

# A GREAT GREEN WALL SOCIAL-ECOLOGICAL SYSTEMS DATABASE

A TOOL FOR RESEARCHERS AND MANAGERS

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# INTRODUCTION

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# The Great Green Wall

Yes, the Green Great Wall can be in China, by our sandbox is in Africa, where we work for the "Future Sahel" ANR project.



- width  $\approx 15km$
- length  $\approx 7600km$

# Future Sahel Framework

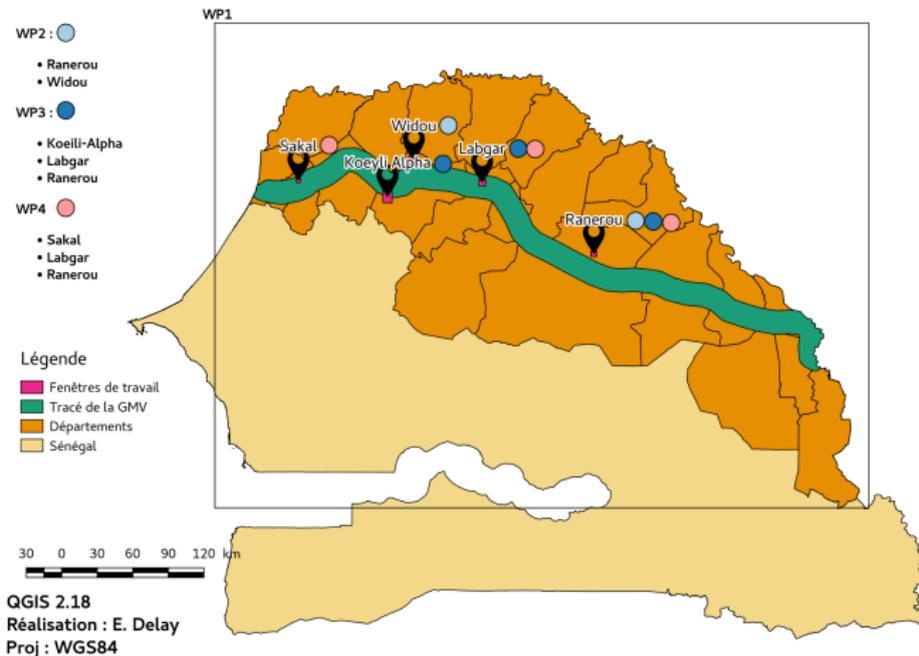
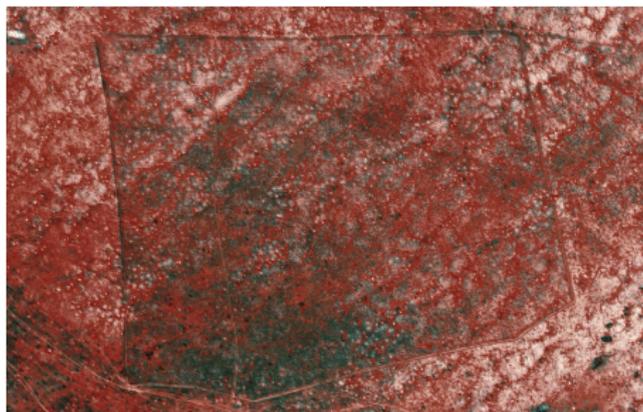


Figure: FutureSahel Work Packages

# Focus on WP1

In close cooperation with the Senegalese agency of Green Great Wall (ANGMV), build a database for researcher and green great wall managers :

- researchers → maintain and exploit data produced in a research context (landscape ecology);
- managers → use knowledge for spatio-temporal planification.



# Material and methods

- The initial architecture developed on PostgreSQL and PostGIS (GEOLAB);
- Stay compatible with BBees metadata;
- We need to find a way to deal with heterogen space and time data :
  - Raster (Spot, Modis, Landsat, Sentinel);
  - statistical information produced by institutions;
  - field data.
- Technology transfer to stockholders (ANGMV), we need to choose free and open source software.

