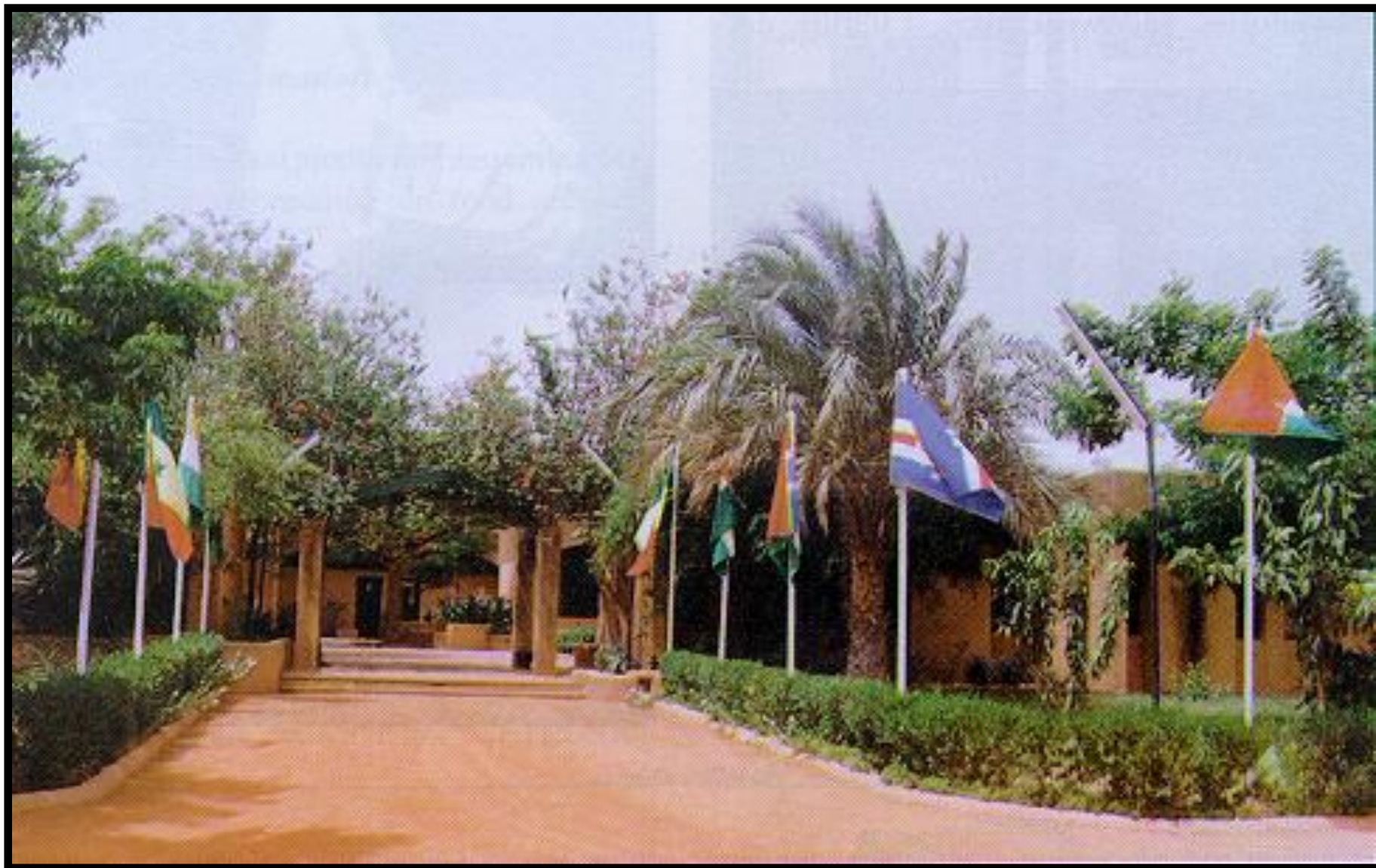
OVERVIEW OF CILSS ORGANISATION

The services provided to countries members

1. **Training**
2. **Information**
3. **Multi-countries projects (field investment program)**
4. **Support to policies and desertification control strategies**
5. **Capitalization and diffusion**



CENTRE REGIONAL AGRHYMET, Niamey Niger

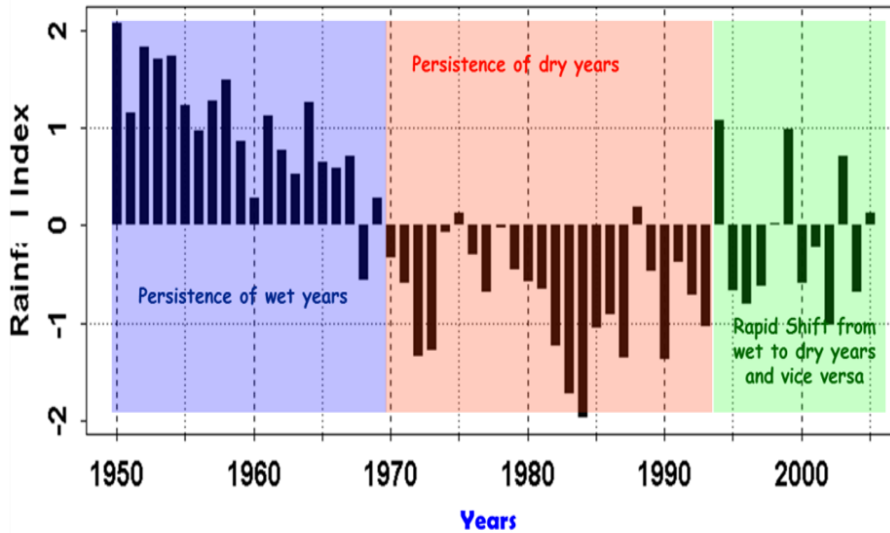




Environmental issues

Increased of rainfall variability since the 1990 years (succession of dry and wet years)

Severe drought (1973, 1984, 2008),



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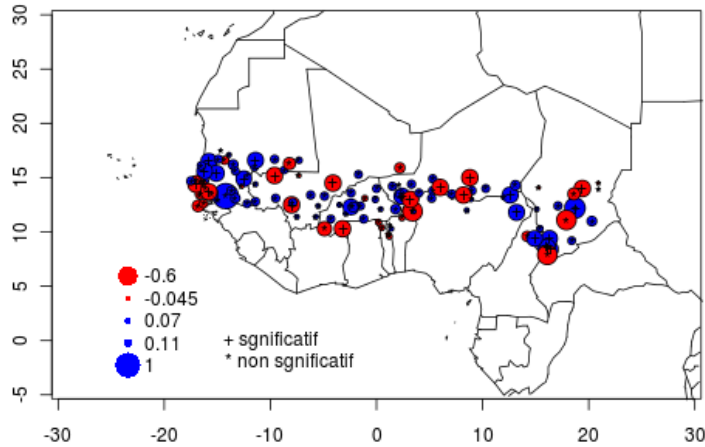
Environmental issues



