**IMPACT ASSESSMENT OF COMMUNICATING SEASONAL CLIMATE FORECASTS IN KAFFRINE, DIOURBEL, LOUGA, THIES AND FATICK (NIAKHAR) REGIONS IN SENEGAL**

# Final Report for CCAFS West Africa Regional Program

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The consultant team certifies that it worked independently, and affirms that the analyses and opinions in this report reflect the facts, observations, data and information obtained on the field.

# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ANACIM | National Civil Aviation and Meteorology Agency |
| ANCAR | National Agricultural and Rural Counselling Agency |
| ANSD | National Statistics and Demography Agency |
| CCAFS | Climate Change, Agriculture and Food Security |
| CGIAR | Consultative Group for International Agricultural Research |
| CI | Climate Information |
| CILSS | Permanent Inter-State Committee on Drought Control in the Sahel |
| CNAAS | National Agricultural Insurance Company of Senegal |
| CNCR | National Rural Consultative Council |
| CNRA | National Agronomic Research Center |
| CNRF | National Forestry Research Center |
| COPROSEM | Seed Producers' Cooperative |
| CSE | Ecological Monitoring Center |
| DA | Department of Agriculture |
| ESSP | Land System Sciences Partnership |
| EWS | Early Warning System |
| FONGS | Non-Governmental Organizations Federation of Senegal |
| GAIA | Action and Initiative Group for Alternative Development |
| HELIX | High-End Climate Impacts and Extremes |
| IRD | Institute of Development Research |
| ISRA | Senegalese Institute of Agricultural Research |
| LNRPV | National Research Laboratory on Plant Forecasts |
| MWG | Multidisciplinary Working Group |
| PMV | Millennium Villages Project |

| | |
|---|---|
| PRESAO | Food Security Enhancement and Research Program of West Africa |
| RC | Community Radio |
| SDDR | Departmental Rural Development Service |
| SWOT | Strengths, Weaknesses, Opportunities and Threats |
| URACS | Union of Association and Community Radios of Senegal |
| URAPD | Diourbel Regional Farmer Associations Union |

# Executive Summary

Climate information is now an agricultural input just like seeds, fertilizers or equipment which are at the basis of production. In a nutshell, this is what emerges from this assessment report on the CGIAR Program on Climate Change, Agriculture and Food Security (CCAFS) on the transmission of climate information (CI) and relevant agricultural advice to farmers in Kaffrine, Diourbel, Thies, Louga and Fatick administrative regions. Through this project, CCAFS seeks to contribute to improving the resilience of rural people to climate change by mainstreaming climate information more adequately in the planning and implementation of development activities.

Thanks to the involvement of the network of community rural radio stations (URAC), CCAFS estimates that two million people have had access to climate information (CI), have used it in whole or in part, and that this has had an impact on their farming practices.

The objective of this study was to: (i) confirm or deny the probability of the figures put forward by CCAFS, and (ii) analyze the use made of this information, as well as the impact it has had or not had. The study shows that:

- CI is actually made available through a combination of several distribution channels that are quite accessible to rural populations. An early warning system (EWS) has been put in place to operationalize the communication mechanism so as to facilitate the dissemination of probabilistic CI to farmers.

- While at start-up the project estimated that community radios were the best medium to disseminate CI and agricultural advice, the use of SMS has considerably expanded access to CI. Indeed, the SMS now tends to be overshadowing the radio in CI transmission. Given the effectiveness of the communication mechanism, the figure put forward by CCAFS seems quite realistic. The potential number of people with access to CI is largely underestimated. If we put together community radios and SMS, "word-of-mouth" or the contribution of general information commercial radios like in Bambey and Niakhar, nearly 3 900 000 or more people have access to CI. The use made of climate information and how the information has changed their behavior are fundamental issues that will be explored in the section of this study devoted to impact analysis.

- The innovation adoption level of the people is clear. CI is now regarded as the primary agricultural input by farmers who request for it before embarking on any initiative. There are several types of changes in the management of farming processes: (i) adoption of short cycle varieties depending on the seasonal forecast, (ii) conduct of farm work based on the intended actions, (iii) abandonment of dry planting and fertilizer application during earing, especially when dry spells are announced, or (iv) promotion of assisted natural regeneration. The advice applied by farmers significantly improves agricultural yields and thus income from

agriculture, which is reinvested in other productive sectors to enhance social welfare.

To upscale this program that has proven its worth, specific recommendations have been made so that the use of climate services in agriculture can effectively help to reduce food insecurity within a context of changing climate.

**Overall Project Context**

The Research Program on Climate Change, Agriculture and Food Security (CCAFS) of the Consultative Group on International Agricultural Research (CGIAR) is a strategic partnership between CGIAR and Future Earth (http: //ccafs.cgiar. org /). It was designed to curb the risk posed by climate change on the livelihoods of populations and food security in general, and to improve environmental management in a rapidly changing world.

The CCAFS Program uses the best strategic research approaches in agricultural climate science, earth sciences and research and development to identify and analyze interactions and synergies between climate change, agriculture and food security.

As a multidisciplinary effort, CCAFS is a hub that facilitates action through several CGIAR centers and programs, as well as seeks to: (i) involve farmers, policymakers, donors and all other stakeholders, and (ii) integrate their knowledge and needs in the design of tools and approaches.

One of the major objectives of CCAFS is to evaluate and test adaptation and mitigation practices, technologies and policies so as to improve the resilience of farming systems and livelihoods of rural people. This task is performed using a specific onsite approach.

The CCAFS Program targets five areas chosen for their vulnerability, including West Africa. In this sub-region, the program operates in five pilot countries: Burkina Faso, Ghana, Mali, Niger and Senegal (Figure 1).

**Figure 1: Map of CCAFS Intervention Countries in West Africa**

This regional program aims to identify partnerships, opportunities and barriers to action, and the measures needed to consolidate and ensure wide dissemination of best practices. It also seeks to identify shortcomings in knowledge and capabilities, as well as policy responses that can support the fight against the adverse effects of climate change and benefit from better opportunities.

Since the 1970s, the Sahel has experienced a long series of dry years that have significantly affected the natural resources and socio-economic activities. As a result of these repetitive droughts, there have been many reactions to mitigate the impacts of climate variability. Thus, initiatives to integrate climate data into strategies for fighting against drought, desertification and insecurity have been implemented. For example, the creation in 1973 of the Inter-State Committee for the Fight against Drought in the Sahel (CILSS) and the AGRHYMET regional center and, at country level, the implementation in 1982 of the Project of the Department of Meteorology of Mali to provide climate information (CI) to rural areas, as well as the weather forecasts project launched in 1998 by the Department of Meteorology of Burkina Faso and implemented in three agro-ecological regions. The aim of these projects was to improve decision-making by farmers through the dissemination and use of CI.[1]

In Senegal, the same problem arises in the use of CI, since the country has a predominantly rural economy where rainfall is the most decisive factor of production. Indeed, the farming system is dominated by rain-fed agriculture, and is thus quite vulnerable to climate change.

Climate change is manifested through: (i) variability of the starting date of the rainy season, (ii) the amount and distribution of rainfall, (iii) changes in temperatures, (iv) the occurrence of extreme events (high winds, and off-season showers or rain), etc. The droughts of the 70s and 80s significantly changed environmental conditions, putting significant constraints on food production. This illustrates the need to integrate CI in production improvement strategies and all development sectors sensitive to climate, particularly agriculture.

[1] The results obtained by the Adaptation to Climate Change in Africa (ACCA) project have largely contributed to the scientific management of this problem. Previously, the relevance of CI in decision-making by farmers and particularly small farmers.

To achieve this goal, it will increasingly be necessary to factor climatic considerations into decisions concerning agricultural facilities and works so as to make the best use of available rainwater.

It is for this reason that the CI dissemination project was initiated in 2011 for farmers in Kaffrine, before extending to Bambey, Louga, and Thies regions in 2013. The program is managed by the National Civil Aviation and Meteorology Agency of Senegal (ANACIM).

In 2014, the project was extended to Niakhar in Fatick Department at the request of the Institute for Research and Development (IRD), which manages a project to demonstrate CI value added in agricultural production. It is a component of the "High-End Impacts and Climate Extremes" (HELIX) project, whose overall goal is to assess and present the long-term impacts of extreme climate change under different temperature rise scenarios and the adaptation efforts required.

Kaffrine region is located in the transition zone between the Sahel and the Sudano-Sahel zone. The selection of Kaffrine is justified by its strategic location in the groundnut basin, the high interannual variability of rainfall, and the results of the household survey conducted in January 2011 (Ndour et al. 2011). Indeed, the socio-economic survey provided basic information on aspects related to food security, the vulnerability of farmers, crop types and the level of CI utilization, etc.

The region has an average rainfall of about 500 mm per year in the north, 600 mm in the center, and 800 mm in the south-west. The predominant cropping systems are based on millet, groundnuts and cow pea; they are generally not intensive and require very little use of agricultural inputs (certified seeds and fertilizers). In the southern part of the region, during the cultivation of groundnuts, the soil is treated with chemical amendments. Maize, sorghum, plain rice and sesame are also grown.

As part of the diagnosis conducted before the project, the work of Ndiaye et al (2011) showed good predictability of rainfall in the Sahel, and therefore the possibility of establishing a warning system to cope with climate uncertainties.

The program also paid special attention to gender issues following a study that explored women’s vulnerability and needs with respect to climate change.

In addition to CI availability, the issue of capacity building for stakeholders emerged as an important dimension of the project. Consequently, capacity building workshops were organized in the different project areas to: (i) sensitize local stakeholders on the importance of IC in decision making, (ii) familiarize them with weather forecasting and the jargon used by forecasters so as to ensure wider dissemination.

Several implementation actions, activities and arrangements were initiated under this project, and are the subject of this assessment divided into three chapters:

Chapter 1 presents the project areas, the objectives of the assessment, and the methodology and tools used;

Chapter 2 analyzes the CI production and distribution system. It describes and analyzes the roles of the various stakeholders;

Chapter 3 analyzes the use made of CI and its impact on stakeholders' decision making, behavior and practices.

Following a summary of the various lessons learned from this assessment, recommendations are made for upscaling the program.

# Chapter 1: Objectives and Methodology

After a brief description of the project areas, this chapter outlines the assessment objectives, and the methodology used in answering different research questions in the terms of reference. It also underscores some limitations on data collection.

## I. Overview of the project areas

Overall, the project is implemented in Diourbel, Fatick, Thies, Kaffrine and Luga regions. These regions belong to what is commonly known as the groundnut basin that was once the cradle of the country's economic development. Today, the groundnut basin is experiencing an unprecedented crisis due mainly to climate change and its consequences (water scarcity, salinization of agricultural land, natural resource degradation, etc.). Climate change is indeed a threat to food security and the livelihoods of rural people.

Kaffrine Department, which is the epicenter of this project, belongs to the administrative region of the same name, following the 2008 reform. In addition to Kaffrine, which is the regional capital, there are three other departments: Birkilane, Koungheul and Maleme Hodar. In 2014, the population of the region was estimated at 566,992 inhabitants, with a rural population estimated at 84.9%[2] (ANSD 2014).

After Kaffrine[3], Bambey in Diourbel region is the department in which the project activities are most significant. The population of Diourbel region was estimated at 1,497,455 inhabitants in 2014, with 83.6% of the people living in rural areas. In Louga department, 78.3% of the population is rural; the program area is limited exclusively to Léona rural council on the coastal fringe, through a partnership between ANACIM and the Millennium Villages Project.[4] In Thies, whose population is 51.2% rural, the project is in

[2] These figures are provided by Final Report of the General Population, Housing, Agriculture and Livestock Census of 2013 produced by the National Statistics and Demography Agency of Senegal published in September 2014 www.ansd.sn

[3] At the time of the assessment, the population data by department were not yet available to the general public. Consequently, the consultants worked with the regional data. At Bambey, the figures are available in the SDDR, unlike the other decentralized services which did not have them.

[4] It is a demonstration project which forms part of MDG implementation.

partnership with the NGO "AGRECOL". The project is also implemented in Niakhar district, Fatick region, where 84.5% of the population is rural.

In these different project areas, the dominant cropping system is based on rainfed agriculture, as shown in the table below.

**Table 1: Types of cropping systems by region**

| ADMINISTRATIVE REGION | Rainfed Agriculture | Irrigation farming (excl. market gardening) | Market Gardening | Other |
|---|---|---|---|---|
| DIOURBEL | 60.6 | 0.6 | 1.4 | 37.4 |
| KAFFRINE | 86.4 | 0.5 | 4.3 | 8.8 |
| LOUGA | 66.0 | 0.8 | 3.9 | 29.3 |
| THIES | 58.4 | 2.4 | 14.0 | 25.2 |
| FATICK | 75.1 | 1.2 | 12.6 | 10.1 |

***Source ANSD (2014)***

The major agricultural crops are groundnuts, millet, cow pea and water melon. Sesame and soya bean were introduced recently, especially in Kaffrine region. The areas under cultivation by crop type in Kaffrine zone increased significantly between 2011 and 2013 (Table 2).