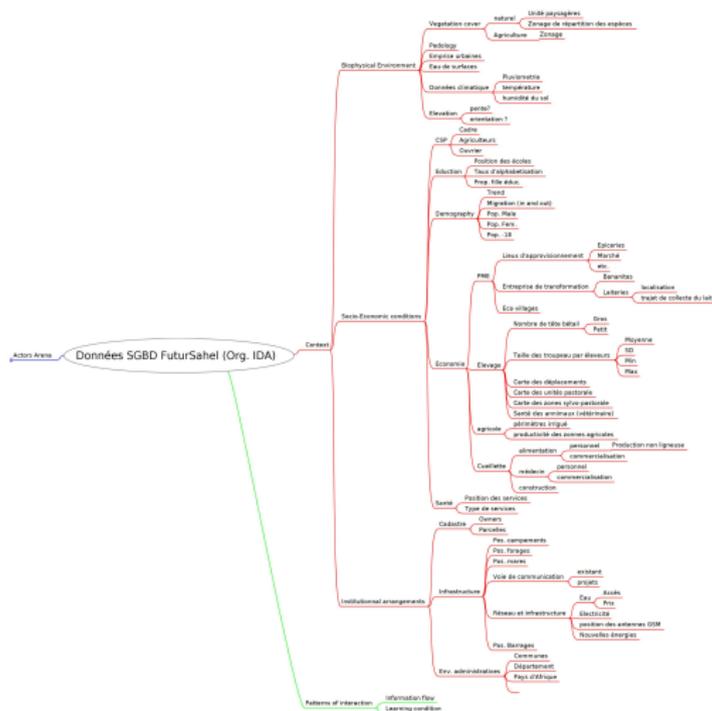


PATHWAY



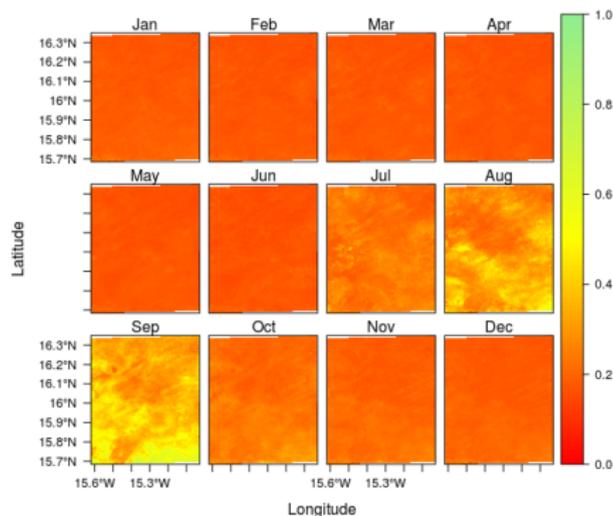
# WP1 : large-scale data

Find data using the Institutional analysis and development (IDA) framework (Ostrom 2009)



# WP1 : biophysical environment data

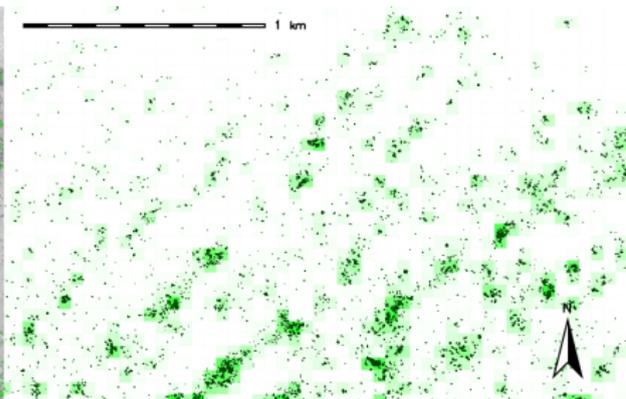
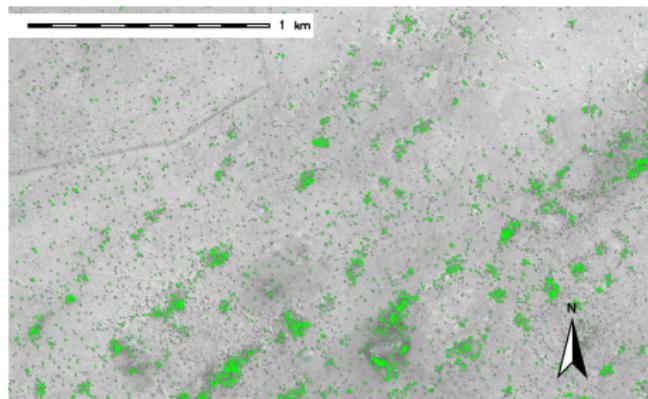
- Work in small windows
  - Spot 6 images (1.5 m) → canopy, pond detection and NDVI calculation
  - MODIS (250 m) → evaluation of tree NDVI participation
  - Spot / Modis → evaluation of sahel greening?
- Generalization → Sentinel ?



