Since 1984, the Senegalese Ministry of Agriculture has mandated a national, multi-disciplinary working group, spell out «GTP» in French, to monitor the country's crops and provide information to aid in agriculture policy making.

GTP consists of the Crop statistics department (DAPSA) under the Ministry of Agriculture, along with key national institutions, such as the Centre de Suivi Ecologique (CSE, currently the GEO Principal) and the national meteorological institute (ANACIM).

Since the mid-1980s, CSE has been monitoring agriculture and pastoralism with geospatial technologies. Just over ten years ago (2003-2004), the Centre started to work with European partners to monitor crops using Earth observation (EO) satellite data, in the context of the Global Monitoring for Food Security (GMFS) activity funded by European Space Agency and led by VITO, Belgium.

In November 2011, the project entitled "A framework for enhancing EO capacity for Agriculture and Forest Management in Africa as a contribution to GEOSS" (AGRICAB), also coordinated by VITO, was created to build on these capacities including experience in data access through the GEONETCast satellite broadcast. Consultations with national stakeholders, in early 2012, put forward the following priorities:

- Consolidate and improve data sources and analysis protocols for early warning and crop mapping, including the introduction of novel methods and tools in time series analysis, with support from VITO, Belgium.
- Create a regional crop model as input to crop monitoring and yield forecasting and improving the within-season yield forecasting with statistical regression models, with support from Alterra, The Netherlands.
- Compare the current list-based methodology with point and area frame sampling methods and assess EO contributions thereto in terms of the quality (in particular at the department scale), cost and overall sustainability, with support from Consorzio ITA, Italy.

At the same time, new EO satellites and sensors (such as the Belgian PROBA-V mission), with often increasing data volumes to analyse, improving software tools or better measurement equipment further underlined the need to strengthen the existing capacities and experiences.
Achievements over the last three years

For early warning on crop growth anomalies, time series analysis techniques were used to investigate crop conditions and compare them to long term data records, to group areas with similar behaviour and to get early indications on delays in the start of the growing season. This resulted in a clear analysis protocol and elaborated information bulletins.

The identification of similar seasons in the past, combined with regression statistics, allowed for estimations of crop yields that showed good correlations to national statistics for millet, sorghum and groundnut (up to 80%) in a report from DAPSA and CSE in 2012.

A regional crop model for grain maize was set up and different indicators such as NDVI, rainfall sums and model-based biomass and yields were evaluated for yield forecasting. A more open exchange of meteorological data and intensive training on the underlying concepts and operational management of the model will allow CSE and DAPSA to establish a model-based forecast in the future.

Thanks to a larger number of valid sampling points, state-of-the-art mobile equipment and improved tools, the performed ground survey showed improved reliability in crop area statistics, in comparison with official statistics, classifications of high resolution satellite imagery and other studies, in the two study areas of Kaffrine and Nioro du Rip. By setting a clear target for accuracy per crop and per area, the sampling method can be further optimized in terms of the number of sampling points.

Towards a sustained partnership

Following the signing of a partnership agreement between CSE and DAPSA in July-August 2014, the Ministry decided to set up a new Earth Observation unit within its crop statistics department, DAPSA. This institutional capacity, illustrated by the below testimonial, paves the way for sustaining the cooperation and partnership.

“It is with great honour that I can tell that DAPSA now has a Remote Sensing Unit, welcomed and supported by the Ministry of Agriculture and Rural Equipment (MAER) of Senegal. The partnership between CSE and DAPSA ensures the quality of the work. I congratulate CSE and its European partners, for their remarkable joint efforts in the context of AGRICAB, which DAPSA considers of high interest to inform the authorities within the Ministry.”

E.M.D. Ngom, Specialist Modelling Agricultural Statistics, Remote Sensing and GIS for Research, DAPSA

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