



Remote Sensing for Wetlands Characterization, Flood Forecasting and Water Resources Monitoring in Nakambe Basin in Burkina Faso

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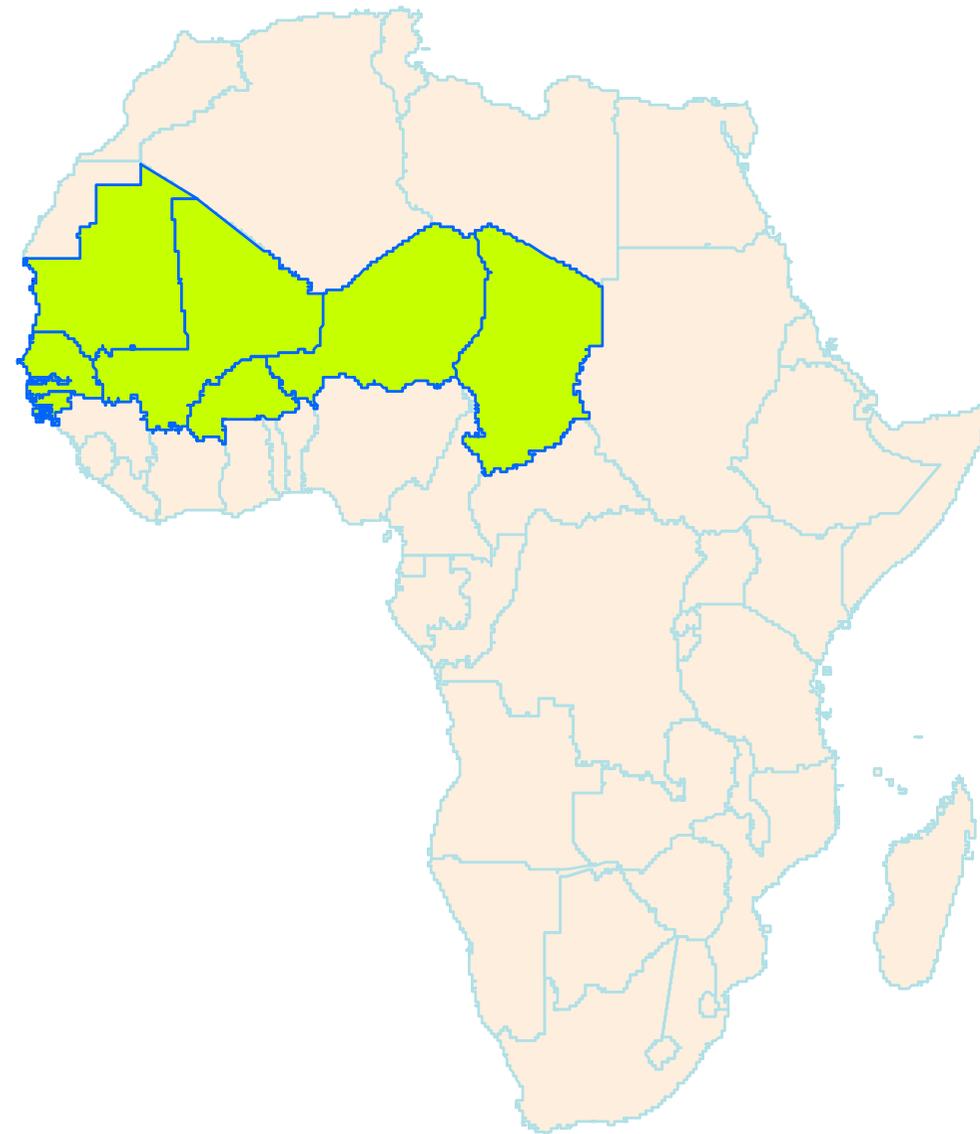
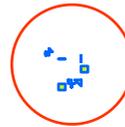




Situation : Specialized Institute of
CILSS, based in Niamey (Niger)

Establishment : December 1974

Member countries : Burkina Faso,
Cape-Verde, Chad, Gambia,
Guinea-Bissau, Mali, Mauritania,
Niger, Senegal



Mandate : « Promoting information
and training in food security,
desertification control, natural
resource management, and
environment in the Sahel »





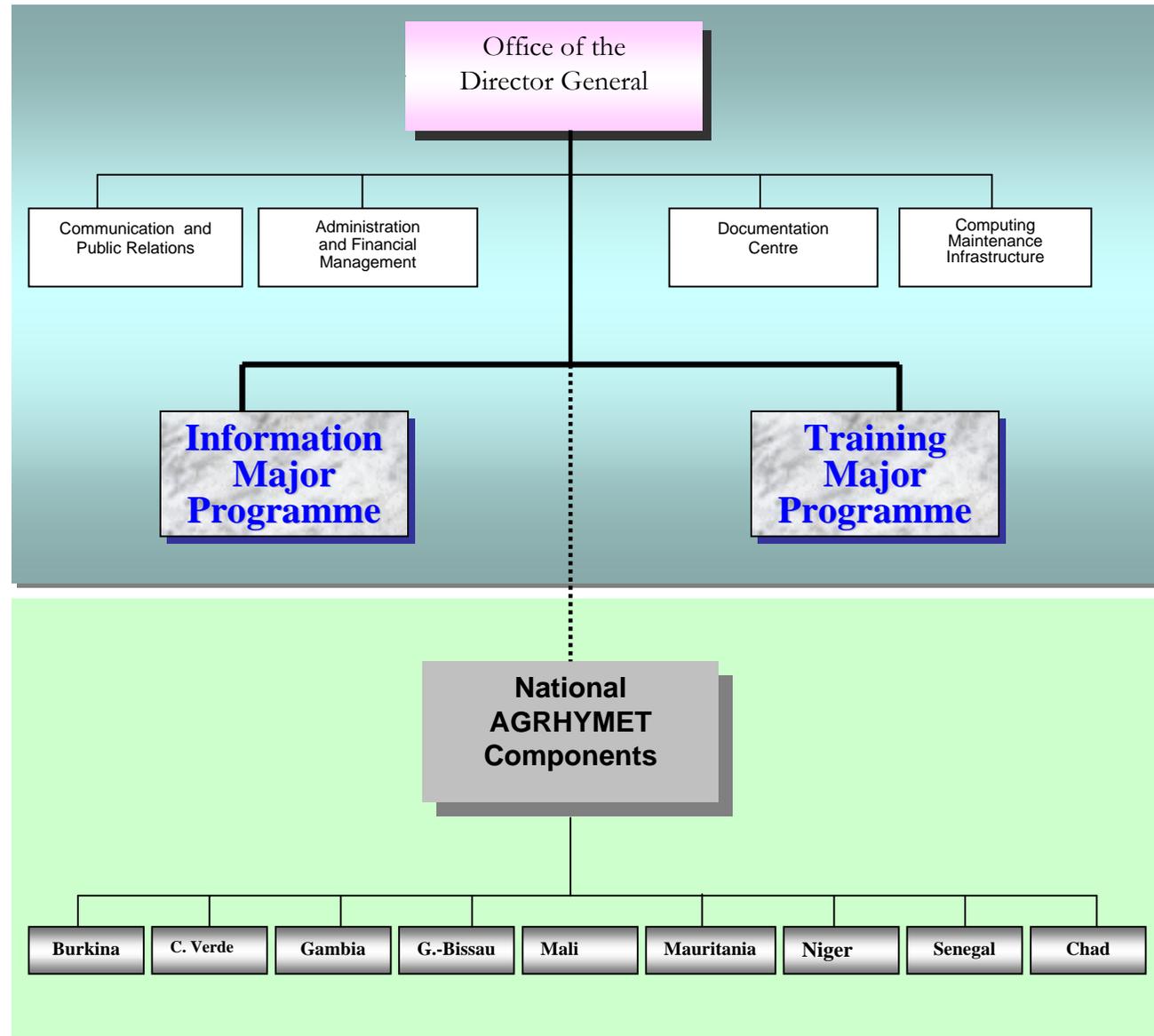
The AGRHYMET Regional Centre is structured into a pyramidal network with :

