



COUNTRY PROFILE OF SENEGAL ON AGRICULTURE DEVELOPMENT AND CROP MONITORING FOR FOOD SECURITY

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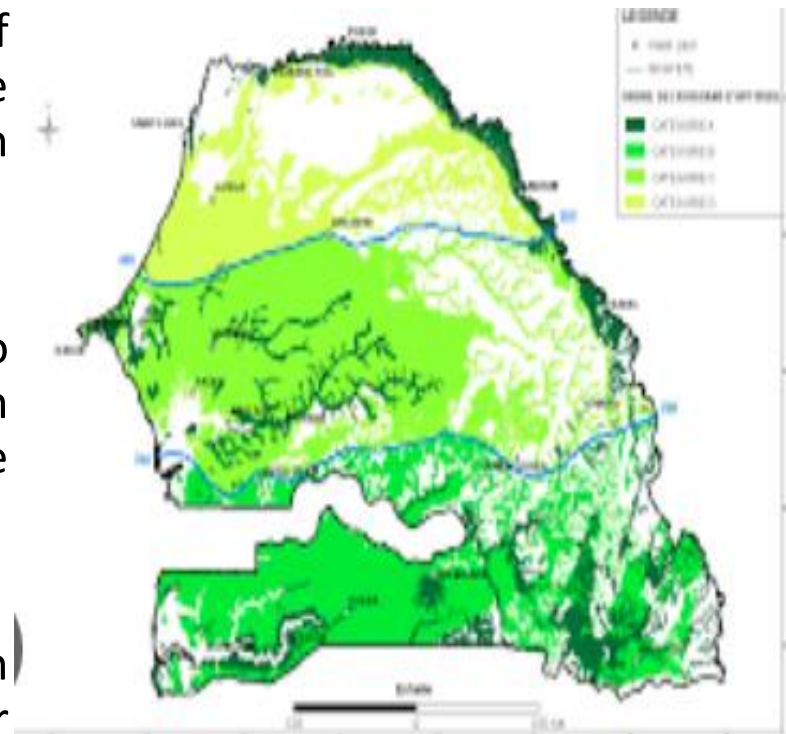


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- V. PHENOLOGICAL SITUATION
- VI. PARTNERSHIP WITH CENTRE DE SUIVI ECOLOGIQUE & DAPSA
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INTRODUCTION

- Senegalese agriculture is an important driver of development. However, a number of initiatives are being developed to enhance the efficient use of agricultural products in order to optimize yields.
- The guidelines adopted by the authorities to revive agricultural activities after the health crises and COVID 19 are described in the flagship document PASAD.
- Geospatial technologies have been identified as a reliable substitute for providing farmers, agronomists and researchers with accurate, up-to-date information on crop yields and phenology.



COUNTRY PROFILE



Senegal is a West African country located on the Atlantic Ocean coast, with a surface area of:

- 196,712 km².

- Mali in the east,

- The Atlantic Ocean To the west ,

- Mauritania to the north,

- Guinea to the Southeast ,

- Guinea-Bissau to the Southwest.

- Senegal has 14 regions,

- Capital: Dakar

- Population: 18,126,390 inhabitants.

- Harvested area in 2023: 3,796,617 ha

Area under rainfed cultivation: 3,796,617 ha

Coastline = 530 km

THE CURRENTLY AGRICULTURAL STRATEGY IN SENEGAL

The Senegalese government has made **agriculture one of the main pillars of its strategic vision for growth and development**. This vision is embodied in various strategic plans aimed at achieving food sovereignty. Various strategic documents have been put in place to support the sector. We can mention some of them:

- ✓ The Senegalese Agricultural Acceleration Program (PRACAS)
- ✓ Agricultural Program for Sustainable Food Sovereignty (PASAD) 2022 - 2026.

The objectives of these plans are:

- Diversifying agricultural speculations and production systems;
- Ensuring food and nutritional security;
- Increase agricultural production and productivity;
- Strengthen financing, Research & Development and Development and advisory services;
- Improve governance of the agricultural sector



THE CURRENTLY AGRICULTURAL STRATEGY IN SENEGAL



- ✓ Support the productive base **through water management, sustainable land management and hydro-agricultural infrastructure**
- ✓ **Direct agricultural research** to contribute to food sovereignty
- ✓ Increase **cereal production**
- ✓ Increase and diversify **horticultural production**
- ✓ Develop the **groundnut sector** and strengthen its competitiveness
- ✓ Develop the **cotton sector** and strengthen its competitiveness
- ✓ Reduce **post-harvest losses**
- ✓ Strengthen **mechanization**
- ✓ Re-think **agricultural financing**, making it more efficient and equitable
- ✓ Strengthen **agricultural insurance**

BASIC INFORMATION FOR AGRICULTURE AND FOOD SECURITY

- Senegal's cereal production in 2023 is estimated at 4,016,504 tons.
- This includes products such as **rice, millet, corn, sorghum and fonio**.
- **Industrial and/or cash crops** such as **groundnuts, cotton, cowpeas, sesame and watermelon** are also produced.
- **Horticultural crops** such as **onions and potatoes** are seeing a marked increase in production (**400,000 tons of onion production**), covering national needs.