**Table 2: Trend of areas under cultivation by crop type**

| Years | Millet (ha) | Sorghum | Maize | Groundnut | Cassava | Water Melon | Sesame |
|---|---|---|---|---|---|---|---|
| 2011-2012 | 45537 | 8448 | 8264 | 59282 | 12 | 878 | 1313 |
| 2012-2013 | 41499 | 11410 | 8070 | 20790 | 71 | 1884 | 1902 |
| 2013-2014 | 31593 | 7398 | 9585 | 56722 | 34 | 1452 | 1352 |

***Source: SDDR of Kaffrine 2014***

# II. Objectives and Methodology of the Assessment

## Objectives of the Assessment

With the emergence of the URAC network member radios, the CCAFS program estimated the number of people with access to CI and the relevant agricultural advice at two (2) million in 2013. CCAFS' assumption is that these two million people with access to this

information have used all or part of it, and that this has had an impact on their behavior, decisions and farming practices.

The objectives of this assessment are therefore to:

(i) verify this estimate of 2 million farmers who have been listening to the URAC network of community radios,

(ii) better understand how farmers use the CI they obtain from rural radio stations and other sources of dissemination of this information,

(iii) analyze the impact of CI use in the management of climate risks to agricultural production and food security, in particular.

**Methodology**

The study attempted to answer two main questions, namely: (i) What is the proportion of farmers with access to the information in the project areas? (Ii) What is the impact of the use of the information and agricultural advice provided to farmers?

Based on these two research questions, the assessment followed the four stages below:

***Stage 1: Review of secondary data and preparation of information collection instruments.***

This stage started with the mapping of stakeholders involved in the project. The stakeholders are ANACIM, the Department of Agriculture (DA), the National Forestry Research Center (CNRF), the National Plant Production Research Laboratory (LNRPV), both of which are of ISRA, the National Agricultural and Rural Council Agency (ANCAR), and the Union of Association and Community Radios in Senegal (URACS). The meetings gave the consultant team a general idea of the project and the role of each of the stakeholders. The meetings also helped the team to assess the importance attached to CI by the Ministry of Agriculture and Rural Equipment, as well as evaluate the development prospects of climate services to ensure agricultural development. The commitment level of community radios in the system put in place was also assessed.

Concurrently with the meetings, the consultant team carried out a literature review on the project and similar experiences. It focused on reports produced by the CCAFS Program in Kaffrine, in particular the 2011 diagnostic study which considered rural households in Kaffrine sector, their vulnerability level and the importance of CI in strategies implemented by farmers. The second report consulted by the team concerned an assessment of dissemination of probabilistic forecasts to farmers in Kaffrine Department in August 2013.

In addition to the basic documents, the team consulted the Report of the last General Population, Housing, Agriculture and Livestock Census (RGPHAE) of Senegal. The report contains the most recent population data on the regions covered by the study, as well as statistics on the rural population and economic activities in the regions.

The information culled from all these documents was put together with the more general literature on climate change, and specifically climate services and their role in adaptation strategies in Africa and the sub-region.

A review of the secondary data (documents on the project, CI and its use, in general) helped to identify the major issues and challenges to be underscored in the assessment, as well as develop data collection tools, including interview guides.

Three types of interview guides were designed for the following stakeholders: (i) community radios, (ii) farmers and farmer organizations, and (iii) rural development technical services.

In addition to the interviews initially scheduled, the consultant team conducted opportunistic surveys on the basis of discussions with targeted individuals, and identified other stakeholders.

***Stage 2: Estimation of the number of people with access to CI***

This was done by: (i) mapping the community radio stations that broadcast information in the project intervention sites (Kaffrine, Bambey, Louga, Thies and Niakhar), (ii) preparing an interview guide to identify and describe the other channels and forms of information dissemination.

This methodology has certain limitations. Indeed, a questionnaire, prepared on the basis of a representative sample of the targeted rural population and over a longer period would have helped to better refine the estimation. However, the time allotted to the study did not allow for the use of such a tool. In addition, to obtain a more accurate figure, a radio ratings survey is essential. This would provide more accurate information on who has access to CI, who uses it and for what purposes, as well the behavioral changes brought about by the CI.[5]

***Stage 3: Analysis of the impacts of CI use***

This was done by preparing an interview guide. Essentially, data was collected in three ways: (i) interviews and working sessions with decentralized administrative and technical services in charge of agricultural and rural development (SDDR, Prefecture, Meteorology, Livestock, Environment etc.), (ii) interviews with farmers; and (iii) interviews with platform partners (agricultural cooperatives, NGOs, Local Red Cross, ANCAR, etc.). In Kaffrine and Bambey, the interviews focused on two key points, namely CI utility and use, while in Louga and Thies, they focused on understanding the constraints on effective project implementation and extension.[6] Interviews were also conducted in Niakhar (Fatick).

***Stage 4: Information processing and analysis***

The information collected was processed using the Word Processor and Excel Spreadsheet. The radio stations location map was produced using ArcGiS.

[5] The questionnaire-based interview would have allowed for not only better quantification of the results (production with or without CI, number of persons applying the advice given, etc.) but also an approach by category of stakeholders, including gender (big, small farmers, women farmers, etc.).

[6] The meetings with the Project Coordination in ANACIM showed that efforts focused mainly on Kaffrine and Bambey regions. In Louga and Thiès, the project has just started (cf. part on project areas).

The information analysis helped to: (i) document the strengths and weaknesses of the CI and agricultural advice dissemination process, (ii) identify opportunities for expanding the farmer population likely to be affected so as to make appropriate adjustments, and (iii) define guidelines for the coming years.

# Chapter 2: CI production and dissemination process

This chapter describes and analyzes the CI production and dissemination process. Three main assumptions underlie the analysis:

(i) *Assumption 1: The radios trained to broadcast the information effectively received it from ANACIM and regularly broadcast it. As such, they fulfill the missions for which they were coopted by the project;*

(ii) *Assumption 2: In addition to these radios, there are other key channels for disseminating climate information;*

(iii) *Assumption 3: Consideration of other dissemination channels, in addition to community radios, increases the potential of the rural population with access to CI.*

To test these assumptions, several methodological tools were put together by the consultant team.

*As Regards Assumptions 1 and 2*, the team first had a telephone interview with each of the managers of the 30 community radios trained under this project. The interviews were intended to measure their level of understanding of the project objectives on CI dissemination. In the field, an interview guide was given to 11 broadcasters or radio station managers that broadcast climate information in the regions visited, irrespective of whether they are project partners or not. This allowed the team to measure the effectiveness of CI dissemination. The interviews with stakeholders and farmers revealed the existence of other CI dissemination channels.

| Project Areas | Development Stakeholders Met | Farmers |
|---|---|---|
| Kaffrine | 11 | 16 |
| BAMBEY | 6 | 9 |
| LOUGA | 3 | 3 |
| NIAKHAR | 5 | 2 |
| THIES | 1 | 0 |
| **TOTAL** | **26** | **30** |

It should be noted that several development stakeholders are also farmers. To avoid biasing the results, they were considered only once, that is to say, in counting the stakeholders.

*As regards Assumption 3*, the evaluators mapped out the community radios that broadcast climate information. Based on the location of the radio stations, obtained using the GPS, they tried to determine their coverage radius. The findings on the radius showed that community radios alone do not cover the entire project area. Other general information radios operating in the various regions also broadcast climate information in full complementarity with the community radios. This is the case with the radio stations in Kaolack (Walfadjri FM, Al fayda FM, RTS Kaolack and Sud FM) which cover Kaffrine region, and the radios in Fatick (Ndef LENG, SINE FM, Sud FM and RTS), as well as Bambey FM radio. This helps to fully cover the project areas, and gives the assurance that all the project areas actually receive the climate information.

In preparing the interview guide, the consultant team also focused on describing the other channels and forms of information dissemination.

The analysis in this methodological approach focuses on two main points: (i) the facts and observations, and (ii) a description of the CI broadcast channels. A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis helped to indicate the aspects on which the project should focus to upscale the mechanism.

# I. Facts and Observations

Four types of information are produced and supplied to farmers by ANACIM. Several stakeholders (institutions and organizations) are involved at different levels to enable people to have access to this information.

### Types of Information

At ANACIM, there are several types of climate information. Under this project, the information provided to farmers relate to: (i) seasonal forecasts, (ii) ten-day forecasts, (iii)

*«In addition to the indigenous knowledge of farmers, CI is important in decision making for the farmers. This is what this project seeks to provide to farmers." Dr. Ousmane Ndiaye, ANACIM, 12-01-2014*

daily forecasts, which are the simplest weather forecasts, and (iv) instant forecasts for extreme events.

**Seasonal Forecasts**

Seasonal forecasts give the overall configuration of the rainy season. It depends on the forecasts made for West Africa by the Food Security Enhancement and Research Program for West Africa (PRESAO)[7]. At the end May and beginning of June, on the basis of these forecasts, ANACIM experts observe trends for the coming season and describe them (rainy, normal or deficit). If the forecasts show that the season will be in deficit, a warning report is immediately generated and transmitted to Government authorities to take appropriate measures to address the deficit. These specific forecasts for each region of Senegal are produced by ANACIM and disseminated. The seasonal forecasts are updated at the beginning of June, July and August.

When this information is available, a multidisciplinary working group (MWG) meets at national level to translate the information into agricultural advice. Concrete actions on the ground are recommended to farmers. The MWG is composed mainly of the Department of Agriculture (DA), the Institute of Agricultural Research of Senegal (ISRA), the Ecological Monitoring Center (CSE), the National Agricultural and Rural Council Agency (ANCAR), the National Agricultural Insurance Company of Senegal (CNAAS), and ANACIM. The importance of such forecasts is that they can deal with weather uncertainties.

**Ten-day Forecasts**

When the rainy season sets in, ANACIM produces ten-day forecasts that help to identify dry spells, drought pockets and other anomalies in the distribution of rainfall in the program intervention areas. These ten-day forecasts are provided to enable the local MWG[8], which meets every 10 days, to identify major trends in rainfall and provide appropriate guidance for the farm work to be done (application of fertilizers, fight against pests, etc.)

[7] In addition to West Africa, PRESAO also covers Chad and Cameroon.
[8] The local MWG is described in subsequent pages.

**Daily Forecasts**

Since climate information is considered a perishable commodity that can therefore become quickly obsolete, two weather reports are produced each day by ANACIM during the rainy season. These forecasts, which indicate the probability of rainfall and the regions concerned, are systematically transmitted to community and national radio stations. The first forecast is made at 10 a.m. and gives the weather conditions for the coming 12 hours, that is between noon and midnight. The evening forecast is made at 4 p.m. and indicates the trends for the next twelve hours.

**Instant Weather Information**

This concerns extreme events. The instant information concerns early rains (before the onset of the rainy season) or late rains (after the official end of the rainy season), high winds, and especially lightning (during the rainy season) which quite often decimates livestock. At ANACIM, an early warning system (EWS) has been put in place to give forecasts on risks of lightning, more than 4 hours in advance.

These different types of information form the basis of advice provided to farmers to cope with all the uncertainties associated with the rainy season. According to ANACIM experts, only forecasts provided in 2 to 4 hours are reliable; however, the project has made a major achievement, which is the capacity to determine the starting date of the rainy season in Senegal. This was indeed a strong demand of the farmers who participated in the seminars organized to inform and sensitize stakeholders on the program. According to Dr. Ousmane Ndiaye[9] "*For a long time, the weather service was unable to say exactly when the rainy season would start*." This project, in partnership with AGRHYMET, has helped to develop forecast models for the start of the rainy season, particularly in Kaffrine.

These models state that the start of the rainy season is deemed effective when we observe a total rainfall of at least 20mm between 1 and 3 consecutive days as from 1 June and it is not followed, during the next month, by a break of more than ten days.

Thus, stakeholders in the field can obtain, in addition to the above-mentioned forecasts, information on the starting date of the rainy season. The advantage of such information is

[9] Coordinator of this program in ANACIM.