## WP2 : plant biodiversity

Maximize the plant biodiversity used in the GGW reforestation protocols. Initially, plantations were not very diversified, mainly composed of three species of trees: *Balanites aegyptiaca*, *Acacia senegal*, and *Acacia tortilis subsp raddiana*.

- new planting plots with other plan trees,
- *in situ* ecological monitoring of planting trials.



## WP3 : valorization of *B. aegyptiaca* sector

This species is widely used for various purposes by local populations : fruts, oil extracted from the almond (cooking and cosmetics).

- Biogeographic study,
- phenology and production (biomass, fruts),
- intra-species variability

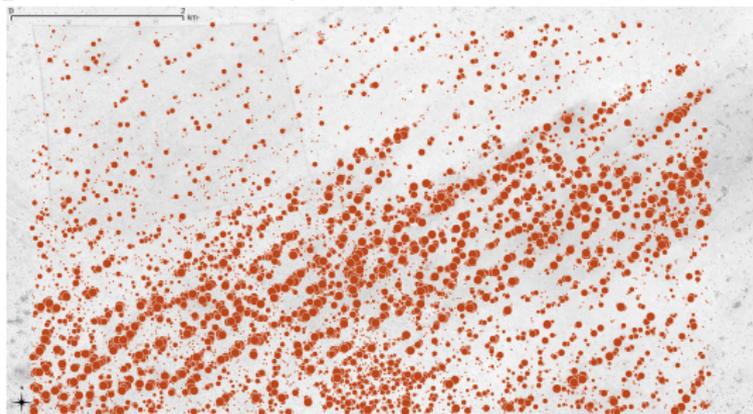


Figure: Biomass (J.-L.Peiry and D. Ndiaye)

# WP4 : Resilience and "territorial" management

Build a common pool resource management framework for the GGW based on resilience approach and ecosystem services.

- Historical analysis for reforestation project
- Mapping ecosystem services along the GGW.
- Improve the system resilience

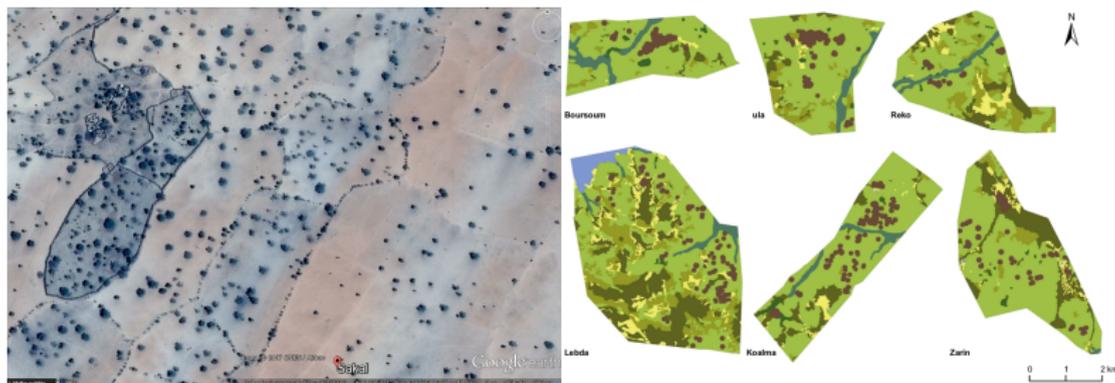


Figure: Screenshot Google-earth and maps from Sinare et al. (2016)

PERSPECTIVE

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Create a database is ever the first step of something. My interest is about cooperation and agent-based modeling :

- cooperation and emergence
- Agent based modeling and ComMod.



Figure: CeLL model (Delay 2015)



Thank you for your attention



You can find this presentation on  github