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→ Significant increase over the last 20 years of heavy rainfall in many places



Niger August 2011



Burkina Faso, September 2012



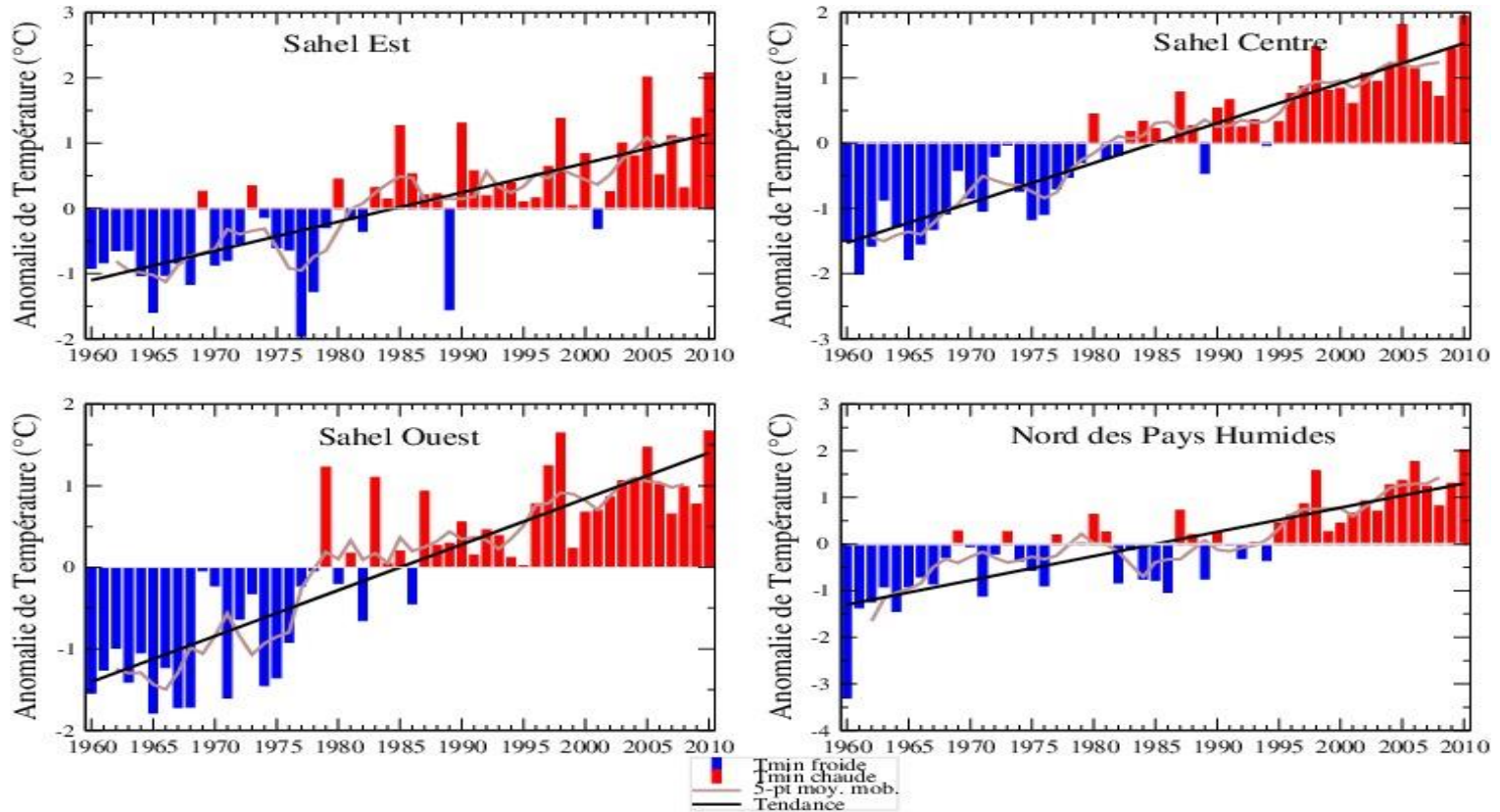
- Number of observed floods more frequent (6 to 12 + / year during the last decades
- Floods caused severe destruction to infrastructure, significant crop losses, and extensive land erosion and degradation

→ Average losses and damages du to flood were evaluated to 7.5 billion dollars between 2000 to 2008 (source DPCS, OCHA 2009) in the 8 UEMOA countries



Production of knowledge on climate change

Warming in CILSS ECOWAS region



- ➔ Continuous warming since the 1980s in the region,
- ➔ The 2000-2010 period experienced the warmest period,
- ➔ For most of the weather stations Tmin increased from +1 to 1.3 °C and Tmax about 0.5. Observe temperatures have been increasing than global warming

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Monitoring Land Use Land Cover Change in West Africa and Chad (LULC)

A collaborative programme :

- Secrétariat Exécutif du CILSS
- Centre Régional AGRHYMET
- Institut du Sahel
- EROS Center (USGS)
- National Environmental Agencies

Financed by :

- U.S. Agency for International Development

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Global Objective :

The global objective is to reinforce the environmental information systems for decision making for a better planning in land use and for sustainable natural resource management

Specific objectives :

- ✓ Provide reliable information on land use and land cover and associated trends from 1975 to 2010 for twelve West African countries in order to :
 - (i) improve the decision making in the water resources and lands management and
 - (ii) ensure that the ecosystems and the landscapes in constant evolution, are managed in a sustainable way,

- ✓ Capitalize and promote successes in natural resource management in support of improved food security, increasing biodiversity, and adaptation to climate change





The LuLc fits very well in the CILSS strategy that allows the institution to accomplish its key missions in term of climate change, which are :