Main crop

- peanuts
- millet (souna and fonio varieties)
- sesame
- sorghum
- corn
- cotton
- rice
- sugar cane.

Senegal

Crop Calendar

(*major foodcrop)

Groundnut
Maize*
Millet* and Sorghum
Rice*

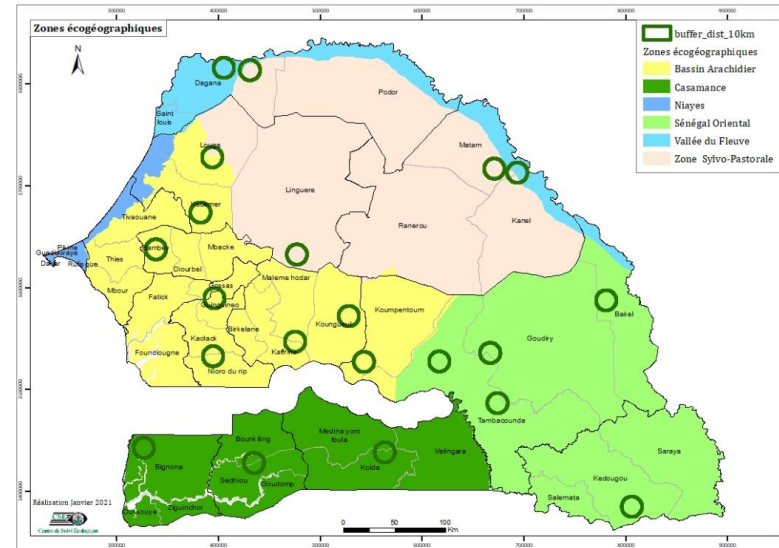


Lean period

Sowing
Growing
Harvesting

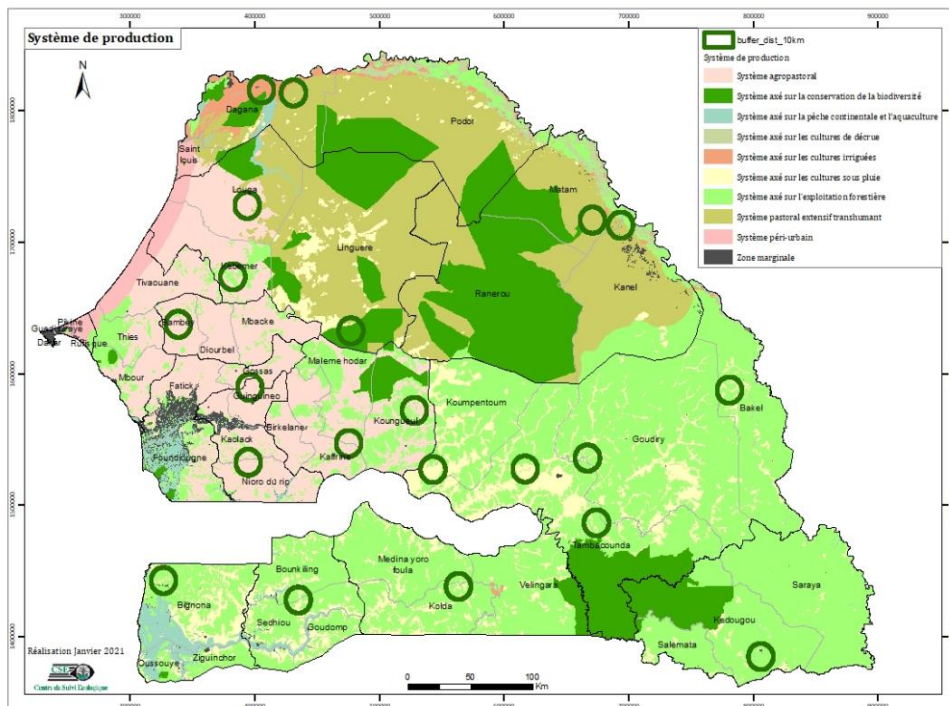
PHENOLOGICAL SITUATION

- Senegal comprises **6 major agro-ecological zones**. These zones have their own specificities, and each zone adopts a different cropping pattern depending on its configuration and climatic conditions.



- The **phenological situation of crops is highly heterogeneous and depends on sowing dates.**

- Senegalese agriculture is **mainly seasonal and rain-fed**, centered on the wintering period. However, **only 5% of the UAA is irrigated.**



