RESULTS OF THE INSTITUTIONAL ASSESSMENT OF THE MALI AGROMET PROGRAM

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Introduction

In 1974, the world witnessed the worst ever drought followed by a famine that smashed the Sahel region in West Africa. Extremely dry years experienced in the region from the 1970s were identified as the main drivers of the situation. Mali, a landlocked country of which 65% is either desert or semi-desert suffered the situation. Recognizing that rural communities need help in managing the risks associated with rainfall variability, the Mali's National Meteorological Directorate launched in 1982 a project to provide climate information to rural communities, especially farmers with external funding from the Swiss Agency for Development and Cooperation (SDC), assisted by the AGRHYMET center and technical support from WMO. It was envisioned that climate information would help farmers in their decision making in farming activities and food security. The project was highly innovative from the outset and the first in Africa for a national hydrological and meteorological service to supply climate-related advice and recommendations directly to local communities including farmers, and to enhance their capacity to measure rainfall themselves (Agriculture in Mali). How the project achieved the notoriety from the institutional arrangements perspective to allow scaling up in other regions in the Sahel?

Aim of the report

This report aims to develop an understanding of the institutional arrangement that led to the success of the project as depicted by the Mali's National Meteorological Directorate and disseminated worldwide. Specifically, the assessment aims to:

- develop an historical description of the program with focus on
    - the origins, the rationale and the problem that led to the program
    - the organizational chart and narrative, with key institutions roles and interactions within and across scales
    - a narrative timeline on how the program evolved
    - description of the clients/users
    - the specific products and services provided to the farmers

    - processes such as high level planning, communication, monitoring and evaluation, response to feedback from farmers and other end-users
- identify key enabling or constraining factors on delivery, uptake, impact and sustainability.
- identify gaps in services related to demand, and opportunities to address gaps

Methodological approach

The assessment was done followed three main components:

- literature review on the program with focus on the institutional set-up,
- semi-structured interviews and questionnaires administered to key informants and pioneers (cf. list attached)
- analysis of the information

1. Program description

1.1. Historical background and rationale

"How to address national development issues, including drought through the production and effective use of meteorological (weather and climate) information particularly at the grassroots level"? That was the question by two young scientists namely Mr Kaliba Konaré and late Mama Konaté in 1977. More specifically, how to transform science-based weather and climate information into relevant user-friendly products by farmers in order to assist them in their cropping activities and increase agricultural production? In aiming to address this issue, the two then developed the first ever concept note with the following objectives:

- assess farmers needs and requirements regarding weather and climate information services
- produce weather and climate information services to farmers through appropriate channels and ensure effective use by farmers
- demonstrate the benefits, if any, of the use of weather and climate information and services to the farming community and policy makers.

Against this backdrop, the World Meteorological Organization (WMO) in collaboration with the United Nations Development Program (UNDP) established in Africa's sub-regions regional climate monitoring institutions aimed to provide early warning advisories to countries for extreme climate events preparedness. However, the regional climate products

issued lacked the level of resolution needed to provide adequate details at the national and indeed at the local levels.

In 1982, the Mali meteorological service embarked on a project to bring agro-meteorological information to rural communities and authorities, to help them in their decision making concerning farming activities and food security: **the agro-meteorological project** with support from AGRHYMET[1], WMO and funding of the Swiss Agency for Development and Cooperation (SDC).

1.2. Aim of the project

The project aimed to identify whether and how climate information could be useful to rural farmers to assist them in making informed decisions in their farming activities and food security to alleviate the impacts of drought. More specifically, the objectives were:

- the sensitization of rural communities by getting them to be directly involved in the various activities, through teamwork and a chain reaction network, involving extension workers, agricultural officials and policy makers
- the provision of professional training for local farmers and their introduction to data collection and the practical use of meteorological and agro-meteorological information in all agricultural decision making processes
- the establishment of a functioning system of compilation and dissemination of agro-meteorological information and advice to rural communities
- the preparation of forecasting tables to determine when to begin the main planting seasons
- the establishment of a rural database to help with agro-meteorological work and operations.

