Climate information services need for livestock production in Senegal and priorities for investment

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Contents

ACRONYMS

ACF	Action Contre la Faim
ANACIM	Agence Nationale de l'Aviation Civile et de la Météorologie
AVSF	Agronomes et Vétérinaires Sans Frontières
CCAFS	CGIAR Research Program on Climate Change, Agriculture & Food Security
CINSERE	Climate Information Services for Increased Resilience and Productivity
CIS	Climate Information Services
ClimBeR	Building Systemic Resilience Against Climate Variability and Extremes
CSE	Centre de Suivi Ecologique
ETP	Evapotranspiration
GOS	Government of Senegal
LAC	Livestock and Climate Initiative
MWG	Multidisciplinary Working Group
PO	Producers' Organization
PRAPS	Projet régional d'appui au Pastoralisme au Sahel
PSE	Plan Senegal Emergeant
URAC	Union des Radios Associatives et Communautaires
USAID	United States Agency for International Development
USSD	Unstructured Supplementary Service Data
WP	Work Package
LAFS	Livestock AgriFoof Systems
ADIS	Association de Développement Intégré de Dahra
PRAPS	Projet régional d'appui au pastoralisme au Sahel

Executive summary

Climate change and variability is affecting livestock production system in Senegal. The use of relevant climate information services (CIS) in livestock production value chain has the potential to build the resilience and productivity of transhumant pastoralists. The demand for CIS has increased today at a stage where several pastoral communities are willing to contribute to the cost of CIS production. Attempts to promote and scale up access to and use of CIS have been successful for the farming and fishing sectors in Senegal but this has not been the case for livestock sector due various reasons including failure to produce needed CIS and to set up dedicated CIS dissemination channels. The ONECGIAR Initiative on Livestock and Climate (LAC), under its work package 2 is taking stock of achievements from previous projects to deliver salient CIS to pastoral communities in the Ferlo zone of Senegal. To this end, fine tuning the need assessment in terms of CIS (types, resolution, frequency etc.), dissemination channels and capacity building is a prerequisite. Therefore, stakeholders' consultations meetings and review of existing literature were used to assess the needs. In total, 15 CIS have been identified by the various stakeholders of which seven are already available; several CIS dissemination channels have been identified of which, community radio and mobile network operators' platforms such as SMS and IVIR are the most preferred ones. There is also a need to translate CIS into advisories suitable for each agro-ecological zone. This will require some capacity building of the multidisciplinary working groups (MWG) for each target district.

Introduction

Senegal's economy heavily depends on agriculture, livestock and fisheries which represent about 17% of the gross domestic product (GDP) and employ 70% of the population. These sectors are currently affected by climate change and prevailing climate variability. Shrinking biomass growing period, unreliable rainfall distribution in time and space, increasing land degradation and the increasing frequency of climate extremes such as dry spells and floods have all contributed to decreased agricultural and livestock productivities. The occurrence of intensified weather events such as rising sea surface temperature, swells, tides, winds and fogs have led to northbound fish migration and to increased risk events for the fisherfolks (loss of life and equipment). The overall consequences of these events have translated into country-wide emergence of food insecurity.

. Addressing the negative impacts of climate change on agriculture requires adaptation and mitigation efforts in line with the Malabo Declaration regarding the commitment to enhance the resilience of livelihoods and production systems to climate variability and related risks. These efforts will also contribute to the Sustainable Development Goals on climate action and on achieving zero hunger. The uptake of adaptive measures to tackle climate change effects has therefore become prominent for the GOS and the country's development and research partners.