PARTNERSHIP WITH CENTRE DE SUIVI ECOLOGIQUE & DAPSA ON CROP MONITORING

SERVIR WEST AFRICA

PHASE 2



AIMS African Institute for
Mathematical Sciences
NEXT EINSTEIN INITIATIVE



 COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

UF UNIVERSITY of
FLORIDA

Connecting Space to Village

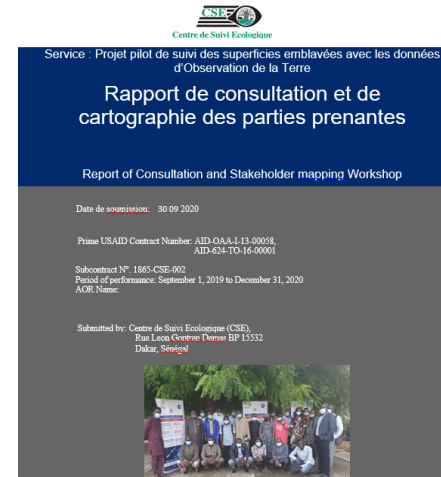
PARTNERSHIP WITH CENTRE DE SUIVI ECOLOGIQUE & DAPSA ON CROP MONITORING

What: Respond to the need to overcome an AFS early warning systems under the CILSS Cadre Harmonisé through this pilot study in Senegal in the Peanut Basin by producing cropland and crop type mapping algorithms based on EO's potential, that will improve agricultural statistics and decisions at national level.

Who: CoP of Crop service (National administrations (SN/SECNA, DA, ANACIM, CNRA/ISRA, ANCAR, **DAPSA**, INP, CNAAS), Organizations/Private sector (UAEL: Union des Associations d'Elus Locaux, ...), Research and training institutes (ENSA, CIRAD, LTA/IST/UCAD, CNCR, ASPG, LBA, FAO, USSEIN, UFR-Agro-UGB)

Technical Support By:

- SCO/NASA
- PMU
- Nasa Harvest



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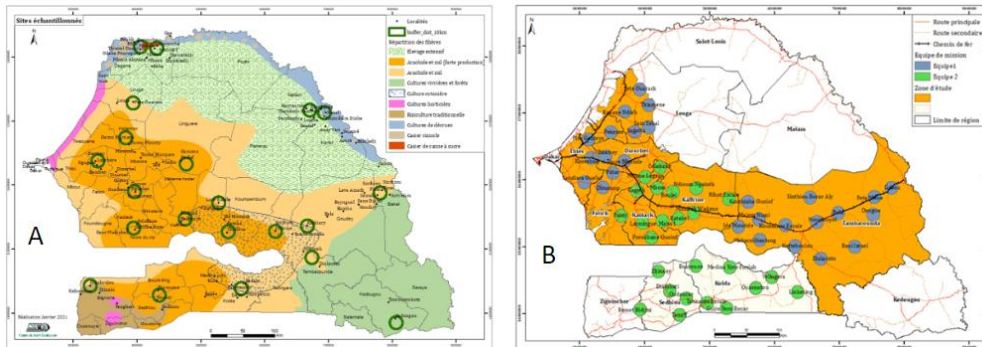
Strengthening regional capacity for crop monitoring from Senegal

Define a relevant study area:

- Peanut Basin & Casamance
- Main existing crop in Sahelian & Sudanian climatic areas (peanuts,

Set up a Database based on field data collection

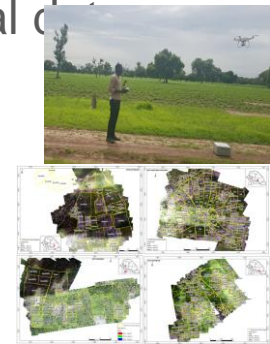
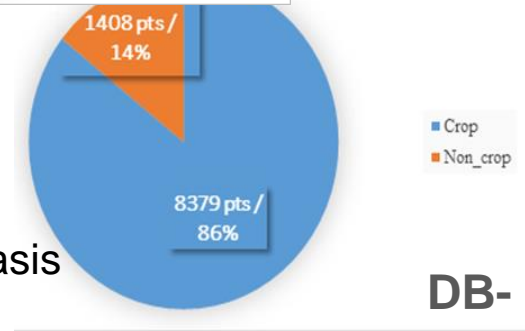
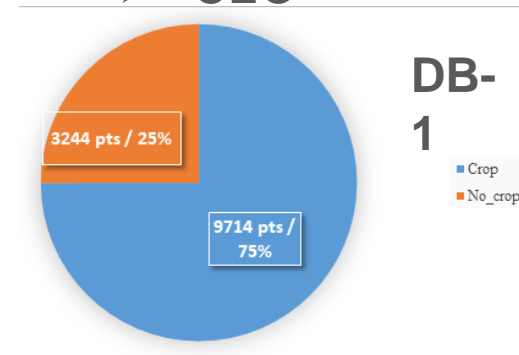
- Use of geo-spatial data
- CEO



The circles represent areas where field data were collected in 2018/2019/2020 (A/DB-1) at the national scale and 2023 (B DB-2) focus in the Peanut Basin/Casamance region.