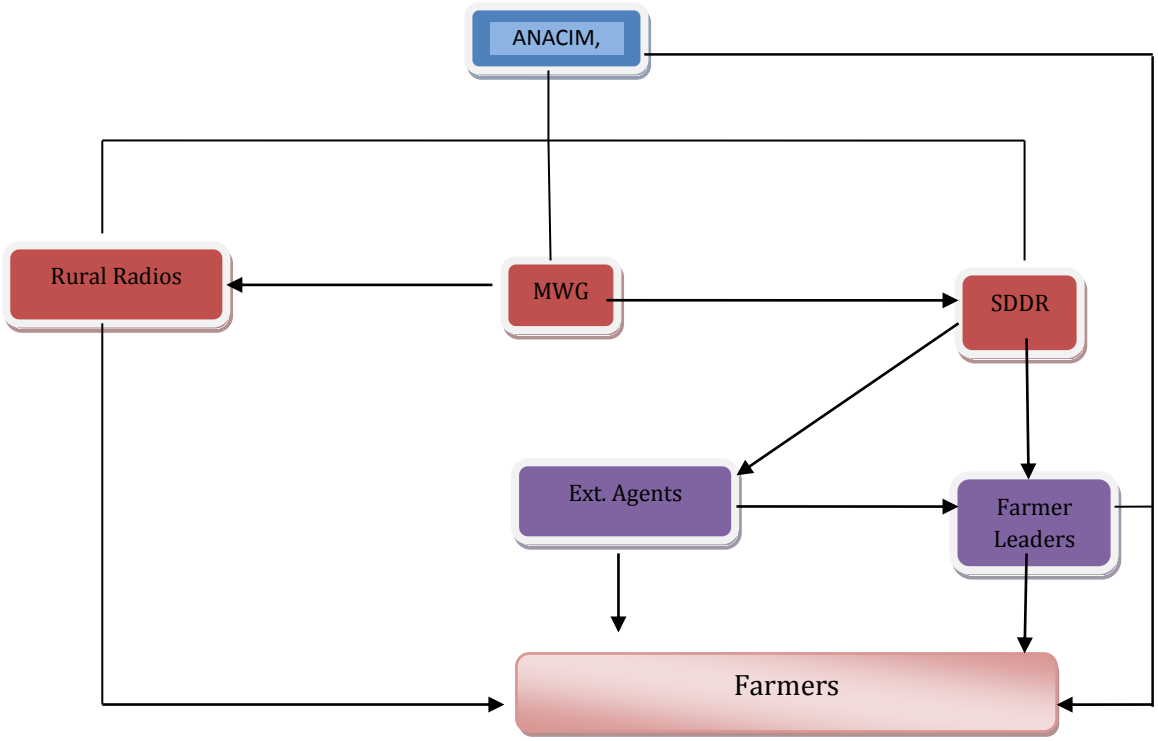
that it allows farmers to rationally use their seed capital by avoiding early planting that will fail to grow.

## II. Stakeholder mapping and IC management and dissemination diagram

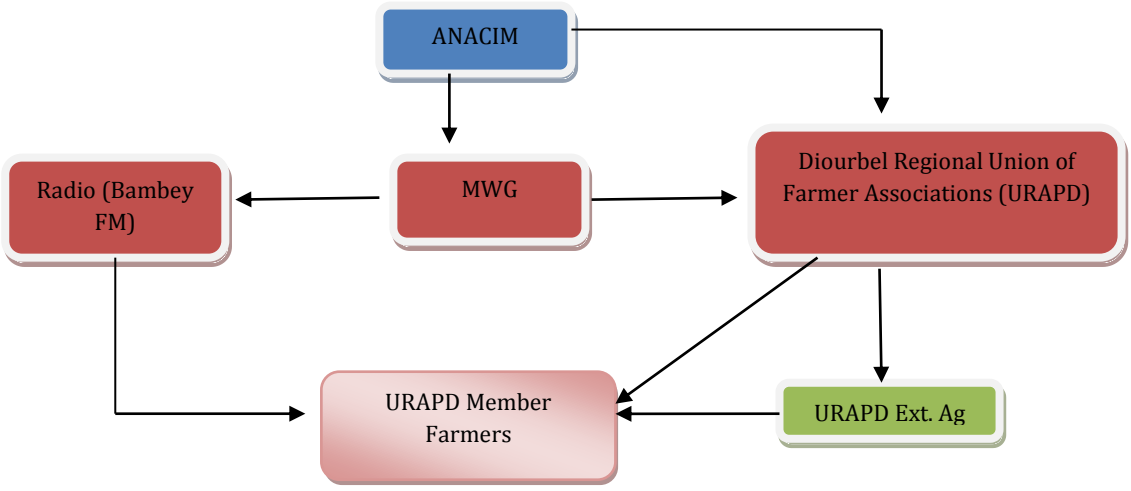
### Role of stakeholders in the information dissemination chain

Several stakeholders play a very important role. However, there are two very interesting systems in Kaffrine and Bambey represented by the following diagrams:

***Situation in Kaffrine***




***Situation in Bambey***



Unlike Kaffrine where there is a direct relationship between ANACIM and rural radios in the information dissemination chain, in Bambey, these structures have no direct relationship. Information comes to farmers through URAPD and its extension agents or through Bambey FM Radio, when it receives information from the MWG and deems it useful. In Kaffrine, the SDDR in its capacity as focal point of the MWG, is in direct contact with the following three categories of stakeholders: farmer leaders, extension agents and farmers.

***ANACIM produces and transmits Climate Information***

ANACIM produces CI and is responsible for transmitting it directly to the MWG, rural radios, the SDDR and farmers. In addition to producing this information, ANACIM organizes a seminar at the beginning of each rainy season with all local partners to inform farmers of major trends in the rainy season. The seminar is also an opportunity for collecting farmers' forecasts based on their empirical and traditional knowledge. The objective of this seminar is to demonstrate the added value of CI in decision-making to farmers. During the entire rainy season, ANACIM ensures availability of climate information (rains, winds, lightning, etc.).

In addition to the information, ANACIM distributed rain gauges to farmers to enable them to directly collect rainfall data on their farms. The distribution of rain gauges was preceded by capacity building in data interpretation. In this connection, ISRA also works in partnership with ANACIM in the management of test farms (weather farmer in the jargon of beneficiaries) with yield plots that measure production at the end of the season. Work in these test farms is entrusted to farmers, and done in compliance with strict guidelines provided by ANACIM and its partners.

***The SDDR: a pivotal role in Kaffrine and relatively passive in Bambey***

In Kaffrine, the SDDR plays a pivotal role in the transmission of CI and agricultural advice. This central role stems from historical reasons. In 2011, before the project start-up, consultations were held to determine the simplest way to send CI to farmers. The proposal made by the farmers was to transmit the information through the SDDR. Indeed, the farmers were sure to go to the service at least once a week during the rainy season, since seeds and fertilizers are distributed by the service.

On the other hand, in Bambey, apart from the local MWG, the SDDR is almost absent from the information dissemination process. This is due to the plan adopted by ANACIM in the program implementation. Indeed, the Agency works directly with URAPD which is an umbrella organization that receives information and disseminates it in its network. Meanwhile, the SDDR is responsible for monitoring the crop season, and informs the MWG during its meetings held after every ten days so that it can take decisions and make appropriate recommendations for the smooth conduct of the crop year. Farmers obtain the information through URAPD representatives who attend the said meetings.

In Louga, the program works in collaboration with the Millennium Villages Project, which receives and transmits the information to its farmers in Léona rural community. In Thies, the NGO "AGRECOL" is the main partner of the project. The information is disseminated to its partners in Kaffrine instead of Thies where the NGO has its headquarters.

***Multidisciplinary Working Group (MWG): a crop year monitoring structure***

As was the case with the national MWG, a local MWG was established in three program areas: Kaffrine, Bambey and Niakhar. It is a multidisciplinary group that manages an early warning system (EWS) based on climate information received from ANACIM. The EWS is an essential tool for the MWG, which is responsible for regularly monitoring the crop year.

The EWS has two main objectives: (i) make arrangements to cope with situations of rainfall deficit, late vegetation growth, decreased yields, showers or floods that may arise, and (ii) improve and secure agricultural production.

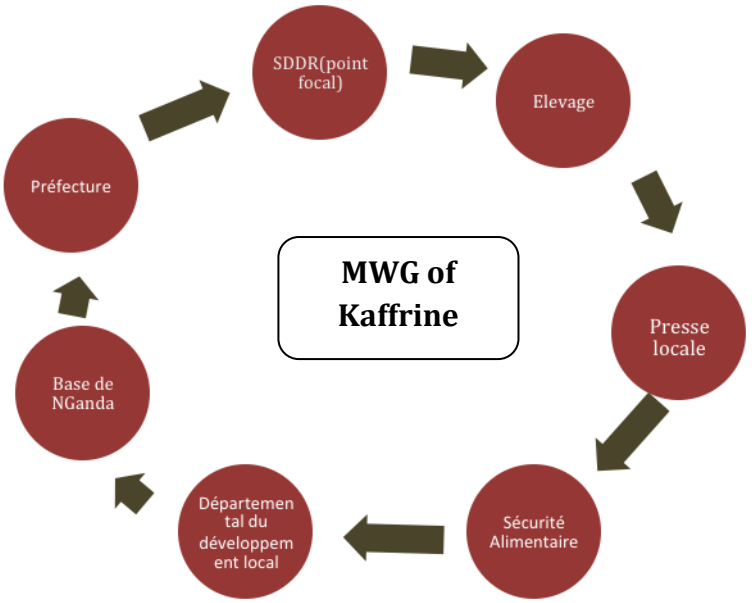
The MWG is responsible for:

(i) collecting climate information from ANACIM,

(ii) disseminating climate information widely to farmers,

(iii) reviewing the current situation of the crop year, the trend of parasitism, pastoralism and market supply, and

(iv) analyzing data from the above review in relation to climate information.




The local MWG comprises all the decentralized technical services of the State, (SDDR, Meteorology, Forestry, Environment, Livestock, etc.), local authorities, farmer organizations, the local media, and NGOs. It is chaired by the Prefect of Kaffrine and Bambey Department and the Sub-Prefect of Niakhar District. It is institutionalized by an Order (see Annex). The MWG meets every 10 days, and produces a report with agricultural advice that is shared with policymakers and farmers.

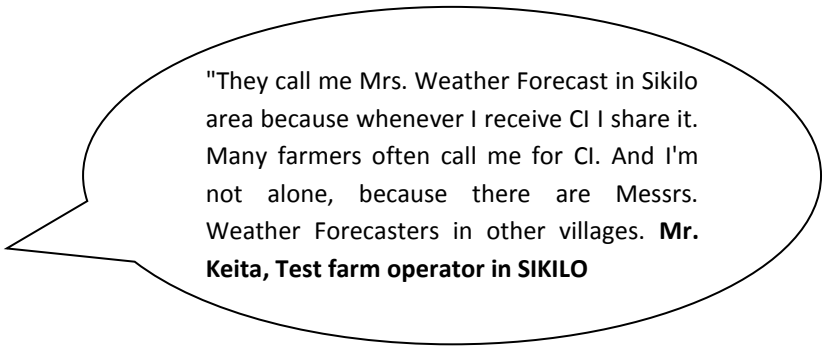
***Radios: a mandate to disseminate climate information***

At the very beginning of the project, climate information was disseminated in Kaffrine by the SDDR. Following an internal evaluation of activities conducted in 2011, the farmers proposed that ANACIM should make community radios serve as the main medium of CI dissemination. Right from the start, the radio emerged as one of the most effective ways of communicating to rural communities, which are very exposed to climatic risks. Radios disseminate information in a timely manner and in a language that is clear and understood by users.

In 2012, ANACIM, taking into account the representative nature of the network throughout the country, signed a collaboration agreement with the Union of Association and Community Radios of Senegal (URACS) with the hope that climate information will be widely disseminated in all the sites targeted by CCAFS, since the radios have a large

audience in rural areas. To assist radio broadcasters, capacity building workshops were organized in Thies in 2013 and in Kaolack in 2014. The aim of these workshops was to enable broadcasters to easily understand and assume ownership of the jargon used by ANACIM forecasters. In addition to other national media partners (agro-pastoral newspaper, RTS, APS, and Environmental and Press Research Group, etc.), thirty (30) broadcasters of URACS member community radios participated in the workshops.

***When extension agents become Mr. or Mrs. Weather Forecasts***




The extension agent role is played by farmers who travel frequently to the most inaccessible areas of Kaffrine and Bambey in the course of their activities. They are generally project or NGO workers (e.g. workers of the Red Cross or World Vision in Kaffrine) or members of farmer organizations (URAPD in Bambey). They receive information directly from the SDDR (Kaffrine) and URAPD (Bambey), and play an active role in its dissemination, as well as the dissemination of advice from members of their association or various groups and networks.

The extension agents disseminate climate information by SMS, phone calls or "word of mouth" in weekly markets and various family ceremonies (weddings, baptisms, etc.).