• **The Major Programs (2)**
«Training and Information»

based in Niamey

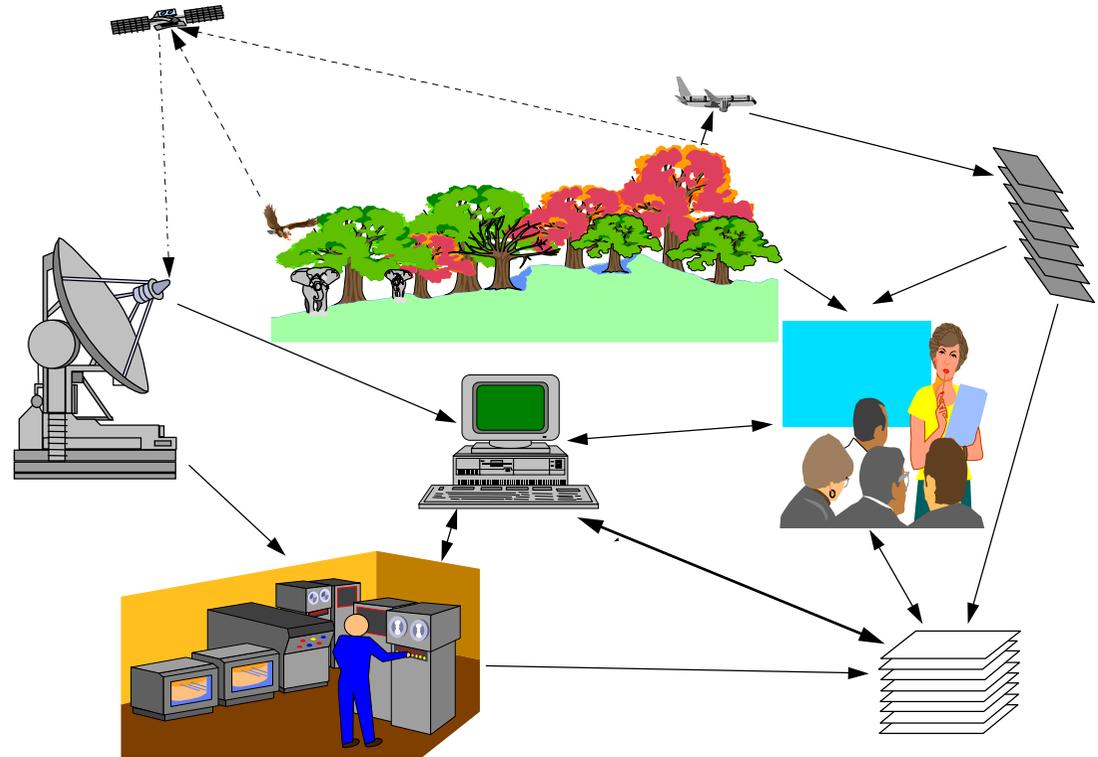
• **The «National AGRHYMET Components»,**

The technical partner in each country





- **Data acquisition, processing management, and analysis...**
- **Dissemination of information on regional policies : food security and early warning**
- **Training and transfer of tools, methods and know-how in Food security and Natural Resources Management :**
Climatology, Agrometeorology, Hydrology, Crop protection,



GIS, Remote sensing....



● Hydrological regime

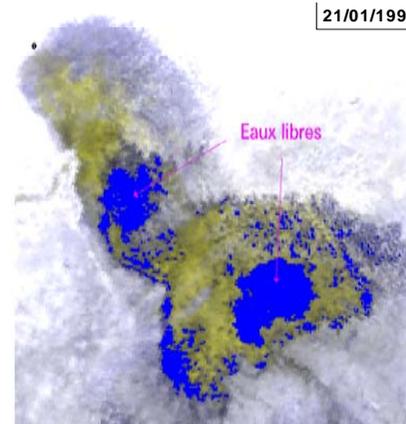
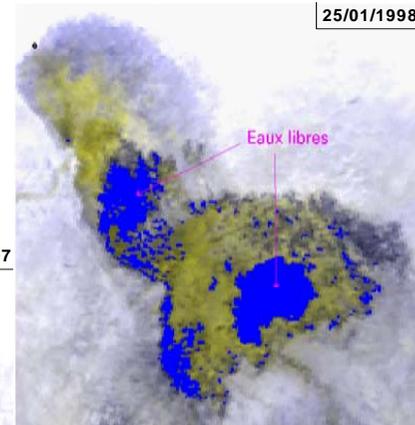
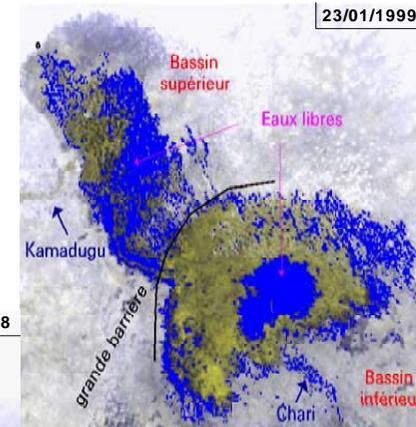
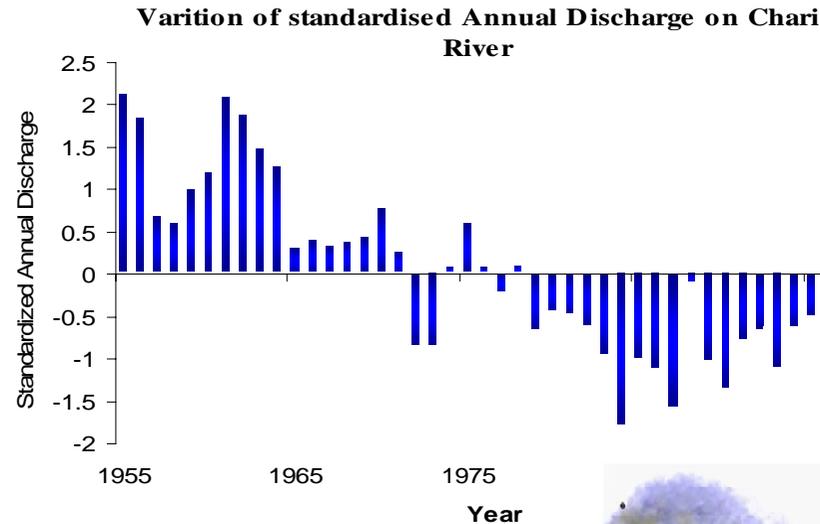
: Change of flood discharges as from the years 1970