BD-2: collection was based on the following points

BD-2: work is being finalized to digitize the limits of the plots on the basis of points in order to improve the classification

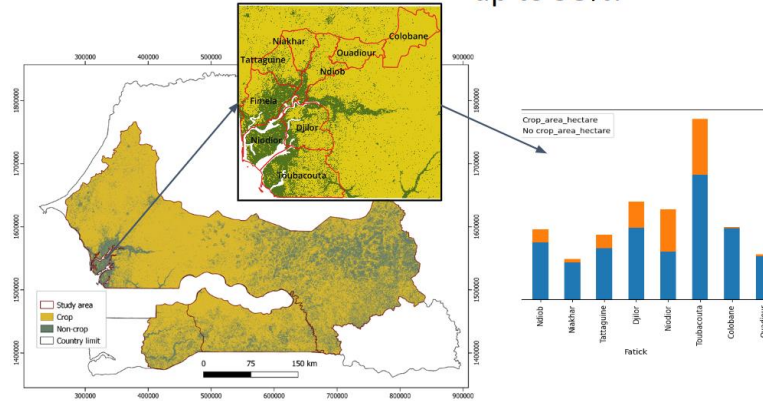
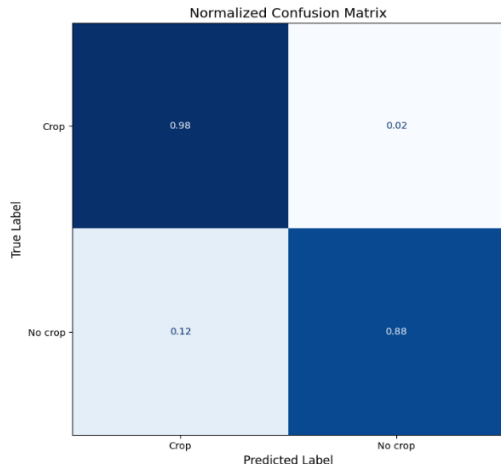


DB-2

PARTNERSHIP WITH CENTRE DE SUIVI ECOLOGIQUE & DAPSA ON CROP MONITORING

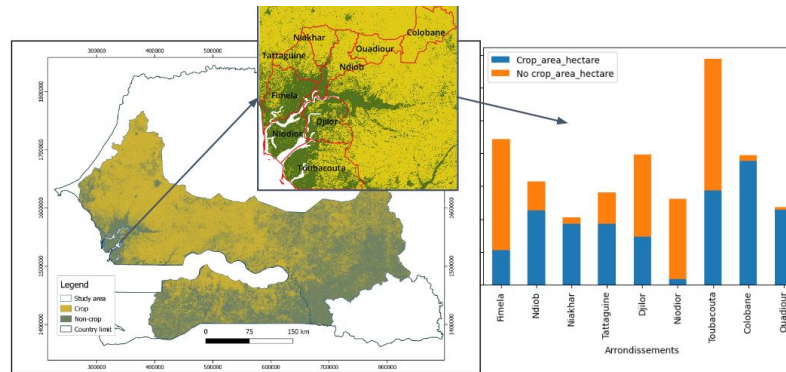
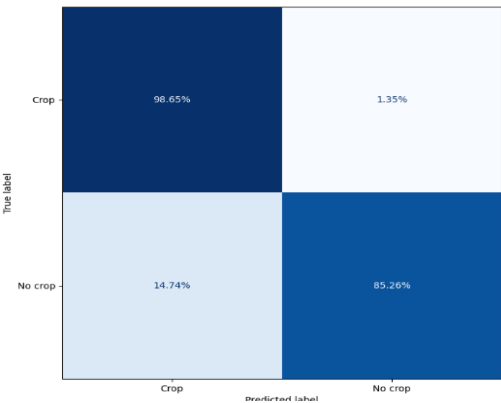
Strengthening regional capacity for crop monitoring from Senegal

Confusion Matrix (RF 2020)



The RF model trained and tested with dataset 1 achieved an overall accuracy of 96%, with a pronounced sensitivity to the Crop class reaching up to 98%.

Confusion Matrix (RF 2023)



The RF model achieves an overall accuracy of 96% and a high sensitivity to the Crop class. However, the sensitivity for the “No crop” class decreased from 88% to 85% compared to the 2020 model.