***The beneficiaries: an active role in CI dissemination***

These are the farmers who are the main beneficiaries of the CI provided by ANACIM. They are far from playing a passive role in its dissemination. Indeed, relying on a network of very strong social relationships within their community, they facilitate access by the other farmers to the CI and agricultural advice. In making their decisions, these farmers often bring to play CI and their empirical knowledge based on bioclimatic indicators. Use of this endogenous knowledge by the project contributed significantly to the social acceptability of the innovation.

**Strengths and weaknesses of the stakeholders**

The table below shows the strengths and weaknesses of each structure in the CI dissemination chain.

| Structures | Roles | Strengths | Weaknesses |
|---|---|---|---|
| ANACIM | - Produces and transmits the information<br>- Provides rain gauges to some farmers | - Strong partnership with the MWG, URAC, farmer associations. | Messages sometimes too technical, delays in organizing workshops on seasonal forecasts, lack of key role for weather forecast workers in the program area. |
| SDDR | - MWG and ANACIM Focal Point<br>- Pivotal role in CI dissemination in Kaffrine | - Relationship of trust with farmers – good knowledge of the area and farming practices | Very passive role in Bambey, Louga, Thiès and Fatick |
| MWG | - Coordinates the EWS<br>- Monitors the crop year | - Its institutionalization- compulsory participation of members in meetings – technical capacity for analyzing and decision making -<br>- Production of reports to be distributed to farmers | Non-involvement of some administrative and local authorities – limited number of farmers in the MWG |
| Radios | - Broadcast climate | - Very wide audience in | Inadequate cover rate, difficulties of access to the Internet |

| | | | |
|---|---|---|---|
| | information | rural areas<br>- language understood by farmers<br>- broadcast programs on agriculture and rural areas | to read the CI sent by mail by ANACIM |
| Extension agents | - Disseminate the information in their networks and villages | - Their mobility<br>- Long working experience of some of them in rural areas<br>- Relationship of trust with the farmers | Number of extension agents and inadequate resources |
| Beneficiaries | - Disseminate the information and give feedback | - Endogenous knowledge- | Illiteracy - |

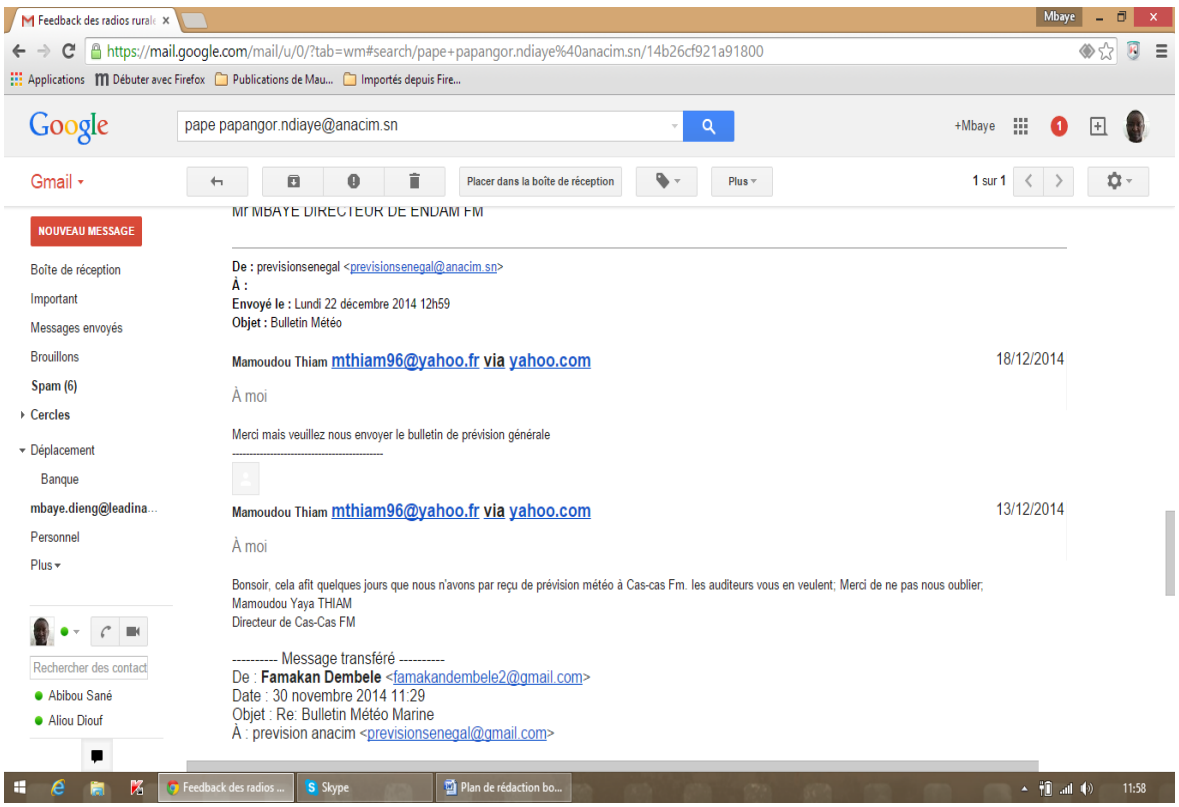
## III. Information dissemination channels

In all the program areas, the major channels for disseminating information are: electronic mail (e-mail), SMS, radio, television and by "word of mouth".

***Electronic mail (or e-mail): a channel exclusively used by ANACIM***

To disseminate weather reports to radios, ANACIM uses a mailing list created from the various seminars organized to introduce radio broadcasters to the probabilistic nature of forecasts. In addition to URAC member radios, the same weather reports are sent to other information channels in Senegal, as well as the written and online press. However, unlike URAC member community radios which have the obligation to broadcast the information, the other organs relay it depending on its perceived importance.

**Figure 2: Example of electronic mails**




The electronic mail is also the channel used by radios to give their feedback to ANACIM. Sometimes, the reports are not sent to the radios, and the radios request for them by e-mail. The image capture above refers to such a case in which the radio manager of CAS CAS rural community complained of not having received the reports for several days, making the listeners angry.

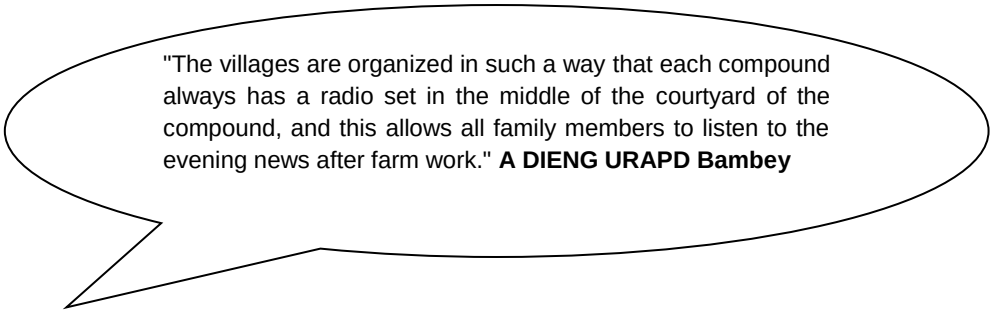
***Radios used for wider CI dissemination***

Reports received from ANACIM are systematically broadcast in local languages and at specific times: the 1 p.m. News and during the evening News. According to Mr. SEGNANE, broadcaster at Kaffrine FM radio, the evening News, which coincides with farmers coming back from their farms, has the largest audience. That is why this time slot is widely used for host discussions on issues related to rural areas.

In Kaffrine area, the radios that receive CI are: Kaffrine FM, Koungheul FM, and urban radios in Kaolack town, which cover all the departments in the region (RTS Kaolack, RFM, Al fayda FM, Sud Info and Walf FM[10]). These regional channels have always been used by ANACIM. During press conferences to provide information on weather trends in the rainy season, these radios are invited and their expenses fully covered, since the aim is to reach as many farmers as possible throughout the groundnut basin. During the rainy season, just as the partner radios of the program, they receive specific weather reports for their locations.

In Bambey, after each MWG meeting, a press conference is organized provide information on weather trends for the next ten days. However, only two press conferences were organized during the rainy season in 2014. According to D.L. FALL, Director of Bambey FM, a commercial radio which is also a local MWG member, the main constraint on effectively organizing the press conferences is the failure to take into account the cost of disseminating the information.

In Louga, the information is not routinely disseminated because of lack of access to the Internet for the radio, and of communication between the various stakeholders in the dissemination chain. In Fatick, NDEF LENG FM, SINE FM and RTS broadcast the




[10] Kaffrine FM radio synchronizes with Walf FM twice a day for the News, which is often the prime time for CI dissemination.

conclusions of the MWG, in addition to the ANACIM reports.

The seasonal forecasts or MWG recommendations are discussed during these programs.

***SMS: a means of diversifying dissemination channels***

The SMS is widely used for CI dissemination. In rural areas, the vast majority of farmers have mobile phones. For example, the Orange phone company had 8 million subscribers in 2014. This figure corresponds roughly to the adult population of Senegal, including the rural and urban populations. The rural population in the project areas is about 4 million people, who are also included in this total subscriber number. Apart from Orange, Senegal has two other mobile phone operators: Tigo and Expresso. Very often, some subscribers have the three subscriptions, depending on the coverage quality of the operators.

The mobile operators network (Orange, Tigo and Expresso) is operational throughout the program areas. The very broad cellular system links allow for access in rural areas without electricity and not connected by roads. The mobile phone is used in rural areas that have adopted it because of its ease of use and extension of network coverage. In every rural household, there is at least one mobile phone and its use by many people enables farmers to stay informed.

The project drew on the national link network to disseminate CI through SMS. To curb costs associated with CI dissemination by SMS, the project, in each intervention area, targeted farmer leaders whose contacts could be obtained from the SDDR. The information is therefore given by ANACIM to the SDDR which then contacts farmer leaders and extension agents, and requests them to disseminate it.

As regards the daily forecasts, sometimes certain farmers are directly contacted by ANACIM by SMS. This is often the case when exceptional events are expected (lightning, tornadoes, thunderstorms, high winds, early or late rains, etc.).

**Figure 3: Types of messages received by SMS**

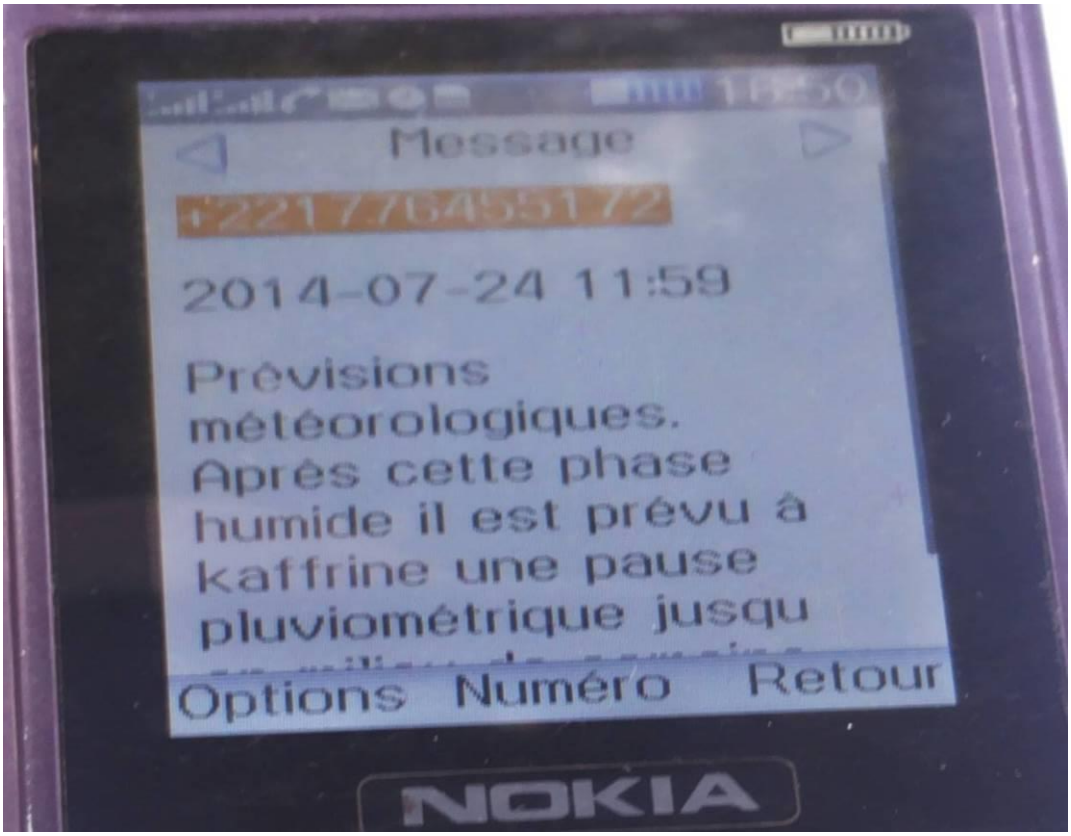



**Photo: Assessment Team**

When farmers and extension agents receive the information, they relay it to other farmers by SMS. This creates a multi-branching distribution chain. In reality, in Kaffrine and Bambey, such dissemination is encouraged by many special offers made by phone operators. For example, the operator Expresso offers 1000 free SMS to its subscribers to be used within 15 days following the special offer.

