

A GREAT GREEN WALL SOCIAL-ECOLOGICAL SYSTEMS DATABASE

A TOOL FOR RESEARCHERS AND MANAGERS

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INTRODUCTION

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 $\approx 15\text{km}$
- length $\approx 7600\text{km}$

Future Sahel Framework

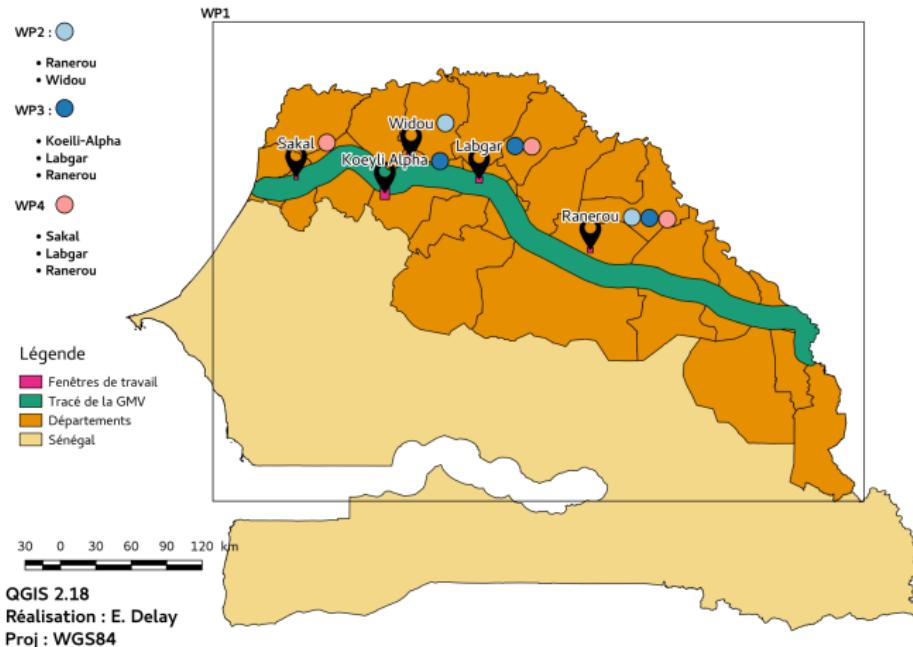
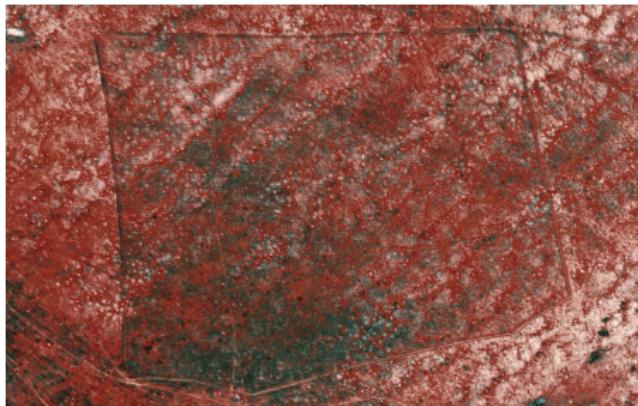


Figure: FutureSahel Work Packages

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

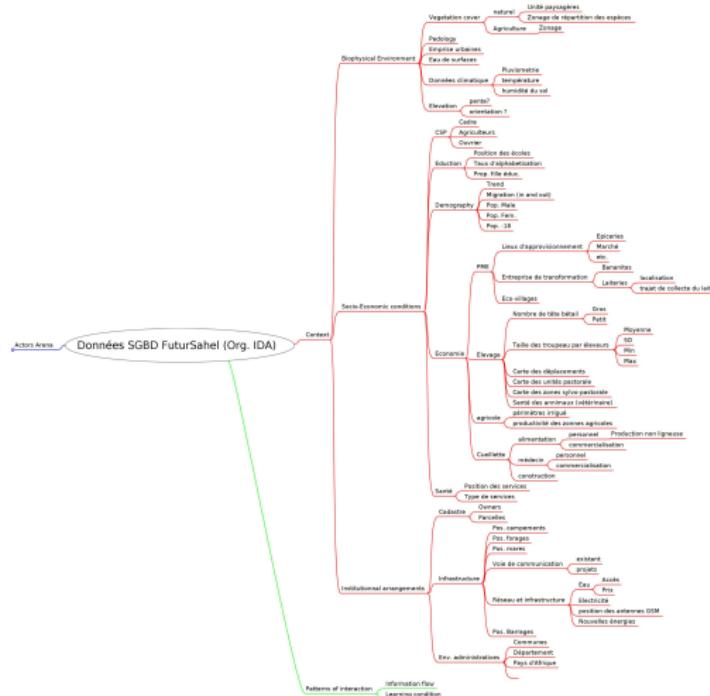
- The initial architecture developed on PostgreSQL and PostGIS (GEOLAB);
- Stay compatible with BBees metadata;
- We need to find a way to deal with heterogen space and time data :
 - Raster (Spot, Modis, Landsat, Sentinel);
 - statistical information produced by institutions;
 - field data.
- Technology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