PARTNERSHIP WITH CENTRE DE SUIVI ECOLOGIQUE & DAPSA ON CROP MONITORING



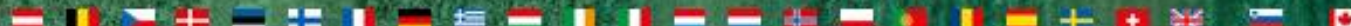
Sentinels for Agricultural Statistics

Project overview

Sophie Bontemps



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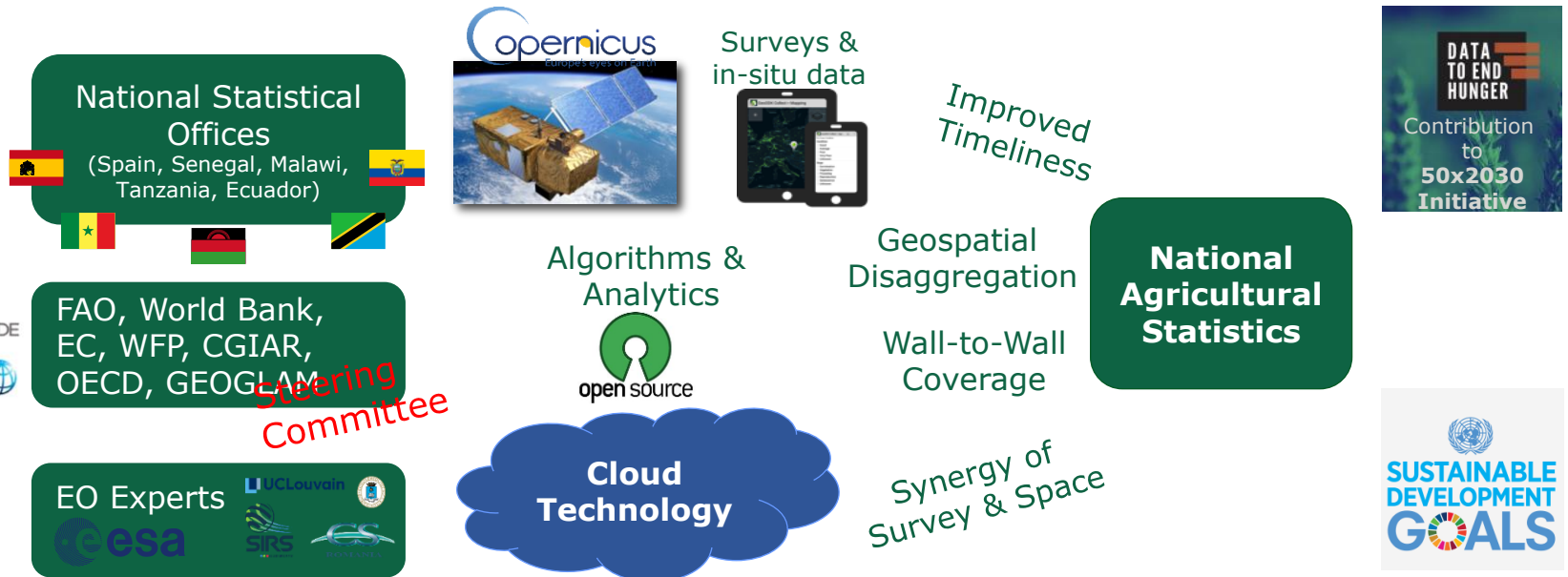
European Space Agency

PARTNERSHIP WITH CENTRE DE SUIVI ECOLOGIQUE & DAPSA ON CROP MONITORING

ESA Sen4Stat project: Objectives & Scope

•Objectives:

- Engage **agricultural National Statistical Offices (NSO)** to demonstrate the **benefit of EO information** within their operational workflows
- **Provide & demonstrate validated algorithms, open source tools, products and best practices** for national agricultural statistics with EO **facilitating the uptake of EO information** in the NSO



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EO products supporting the use cases

**COST
EFFICIENCY**

**STAT.
GRANULARITY**

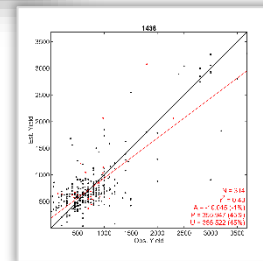
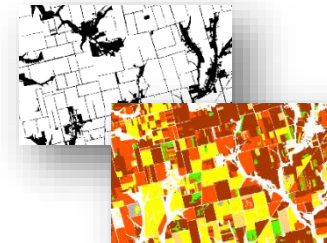
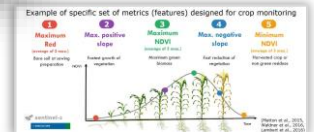
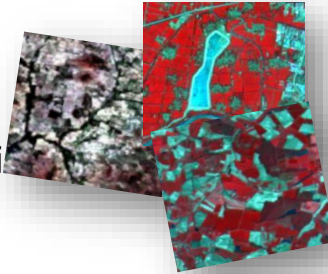
**STAT.
TIMELINESS**

**SAMPLING
DESIGN**

**SDG's
REPORTING**

**DATA
COLLECTION
PROTOCOL**

- Pre-processed reflectance / metrics time series
- Biophysical indicators, e.g. NDVI or LAI
- Crop growth condition metrics at segment-level
- Cloud-free color composites at segment-level
- Wall-to-wall cropland – non-cropland map
- Wall-to-wall annual vs permanent cropland map
- Wall-to-wall map of the main crop type groups
- Wall-to-wall crop type map
- National crop distribution probability map at pixel-level
- Crop yield estimate at reporting unit

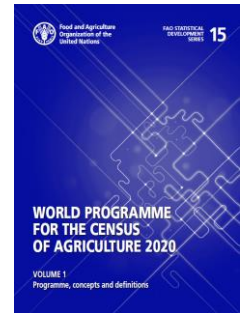


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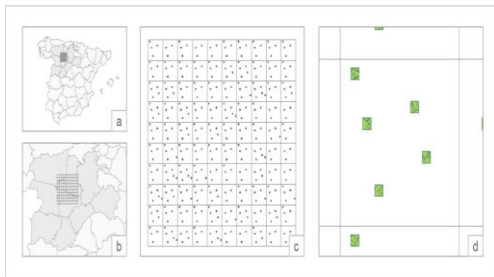
Sampling Design for Agriculture Statistics Survey according to each National Statistical Office

5 pilot countries to cover the range of sampling design used at national scale :