***Phone calls***

Instant information is usually disseminated through this channel to the MWG for appropriate decisions to be taken. Sometimes, ANACIM contacts the SDDR and extension agents through this channel. For example, in May 2012, Kaffrine had a significant amount of early rainfall. To ensure efficient transmission of the information, ANACIM directly contacted the appropriate departments to inform them. The aim was to disseminate information widely and discourage farmers from planting. The information was subsequently relayed to farmers through community radios and extension agents.

Often, during long dry spells, farmers call ANACIM or the SDDR for information and advice.

***Word-of-mouth, a widely used channel***

Despite the available technologies (cell phones, e-mail, etc.), orality is still widespread, because of many infrastructure constraints such as access to energy - to charge phones for example – and, in particular, illiteracy. Baptisms, weekly markets, the Friday prayer, and women's meetings are opportunities for transmitting CI. Farmer leaders, extension agents and/or simple farmers use these meetings to disseminate the information.

Based on 43 interviews with farmers and extension agents during the field visit, the classification below gives an idea of the importance of the different means of dissemination used by the program.

| Means of Dissemination | Rank (in importance) | Comments |
|---|---|---|
| **Radios** | 1st position | The radio is cited in first position in Kaffrine taking into account the information disseminated by community radios and regional channels. |
| **SMS** | 2nd position | In Kaffrine and Bambey, SMS is widely used to disseminate the information. It seems to be supplanting the radio. |
| **Word of mouth** | 3rd position | Widely used in Kaffrine and Bambey in weekly markets, mosques, women's meetings, etc. |
| **Phone call** | 4th position | Scope limited to the SDDR, farmer leaders, MWG, and ANACIM |
| **E-mail** | 5th position | Only with community radios |

## IV. Estimation of the potential number of people with access to climate information

One of the main questions that this assessment attempts to answer is: What is the potential number of farmers with access to climate information? This question is the third assumption of the study.

The benefits expected from CI go beyond the farmers to other stakeholders in the rural population. Based on the methodology described above, the following observations were noted.

***First observation***: The community radios in Kaffrine Department have an average coverage of 25 to 50 km radius when atmospheric conditions are ideal. In Koungheul, the community radio covers a radius of 50 km and is sometimes captured in Kanilai in the Gambia. The geographical location of these radio stations suggests that the entire Kaffrine region is covered.

***Second observation:*** As regards Kaffrine specifically, there are national radios and general information radios that complement community radios to cover the entire region. These radios help to broaden the radio audience, and therefore CI access, in this region.

***Third observation***: In Niakhar, which was not part of the project, radios disseminating CI and agricultural advice and broadcasting from Fatick (RTS, NDEF LENG and SINE FM) cover the entire region. In Bambey too, Bambey FM commercial radio covers a radius of 75 km. There again, the entire region is covered. Furthermore, according to the Director of the radio, Bambey FM is picked up as far as Thies located 52 km away.

**Fourth observation**: In Thies region, the program is not really operational yet. The main partner of ANACIM in this department disseminates CI to farmers whom it supports and who are based in Kaffrine. However, in Louga, CI dissemination is limited only to Léona rural community where the radio covers a radius of 12 km. In addition, the radio broadcaster does not regularly receive the CI. Nevertheless, general weather information is broadcast in these regions by national coverage radio stations (RTS, Sud FM, RFM, Walfadjri, etc.) The population has access to CI on rainfall forecasts recorded by the regional meteorology services.

This radio coverage has been corallated to the ANSD[11] data on the rural population of the project areas. These data indicate a rural population of 481,370 inhabitants for Kaffrine or 84.9%, 1,251,870 inhabitants for Diourbel or 83.6%, 603,660 inhabitants for Louga or 78.3%, 955,898 inhabitants for Thies or 51.2%, and 684,490 inhabitants for Fatick or 84.5%. This brings the total rural population to 3,937,300 inhabitants in 2014. Since the project areas are fully covered by the radio, there are therefore 3,937,300 potential people with access to CI by the radio alone.

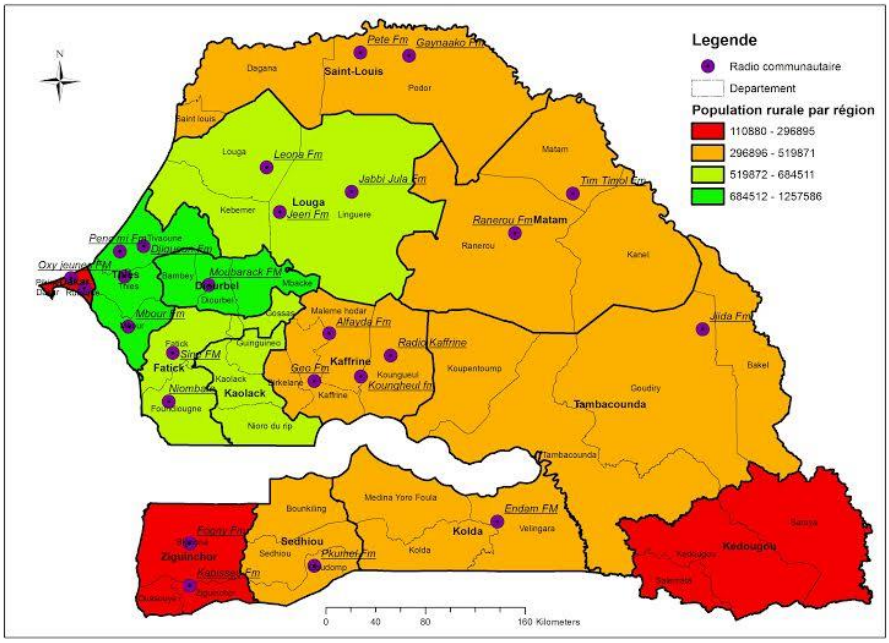
The interviews revealed that in addition to the rural radios and general information radios[12], there are other CI dissemination channels, particularly SMS, "word of mouth", phone calls and the national television.[13] These channels not only increase the level of CI access but also improve the quality of access.

The combination of these different channels shows that nearly 4 million people have access to CI; especially as SMS seems to be replacing the radio as the leading dissemination channel. Indeed, with the widespread use of mobile phones and quite affordable cost of SMS (SMS is virtually free because of the various special offers by telephone operators), the conditions are good for CI access for the largest number of people. However, using languages that are accessible to the population would allow for better understanding of the information being disseminated. A key conclusion from the field surveys is that very few people, at least in Kaffrine, are unaware of the project and the CI it disseminates regularly to farmers.
It also turns out that other community radios throughout Senegal (Map 1) are involved in CI dissemination. This further increases the number of people who effectively have access to the information in all the regions.

[11] The information comes from the results of the last population census of Senegal in 2014 and has been used as basis for the estimation.
[12] These are general information channels that cover the entire country. Unlike rural radios, they broadcast throughout the day (24H/24H)

[13] Aliou Ndiaye, a farmer and trader we met in Kaffrine market, informed us that the other members of his family can watch the television only after he has watched the weather report.

**Figure 4: Location map of URAC member community radios in Senegal**




Equipe de Consultants Evaluation

# Chapter 3: The use of climate information and its impacts

Receiving climate information is one thing, and putting it into practice is another. To analyze the impact of the use of CI and agricultural advice, the consultant team focused on farmers in Kaffrine and URAPD in Bambey. This choice is justified by the fact that these two departments have so far been the core of the project implementation.

The analysis is based on three key assumptions:

i. *Assumption 1: The availability of information is a response to climate risk management.*
ii. *Assumption 2: Behavioral change as a result of application of the agricultural advice has helped to improve agricultural productivity.*
iii. *Assumption 3: A multidisciplinary approach (MWG, availability of information on other factors of production) is essential for improving the resilience of the farming system.*

The reasoning below is articulated around these three assumptions.

## I. Climate Risk Management based on Climate Information

Climate information influences decision-making, and is now an agricultural input.

**Climate information facilitates decision-making**

The tools and products that facilitate decision-making are: (i) short and medium-term weather forecasts, (ii) forecasts for planting dates and end of crop year, (iii) advice on farming techniques, (iv) pest monitoring, etc.

MWG advice has three main objectives: (i) help farmers to master their farming calendar, (ii) assist farmers in choosing dates for cropping operations, (iii) secure people and property. The advice focuses on high winds, rain, thunderstorms and lightning.

At each meeting that holds after every ten days, the weather forecasts officer presents the rainfall situation in the department and identifies prospects for the next ten days. The Prefect, in his capacity as Chairman of the MWG, invites various services to present the current situation in their respective departments. An agro-climatic analysis is routinely conducted, and the crop year considered, particularly as regards the selection of seed varieties and the supply of fertilizers and farm equipment.

Recommendations have been made to ensure greater productivity and food security for the population; they concern:

- Fertilizer application: The MWG often advises farmers not to apply fertilizers on millet during earing and flowering. As regards cowpea, which is a crop very sensitive to wind, it advises farmers not to apply urea during dry spells;
- Initiation of the Early Warning System (EWS) whenever the weather forecasts announce difficult periods, particularly dry spells, high winds or lightning. For example, in 2014, in Baba Garage District (Bambey Department), as a result of the rainfall deficit, the MWG took emergency measures, which consisted in providing support to 25 farmer families in the form of short-cycle cowpea seeds (200 kg) for the season;
- Emergency measures to be taken by the authorities on the advice of MWG to help rural households and livestock cope with hunger, if necessary.

**Example of messages sent to farmers by the MWG in Kaffrine**

1. *Moderate to heavy rains for tomorrow in the afternoon and evening in Kaffrine area.*

*2. Moderate to heavy rain storms in Kaffrine area in the afternoon and evening. The same situation will be observed tomorrow in the afternoon, evening and part of the night.*

*3. Intermittent rain storms in the evening and overnight in Kaffrine area.*

*4. Strong rains becoming moderate to low in Kaffrine and Koungheul at the end of the night and in the morning.*

*Source: Report for 28-08- 2014.*

Decision-making is heavily dependent on CI. In 2014, when ANACIM transmitted seasonal forecasts which announced a significant rainfall deficit (below 600 mm as against 1000 mm in general), the main decision was to distribute short cycle seeds. An awareness campaign was conducted to inform farmers of the available stocks and seed sales locations in Kaffrine and Bambey. The Seed Producers Cooperative (COPROSEM) in Kaffrine Department was requested to provide seeds adapted to rainfall conditions (Table 3).