● Streamflows :

Decrease of 20 to 60 % since 1970

● Surface Water :

Decrease of 40 to 60%

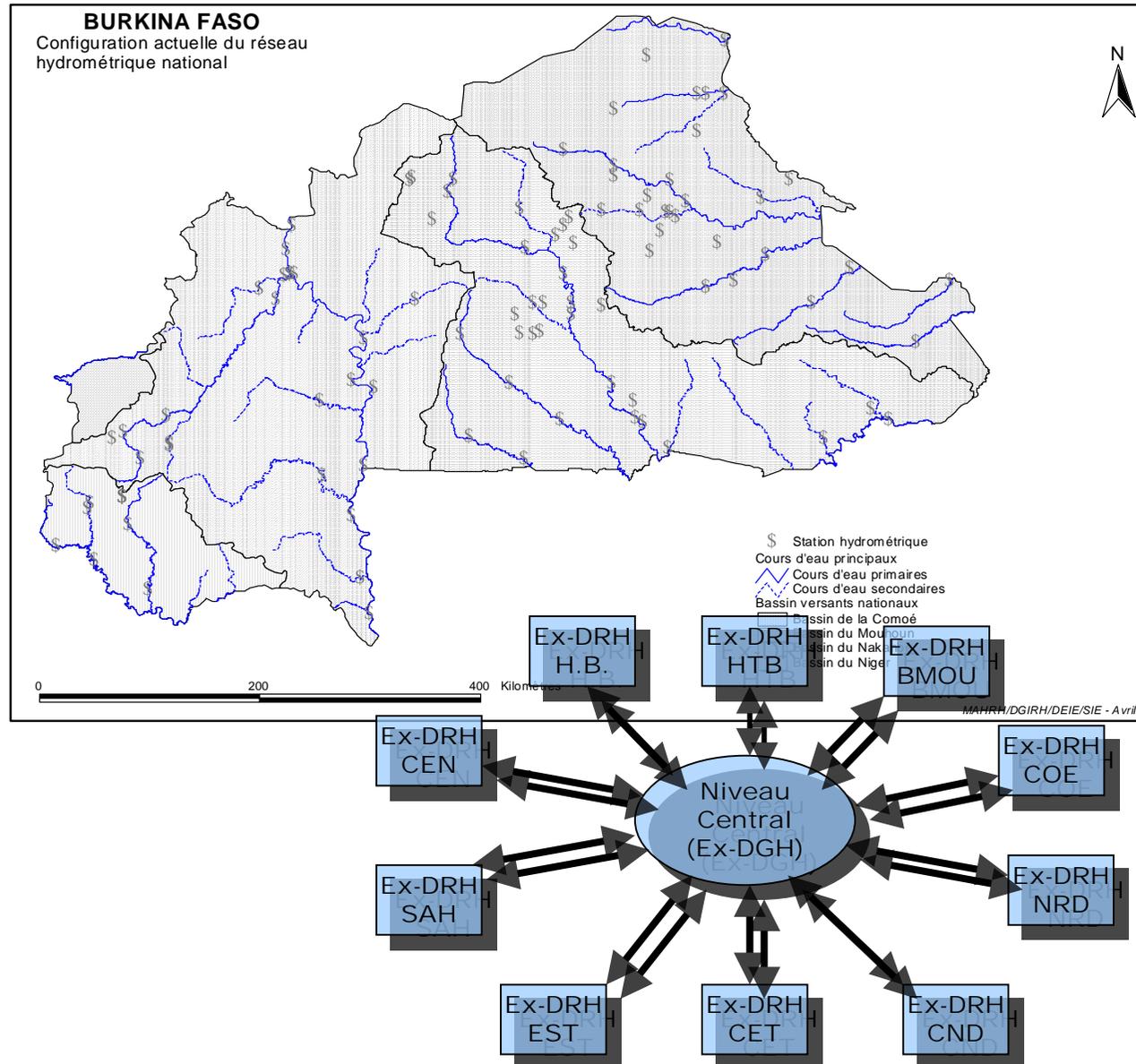


Waterbodies dynamic over time



Water Resources problems in the Sahel (e.g. Burkina Faso)

- Seasonal and interannual variability of water resources
- Increasing pressure on available water resources
- Insufficient of data collection systems (less than 100 observed stations)
- Many different technical stakeholders