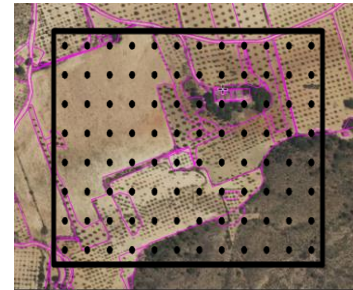
- **Area sampling frame** for Ecuador and Spain
- **List sampling frame** for **Senegal** and Malawi
- **Point sampling frame** for Tanzania



Area Sampling



Point Sampling



List sampling

Name 1 Address 1

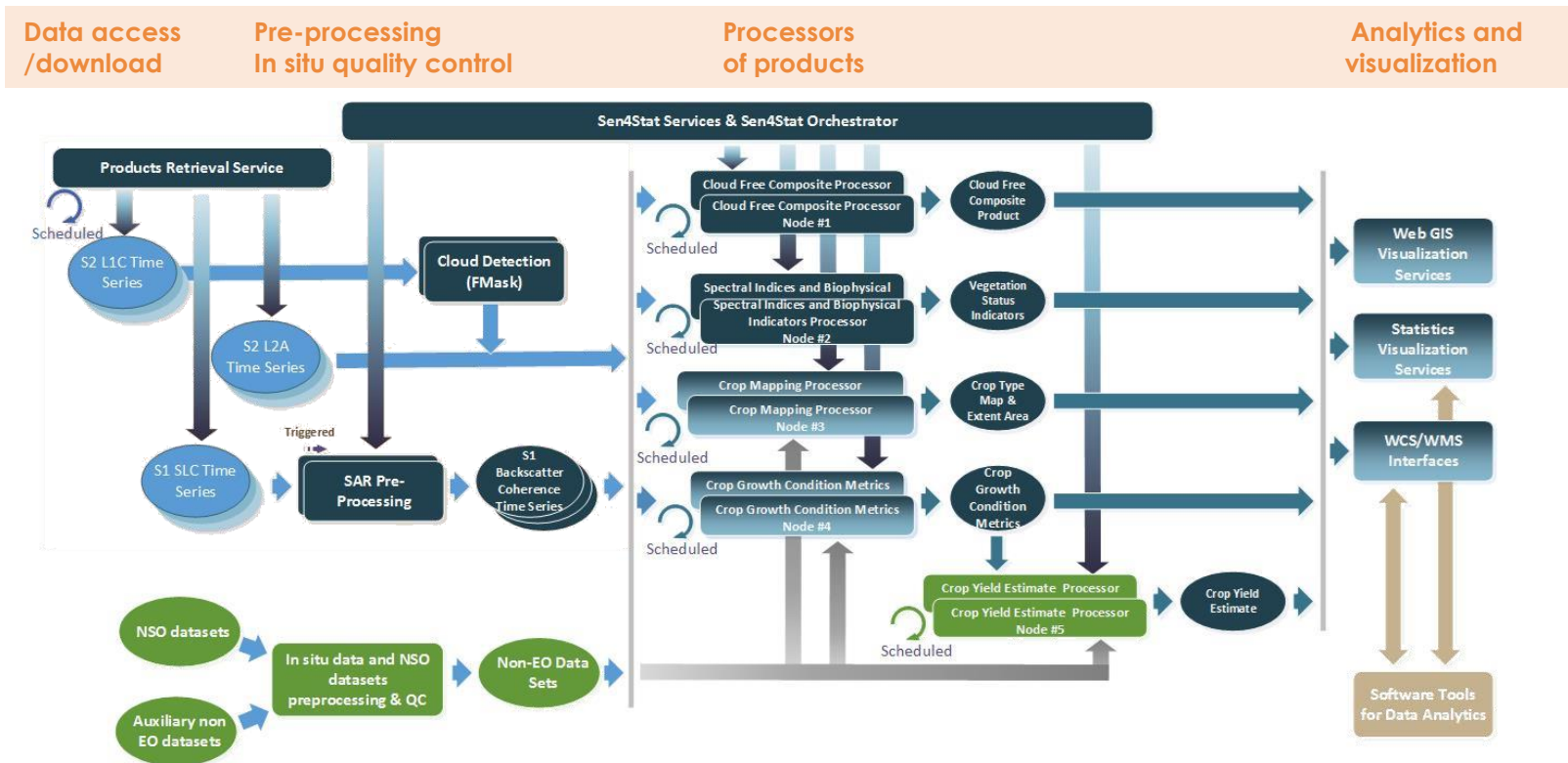
Name 2 Address 2

Name 3 Address 3

.....