**Table 3: Seed distribution status in Kahi rural community in 2014 (Kaffrine Department)**

| Crop | Variety | Level | Weight Distributed (kg) | Hectares (ha) | Number of Farmers |
|---|---|---|---|---|---|
| Groundnut | 55-437 | R1 | 4000 | 32 | 16 |
| Groundnut | GH119-20 | R1 | 500 | 2 | 1 |
| Groundnut | 55-437 | R2 | 73500 | 490 | 245 |
| Groundnut | Fleur 11 | R2 | 63600 | 424 | 212 |
| Groundnut | 55-437 | R3 | 3300 | 22 | 11 |
| Groundnut | Fleur 11 | R3 | 10650 | 71 | 35 |
| Ground | 73-33 | R3 | 35450 | 236 | 118 |
| **Total Groundnut** | | | **191000** | **1277** | **638** |
| Sorghum | SV621 B | Base | 48 | 6 | 6 |
| Sorghum | SV622 A | Base | 40 | 5 | 5 |
| **Total Sorghum** | | | **88** | **11** | **11** |
| Millet | Thialack 2 | R1 | 120 | 30 | 30 |
| Maize | Obatampa | R1 | 840 | 42 | 42 |
| **Total Cereals** | | | **1048** | **83** | **88** |
| **Grand Total** | | | **192048** | **1360** | **726** |

***Source: COPROSEM 2014***

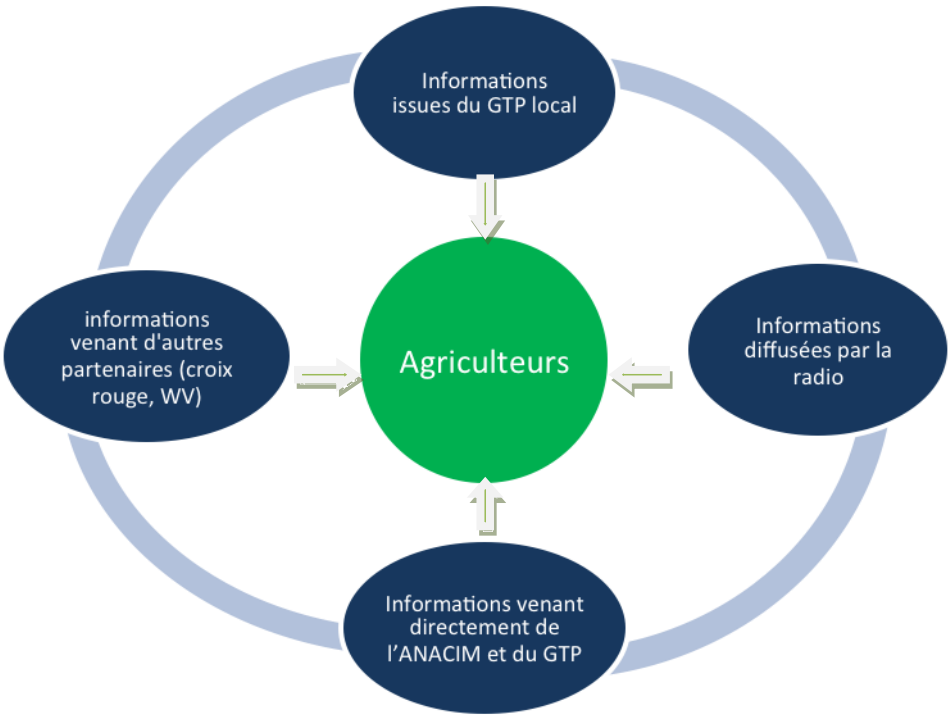
**Figure 5: The Prefect of Kaffrine receiving the consultants in his capacity as MWG Chairman**

***Photo: Assessment Team***

Warning reports were issued and distributed to administrative authorities as well as radios for dissemination to farmers. This decision had an impact on production that year in Kaffrine region. Behavioral changes in farming practices have also been observed, particularly the substitution of maize, a crop that requires a lot of water, with sesame and soya bean.

This type of decision is easier to put in practice in Kaffrine where the CI and agricultural advice dissemination system is decentralized. On the other hand, in Bambey, the MWG decision needs to be put in a report and sent to the radio or URAPD for farmers to have access to it.

**Table 3: CI Sharing Process in Kaffrine**




**The impacts of CI and agricultural advice: CI is an agricultural input**

The use of climate services in agriculture promotes indigenous knowledge and is an innovative approach to agricultural adaptation to climate change. The farmers also noted the significant contribution of CI to productivity, and were more inclined to take it into account in their production system.

The field surveys showed that farmers are all in climate information. The rainy season starting date and seasonal forecasts are considered by farmers as the most important type of information. In fact, the date and forecasts determine the choice of crops and the time for starting to cultivate the farm. Given its importance, CI is the first agricultural input to be considered within a changing climate context. Consequently, farmers are constantly looking for CI and listening to the meteorology services before any initiative.

At national level, CI now appears as an essential factor in the planning of the crop year. In 2014, the Ministry of Agriculture decided to consider CI as an agricultural input, and initiated a number of concrete actions in that direction. One of these actions is that the seasonal forecasts are communicated by the Minister of Agriculture in the Council of

Ministers before the start of the crop year. Based on the forecasts, the Head of State and Government decide on what actions to take.

## II. CI brings about behavioral changes

Behavioral changes can be noted at various levels.

**"Farmers willing to pay" for CI**

At the beginning of the project, ANACIM organized seminars to which were invited farmers, the authorities and the local press to share seasonal forecasts for the coming crop year. During the 2014 crop year, this arrangement was not implemented in all the program areas, because of lack of resources. During the surveys, some farmers complained of delays in sharing information on the rainy season, which made it difficult for them to know what to do. According to them, the importance of such an arrangement and its implications in securing agricultural production are such that the lack of resources cannot be used to justify delays. The interviews showed that farmers would be willing to bear the cost of organizing such a workshop and even pay for CI directly from ANACIM, if need be. This new behavior is indicative of a possible break with the handouts and opportunities mentality regarding sustainability of the process established by the program. Indeed, for the farmers, the impact of CI on production is clear.

**From reluctance to radical behavioral change: «météo lou mou wakh? »**

In the beginning, the project witnessed resistance from many farmers who based their action only on their empirical knowledge. The testimonies gathered during the surveys showed that some farmers were perplexed and even rejected climate information, arguing that the knowledge inherited from their ancestors could not be thrown away just because some people said they were able to predict whether it was going to rain or not. According to them, rain is an act of God alone.

Consequently, at program start-up, no credit was given to CI. This is the case in this anecdote told by A. Ndiaye, a farmer in Gnibi village (see box). The application of CI and agricultural advice by some farmers significantly helped to influence the decisions of the reluctant farmers. Today, farmers are no longer contented to wait for CI, but go in search of it from the structures responsible for its dissemination before taking any initiative so as to master the cropping calendar and improve their practices, which all help to improve crop yields.

*"In 2012, I participated in a workshop on sharing seasonal forecasts and agricultural advice. On my return, I summarized the discussions to my uncle. He was adamant and considered them to be trifles. However, I implemented the recommendations of ANACIM. At the end of the crop year, my uncle realized that yields were higher on my plot than on his. The following year, with the approach of the rainy season, his reaction was this: "meteo lou mou wakh" or put literally "So what are the weather forecasts?"* ***A. Ndiaye, farmer in GNIBI****.*

**Changes in agricultural practices: greater mastery of cropping calendars**

Knowledge of the starting date of the rainy season greatly influences the cropping calendar. Previously, the dry sowing of millet was common practice in the groundnut basin areas. In case of dry spells, the first seedlings were lost, forcing farmers into debt to purchase new seeds. Today, better mastery of the rainfall starting dates and the general behavior of the season as a result of seasonal forecasts and regularity of weather reports throughout the rainy season is essential for the success of the crop year. Indeed, many tasks are now planned on the basis of forecasts announced by ANACIM. Thus, farmers avoid: (i) applying fertilizers just before an announced rain, because of the risk of

*"Agricultural advice and the announcement of rain are very important to us. Indeed, if we are informed of heavy rains in 24 hours, we avoid applying fertilizers as recommended. It is the same for tilling, which is an activity that requires the help of our neighbors. We would have lost energy and time that could be devoted to other activities, especially during the lean season. That's why we continue to listen to weather forecasts and recommendations."* *I TAMBEDOU, farmer in IDA Mouride.*

leaching by water runoff, (ii) weeding because the weeds can grow again, (iii) tilling the farms, which could lead to erosion.

So in addition to changes in farming practices, access to CI helps to streamline spending and labor. This results in better planning of farming activities (Table 4).

**Table 4: Some examples of changes in farming practices**

| **Farming Practices** | **Before** | **After** |
|---|---|---|
| **Sowing of millet** | Dry sowing | Wait for the first rains |
| **Application of fertilizers** | Application of fertilizers during earing | Application recommended during this period and when rain is announced to prevent leaching<br>Promotion of localized fertilization |
| **Weeding** | Done depending on the size of weeds | Refrain from weeding on the eve of rainfall to avoid regrowth |
| **Food crops** | Poor decision on seed varieties to use/ choice of variety<br>Poor diversification of crops (millet, groundnuts, sorghum, and maize). | Substitution of long cycle varieties with short cycle varieties, introduction of soya bean and sesame to replace maize which requires water. |
| **Agroforestry** | Systematic stump removal | Promotion of assisted natural regeneration |

***Source: Survey January-February 2015***

The results in this table are derived from surveys with about thirty farmers, including test farm operators in Sikilo (2) and Toune Mosque (2).

The substitution of certain crops with others is also a key change in farming practices. During the crop year 2014, many farmers substituted maize, which requires much rainfall, with soya bean and sesame, the most suitable crops for low to normal rainfall.

**CI determines the debt level for the crop year**

Starting the crop year requires resource mobilization to finance the purchase of agricultural equipment and materials, fertilizers and seeds. During the survey, some farmers, including H. Ndiaye and M. KA, revealed that they assess their debt capacity for the crop year based on the seasonal forecasts.

**Testimony 1: Harouna NDIAYE, farmer in Kahi.**

«*In May 2014, I submitted a loan application for 800,000 CFA francs to Crédit Mutuel du Senegal for the crop year. Since the weather forecast services announced a deficit rainy season, I reviewed my needs downwards to avoid difficult times in case of poor production. I therefore went back to the bank to withdraw my first application and submit a new application for a more reasonable amount of 500,000 CFA francs."*

**Testimony 2 : Mor Kâ, Test farm in TOUNE MOSQUEE**

"In the past*, I used to finance the crop year with a loan of 400 000 CFA francs. I must admit that it was sometimes difficult to repay it. However, when I benefitted from the test farm and especially the support program in 2013, my production was sufficient and so I could afford not to take the loan, but finance the crop year with my own resources".*

Both testimonies show that farmers now take account of rainy season uncertainties in their debt plan. Greater involvement of banks in this program and in association with ANACIM and CNAAS is desirable. Efforts made by ANACIM to get banks interested in the process have been successful only in Luga where funding structures such as Crédit Mutuel du Senegal, which seem to be adequately informed of the program, require that farmers

subscribe to a weather insurance policy before any financing. In Louga, however, there is an increasing number of bank participants in workshops organized on CI problems, due to sensitization campaigns conducted by the Millennium Villages Project, the program partner in the area.

**Increase in yields and its consequences**

The most significant impact is undoubtedly the increase in agricultural yields. To assess the effects of CI use on yields, a comparison was made between test farms (weather farms) and control farms using traditional methods. The consultant team put their trust in farmers who indicated the quantities produced, thereby making it possible to compare them, since the crop year was not completed.

To show farmers the importance of agro-meteorological information, the program established test farms on which weather forecasts and related agricultural advice are strictly applied.

The table below clearly shows that the yields on test farms are higher than those of control farms.

**Table 5: Comparison of yields on test farms and control farms (Mor KÂ)**

| **Crop Type (to be specified)** | **Traditional Farm (Control)** | | **Test Farm (champ météo)** | | **Remarks** |
|---|---|---|---|---|---|
| | QS | QR | QS | QR | According to Mor Ka, the test farm produced good quality grains. On the other hand, the hay produced on the control farm is more abundant, and will therefore provide livestock feed during the lean period and generate significant income. A bag of hay is sold at 2000 CFA francs. It produced almost 500 bags for this crop year. |
| Souna 3 | 1kg | 370kg | 1kg | 555kg | |
| Millet Thialak | NR | NR | NR | NR | |
| Groundnut Flower 11 | 40kg | 780kg | 40kg | 900kg | |
| Groundnut 73 | NR | NR | NR | NR | |

**QS: Quantity Sown, QR: Quantity Harvested, NR: Not Provided. Source: Surveys January-February 2015**

The results in the table refer to yields on the test farm run by Mor KA in Toune Mosquée.

In November 2014, an evaluation of the crop year in Kaffrine showed that the region, unlike the rest of Senegal, recorded good harvests despite the late start of the rainy

season and the dry spells. This newspaper cut (from L'Observateur Issue No. 3352 of Tuesday, 25 November 2014[14]) testifies to it.

**Figure 6: Cut from *L'Observateur***

Récoltes

Contrairement aux années précédentes où les récoltes des paysans de la région de Kaffrine n'ont pas été les meilleures, cette année, celles-ci ont été de bonne qualité et d'une abondance non négligeable. C'est du moins l'avis des agriculteurs de la région qui ont tenu, hier matin, dans ladite localité, un séminaire d'évaluation sur les prévisions saisonnières, avec l'Agence nationale de l'aviation civile et de la météorologie (Anacim). Selon Pape Samba Diané, porte-parole des paysans, c'est grâce aux séries de prévisions et autres consignes fournies par l'Anacim sur les comportements à adopter qu'ils ont pu se tirer d'affaire et d'avoir des semences adéquates à la saison pluviométrique. Ce qui leur a permis d'obtenir une si bonne récolte cette année. Car, selon eux, malgré l'installation tardive de l'hivernage dans cette partie du Bassin arachidier, les agriculteurs qui ont bénéficié de l'appui de l'Anacim ont pu voir toutes leurs récoltes arriver à terme et minimiser également les effets néfastes liés aux changements climatiques. Et cela, grâce à l'utilisation des informations climatiques. Cependant, pour sa part, l'Anacim qui a affiché une ferme volonté d'accompagner ces hommes de la terre compte, dans les mois à venir et en partenariat avec une coopérative colombienne, initier aux agriculteurs kaffrinois à la culture du riz pluvial.