To address the issue of climate change in the livestock sector, the Livestock and Climate (LAC) Initiative, of the OneCGIAR, aims to partner with public and private actors to develop and deliver actionable innovations that help producers, businesses, and governments adapt livestock agrifood systems to climate change and reduce greenhouse gas emissions, contributing to sustainability and development goals across livestock systems. Work Package (WP) 2 focuses on digital solutions to manage climate risk in livestock agrifood systems (LAFS). Enabled by an understanding of the decision space in livestock production and value chains, this WP implements a socially inclusive approach to de-risk LAFS. WP2 co-designs, tests and scales out digitally enabled and inclusive service bundles of climate information, risk transfer, and credit tailored to LAFS. It also improves risk profiling methods with Micro-Financial Institutions and inform decision-making of producers and value chain actors. LAC is implementing intensive livestock-related activities in Guatemala, Kenya, Ethiopia and Senegal which outcomes will benefit the other countries.

In Senegal, WP2 envisions to strengthen the resilience of pastoralists through production, dissemination and use of salient climate information services. To this end, stakeholders' consultation workshops and meetings with key partners took place in Dakar and in the pastoral zones (Dahra, Thiargny, Linguere, etc.) to identify and fine-tune the needs in terms of CIS, CIS dissemination platforms and tools to capacitate pastoralists to understand and effectively use CIS to guide their day-to-day decision-making. This report provides detailed information on CIS need and relevant dissemination channels needed to timely reach out to pastoralists.

CGIAR

CGIAR INITIATIVE ON Livestock and Climate

Overview of the initiative

This Initiative aims to address the "double burden" that climate change poses for livestock production across Africa and Latin America. Researchers are working with public and private actors to identify existing solutions, to co-create and deliver innovations that quantifiably help producers, businesses and governments adapt livestock agrifood systems to climate change and reduce greenhouse gas emissions. This objective will be achieved through five (5) main activities:

- Improving local capacities and inclusion in livestock production through biometric and socioeconomic analysis of proposed on-farm technology packages to support inclusive scaling of resilient low-emission practices (WP1).
- Developing digital services to manage climate risk and inform decision-making in livestock agrifood systems by co-designing, testing and scaling digitally enabled services that bundle tailored climate information, risk transfer and credit strategies (WP2).
- Undertaking system-level research and interventions for climate-resilient and low-emission livestock production systems, focusing on understanding, measuring and rebuilding climate resilience within pastoral systems, with research-to-development partnerships that optimize scaling a priority (WP3).
- Helping finance the transition to low-emission and resilient livestock agrifood systems by creating a research program that builds investor awareness of and confidence in livestock investments with stated resilience and emission goals (WP4).
- Improving the enabling policy environment by generating data and developing systems to improve the design and implementation of policies and investment proposals at national and global level and supporting governments to monitor and quantify livestock contributions to climate commitments (WP5).

The LAC initiative targets 8 countries namely, Colombia, Guatemala, Senegal, Mali, Ethiopia, Kenya, Tanzania and Tunisia and expects to achieve the following outcomes:

- At least 80,000 households implement climate-smart practices and technologies that enable them to withstand climate shocks, reduce greenhouse gas emissions and generate benefits for women, as well as men.
- At least 320,000 livestock producers (50% women and youth) and 13 public and private organizations access climate risk management strategies.
- Pastoralists and farmers adopt improved governance, management and restoration practices on 500,000 hectares of land used for livestock production.
- Impact investors, private-sector entities and international finance institutions mobilize US$25 million for socially inclusive resilience-building and/or low-emission livestock agrifood systems interventions.
- International agencies and policymakers use the Initiative's products to shape at least four policies or investments to strengthen socially inclusive low-emissions livestock production system resilience, including at least three aimed at realizing climate change-related adaptation or mitigation progress.

Objectives and approach

The main objective of the need assessment was to identify CIS needed to strengthen the resilience of pastoralists living the pastoral zones of Senegal in the face of persisting climate variabilities and extremes. Specifically, the document inventory/identify relevant CIS for livestock, explore existing CIS and missing ones, identify dedicated dissemination channels, and propose mechanisms to translate CIS into livestock advisories.