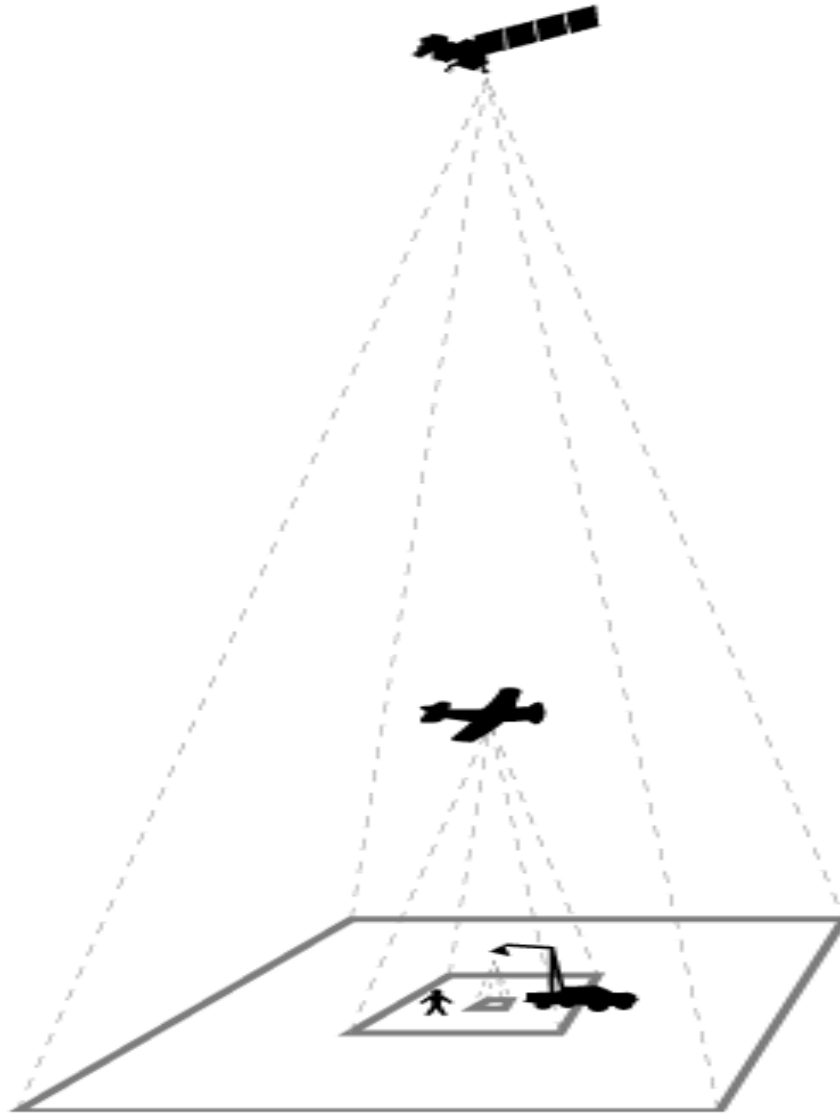
- Capacity development at regional and national levels (training, equipments, transfer of technology and knowledge)
- Production and dissemination of information for decision making at all levels (national authorities, TFPs, NGOs and all the stakeholders)

The (LuLc) project carried out since 1999 aimed at the understanding of the evolution of land cover and the land use in order:

- (i) to improve the decision making in the water resources and lands management and
- (ii) to ensure that the ecosystems and the landscapes in constant evolution, are managed in a sustainable way.



Méthodology : 3 levels of data collection



- **Satellite**
- **Air**
- **Ground**



Phase 1 (1999 à 2000): Outcomes

The first phase of the program (from 1999 to 2000) consisted of the training of the trainers (2) in the United States and the realization of four (4) pilot studies (Burkina Faso, Mali, Niger and Gambia).

This pilot phase made it possible to achieve:

- Six (6) studies on the socio-economic determinants of the use of the natural resources in six countries:
 - i) Burkina Faso “Mare aux Hippopotames” ;
 - II) Gambia (West Gambia);
 - III) Mali (Circle of Kolokani);
 - iv) Niger (Department of Mayahi);
 - v) Mauritania (Gorgol and Guidimakha);
 - VI) Chad (Lake Fitri);
- Four (04) socio-politico and institutional impact studies on Lu/Lc in Burkina Faso, Gambia, Mali and Niger.