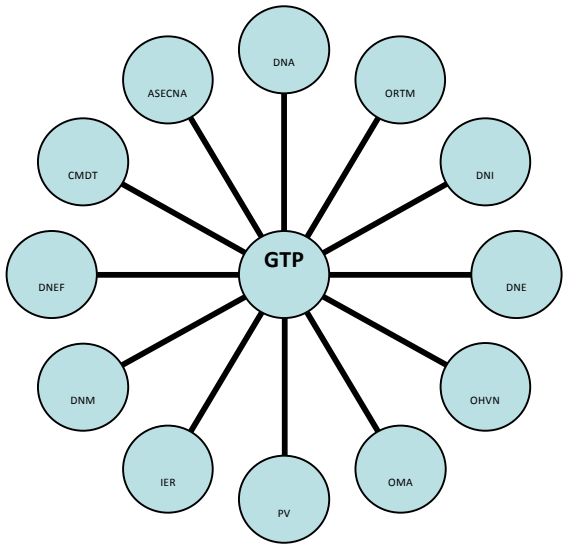
1.3. Program Implementation

1.3.1. The institutional set-up

[1] AGRHYMET is a regional center based in Niamey, Niger. Established in 1974, AGRHYMET is a specialized institution of the Permanent Inter-States Committee for drought control in the Sahel (CILSS), which was created in 1972 following the drought of 1970 (www.cilss.bf). The mandate of CILSS is to invest in research for food security and the fight against the effects of drought and desertification in the Sahel region.

Several public services and institutions were involved in the project. The implementation of the project activities was undertaken by a multidisciplinary working group (GTP) from the technical, development and research fields including members of the national hydrology and meteorological services (NHMS), the Ministry of Agriculture, research institutes, rural development agencies, participating farmers and the media. The multidisciplinary working group was the centre of information flow from climate providers to the users and vice-versa for tailoring climate information to be more useful and usable. These members groups provided the following inputs in the system:

- users define the climate-related data and products they need
- the meteorological service analyze technical aspects of these data and products
- the Ministry of Agriculture, extension services, and research groups worked on issues related to food production, crop health/protection and choice of crop varieties
- the rural development agencies focused on capacity building and information
- the media sensitized users and disseminate climatic and agro-meteorological information



DNA	National Agricultural Directorate
IER	Institute of Rural Economy
PV	Crop protection service
DNE	Livestock National Directorate
DNEF	National Water and Forestry Directorate
OHVN	High Niger Valley organization
CMDT	Malian Cotton development company
DNM	National Meteorological Directorate
ASECNA	Agency for the Safety of Aerial Navigation in Africa
DNI	National Internal Affairs Directorate
OMA	Agricultural markets observatory
ORTM	National Radio and Television

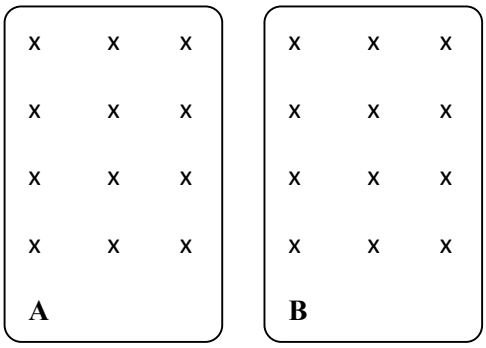
Figure 1 The multidisciplinary working group

The multidisciplinary working group used to meet every ten days to discuss on the above mentioned inputs. Although several national institutions were taken part, the GTP worked more in an informal way without any formal legal status. The objective sought was to promote participation and voluntarism among the different stakeholders and actors involved in the project and thus limiting a cumbersome administrative process.

1.3.2. Implementation phases

1.3.2.1. Experimental phase (1982 – 1986)

The experimental phase started in 1982 with 16 volunteers' farmers who were growing pearl millet, sorghum, maize, cotton, and groundnut in the region of Bancoumana, in the south of the country. The experimental design consisted of two plots



Plot A: management decisions based on agrometeorological information

Plot B: management decisions based on traditional indicators

The first phase worked on fostering participation and building capacity among agricultural extension agents, establishing routes for information flow between stakeholders and developing methods for rapid processing of data and their conversion into appropriate and useful advice.