Relevant information was gathered during various stakeholders' meetings we organized in Dakar and in the Ferlo Zone (Thiargny, Dahra, Linguere). We also met with key partners such as ANACIM, CSE, ACF, AVSF, PRAPS, Office of livestock including pastoralist associations such as ADID in their zones of influence while taking stock of existing documents from the CINSERE project (2016 – 2021).

Fig.1. Stakeholders consultation meeting in Dakar (October 2022)

CIS need for pastoralism

Table 1 below presents the detailed CIS needed by stakeholders as well as the timing and frequency for dissemination and the spatial resolution for each CIS. In total, 15 CIS are needed to build the resilience of the pastoralists in Senegal. Nine CIS are specific to season (rainy or dry seasons) while six are needed throughout the year (off-season rain and bushfires events, forage and water availability, potential lightning zones and transhumance corridors).

Table 1. CIS needed by pastoralists

Rank	Requested WCIS	Timing	Frequency	Spatial Resolution

Livestock Management Sector				
1	Onset data	May	Once a year	Local and regional
2	Cessation data	May-Sept	Once a year	Local and regional
3	Cummulative rain	May-Sept	Decadal	Local and regional
4	Dry spells	May-Sept	Decadal	Local and regional
5	Wet spells	May-Sept	Decadal	Local and regional
6	Extreme temperature forecast	Year round	When relevan	Local and regional
7	Extreme wind forecast	Year round	When relevant	Local and regional
8	Off-season rains	Dry season	When relevant	Local and regional
9	Bushfires	Dry season	When relevant	Local and regional
10	Piezometric level of the water table	Dry season	decadal	Local and regional
11	Fodder availability	Year-round	Decadal	Regional and national
12	Water resource availability	Year-round	Decadal	Regional and national
13	Potential lightning zones	May–Sept	Daily	Local
14	Potential diseases occurrence zones	Year-round	Decadal	Regional and national
15	Transhumance corridors	Year-round	Decadal	Regional and national

Existing CIS

From the long list of CIS identified by the stakeholders above, 8 CIS (Fig.2 below) have already being produced by ANACIM and communicated to farming and agro-pastoralist communities in Senegal. They are onset and cessation date of the rainy season, cumulative rainfall, dry spells, extreme temperature and wind events, and off-season rain. However, access to these CIS by pure pastoralists is very limited due to poor mobile network and radio coverage in the pastoral zones.

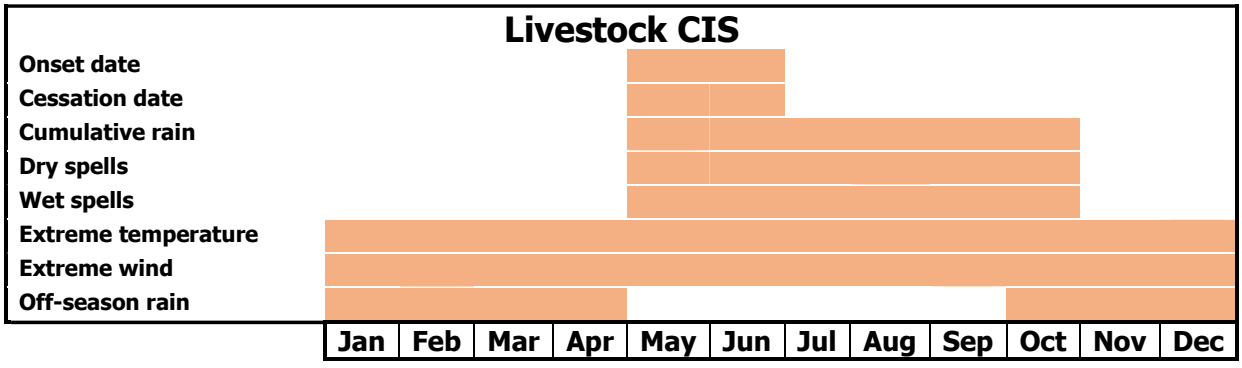

Fig. 2. CIS being generated for agro-pastoralists

Production of missing CIS

Seven CIS are yet to be produced: bushfires, piezometric level of the water table, timely forage availability in the pastoral units, timely water availability in the ponds, potential lightning zones, potential diseases occurrence zones, and transhumance corridors. A partnership agreement was signed in December 2022 with the Centre de Suivi Ecologique de Dakar (CSE) under LAC to produce, validate and communicate bushfires events, timely forage and water availability and the transhumance corridors. Another partnership agreement is ongoing with the national met service