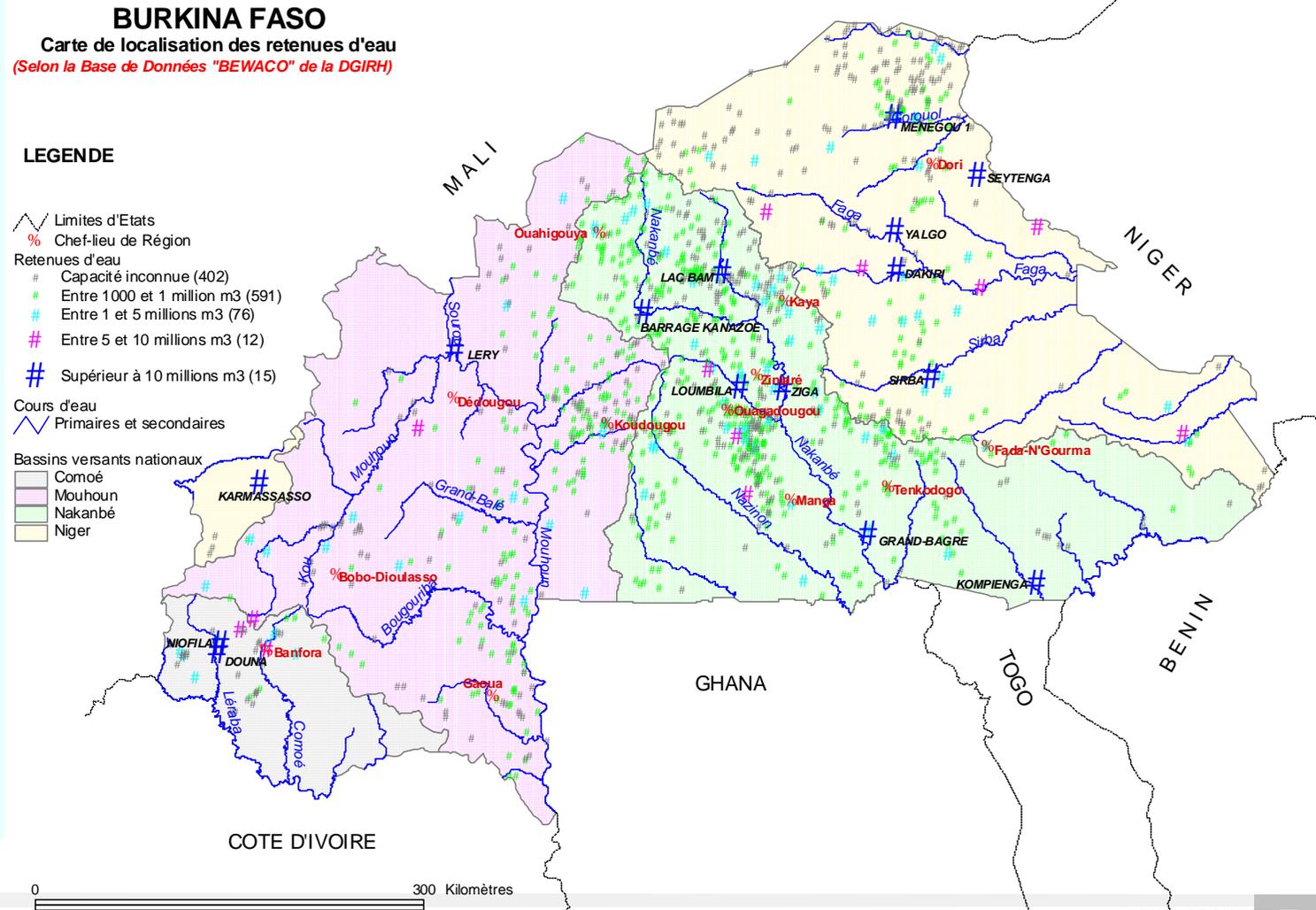
Needs with regard to Water Resources problems (e.g. Burkina Faso)

Wetlands localization, characterization and monitoring

Flood discharge prediction

Waterlogging risk assessment

Information systems with harmonized data





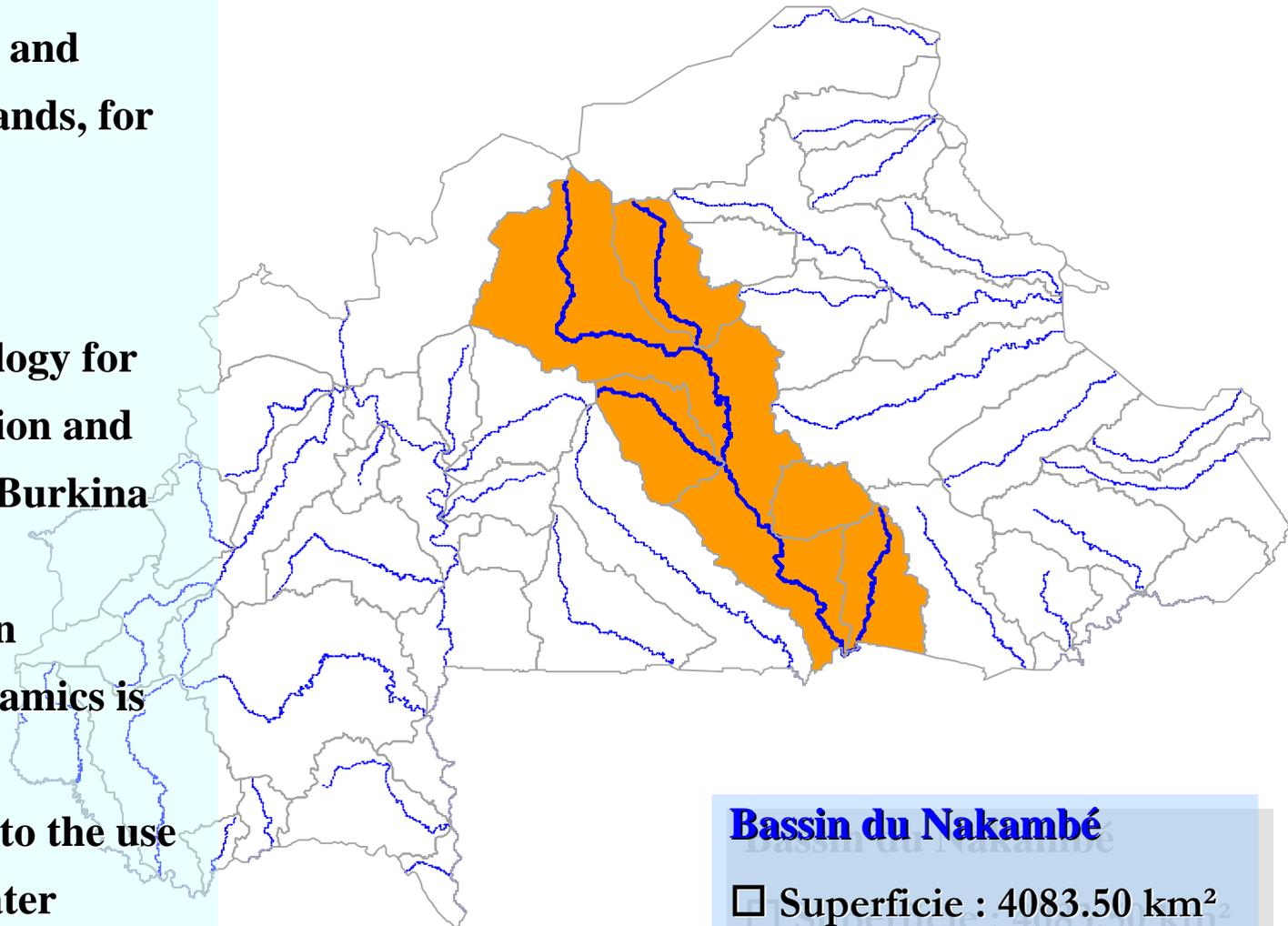
Global Objectives :