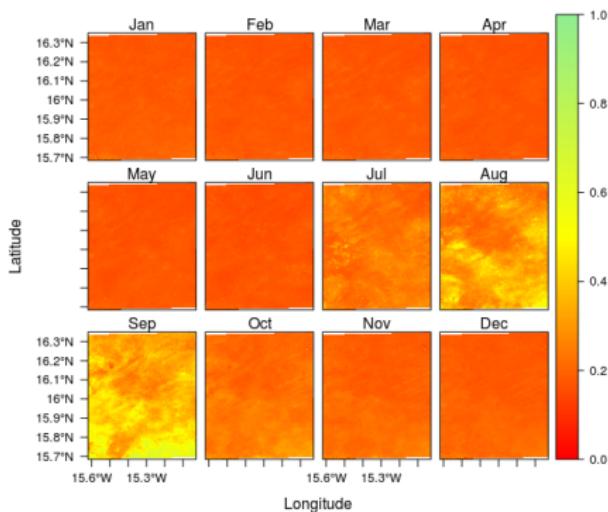


WP1 : biophysical environment data

- 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?

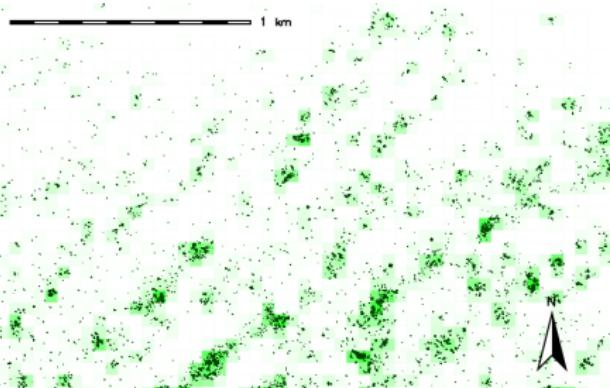
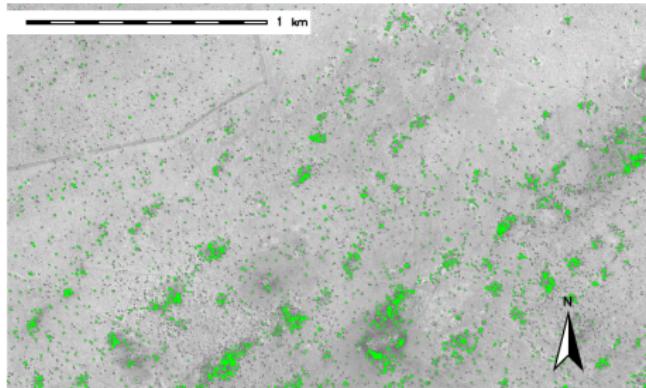
- Generalization → Sentinel ?



