Info Note

Impact of climate services on Senegal's farmers

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Key messages

- CCAFS contributed to climate services in Senegal through improved communication channels, local institutional arrangements, business models, and evidence of impact.
- Use of weather and climate information increases farm productivity.
- Farmers' use and benefit from climate services vary with wealth and gender.
- Local multidisciplinary working groups strengthen the effectiveness, use and impact of climate services.
- Participatory communication processes build farmers' capacity to understand and act on probabilistic climate information.

CCAFS contributions to climate services

Climate services involve the "production, translation, transfer, and use of climate knowledge and information in climate-informed decision making and climate-smart policy and planning."[1] A well-functioning climate service provides the information and support that decision-makers need to understand, anticipate, and manage climate-related risks. While climate services encompass a range of time scales, services for farmers emphasize information at weather (e.g., daily observations, forecasts out to about 10 days) and seasonal climate variability (e.g., historical seasonality, variability and trends; seasonal forecasts) time scales.

CCAFS contributions to the development of climate services for agriculture in Senegal included improved communication channels, institutional arrangements to support co-production of information and advisories, an expanded suite of relevant information products, development of promising business models, and evaluations of use and impact of services.

A collaborative effort, by CCAFS and Senegal's National Meteorological Service, *Agence Nationale de l'Aviation Civile et de la Météorologie* (ANACIM), to improve climate services for farmers began in 2011 with a participatory seasonal forecast training and planning workshop in Kaffrine. Pilot workshop participants, concerned about sustaining access, asked ANACIM to provide climate information through rural radio and local agricultural extension agents. In response, CCAFS and ANACIM worked with the *Union des Radios Associatives et Communautaires du Sénégal* (URAC), an association of 98 community-based radio stations accessible to about 7 million rural people, to incorporate climate information into their programming.

Like other countries in the West African Sahel, Senegal has employed a national multi-disciplinary working group (*Groupe de Travail Pluridisciplinaire* (GTP), in French) since the mid-1980s as a way to engage relevant institutions to monitor climate conditions, translate weather and climate information into advisories, and communicate the information with decision makers across sectors. Since 2012, CCAFS and ANACIM collaborated to establish GTPs at a local scale in 29 departments as a way to improve communication and coordination with farmers and other local decision makers, and to incorporate their feedback into improve services.

The collaborative effort of CCAFS and ANACIM expanded in 2016-2021, supported by the U.S. Agency for International Development (USAID) through the CINSERE (Climate Information Services for Increased Resilience and Productivity in Senegal) project. Key contributions during this period included an expanded

[1] https://climate-services.org/about-us/what-are-climate-services

suite of ANACIM information products for farmers and fisheries, development of business models, and expanded involvement of the private sector and mobile phone platforms in delivering climate services.

Improved farm productivity

Early preliminary evidence that climate services contribute to farm productivity and income came from a farmer-managed trial in 2014, as part of a commissioned study of the effectiveness of CCAFS support for climate services (Lo & Dieng 2015). Field plots in which farmers applied their traditional management strategy to groundnut and millet were compared with plots that applied management strategies informed by seasonal forecasts and weather forecasts. Management based on weather and climate information led to a 15% increase in groundnut yields and a 50% increase in millet yields.

Uptake and impacts are unequal

A set of more rigorous studies demonstrated that farmers adjust their management in response to weather and climate information, that use of this information improves their productivity and wellbeing, and that gender and other farmer characteristics influence use and benefit.

Diouf et al. (2020) assessed the impact of seasonal forecast use on crop (rice, maize, sorghum, millet and groundnut) yields and farm income, based on a survey of 1481 farmers (44% women) conducted in 2019 in five Departments (Kaolack, Kaffrine, Kolda, Sedhiou and Ziguinchor). Seasonal forecast use significantly increased farmers' income by US $41/ha, or 16%. The income gains from using seasonal forecasts were associated with increased millet (158 kg/ha), sorghum (878 kg/ha) and rice (140 kg/ha) yields; but decreased maize (-55 kg/ha) and groundnut (-37 kg/ha) yields.