- To promote an Information system for identification and characterization of wetlands, for flooding forecast

Expected Results :

- Operational methodology for recognition, discrimination and mapping of wetlands in Burkina Faso is developed.
- Information system on waterbodies seasonal dynamics is setting up.
- DIRH staff is trained to the use of remote sensing for water resources assessment and

monitoring



Bassin du Nakambé

□ Superficie : 4083.50 km²

□ Length : +- 500 km

Data acquisition

National level

Ground data
(Acquisition by DIRH and local components on 3 pilote sites)

Regional level :

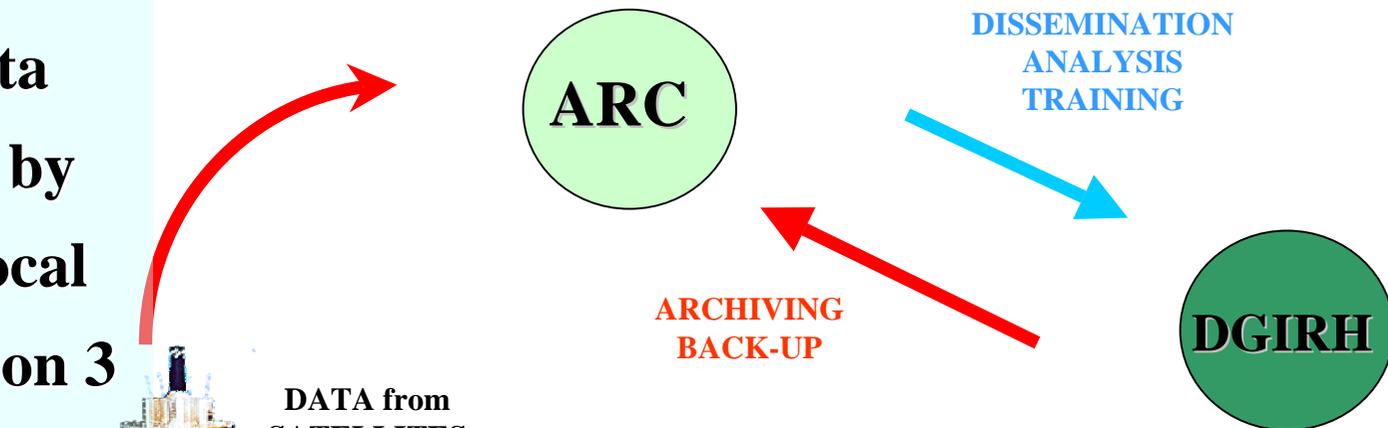
Satellite data

PROJET PILOTE "ZONES HUMIDES"
Situation des zones témoins proposées

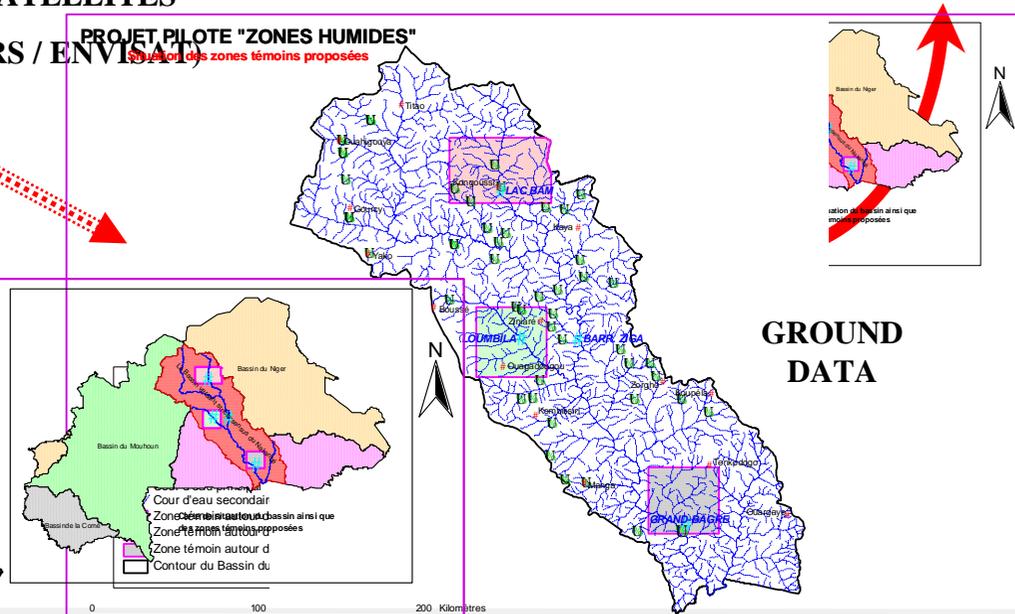
(acquisition via

AGRHYMET

systems)



DATA from SATELLITES (ERS / ENVISAT)
PROJET PILOTE "ZONES HUMIDES"
Situation des zones témoins proposées



GROUND DATA



Data processing and analysis

1

Data pre-processing

Hydrological data
EO Data
Ancillary data

2

Integration / Modelling

Flooding Maps
Seasonal Hydrological characteristics
Qualitative and Quantitative Indicators