Ou

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pour féliciter
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Nous demand
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Sénégalais
hier matin

**Source: Surveys Assessment Team**

The test farm or "***weddi guis bokoou ci***[15]" which in Wolof literally means "*it is impossible to deny the obvious*" is the scientific support of the project. These test farms have proven to be effective means of disseminating CI. They showed the difference between putting into practice only traditional farming techniques and taking into account scientific data, particularly meteorological data. The difference in yields between the two types of farm is a perfect illustration of the situation.

This increase in yields leads to: (i) increased household income and enhanced family welfare, and (ii) better preparation for the lean period.

### Improvement of household incomes

A quantitative assessment of income was not undertaken by the consultant team, given the tools used during the data collection. This approach is justified by two factors:

[14] L'Observateur is a Senegalese daily newspaper with 100,000 copies a day.
[15] A slogan given by farmers to test farms.

i. first, the issue of income is often taboo in rural areas and is not necessarily expressed in monetary terms,
ii. second, as stressed by some people, the marketing season is not yet completed, and sales take place only when the need is expressed.

Consequently, in the interview guide, the issue of income was addressed indirectly, because the consultant team just wanted to know if the people interviewed could improve household incomes.

***Diversification of activities and reinvestment in working tools***

With the increase in agricultural yields, most of the respondents admitted that they had reinvested a portion of their agricultural income in other activities, including cattle fattening. This is particularly true in Toune Mosquée where the quality of well water is not good for gardening and arboriculture, which are diversification options. Cattle fattening somehow replaces bank loans and helps farmers to avoid selling their property to invest in the coming crop year.

***Improvement of family welfare***

This is noticeable at several levels. First, the construction of a solid house to improve the quality of life (photo 6). Then in family health, by contributing to health insurance and investing in children's education (school registration, purchase of supplies, etc.). The improvement is also reflected in the construction of solid houses. All these show improvement in incomes.

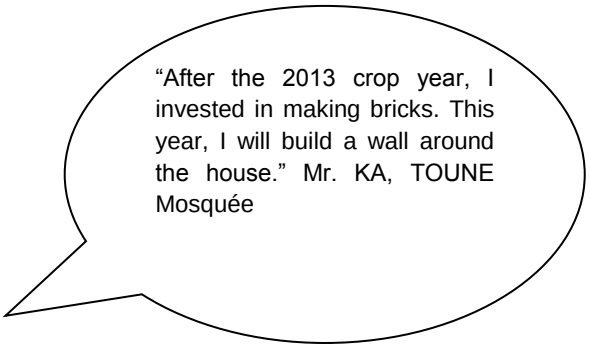

**Photo 6: Bricks for a solid house**

**Photo: Assessment Team**

### *When CI leads to a second wedding*

Unlike his comrade M. KÂ who invested in building a house following a good crop year, E. NDAO, village chief of TOUNE Mosquée and operator of another test farm, chose to marry a second wife.

"I could take a second wife because my income allows me to do so now. In addition, my millet output will enable me to confidently go through the lean season. I have enough hay to sell and meet certain obligations"
E. NDAO

From this testimony, taking a second wife came as a result of increased production following selection of seed varieties adapted to the rainfall trends announced for Kaffrine region.

**Photo 7: Straw from the abundant harvest, stored for the lean period**

**(Toune Mosquée village)**

**Photo: Assessment Team**

**Photo 7: A test farm operator standing proudly in front of his millet and straw reserves**

***Photo: Assessment Team***

**From production security to human safety**

The use of C goes beyond securing agricultural production. Indeed, in 2012, Kaffrine town suffered exceptional floods. Several neighborhoods were under water. To relieve the hard hit population, a fire fighters team was dispatched from Kaolack. After a lull, the team realized it could withdraw, but the Prefect decided to retain them following information from the MWG forecasting new showers.

Another use of CI is for the safety of children and livestock. Indeed, when lightning is announced, children and livestock are systematically kept at home. This precaution helps to limit livestock theft that often occurs in such circumstances, resulting in conflicts between graziers and farmers.

**When CI helps to secure property**

Weather forecasts, particularly concerning high winds and their consequences, early rains, and showers, make it possible to take safety measures in anticipation to

«CI has helped me to save at least the equivalent of 100 million francs CFA for seeds, hay and other products stored and held for sale. Indeed, following ANACIM announcement of early rains, I went to NOVASEN to borrow canvas sheet to cover my products. I was very surprised with the accuracy of the CI, as rain fell on the indicated date and in the forms that had been described. Many people will not tell you what they lost on that day. » **M CISSE, Economic Operator**

ensure safety for people and property.

## III. Constraints and Threats

The CCAFS program provides optimum climate risk management through CI availability and accessibility. However, for more efficient use of the information, other factors need to be taken into account. Indeed, CI cannot lead to success of the crop year and effective increase in yields if certain other conditions are not met; they include:

(i) availability of a good variety map;

(ii) availability and accessibility of good quality seeds, on time and in sufficient quantities;

(iii) better access to land, especially for women considered as one of the most vulnerable groups to climate change. The interviews showed that many women have access to CI and agricultural advice, but do not have land to apply them. According to A. NDAO of NGODIBA village and M. Keita of Sikilo, women suffer discrimination in the distribution of land and seeds, as well as in loans. They feel that such discrimination is due to the fact that access to seeds is subject to the payment of the rural tax, which is the responsibility of the household head alone. *"The irony is that when our husbands receive the seeds they never give us our share."* Yet, women contribute significantly to agricultural diversification by promoting high value-added growth sectors. They are also key players in the processing of primary sector products that can give added value to the activities.

Despite the constraint of access to land[16] for certain categories of stakeholders, the consultant team focused mainly on responses to the issue of crop varieties and seeds that appear as a prerequisite for efficient CI use. Given the need for certified and varied seeds in sufficient quantity, some agricultural cooperatives have started producing them. However, the challenge lies in their ability to produce enough seeds on time to counteract speculation by traders. URAPD in Bambey and COPROSEM in Kaffrine have sufficiently understood the situation and have, for some years now, been producing their own seeds.

[16] Apart from land, there are other types of serious constraints that are not the focus of this study; for example, access by farmers to markets, availability of chemical or biological fertilizers, etc.

**Photo 8: Millet seeds produced by URAPD**


**Photo: Assessment Team**

## Lessons learned and recommendations

- *The Ministry of Territorial administration* is involved in integrated rural development. Given its role in synergizing the various decentralized services, as well with other stakeholders, through the local MWG it chairs, climate information makes the Prefect play the role given to him by Act 3 of decentralization[17].

- *Climate information is an opportunity* for reconciling indigenous knowledge with scientific knowledge. The program is built on an approach that is based in part on developing indigenous knowledge, which is likely to put people at ease and ensure acceptability of innovation.

- *The interdisciplinary approach* in the MWG offers the opportunity to provide appropriate advice taking into account the specificities of the various sectors. This is where dialogue starts around CI and its implications.

[17] Act 3 of the decentralization is a territorial reform.

- *Institutionalization of the MWG is an important step towards sustainability.* Project approach generally suffers from lack of a sustainability mechanism to build on achievements. The CCAFS program has understood this, and institutionalization of the MWG by Prefectoral Order is an important step towards sustainability of the process. It adds new functions attributed to certain people (Mr. and Mrs. Weather Forecast) and recognized by the community.

- *The opportunity offered by information and communication technologies*. Development and democratization of access to the mobile phone are valuable opportunities to be taken to increase the number of people likely to benefit from CI. To that end, messages should be delivered in local languages and in voice format. Furthermore, it would be necessary to consider a partnership arrangement with operators of mobile phones and call centers as part of their policy, in line with corporate social responsibility (CSR).

- *An even greater potential by developing a formal partnership with umbrella organizations* (FONGS CNCR etc.). The project is aware of this, and has developed a partnership with URAPD, which is an arm of FONGS in Bambey.

- *In Kaffrine, climate change is no longer a fatality*. A good knowledge of the factors, coupled with relevant information disseminated on time, in appropriate formats and through appropriate channels, help to adjust and minimize the impacts.

**Recommendations**

**For better dissemination of climate information**

- Involve more national radios (RTS, RFM, WALF, Zik FM, etc.) to supplement community radios that play an important role in CI dissemination, but with low coverage radius;
- Communicate the results of seasonal forecasts early enough;
- Ensure the timely dispatch of weather reports and through appropriate channels for the various types of stakeholders;
- Also produce and disseminate CI in the dry season;
- Identify and involve all voice carriers in the CI dissemination process.

These recommendations are intended for CCAFS and its main partner in Senegal, namely ANACIM.

**For better estimation of the number of people with access to CI**

- Support the conduct of a radio ratings survey in the project areas;

This recommendation is intended for CCAFS.

**For the dissemination of agricultural best practices**

- Increase the number of test farms in Bambey and Niakhar;
- Consolidate the experience in Bambey, and develop a formal strategy for replication at national level, including Thies and Louga targeted as areas for replicating the Kaffrine experience;
- Promote peer learning, particularly within the SDDRs which play an important role in the process.

These are mainly significant efforts to be made by the project to better disseminate its achievements. The attention of CCAFS and ANACIM is drawn to this recommendation.

**For capacity building and sensitization of the various categories of stakeholders**

- Strengthen community radio programs as regards climate change and its consequences;
- Further sensitize climate-related financial and insurance institutions for greater involvement in the process;
- Further support farmers in decisions to be taken, particularly in Bambey;
- Sensitize the members of farmer organizations so that they develop a proactive approach to information; and
- Strengthen the extension agents network to facilitate CI dissemination.

This recommendation is intended for CCAFS and ANACIM.

**For improvement of CI management mechanisms**

- Expand MWG for better representation of the various localities and different categories of stakeholders, particularly women;
- Review the operation of the MWG in Bambey on the basis of the Kaffrine model; and
- Strengthen mechanisms for project ownership by the Government of Senegal so as to facilitate its upscaling.

These recommendations are intended for the local MWG.

# ANNEXES

## INTERVIEW GUIDE FOR COMMUNITY RADIOS

### A - INFORMATION ON THE RADIO

1) Name of the radio

2) Date of creation of the radio

3) Geographical coverage

### B- ACCESS TO CI AND DISSEMINATION

4) Have you participated in training on Climate Information (CI)?

5) How do you rate the training received?

- relevant and enough to enable you to design and broadcast programs;

- not enough (suggestions, recommendations)

6) Do you have other capacity building opportunities within/outside the project (MWG, workshops, etc.)?

7) Do you have access to CI?

- In what form?

- By what channel? (advantages, constraints, suggestions)

- Regularly or ad hoc/sporadic? (constraints, suggestions)

- When, how often /periodicity? (comments, suggestions)

- Do you easily understand the information you receive? (difficulties, suggestions)

8) Since when do you disseminate CI?

9) In what form do you disseminate CI (forecasts, seasonal, ten-day forecasts, etc.)?

10) What types of programs are you broadcast to disseminate CI (radio talks, interactive programs)?

11) Whom have you already invited to host a show?

12) What dictates the choice of these programs?

13) How are the themes chosen? Do you receive suggestions on themes and how are they treated?

14) What are the broadcasting times? Why these times?

15) Do you have any feedback on the information broadcast?

16) Do other radio stations in the area rebroadcast the information that you broadcast?

**C- INDICATORS**

17) Number of programs broadcast

- reports broadcast

- interactive programs

- testimonies

- "Zoom on"

18) Broadcast media

**INTERVIEW GUIDE FOR FARMER ORGANIZATION OFFICIALS**

**A- ORGANIZATION**

1) What is the name of your organization?

2) Is your organization present in all the departments?

3) Please estimate the number of members of your organization in the region.

4) What are your relations with the technical services responsible for agriculture?

5) What are your organization's relations with the CCAFS project?

**B- ACCESS AND USE OF INFORMATION CLIMATE**

**B1 - ACCESS**

1) What do you know about the climate information project?

2) Do your members have access to climate information?

If so,

- Since when?

- Regularly or sporadically?

- How? (transmission channel, advantages, limitations, suggestions)

- In what form? (advantages, constraints suggestions)

- When do they get this information? (advantages, constraints suggestions)

If not, why and what should be done?

B2 - UTILITY AND USE OF CI

1) Is CI helpful? Why?

2) How do you use CI?

3) What changes have occurred since you receive CI? Changes in behavior, practices

- assistance for decision-making (date for sowing and other activities, selection of varieties, harvesting and storage of harvested crops, debt, etc.)

