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The Crop Risk Zones Monitoring System for resilience to drought in the Sahel

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Food security is still one of the major concerns that Sahelian populations have to face. In the Sahel, agriculture is primarily based on rainfed crops and it is often structurally inadequate to manage the climatic variability.
The predominantly rainfed cropping system of Sahel region is dependent on season quality on a year-to-year basis, and susceptible to weather extremes of droughts and extreme temperatures. Low water-storage capacity and high dependence on rainfed agriculture leave the agriculture sector even more vulnerable to climate risks.
Crop yields may suffer significantly with either a late onset or early cessation of the rainy season, as well as with a high frequency of damaging dry spells. Early rains at the beginning of the season are frequently followed by dry spells which may last a week or longer. As the amount of water stored in the soil at this time of the year is negligible, early planted crops can suffer water shortage stresses during a prolonged dry spell. Therefore, the choice of the sowing date is of fundamental importance for farmers. The ability to estimate effectively the onset of the season and potentially dangerous dry spells becomes therefore vital for planning rainfed agriculture practices aiming to minimize risks and maximize yields. In this context, advices to farmers are key drivers for prevention allowing a better adaptation of traditional crop calendar to climatic variability.
In the Sahel, particularly in CILSS (Permanent Interstates Committee for Drought Control in the Sahel) countries, national Early Warning System (EWS) for food security are underpinned by Multidisciplinary Working Groups (MWGs) lead by National Meteorological Services (NMS).
The EWSs are mainly based on tools and models utilizing numeric forecasts and satellite data to outlook and monitor the growing season. This approach is focused on the early identification of risks and on the production of information within the prescribed time period for decision-making.
Since the ‘90s, analysis tools and models based on meteorological satellites data have been developed within different regional and national initiatives to allow near-real-time monitoring of the cropping season. The software was in general stand-alone applications, transferred to MWGs without continuous user support and updates. Currently MWGs in the Sahel do not have any working operational tool for drought risk identification and forecast, because such tools are by now obsolete from the IT perspective.
The challenge and the objective of this work is to provide to MWGs and local end-users an open access/source Crop Risk Zones Monitoring System (CRZ-MS) supporting decision making for drought risk reduction and resilience improvement. A first prototype has been developed for Niger and Mali NMSs, based on a coherent Open Source web-based infrastructure to treat all input and output data in a interoperable, platform-independent and uniform way. The System architecture and functions are based on a agro-meteorological model, running in two different modes:
1) diagnostic mode for the drought monitoring during the agro-pastoral campaign allowing MWGs to identify agricultural drought risk areas in order to support decision making at local and national level in agricultural drought management. This early warning information also represents an input for estimating the nutritional food insecurity, for the identification of potentially vulnerable populations and assessing food crises risks by National EWSs put in place by CILSS with EU, FAO and WFP.
2) predictive mode for "advisory-support" activities to the farmers by the Agricultural Extension Services, in order to implement the most appropriate strategies for minimizing drought risk on crops (i.e. identification of the optimal period of sowing, choice of varieties based on the expected length of the growing season, adoption of suitable cultural practices for soil water management) and to build farmers resilience.
To increase the accessibility of appropriate and targeted drought risk information, it is essential to move from generic information to specific advises for end-users at different decision-making levels, bridging the gap between available technology and local users’ needs.
Thus, advices to farmers are a fundamental component of prevention allowing a better country’s preparedness to cope with weather variability.