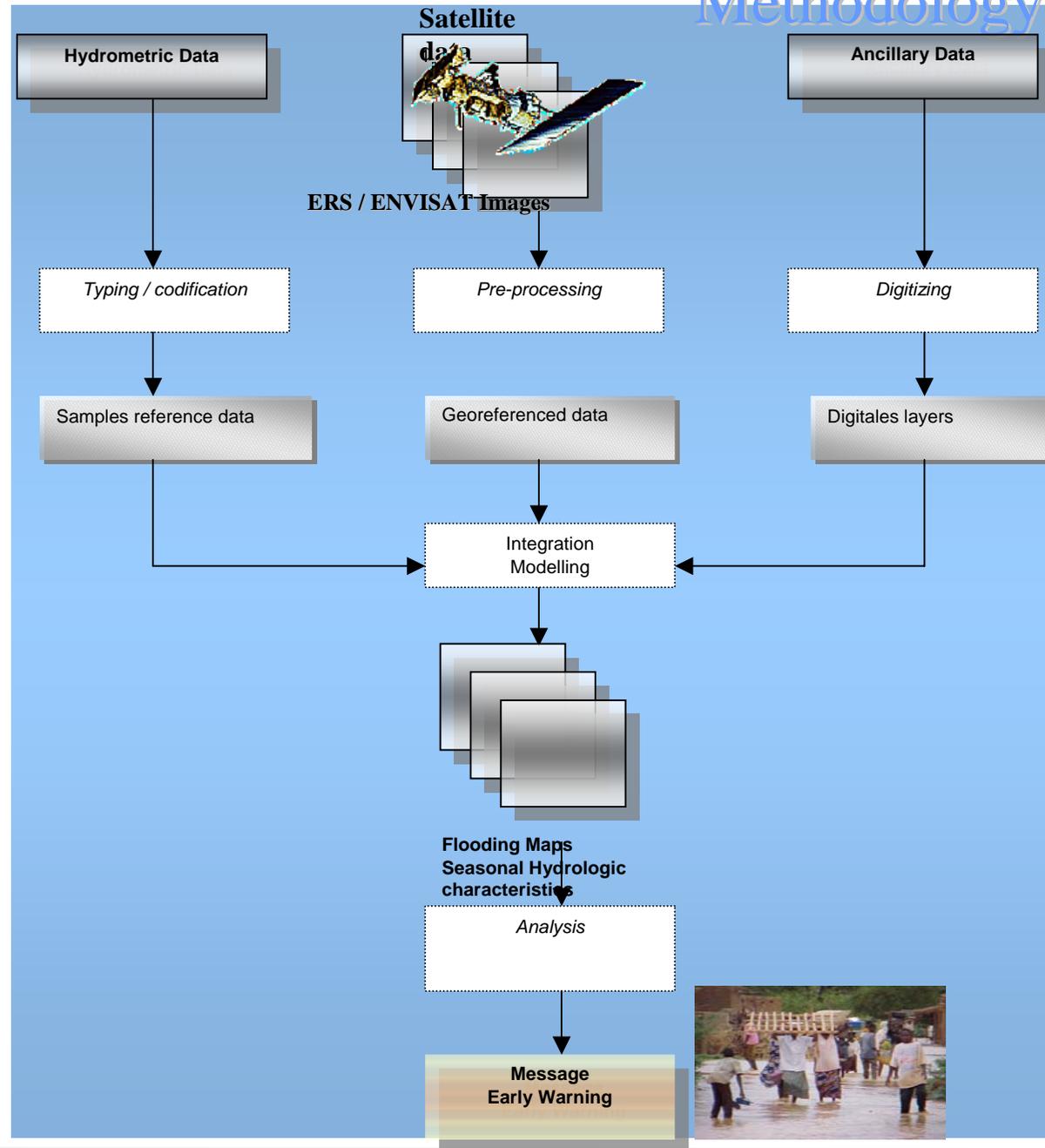
3

Analyse

To compare current, average and extreme situations

Seasonal forecast
Extreme events
Early warning

Methodology

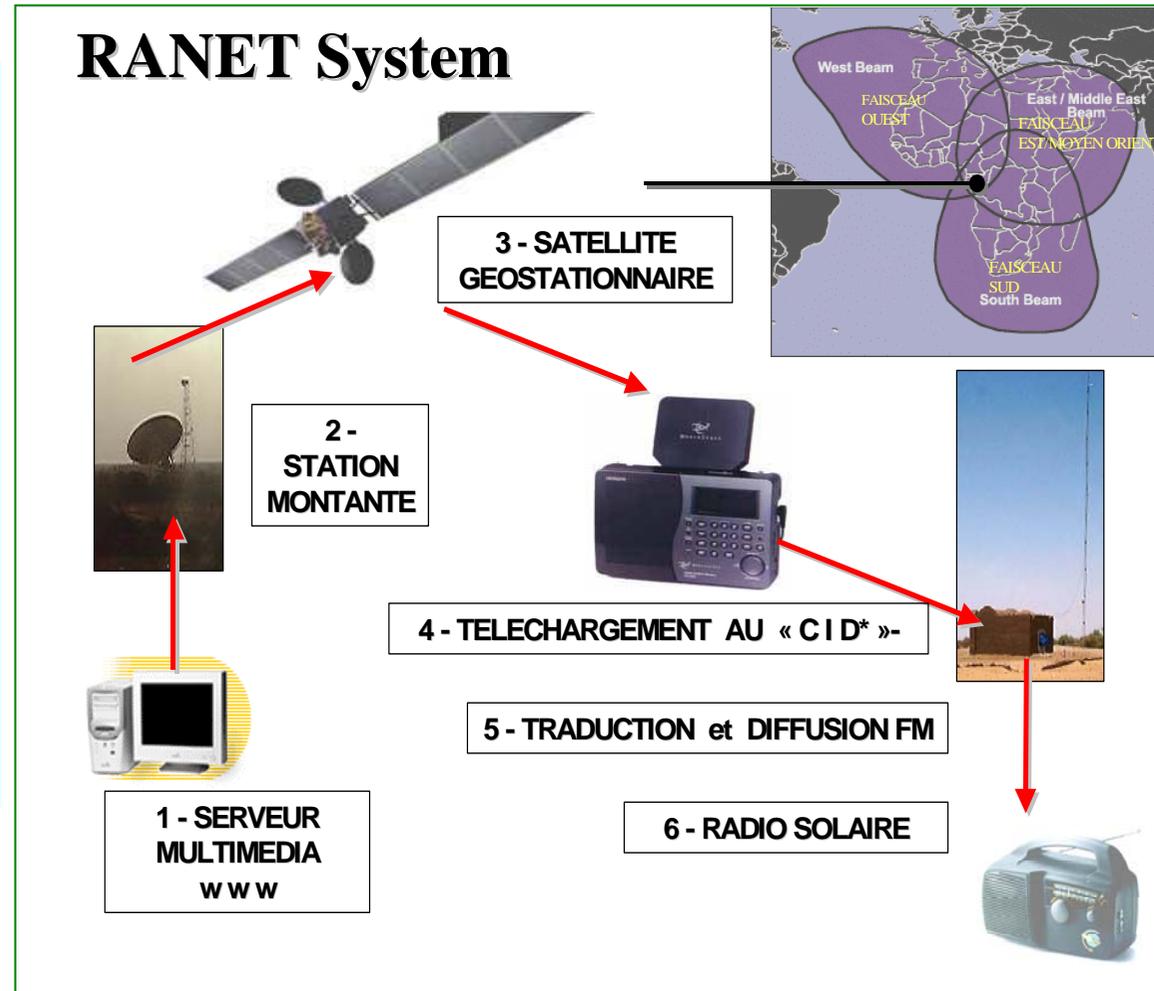


Information dissemination

Aim : To disseminate informations at regional and local level to operational users for decision :