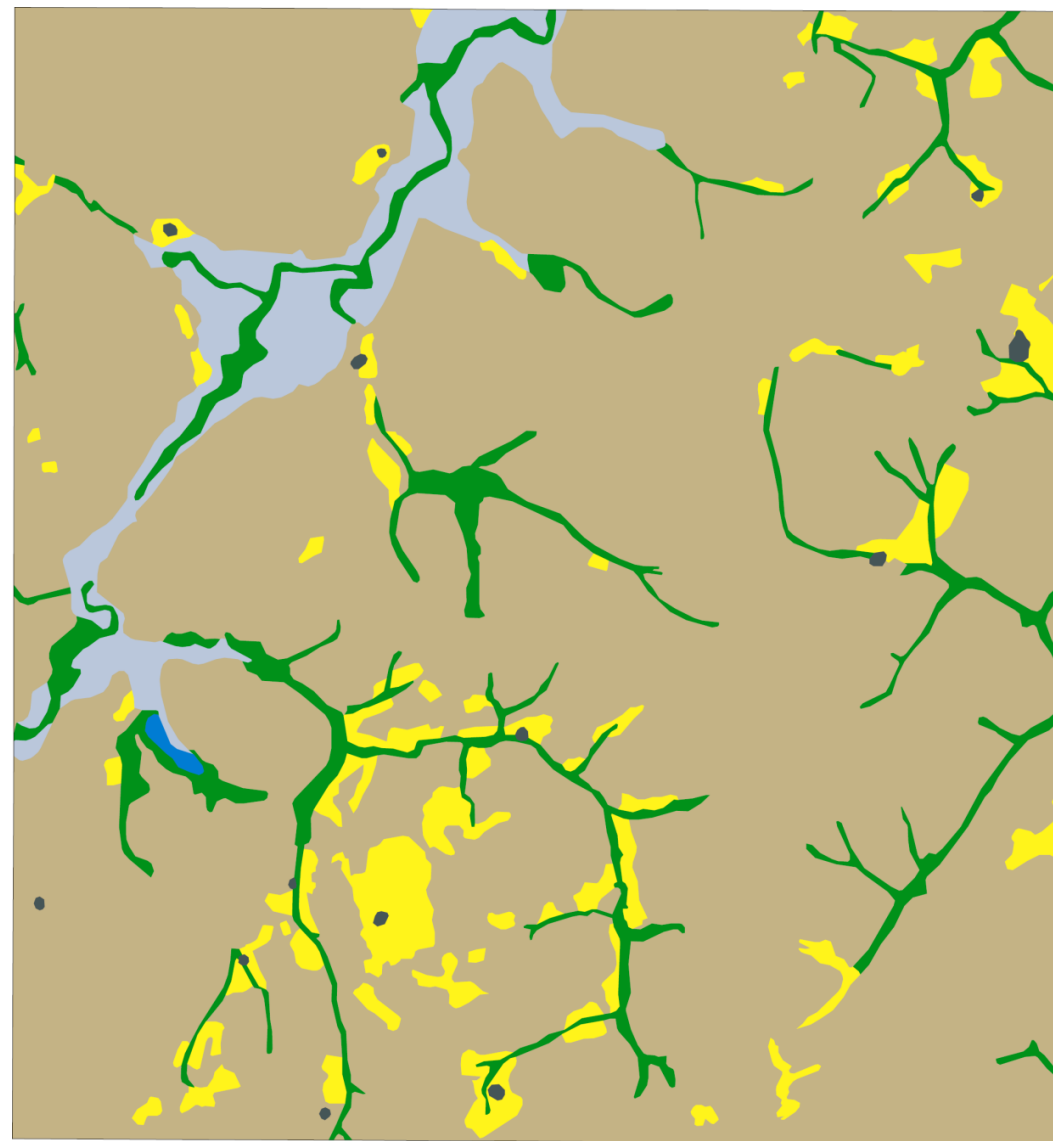




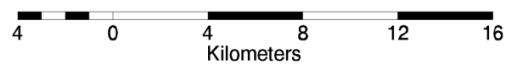
Results

Case of Burkina : Mare aux Hippopotames

In 1965

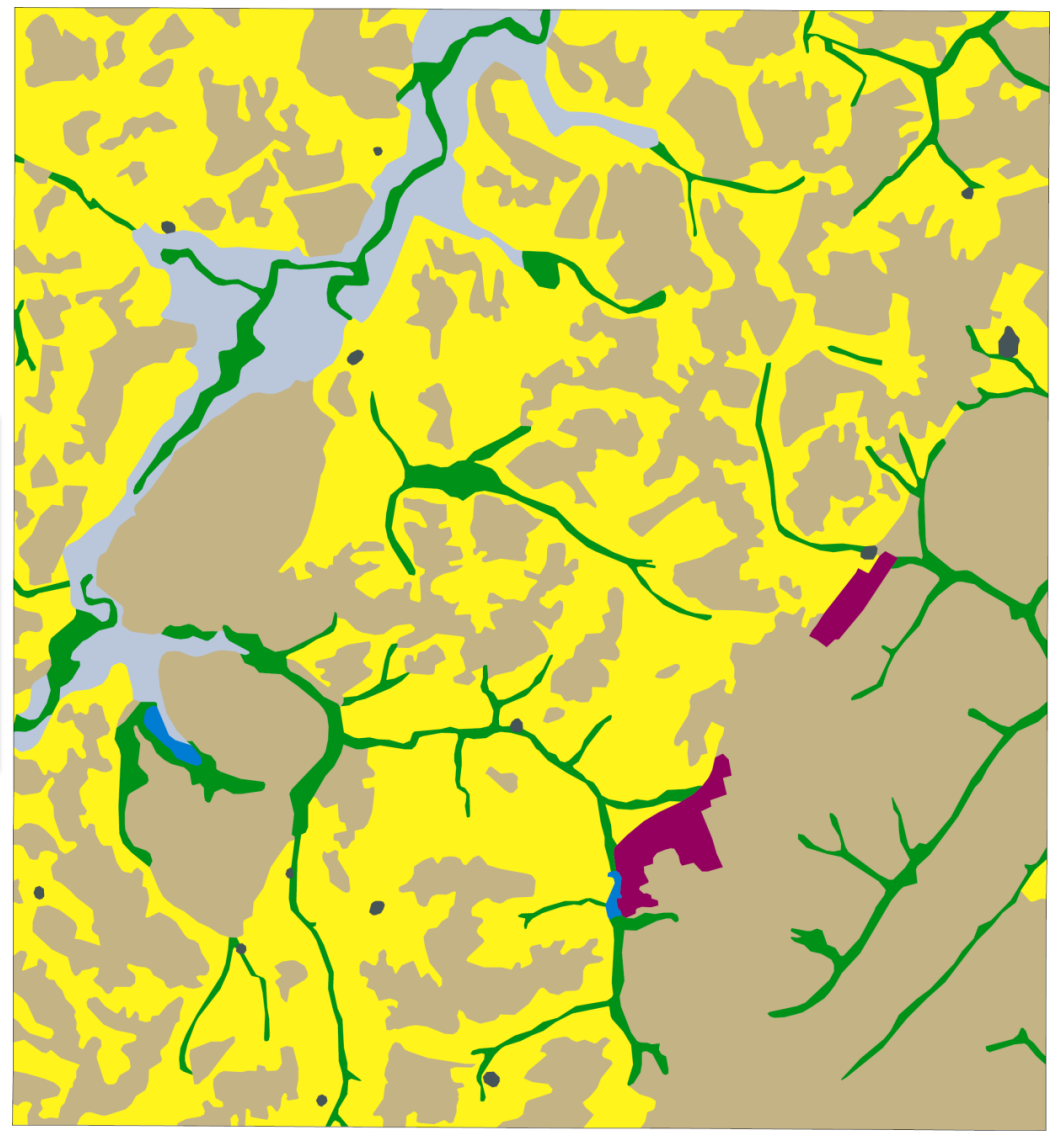


- Terres Cultivées / Cultivated Lands
- Forêt Amenagée / Forest Plantation
- Savanes / Savannas
- Forêt Ripicole / Riparian Woodland
- Marécage Herbacé / Herbaceous Wetland
- Habitation / Settlement
- Eau / Water

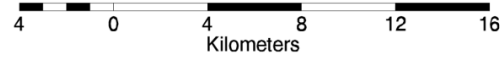




**Case of Burkina :
Mare aux
Hippopotames
in 1999 (35 Years)**



- Terres Cultivées / Cultivated Lands
- Marécage Herbacé / Herbaceous Wetland
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- Eau / Water
- Forêt Ripicole / Riparian Woodland