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Sen4Stat open source system

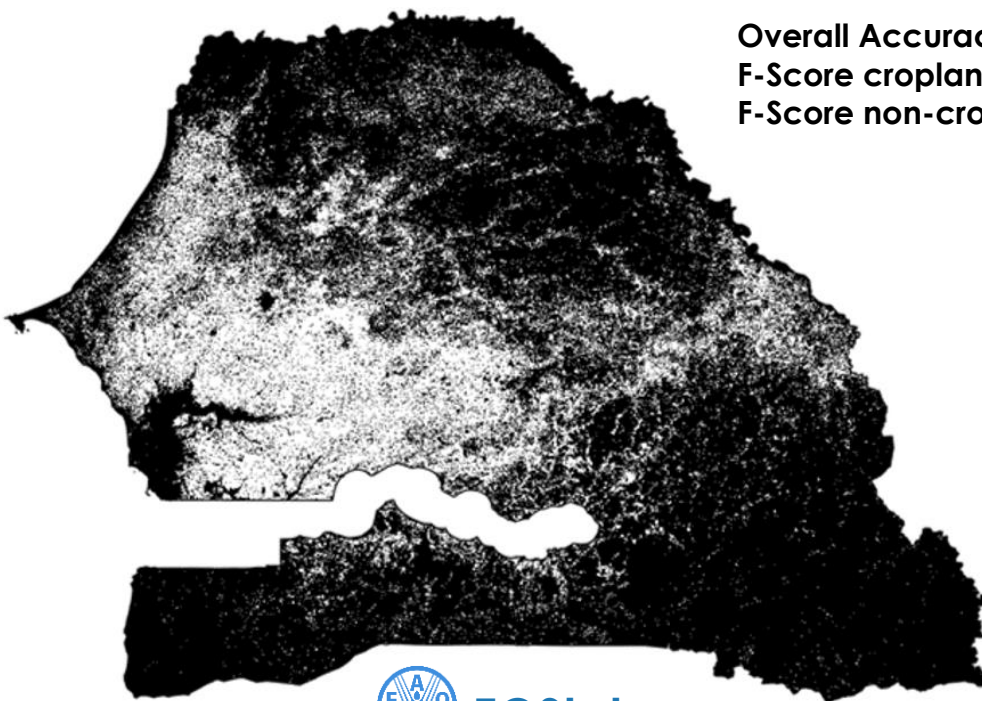
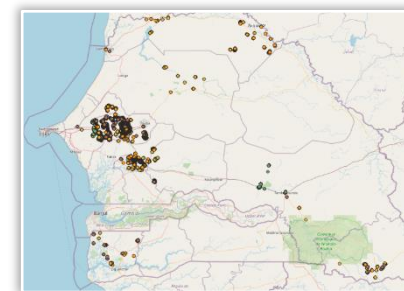


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National cropland mask at 10-m resolution

Random Forest classification based from
S2 & L8 time series only

Overall Accuracy : 96%
F-Score cropland: 0,97
F-Score non-cropland: 0,88

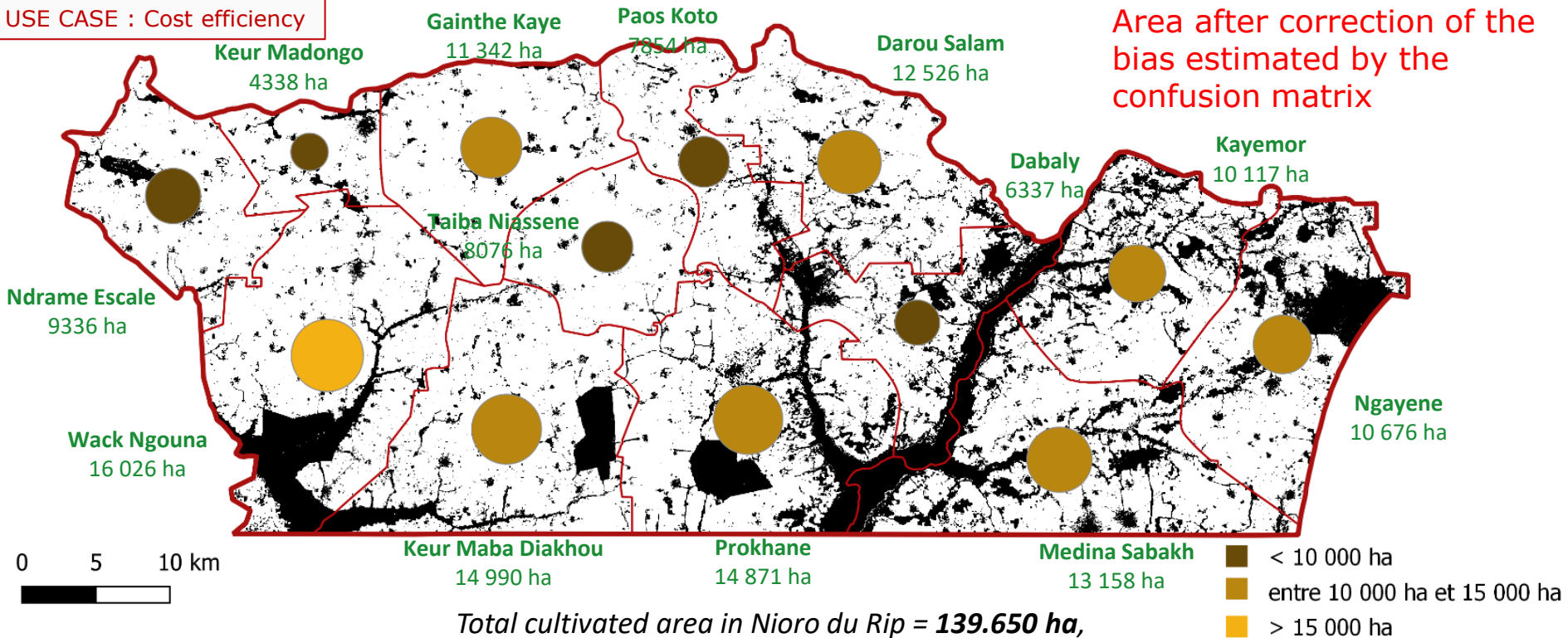


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Map of cultivated area estimates by municipalities