- By E-mail
- Decadal and monthly bulletins
- RANET System (radio on Internet)

RANET System

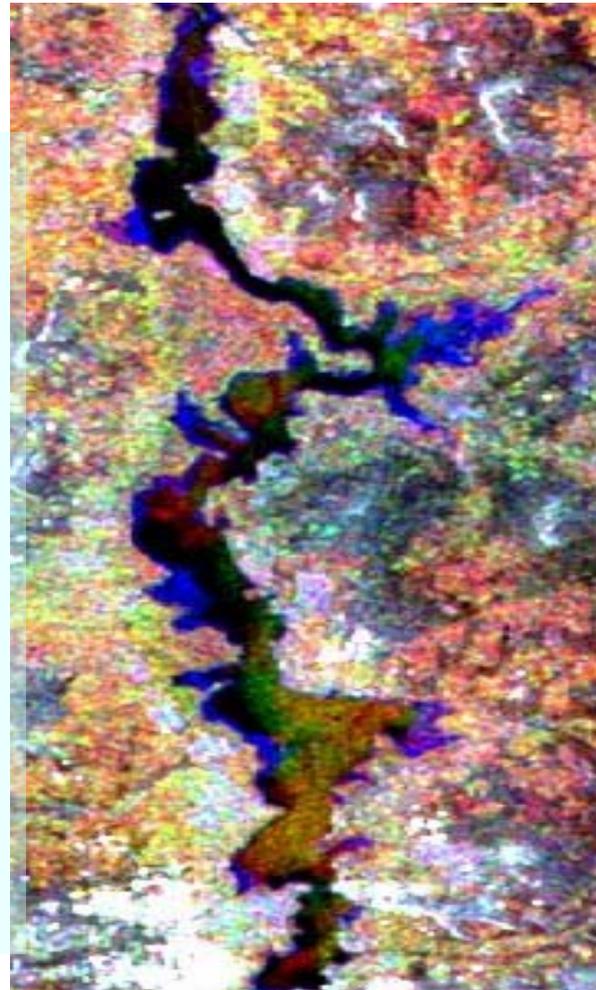


Approaches

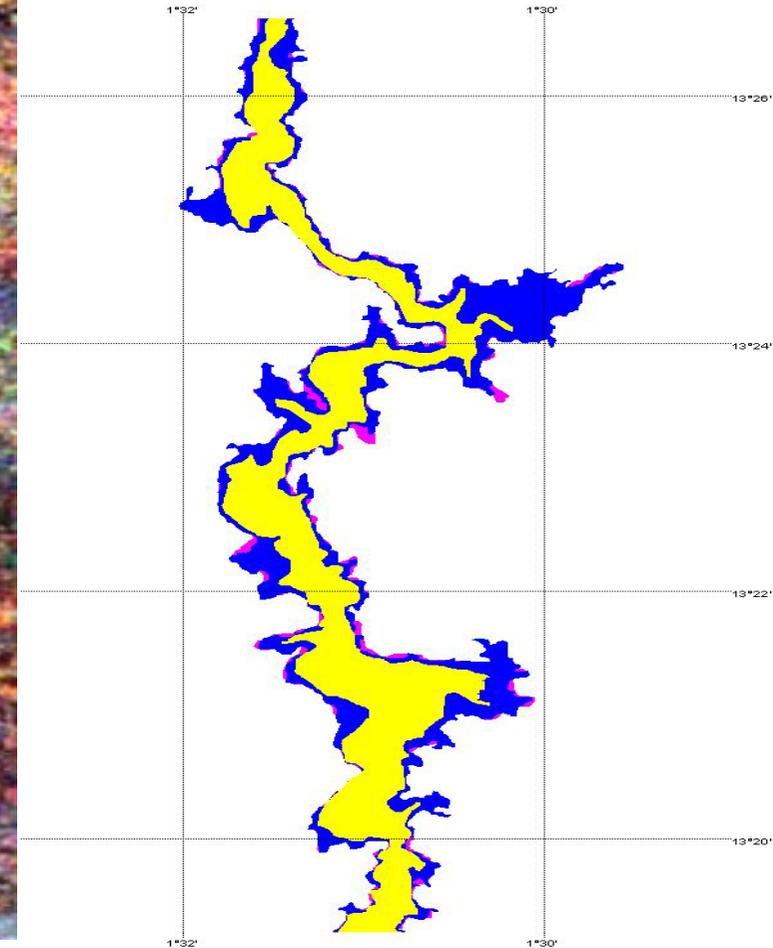
- Multi-temporal Images processing
- Detection of change from from one acquisition to the others

E.g. of Results

- Flood
- Inundation Mapping



Multitemporal Radar Images (ERS-1 & 2, Envisat)



Lac Bam spatial extension Mapping : Jaune (avril), bleu (août), magenta (octobre)