Phases 2 and 3 (2000 à 2014): Extension to the whole West Africa and Chad

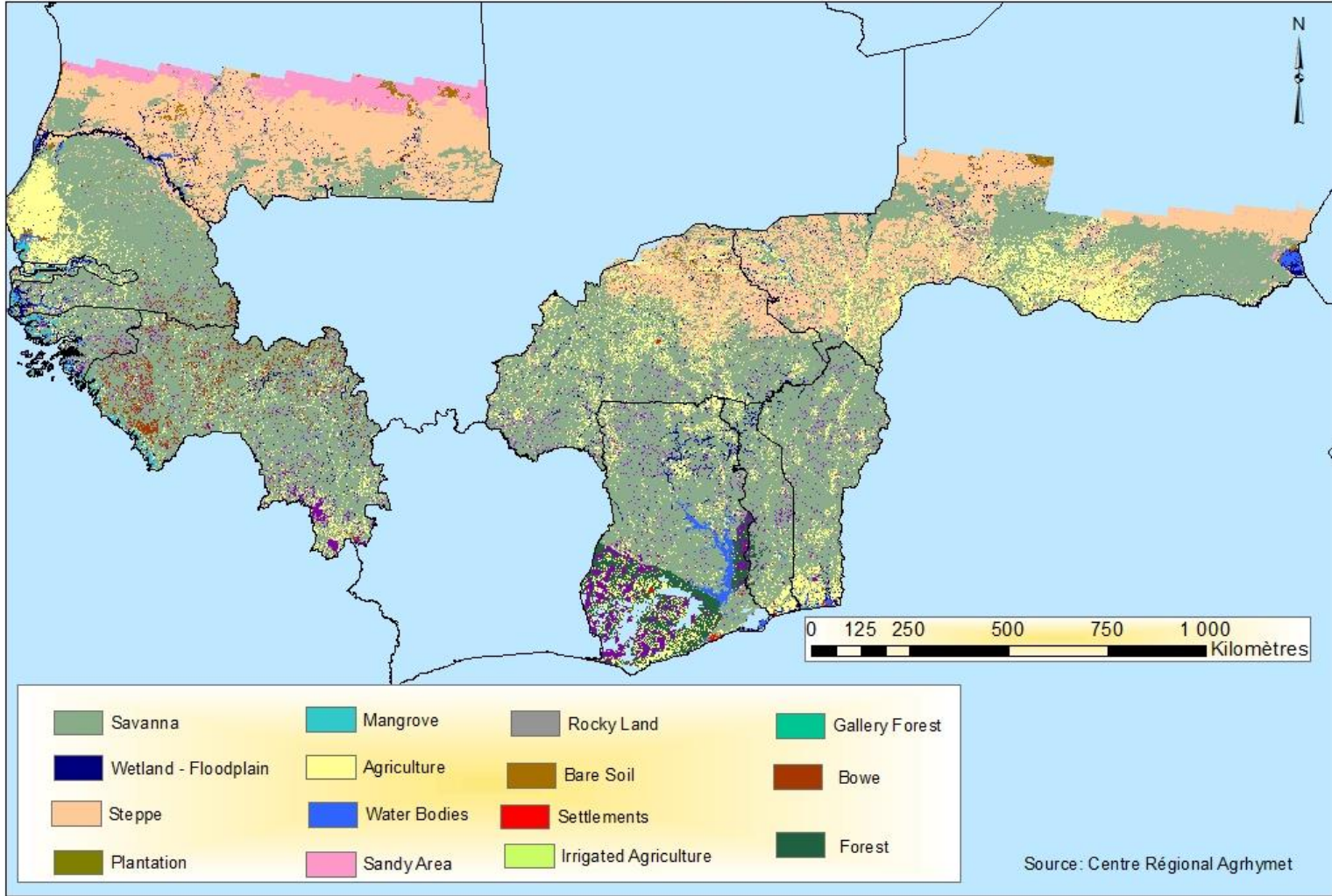
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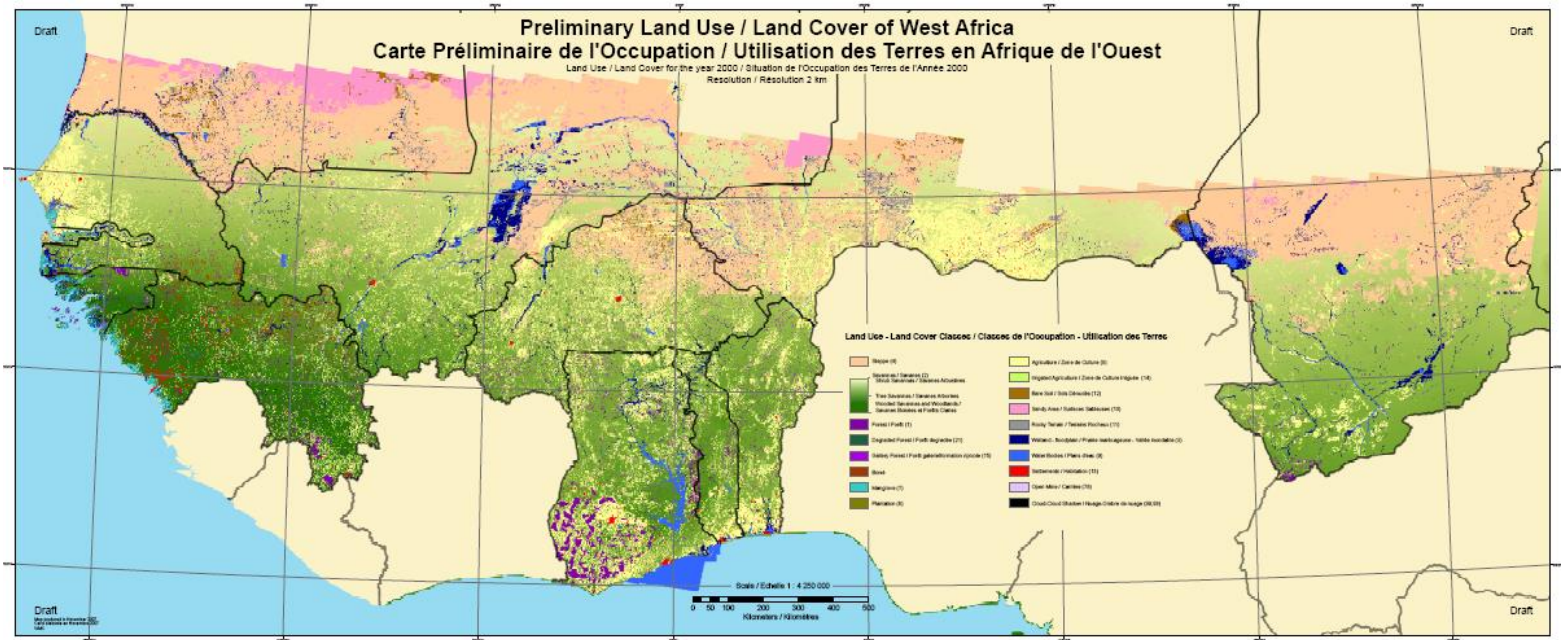
Outputs : LuLC 1975