USE CASE : Cost efficiency

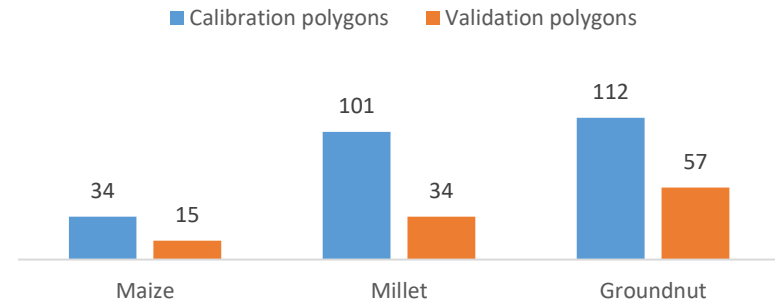
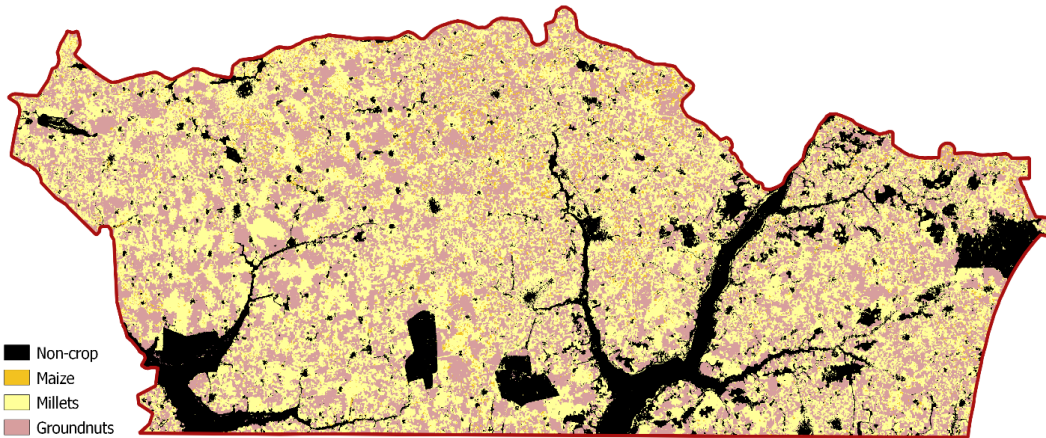
Area after correction of the bias estimated by the confusion matrix



Total cultivated area in Nioro du Rip = **139.650 ha**,
i.e. nearly **61%** of the total area

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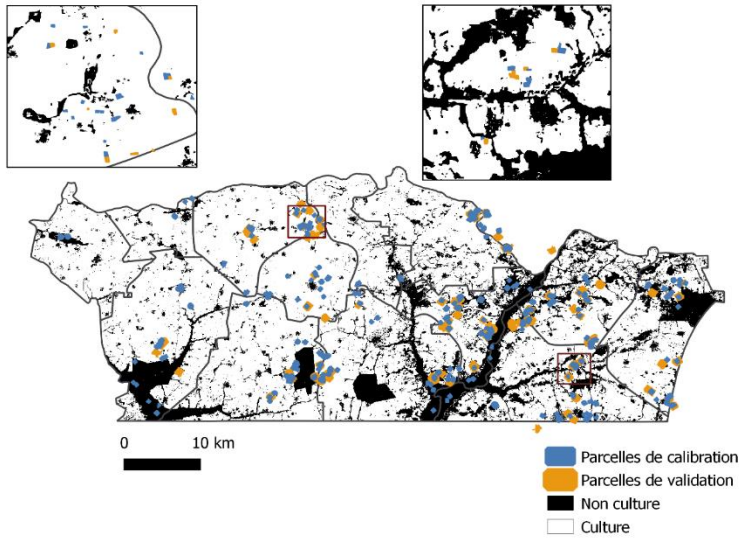
Field campaign 2021 :
Crop type map (3 crops types)



OA = 88,2 %

		Field survey				UA	Contaminations (%)	Omissions (%)
		Non crop	Maize	Millet	Groundnut			
Crop type map	Non crop	2205	0	34	17	97.7	2.3	9.3
	Maize	0	325	10	0	97.0	3.0	47.9
	Millet	202	265	2755	3268	80.5	19.5	12.6
	Groundnut	25	34	354	3487	88.8	11.2	6.3
PA		90.7	52.1	87.4	93.7			

Expressed in number of pixels



EXPECTATION

How to customize CropWatch-ICP project in Senegal based on what we are doing?

Jarrajeuf