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

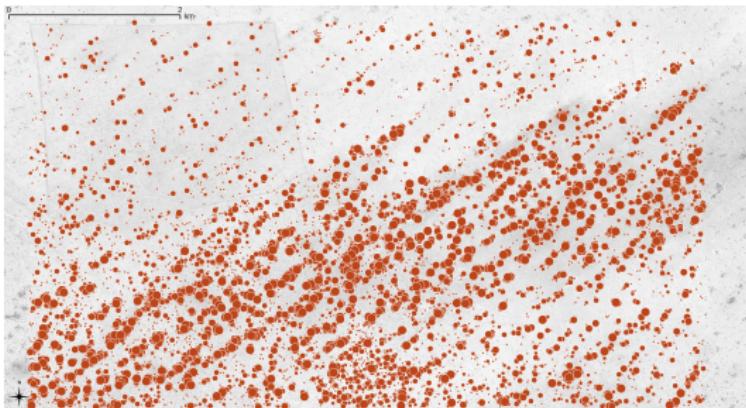


Figure: Biomass (J.-L.Peiry and D. Ndiaye)

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

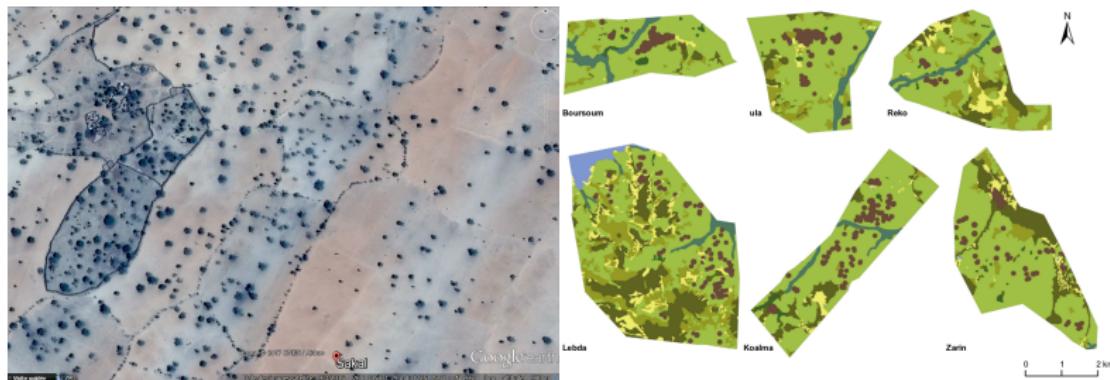


Figure: Screenshot Google-earth and maps from Sinar et al. (2016)

PERSPECTIVE

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

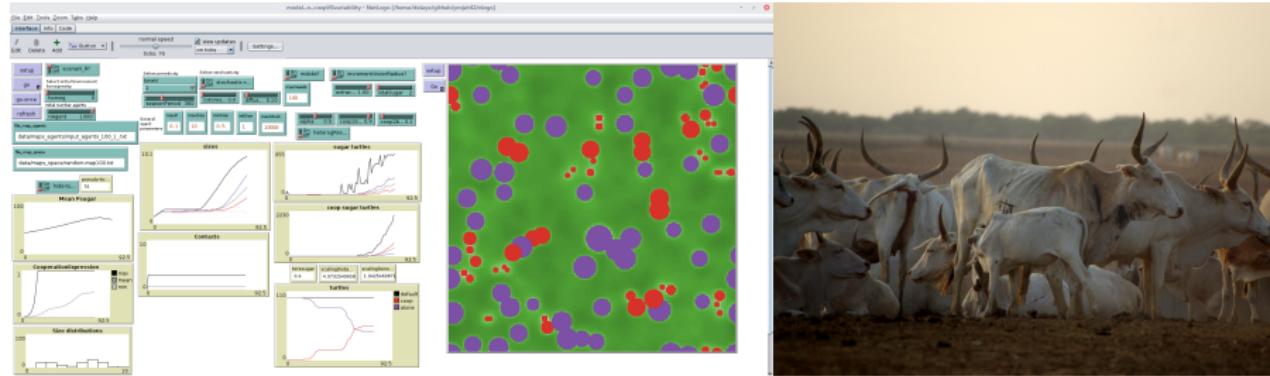
- cooperation and emergence
- Agent based modeling and ComMod.



Figure: CeLL model (Delay 2015)

Post-doctoral research benefit - Cooperation

- Concept paper proposed in JASSS
 - explore irrigation in Mediterranean context
 - beneficial environmental condition of cooperation emergence
- Ferlo is a quiet hard zone for humans. Can we explore this space with our hypothesis in cooperation ?



Thank you for your attention



github



You can find this presentation on [github](#)