Occupation et utilisation des sols 1975





Outputs : LULC 2000



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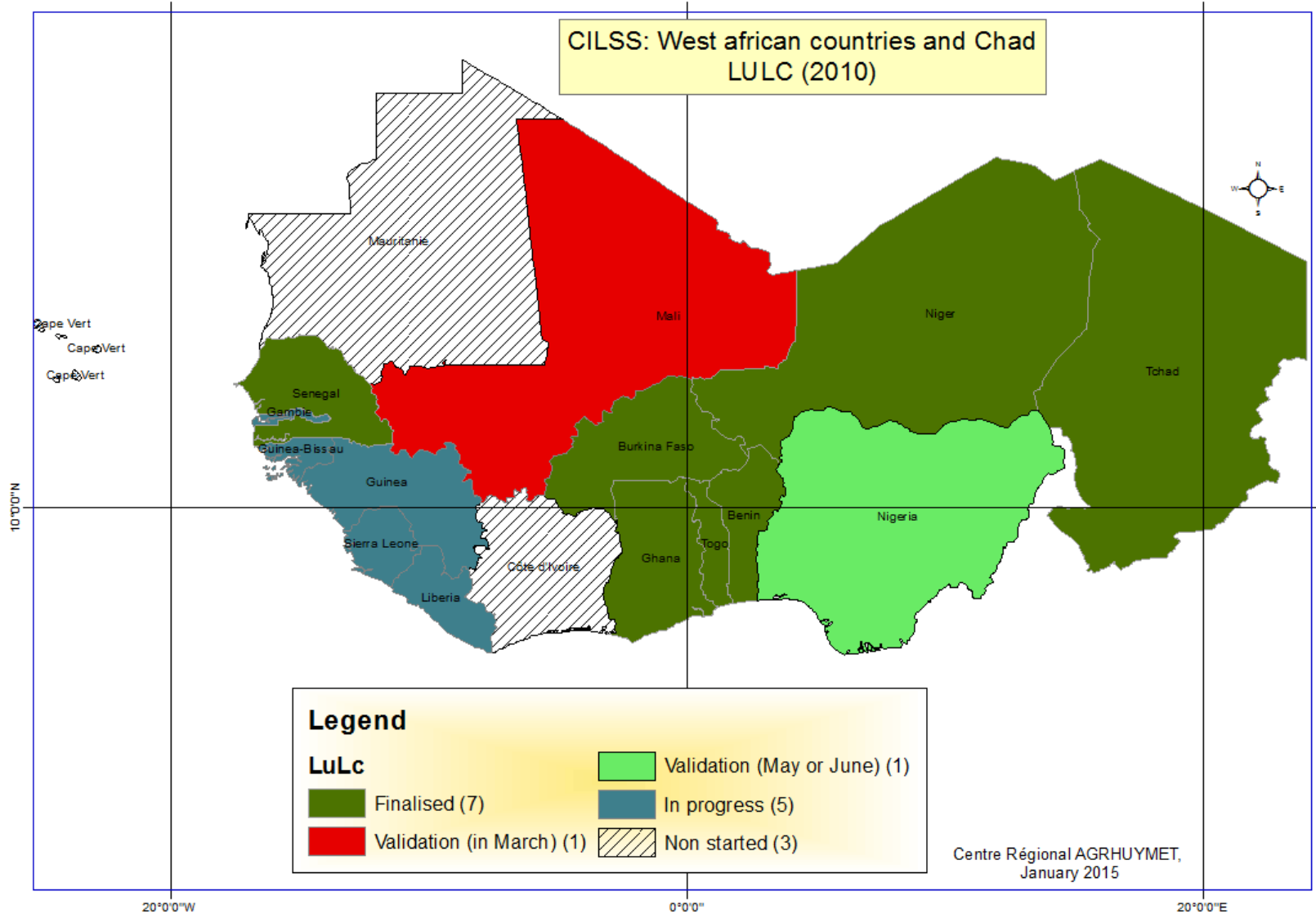




Outputs : LULC 2010

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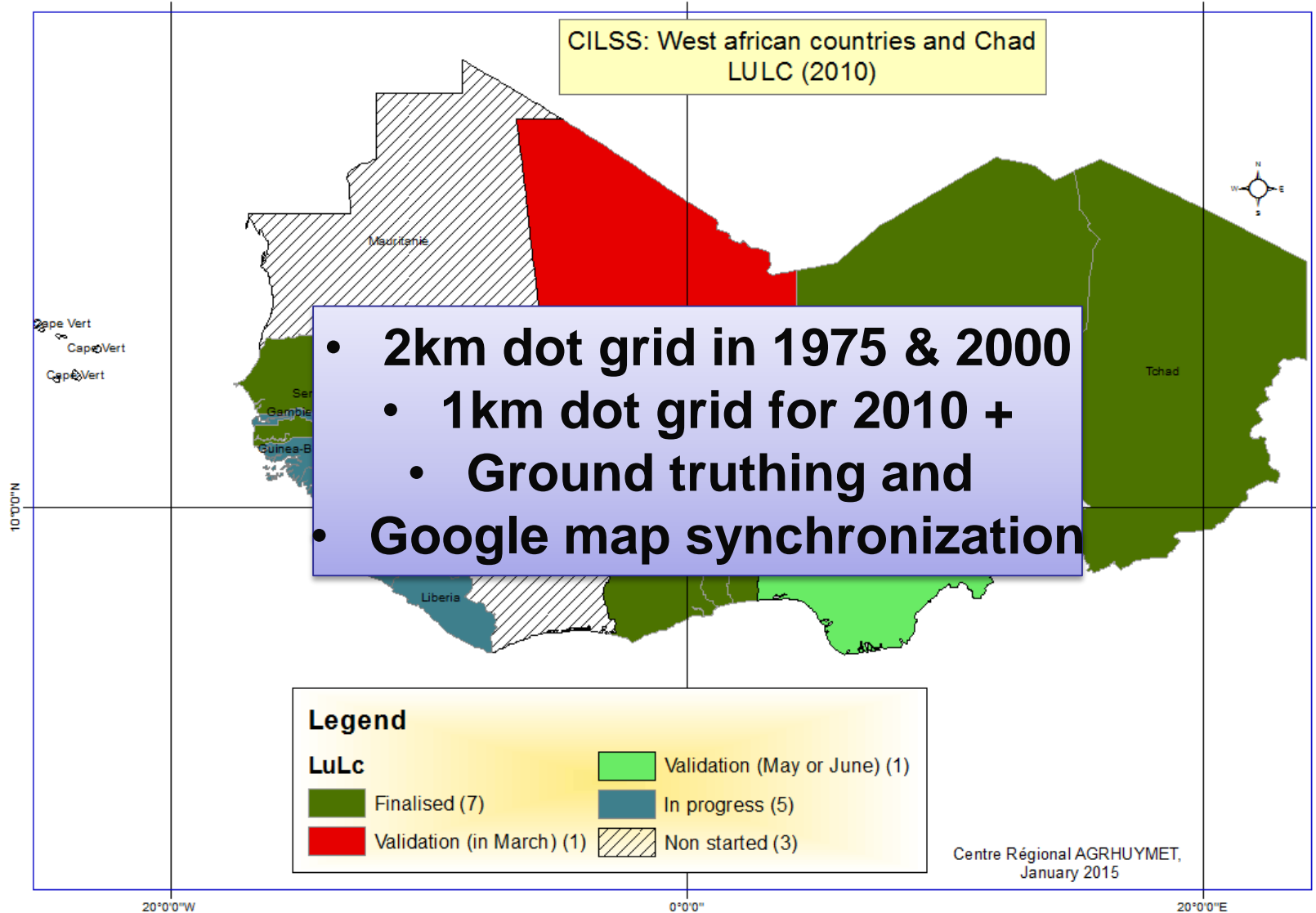