- innovations

- examples

17) What other forms of support are associated with CI? Advice? Joint experiments?

- What kind of advice/experimentation, in what form, by whom, how often?

18) What other arrangements/mechanisms would allow for better access to and greater ownership of CI?

19) How do the various supervisory structures work together for better ownership and better use of CI? What needs to be improved? How?

20) In your opinion, what are the strengths of climate information?

21) What are the limitations/weaknesses/constraints on the use of climate information?

22) What are your prospects/recommendations?

**INTERVIEW GUIDE FOR TECHNICAL SERVICES (SDDR, ANCAR, CADL, REGIONAL FISHERIES SERVICE, etc.)**

**A - INSTITUTION**

1) Name of the Institution

2) What are your relations with farmers (farmers, graziers, fishermen)?

3) Do you have agencies at departmental level?

4) How has your role developed with Act 3 of decentralization?

**B – THE INSTITUTION AND CLIMATE INFORMATION**

5) Tell us about the CCAFS project on climate information.

- When did your relations with the project start?

- What role do you play in the project?

- How do you see this role in relation to your mission for farmers?

6) Do you receive the CI produced by ANACIM?

- Who gives you the CI?

- At what time?

- How often?

- In what form and through what channel?

7) What do you do with the information once you receive it?

8) Through what channel is it disseminated?

9) Who receives it and how frequently, how often?

10) Who is involved in the dissemination of the information?

11) How many farmers are there in the region?

12) In your opinion, how many farmers receive the CI?

13) What are the challenges/constraints/limitations on the dissemination of CI?

14) What are your suggestions/recommendations to address these constraints?

**C - USES AND UTILITY OF CI**

15) What do farmers use the CI for?

16) How has CI changed the lives of farmers (value added/ impact of CI)?

- Assistance for decision-making (date for sowing and other activities, selection of varieties, harvesting and storage of harvested crops, debt level, etc.)

- Changes in behavior and practices

- Innovations

- Examples

17) What other arrangements /mechanisms allow for better dissemination and ownership of CI?

18) What synergy is there between the supervisory structures for greater ownership of CI?

19) In your opinion, what are the strengths of climate information?

20) What are its limitations/concerns?

21) What do you recommend for better use of CI?

**LIST OF PERSONS MET**

## Dakar Region

| No. | Full Name | Position | Structure |
|---|---|---|---|
| 1 | Dr. Diaminatou Sanogo | Agroforestry Expert | CNRF/ISRA |
| 2 | Mouhamed Diop | Assistant | CNRF/ISRA |
| 3 | Dr. Ousmane Ndiaye | CCAFS Focal Point | ANACIM |
| | Bounama DIEYE | Ministry of Agriculture | DA/MAER |
| 4 | Pape Ngor Ndiaye | Forecaster | ANACIM |
| 5 | Talla Dieng | Chairman | URAC |
| 6 | Dr. Yacine Ndour Badiane | Director/ Laboratory | ISRA |
| | Dr. Robert Zougmoré[18] | Coordinator, CCAFS Program | ICRISAT |

## Kaffrine Region

| No. | Full Name | Position | Structure or Locality |
|---|---|---|---|
| 1 | Abdou Loum | CAR | Koungueul |
| 2 | Abdourahmane Ndiaye | Prefect | Kaffrine |
| 3 | Aissatou Ndao | Farmer | Ngodiba |
| 4 | Alioune Ndiaye | Farmer/Trader | Kaffrine |
| 5 | Amy Ndiaye | Farmer | GNIBY |
| 6 | Arona Ndiaye | Farmer | CLCOP |
| 7 | El hadji Moussa Seck | SDDR | SDDR |
| 8 | Elhadji Alioune Diaby | Farmer/Village Chief | Sikilo |
| 9 | Elhadji Malick Ndao | Farmer/Village Chief | Toune Mosquée |

[18] A meeting was held during their stay in Dakar in the first fortnight of January 2015

| | | | |
|---|---|---|---|
| 10 | Ibrahima Tambédou | Farmer | Ida Mouride |
| 1 | Mr. Elhadji Ndiol Loum | Farmer/Mayor of Ndionick | CESE |
| 12 | Mariama Keita | Farmer | Sikilo |
| 13 | Mor Ka | Farmer | Toune Mosquée |
| 14 | Moth Cissé | Economic Operator | Kaffrine |
| 15 | Moustapha Ségnane | Broadcaster | Kaffrine FM |
| 17 | Ndongo Baba Ndao | Secretary-General | Red Cross |
| 18 | Oumar Ka | Farmer | Toune Mosquée |
| 19 | Oumar Ndiaye | Journalist | Alfayda FM and Walf TV |
| 20 | Ousmane Ndione | | COPROSEM |
| 21 | Pape Samba Diané | Farmer | Nganda |
| 22 | Seydou Dieng | Broadcaster | Koungueul FM |

**Diourbel Region**

| No. | Full Name | Position | Structure or Locality |
|---|---|---|---|
| 1 | Alouise Dieng | Secretary-General | URAPD |
| 2 | Amy Diouf | Farmer | Ndim |
| 3 | Boucar Diouf | Farmer | Ngueye-Ngueye |
| 4 | Ababacar Diop | SDDR | Bambey |
| 5 | Doudou Lamassas Fall | Director | Bambey FM |
| 6 | Dramé | Prefect | Bambey |
| 7 | Ibrahima Paul Thiaw | Coordinator | FONGs/Diourbel |
| 8 | Dr. Mbaye Diop | Director | CNRA/Bambey |
| 9 | Pierre NZalé | Manager, Weather Station | Bambey |

**Louga Region**

| No. | Full Name | Position | Structure or Locality |
|---|---|---|---|
| 1 | Daouda Kébé | Community Radio Manager | Léona FM |
| 2 | Mahécor Diouf | Employee | MDG/PMV |
| 3 | Modou Fatma Mbow | SDDR | SDDR |
| 4 | Samba Diaw | Farmer | Léona |
| 5 | Yacine Seck | Employee | MDG/PMV |

**Thies Region**

| No. | Full Name | Position | Structure or Locality |
|---|---|---|---|
| 1 | Assane Guèye | Program Officer | AGRECOL |
| 2 | Cheikh Fall | Station Manager | RTS |

**Fatick Region**

| No. | Full Name | Position | Structure or Locality |
|---|---|---|---|
| 1 | Ameth Sarr | Sub-Prefect | Niakhar |
| 2 | Bassirou Fall | Employee | IRD/ Niakhar |
| 3 | Ibrahima Diouf | CAR | Niakhar |
| 4 | Mamadou Diagne | Manager | CADL/Niakhar |
| 5 | Maodo Samb | Manager | Weather Station |

# ORDER ESTABLISHING THE MWG OF KAFFRINE

REPUBLIQUE DU SENEGAL
Un Peuple-Un But-Une Foi

REGION DE KAFFRINE

DEPATEMENT DE KAFFRINE

*ANALYSE* : Arrêté N°...088...PD/KAF portant création d'un groupe de travail pluridisciplinaire pour le système d'alerte précoce basé sur les informations climatiques

## LE PREFET DU DEPARTEMENT DE KAFFRINE

VU la Constitution ;
VU la loi 72-02 du 1er Février 1972 relative à l'organisation de l'Administration territoriale et locale modifiée ;
VU le décret N°72-636 du 29 mai 1972 relatif aux attributions des chefs de circonscriptions administratives et des chefs de village modifié ;
Vu le décret n°2013-678 du 15 mai 2013 portant nomination de Monsieur Abdourahmane NDIAYE, Préfet du Département de Kaffrine ;
VU les nécessités.

## ARRETE

**Article premier** : Il est créé à Kaffrine un groupe de travail pluridisciplinaire pour le système d'alerte précoce basé sur les informations climatiques dénommé GTP/SAP.
**Article 2** : Ledit GTP/SAP est chargé de :

- Recueillir les informations climatiques auprès de l'ANACIM
- Diffuser largement aux producteurs
- Faire le point sur la situation présente de la campagne agricole, de l'évolution du parasitisme, du pastoralisme et de l'approvisionnement des marchés
- Analyser ces situations en rapport avec les informations climatiques
- Diffuser les résultats de ces analyses à qui de droit pour la prise des décisions idoines
- Recueillir les feed back
- Elaborer le rapport pour niveau national

**ARTICLE 3** : Le groupe de travail multidisciplinaire est ainsi composé :

- **Président** : Le Préfet du Département ou son Représentant
- **Coordonnateur** : Le chef du Service Départemental du Développement Rural, Point focal
- **Membres :**
  - ✓ L'Inspecteur régional du Commissariat à la Sécurité Alimentaire
  - ✓ Le chef de la base d'avertissement de Nganda

# ORDER ESTABLISHING THE MWG OF BAMBEY

REPUBLIQUE DU SENEGAL
*Un Peuple – Un But – Une Foi*
REGION DE DIOURBEL
DEPARTEMENT DE BAMBEY
*PREFECTURE*

N°083 / PDB
*Bambey, le* 09 JUIL 2014

**ANALYSE :** Arrêté portant création d'un groupe de travail pluridisciplinaire sur l'utilisation de l'information climatique dans le développement rural

*Le Préfet du Département de Bambey*

- Vu la Constitution ;
- Vu la Loi n° 72 02 du 1er février 1972 portant organisation de l'administration territoriale et locale, modifiée ;
- Vu le Décret n° 72-636 du 29 mai 1972 relatif aux attributions des Chefs de circonscriptions administratives et des Chefs de villages, modifié ;
- Vu le Décret n° 2011-277 du 24 février 2011 portant nomination de **Madame Rachelle COLY BOUCAL**, Préfet du département de Bambey ;
- Vu les circonstances,

ARRETE

**Article premier :** Il est crée dans le Département de Bambey, d'un groupe de travail pluridisciplinaire sur l'utilisation de l'information climatique dans le développement rural.

➢ **Article 2 :** Ledit comité est composé ainsi qu'il suit :

- Le Préfet ou son représentant : **Président**
- Le chef du service départemental du développement rural : **Rapporteur**

**Membres**

- Le chef du service départemental de l'élevage
- Le commandant des eaux et forêts
- Le chef du service départemental d'appui au développement local
- Le directeur du CNRA
- Le directeur de l'ISFAR
- Le représentant de l'ANCAR
- Le chef de la station de météo de Bambey

**Name** : Dr Henri Mathieu LO (Sénégal)

Position : Senior Lecturer, Institute for Environmental Studies

Cheikh Anta Diop University

**Key expertise** : Climate Change, Sustainable Developement, Green Economy, Participatory Research

Henri M. LO is a Geographer and Environmentalist with a PhD in Physical Geography (Université de Nancy, France) and a Professional Master in Environmental Planning and Management (Université Senghor, Alexandry, Egypt).

He joined the University of Dakar in 1986, as a research assistant. From 1986 to 2000, he tought as Lecturer at the Institute for Environmental Sciences, on Hydroclimatology and supported the students in their research on climatology, hydrology and water management.

From 2002 to 2008, Dr LO was appointed as the Coordinator for the Formulation of the National Strtategy on Sustainable Development. He also conducted many studies for institutions like UNDP, GEF, IUCN, UNEP, WWF, FAO, IFAD, CIAT, etc., around Natural Resouces Management, Biodiversity, Land Tenure, Sustainable Development, Participatory research, etc.

From 2008 to 2012, Dr LO worked as a Senior Programme Officer in the Climate Change Adaptation Programme in Africa (CCAA), a joined-funded IDRC/DFID programme, with a special focus on Community Adaptation and Participatory Research Action. At the end of the Programme in 2012, he returned at the Institute for Environmental Studies to set up a research team on « Territoires, Ressources et Acteurs du Développement Durable (TERADD). He recently conducted some studies on Climate Change Adaptation with a special focus on Development Aid, Capacity building, Migration, Institutional Assessment, Green Economy, etc., in Senegal, Mali and Togo.

**Publications and study reports:**

- Résilience au changement climatique dans les zones arides et semi-arides. Le contexte du Sénégal (en cours)
- Impact des changements environnementaux sur les migrations humaines. Etude de cas, Sénégal et Côte d'ivoire. UNESCO-SHS, 2014
- Institutional Analysis of l'Agence de l'Environnement et du Développement Durable (AEDD) and l'Agence Nationale de la Météorologie Mali-Météo) African and Latin American Resilience to Climate Change project (ARCC). Study report, with M.Freudenberger and M. Boulahya, 2014
- The Influence of US Development Assistance on Local Adaptive Capacity to Climate Change: Insights from Senegal, Oxfam America report, April 2013 http://www.oxfamamerica.org/files/senegal-climate-change-research-backgrounder-7-23-13.pdf

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