of Senegal (ANACIM) to produce and validate potential lightning zones during the rainy seasons and the potential animal diseases occurrence areas. These missing CIS will be produced and disseminated in 2023.

Dissemination of livestock CIS

Table 2 below presents the list of CIS dissemination channels and platforms identified during the consultation meetings. The strengths and weaknesses of the platforms are also highlighted.

Table 2. Platforms needed to disseminate livestock CIS in Senegal

Identified CIS diffusion channels	Beneficiaries	Strengths	Weaknesses
Community radios	All users	Accessible Local language	Weak coverage
Mobile devices: • SMS • IVR • USSD • Mobile application (Meteo Senegal)	All users	Targeted information, Interactive	Not accessible to all beneficiaries
Socila media: • Facebook • Whatsapp	All users	Very attractive and efficient	Limited access due to weak mobile internet coverage
Emails	Technical services, Radios, Officials Producers group	Easy to understand Interactive	Limited access
Website (www.ANACIM.sn)	All users	Accessible Full information	Lack of accuracy Limited access
Call service	All users	Interactive, direct feedback	Very costly

Community radios and mobile network operators (MNO) are presented as the best communication platforms for the livestock sector given the mobility nature of the pastoralism in northern Senegal. Currently, there are 130 community radios in Senegal, of which, 25% are located in the pastoral zone (Fig. 3). The role of the community radios is to provide producers with relevant information needed to improve crop and livestock productivities.

Various CIS dissemination platforms have been developed in the past in Senegal to communicate CIS to farmers and few pastoralists (Fig.4). These platforms need to be strengthened to scale up access to CIS in the pastoral zone. An SMS platform was developed in 2016 by ANACIM to communicate CIS to various users. In 2018, a new SMS platform called Meteo-Mbay (meteo market) was developed by MLouma (start-up on mobile market) to scale up access to CIS through USSD system. In 2017, feedback collected from CIS users revealed that the SMS platform was not reliable in many zones given the high percentage of illiterate among farmers, pastoralists and

fishermen. Therefore, in 2018, Jokalante introduced the voice messaging system (VMS) in local language. The VMS was well appreciated by CIS users and regional and local leaders (governors and district prefects). In 2020, Jokalante set up the Nafoore platform to scale up access to CIS and agro-advisories through the VMS system. In 2018, ANACIM set-up a mobile application called "Meteo-Senegal-Officiel" to scale up timely access to CIS. A facebook account dedicated to CIS (https://www.facebook.com/www.anaciml.sn) has been created by ANACIM to communicate CIS.