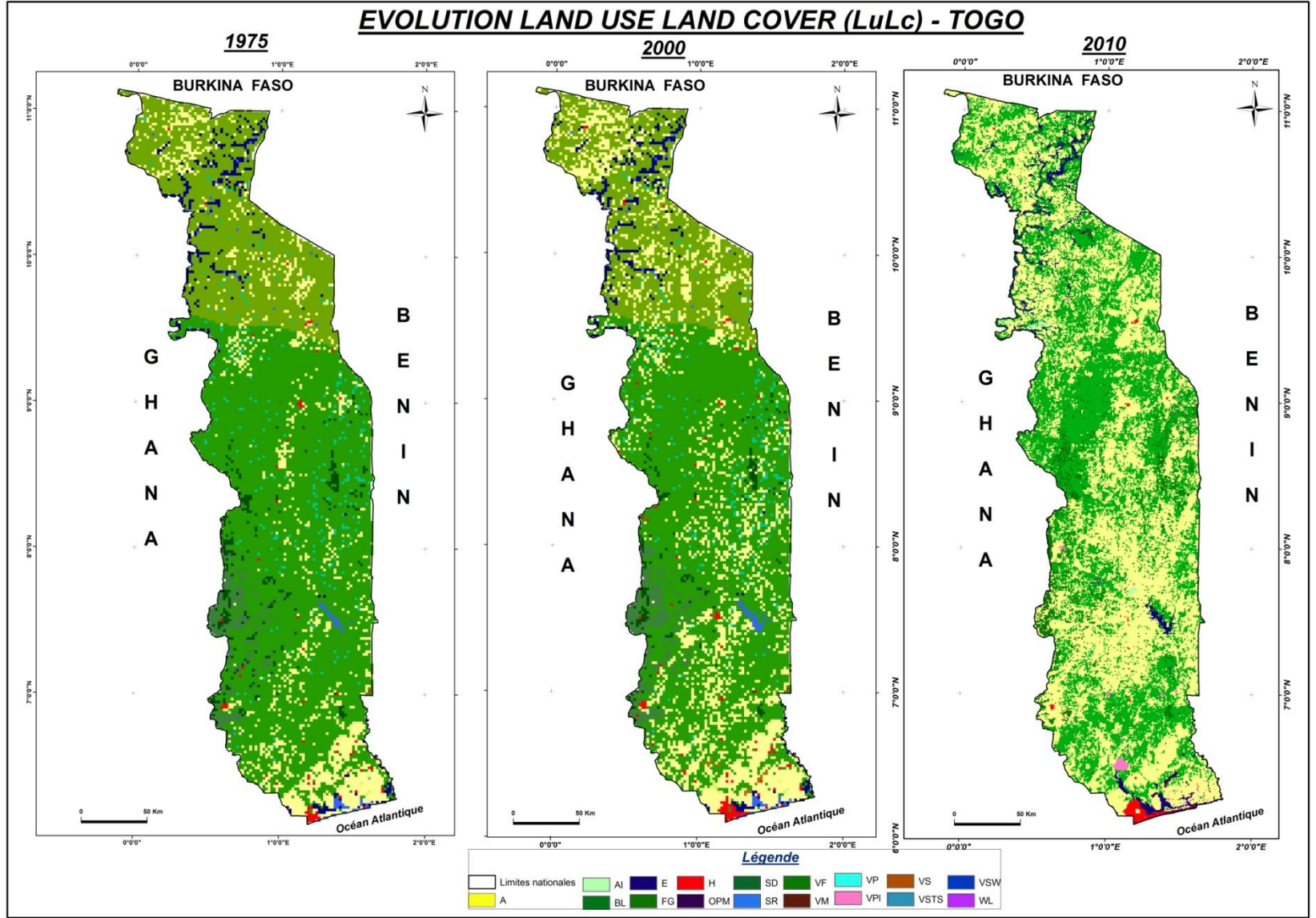
Outputs : LULC 2010

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Outputs : Togo





Outputs: Togo

Occupation/utilisation des terres	Superficie en 1975 (Km ²)	Pourcentage en 1975	Superficie en 2000 (Km ²)	Pourcentage en 2000	Changement (%)
Forêt	1148	2,0%	748	1,3%	-34,8%
Forêt galerie/formation ripicole	1028	1,8%	976	1,7%	-5.1%
Forêt dégradée	1524	2,7%	1704	3,0%	11,8%
Total - Forêt	3700	6,5%	3428	6,0%	-7,3%
Savanes arborées et boisées	44304	78,1%	38620	68,1%	-12,8%
Prairie marécageuse - Vallée inondable	1268	2,2%	1368	2,4%	7,9%
Plantation	8	0,0%	60	0,1%	650,0%
Zone de Culture Pluviale	6788	12,0%	12228	21,6%	80,1%
Zone de culture Irriguée	36	0,1%	120	0,2%	233,3%
Plans d'eau	296	0,5%	348	0,6%	17,6%
Surfaces Sableuse	4	0,0%	4	0,0%	0,0%
Sol Dénudé	12	0,0%	52	0,1%	333,3%
Habitation	280	0,5%	476	0,8%	70,0%

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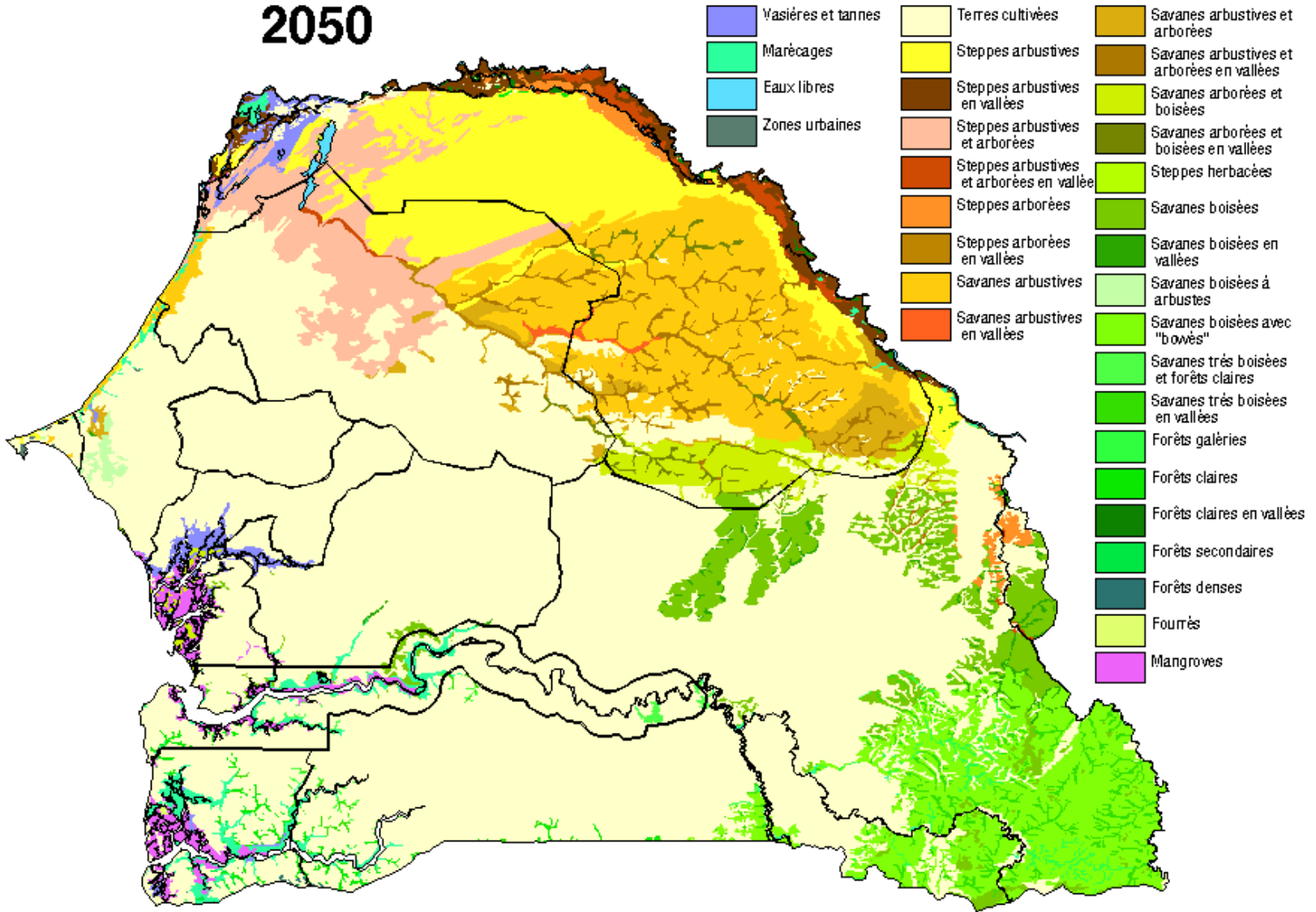