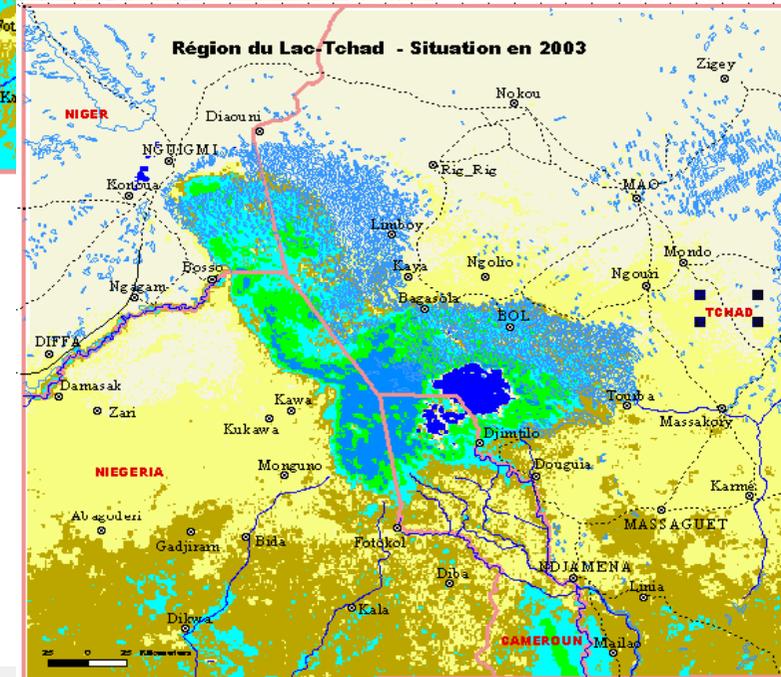
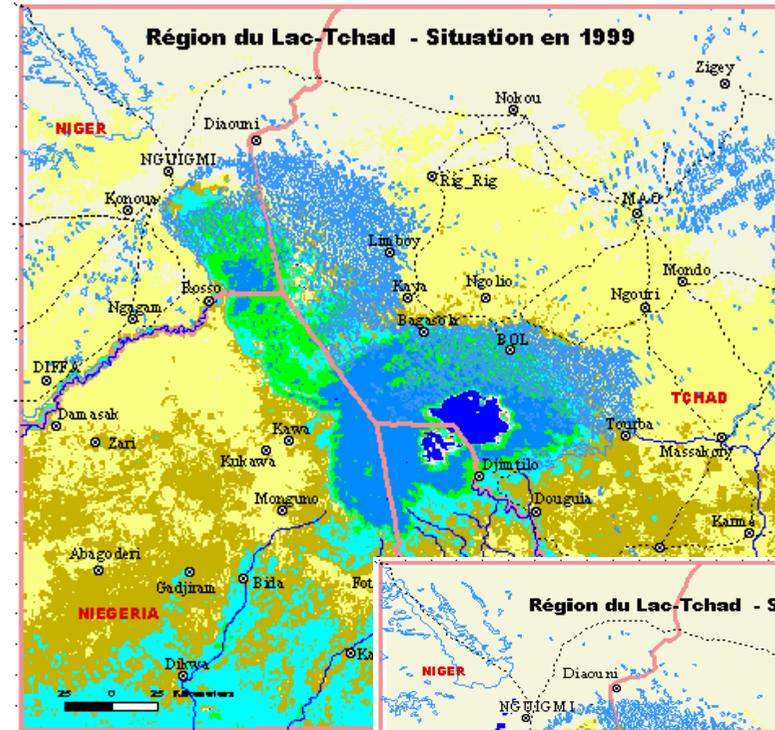


Monitoring

- Water Front and Waterbodies Surface (Automatic Classification of Low and Medium resolution Images)

E.g. of results

- 40-km Advance Further North of the Upper Bassin in 1999
- 80% Increase in open water surface.





Inventory

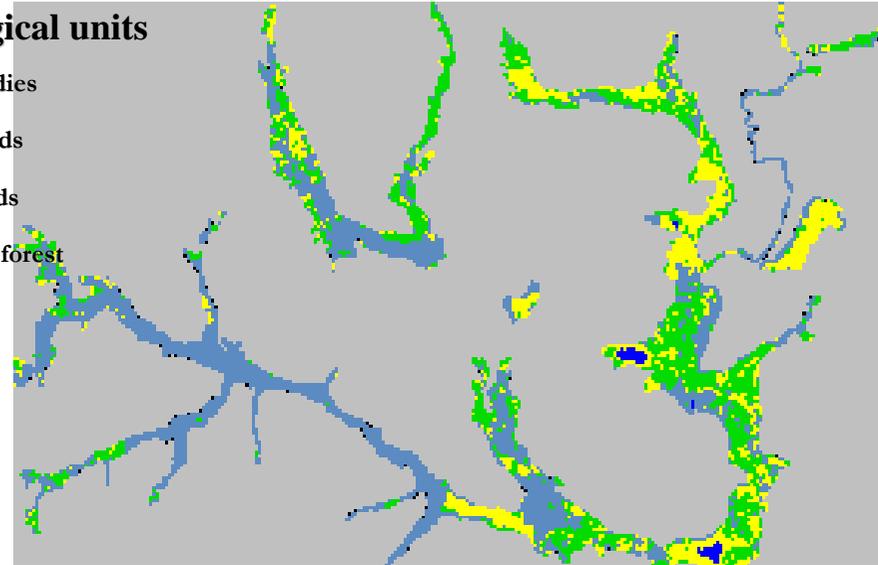
- Recognition and identification of wetlands in the landscape
- Discrimination of the principal agroecological units into the wetlands

Characterization

- Aggregation of the information according to a gradient of flooding given by a relation between humidity index (from satellite data) and piezometric level

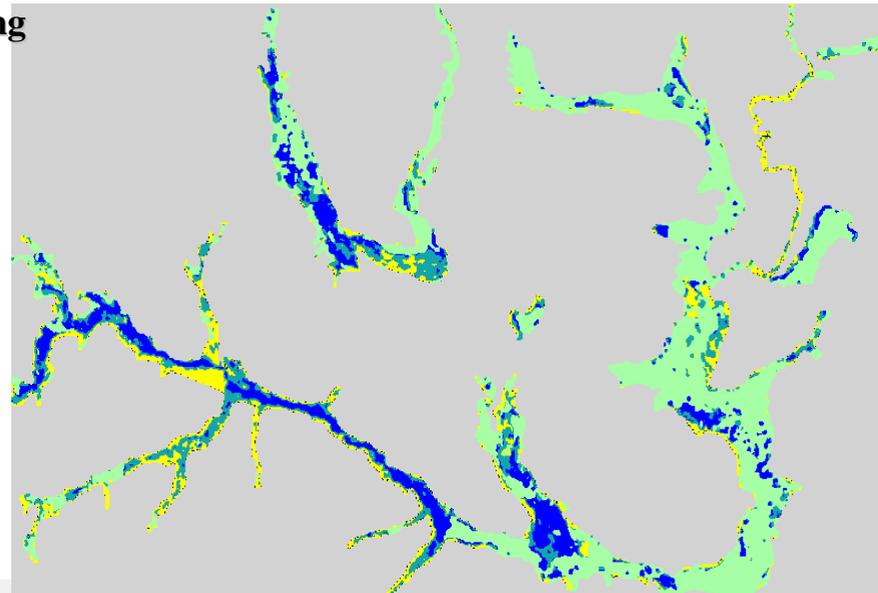
Agroecological units

-  Waterbodies
-  Rice Fields
-  Grasslands
-  Riparian forest



Waterlogging

-  High
-  Mean
-  Low





Project is in a preliminary step.

But conviction that earth observation systems (e.g. ERS and ENVISAT) is useful for the recognition, the discrimination and the characterization of wetlands hydrodynamic.

2 Avenues of success

- Capacity building of NHS to collect, process, analyze and disseminate hydrological data**
- Availability of earth observation data regularly in time**





Thank you

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