The average income benefit from using seasonal forecasts was lower for women farmers (US $11) than for men (US $56). The productivity impact of the use of seasonal forecasts was greater for men than for women in the case of millet (203 kg/ha vs. 17 kg/ha) and rice (321 kg/ha vs. -25 kg/ha), whereas it was greater for women in the case of maize (210 kg/ha vs. -105 kg/ha).

In addition to gender, analyses of 2018-2019 surveys show that age (favoring youth), education level, location, producer organization membership, and radio ownership significantly influence the likelihood that farmers act on weather and climate information (Ouedraogo et al., 2021). Yet the large majority (85%) reported changing decisions based on this information.

GTP strengthens uptake and benefit

The local GTPs aim to engage stakeholders with a diverse set of mandates, perspectives and expertise to co-produce climate-related information and advisories, and to bridge the communication gap between national information providers and local decision makers including farmers. A pair of studies provide evidence of their influence on farmers' awareness and use of weather and climate information, and resulting benefits.

To assess the role of the GTP on awareness and use, Chiputwa et al. (2020) applied rigorous analytical approaches that control for self-selection bias to a survey of 795 farmers, sampled in districts where local GTP were (Kaffrine) and were not (Kaolack) active. Improved climate services supported by local GTP were associated with increased adoption of improved seed (22% for seasonal forecasts, 23%, for seasonal plus weather forecasts), manure (11%, 16%) and chemical fertilizers (9%, 24%), in response to seasonal climate forecasts, or seasonal and weather forecasts respectively. The presence of local GTP increases farmer's awareness of WCIS by 18%, access by 12%, and uptake by 10%.

Using differences between results of their earlier survey and a follow up survey to reduce selection bias, Chiputwa et al. (2022) then estimated productivity of three major crops (maize, millet, and groundnut) in response to the interaction between exposure to a functioning GTP and the use of weather and climate information. For farmers exposed to the GTP, the use of seasonal and daily forecasts significantly increased the value of crop income from groundnuts, maize and millet by between 10 and 25% compared to farmers with no access to the MWG, depending on the estimation method.

Participatory processes build capacity

While broadcast media and mobile phone channels work well for daily weather forecasts and the routine agricultural decisions they inform, face-to-face participatory communication processes are more effective at building farmers' capacity to understand and use probabilistic information about climate variability (e.g., historical analyses, or forecast for the upcoming season) for strategic planning. Pilot experiences with the 2011 seasonal forecast training and planning workshop in Kaffrine that launched CCAFS work in Senegal, and with the Participatory Integrated Climate Services for Agriculture (PICSA) method in Kaffrine in 2016 (Dayamba et al., 2018) showed that such processes are effective and well received among Senegal's farmers, and that informal sharing among farmers multiplies their influence. A quantitative assessment (Ouedraogo et al., 2021) confirmed that participation in farmer training increased the likelihood of acting on climate services.

Conclusions and policy implications

For the context of Senegal, the studies summarized in this Info Note contribute to a growing body of evidence

that well targeted investment in climate services can be an effective way to advance national development goals, and to improve the productivity, resilience and wellbeing of vulnerable smallholder farmers in the face of a variable and changing climate.

Climate services involve more than merely disseminating weather and climate information; how climate services are implemented matters. While the growing use of mobile phone dissemination channels by private sector actors is expanding farmers' access to weather information, further attention is needed to building farmers' capacity to understand and effectively use probabilistic information at a climate time scale, and to ensure access to farmers who face obstacles due to gender, literacy or financial constraints. The studies summarized here provide direct evidence that engaging local institutions in working groups to co-produce and communicate services enhances their uptake and impact. They also highlight the importance of providing information and communication processes that address the needs and challenges of rural women.

Further Reading

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