Outputs: Model

LULC models predicting trends for 2050 under various scenarios of population growth, economic activities, climate and social factors,

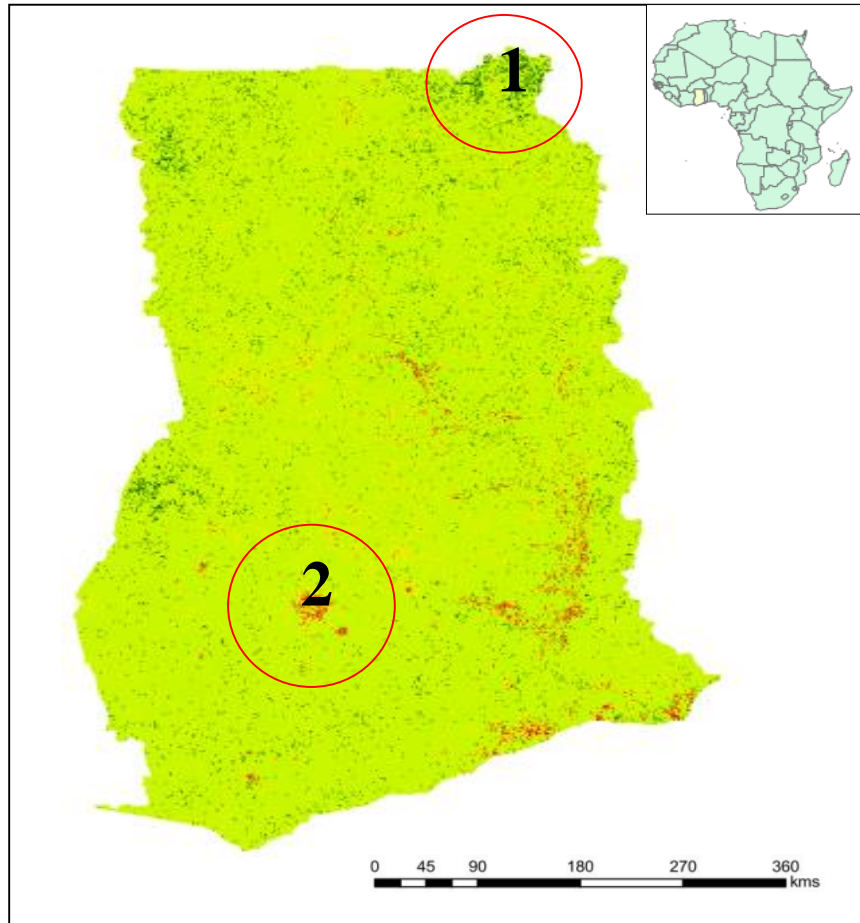
2050



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Outputs : Hotspots studies



- identify and analyse drivers of change;
- document the socio-economic and environmental effects;
- contribute to MDG1 and 7

1. Northern Ghana vegetation improvement - Bawku West, Bawku Municipal, Garu Tempene and Binduri (+ve hotspot)
2. Kumasi urbanization (-ve hotspot)



Outputs : Hotspots studies

Atlas showing the major environmental changes (positive and negative hotspots) in West Africa and Chad is being finalized





Valorisation of LULC products

Tools of advocacy and sensitization of policy makers to the vigorous protection and environmental management

Support countries in developing their national report on the UNCCD impact indicators: state of vegetation cover and other optional two indicators: (i) change in land use; (iii) carbon sequestration

Support the development of strategies REDD + (Reduction of deforestation and land emission degradation)

Feed management platform of knowledge of CILSS on the CC and SLM

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Tools: Rapid Land Cover Mapping / ArcGIS

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SenegalLCMapper.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

1:87,365

100%

Store Group Layer Load Scene Images Land-Cover Attributer Local Registration Tool

Land-Cover Attributing

- lc_points
 - <all other values>
 - Land-Cover Landsat 7
 - Forêt galerie
 - Zone de Culture (A)
 - Zone de Culture irriguée
 - Nuage / ombre de nuage
 - Forêt (VF)
 - Savanes (VS)
 - Prairie marécageuse (VP)
 - Steppes (VSt)
 - Oasis (VO)
 - Plantations (PVI)
 - Mangroves (VM)
 - Plans d'eau (E)
 - Surfaces Sableuses (SS)
 - Terrains Rocheux (SR)
 - Sols Dénudés (SD)
 - Habitations (H)
- wrs2000
- lc_points5 - lc_points5
- Scene p205r050
 - p205r050_5t19841017_t RGB
 - Red: Layer_1
 - Green: Layer_2
 - Blue: Layer_3
 - p205r050_7t19991104_t RGB
 - Red: Layer_1
 - Green: Layer_2
 - Blue: Layer_3

Display Source Selection Catalog

LCMapper

Land-Cover Type

- Forêt
- Savane
- Prairie marécageuse -
- Steppe
- Oasis
- Plantaiton
- Mangrove
- Zone de Culture
- Zone de Irrigué Culture
- Plans d'eau
- Surfaces Sableuse
- Terrains Rocheux
- Sols Dénudé
- Habitation**
- Nuage
- Ombre de nuage
- Forêt galerie/formation

Time Period

1985(Circa)

-2042158.23 423343.51 Meters





Conclusion

Lessons learned:

- Tools should be directed to free software
- The products must be directed to the operational administrative authorities such as municipalities through **DOWNSCALING** (this workshop ?)





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Thanks