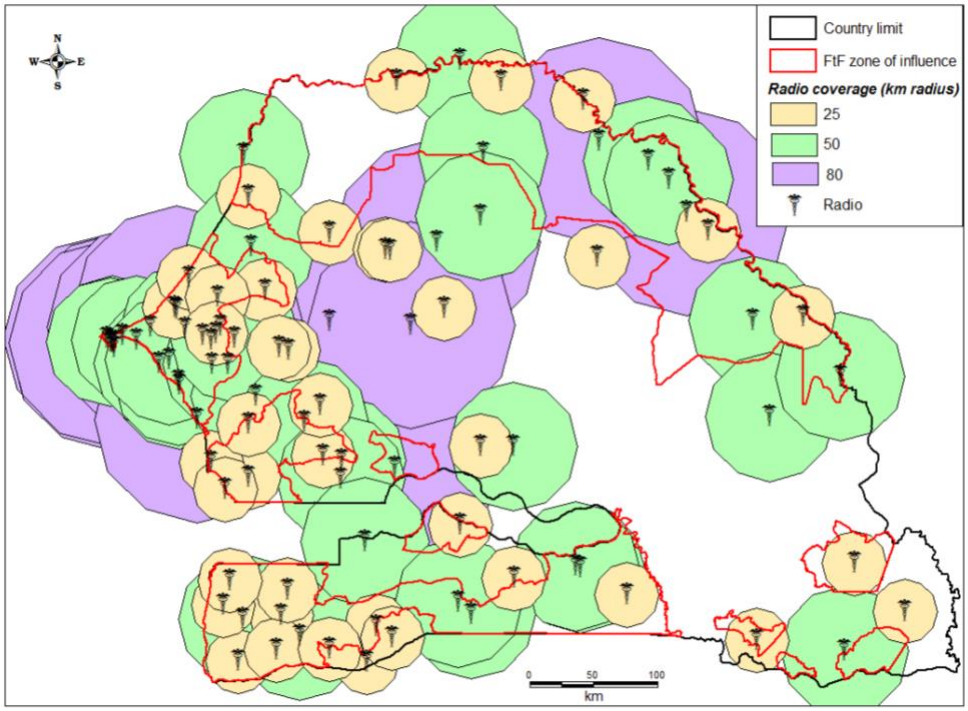

Fig.3. Distribution of community radios in Senega in 2018

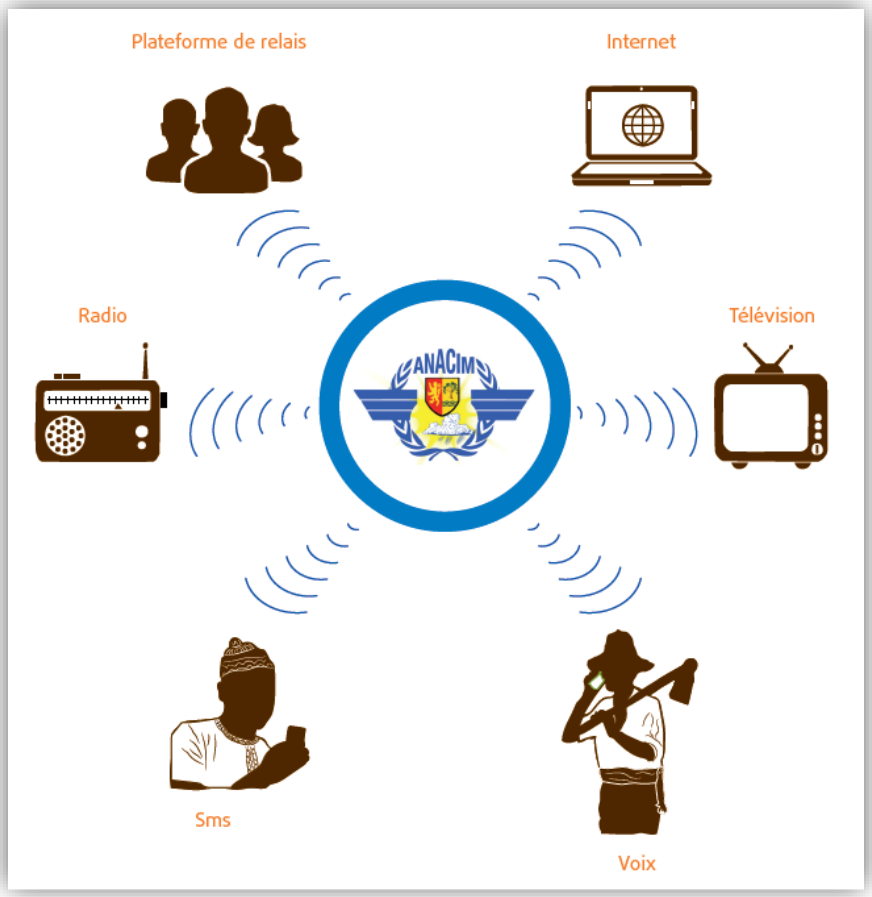

Fig.4. CIS dissemination platforms in Senegal

Translation of livestock CIS

In Senegal in general, CIS is communicated to farmers and pastoralists without any advisory that goes with it. As a result, users must make personal decisions based on CIS they receive. Very often, users end up making wrong decisions that are harmful to their activities. To help pastoralists make appropriate decisions to increase their resilience and productivities, it is crucial to: (i) build pastoralists' capacity to understand CIS and (ii) create/strengthen existing multidisciplinary working groups (MWG) to produce and disseminate district-specific advisories for farmers and pastoralists.

- Building the capacity of pastoralists consists of training various pastoralists on the usefulness of CIS and how it can be used to inform their decision-making. Such training must cover various topics including – climate change, climate information services, seasonal forecast, etc. The met service (ANACIM) and CSE are committed to providing such training and a partnership agreement is being signed between the Alliance and ANACIM/CSE.
- About 32 MWG (Fig. 5) have been created since 2016 in 32 districts (out of 46). These MWGs have been instrumental in the translation of CIS into locally actionable agro-

advisory decisions for the communities within the districts (Fig. 6). Members of the MWG meet three-time per month during the growing seasons to discuss issues in relation with agriculture, environment, livestock, etc. and produce bulletins that are communicated through the community radios. Members of the MWGs have been trained and dedicated equipment (computers, software, etc.) was provided to facilitate their operations. Unfortunately, the MWG are operational during rainy seasons while livestock activities are permanent. Therefore, LAC has targeted districts with important livestock activities (in the north) where MWGs will be capacitated to cover livestock related activities during dry seasons as well. Target districts are Dagana, Podor, Matam, Kanel, Ranerou, Linguere, Louga and Saint Louis.

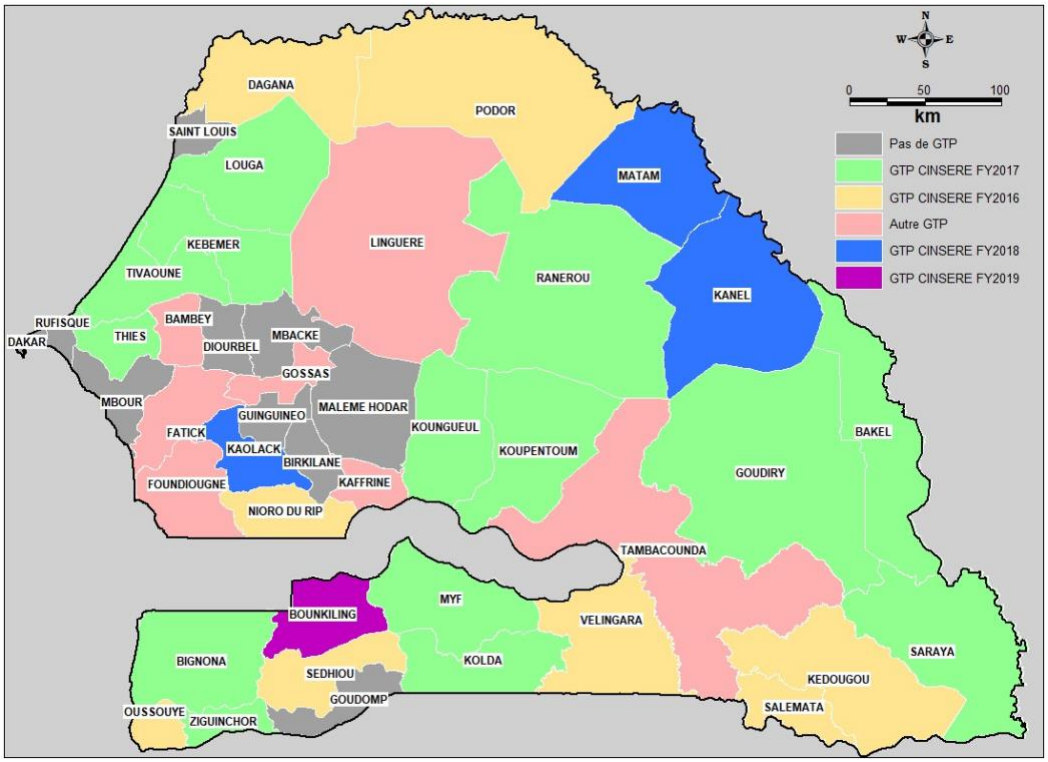

Fig.5. Distribution of the multidisciplinary working groups in Senegal

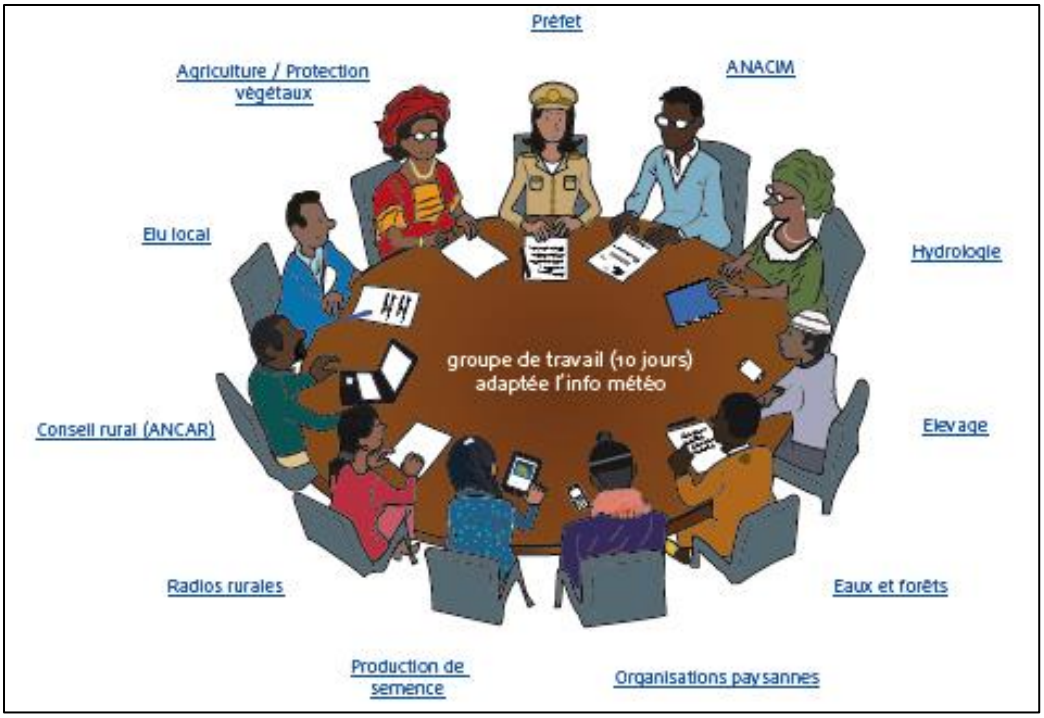

Fig.6. Members of the district level multidisciplinary working groups

Conclusion: niches for investment

Past initiatives led by the Government of Senegal and international institutions and donors (CCAFS, USAID, CINSERE project, etc.) have contributed to a large-scale production, dissemination and adoption of CIS use by farming and fishing communities. In the livestock sector however, expected CIS have not been fully met and the dissemination aspect has been very challenging due to the mobility nature of livestock production system in the pastoral zone. Overcoming these challenges is very critical to building the resilience of the transhumant pastoralists. Therefore, the Livestock and Climate Initiative should focus on:

- **Production of CIS that meet the expectations of the pastoralists**: this will be achieved through partnerships with relevant national institutions such as ANACIM and CSE. It would also be important to understand and define the scope of CIS in relation to livestock, specifically pastoralism due to the difference in production systems from crops.
- **Dissemination of livestock CIS**: this requires strengthening the capacity of existing dissemination platforms such the community radios, the SMS and IVR led by ANACIM, MLouma and Jokalante. Moreover, there is a scope for testing innovative methods of information gathering and dissemination, based on citizen science, as a compliment to existing dissemination platforms.
- **Translation of CIS into advisories**: the advisories add values to the CIS and help CIS users to make immediate decisions and actions. The MWG are essential platforms for producing advisories that are suitable to specific districts. Therefore, MWG within the

pastoral zones must be technically capacitated to operate permanently, while also identify partnerships with other information providing institutions such as ACF

- **Evaluation of decisions being made and usefulness of CIS for livestock activities**: feedback from CIS users necessary to understand the perception on CIS being produced (accuracy, preference, utility, etc.) and to improve the quality of the products and the delivery system. Specifically, it would be good to understand a gendered need of information (both climate as well as non-climate) in the pastoral areas, as studies often suggest that information needs differ between men and women.
- **Sustainability of CIS use**: to avoid discontinuity of CIS delivery when the initiative phases out, it is essential to think of an exit strategy at the earliest stage of the implementation phase. This exit strategy could consist of developing CIS business models or bundling mechanisms that will scale up access and adoption of livestock CIS and sustain the system.

Annex 1. Relevant resources

Training manuals

1. Pluviométrie à Lecture Directe: https://ccafs.cgiar.org/publications/pluviom%C3%A9trie-%C3%A0-lecture-directe#.W83lTxP7Q6g
2. Assistance météo a la pêche artisanale: https://ccafs.cgiar.org/node/56308#.W83okhP7Q6g
3. Prévision saisonnière des précipitations: https://ccafs.cgiar.org/node/56311#.W83o7xP7Q6g
4. Produits et services climatiques: https://ccafs.cgiar.org/node/56312#.W83pJhP7Q6g
5. Changement climatique : https://ccafs.cgiar.org/publications/changement-climatique#.W9mBWBP7Q6g

Capitalization documents

1. Canaux de dissémination des informations météorologiques et climatiques au Sénégal: https://cgspace.cgiar.org/handle/10568/115155
2. Durabilité des services climatiques au Sénégal: Synthèse de l'étude réalisée par le cabinet Dalberg: https://cgspace.cgiar.org/handle/10568/115156
3. Évaluation et Leçons apprises de l'utilisation des services d'information météorologiques et climatiques au Sénégal: https://cgspace.cgiar.org/handle/10568/115157
4. Mise en œuvre de l'approche Village intelligent face au climat (VIC) pour améliorer la résilience des communautés rurales: https://cgspace.cgiar.org/handle/10568/115158
5. Renforcement de capacités des utilisateurs pour une compréhension et utilisation effective des services météorologiques et climatiques: https://cgspace.cgiar.org/handle/10568/115160
6. Le changement climatique et ses impacts sur l'agriculture: https://cgspace.cgiar.org/handle/10568/115195
7. Le changement climatique et ses impacts sur la pêche: https://hdl.handle.net/10568/116113
8. Production de l'information météorologique et climatique au Sénégal: https://hdl.handle.net/10568/116114
9. Le "Groupe de Travail Pluridisciplinaire" dans le cadre du projet USAID/CINSERE: https://hdl.handle.net/10568/117375
10. Options de Modèles d'Affaires pour Assurer la Durabilité de l'Utilisation des Services d'Information Climatique au Sénégal : https://core.ac.uk/download/pdf/288633822.pdf
11. Vidéo de présentation du projet USAID/CINSERE: https://hdl.handle.net/10568/117377

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