Table 1. Sorghum and pearl millet yields in experimental and traditional plots (1982-1986)

Crop	Year	Place	Traditional	Experimental	Change in yield (%)
Sorghum	1983	Bancoumana	1403	1489	6
		Keniéroba	732	897	23
	1984	Bancoumana	1440	1530	6
		Keniéroba	1081	1284	19
	1985	Bancoumana	1249	1469	18
		Keniéroba	503	783	56
	1986	Bancoumana	1367	1351	-1
		Keniéroba	667	1021	53
Pearl millet	1983	Bancoumana	479	643	34
		Keniéroba	611	733	20
	1984	Bancoumana	899	1019	13
		Keniéroba	802	1256	57
	1985	Bancoumana	846	979	16
		Keniéroba	878	1075	22
	1986	Bancoumana	864	1071	24
		Keniéroba	746	908	22

1.3.2.2. Demonstration/extension phase (1986 – 1990)

After the first year promising results experienced by the 16 volunteers' farmers (Table 1), there was an increasing demand from neighboring communities for rain gauges, agro-meteorological information, and training from 1984. The project therefore expanded and by 1990, some 80 representative farmers had been trained.

1.3.2.3. Scaling-up phase

The project scaling up phase began in the earnest with a large stakeholder workshop in 1993. During the workshop, participants evaluated their activities from 1989 to 1993. Monitoring and evaluation was a major activity in this phase. The following outcomes were achieved during this phase:

- the number of representative farmers involved increased
- the number of district involved increased to five
- local production of rain gauges begun and replaced the more expensive imported rain gauges
- the information flow loop enhanced with the formation of two level multidisciplinary teams in 2001, to help reach rural communities more efficiently. Two additional groups were also being developed in other regions; they complemented the national level group, allowing the project to work closely with farmers
- over 50 bicycles were provided to representative farmers to facilitate the recording and transmission of rain gauges data to the nearest synoptic meteorological station for transmission to the national meteorological committee of the NMHS

- climate and agrometeorological information was being provided to an expanding number of farmers' organizations, rural programs, development agencies, and NGOs
- farmers were regularly visited and asked for feedback on how well the project met their needs

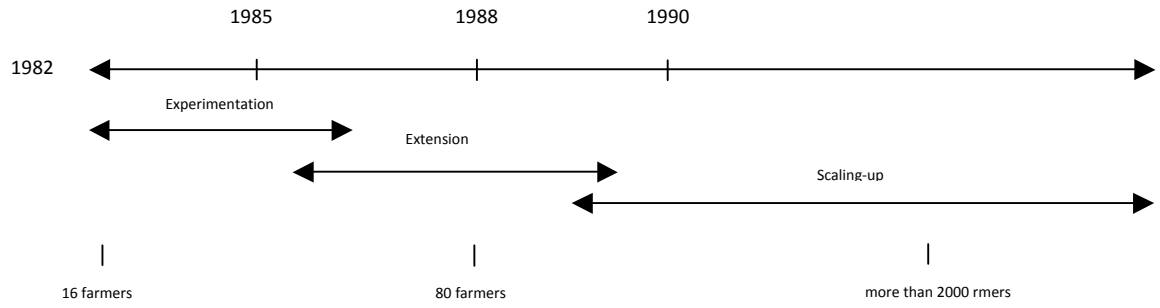


Figure 2. Program implementation phases

1.3.3. Evolution of the target and end-users

Target users were identified after exchanges with OHVN, DNA, IER, alphabetization services. Siby area was the first pilot test because of accessibility, farmers' collaboration level, the site particularity (not to dry and not to wet). So, 4 villages (Bancoumana, Kenieroba, Kongola, Magandiana) experimented respectively sorghum for the two first ones and millet for the following were identified. Four (4) farmers tests were chosen by researchers in each village leading to a total of 16 farmers. At the onset, 16 volunteers' farmers were involved in the project. Following the results achieved over the different years, the number of farmers has increased. Although no formal records exist to depict with accuracy the number of farmers that have adopted and/or used the information has expanded as the project developed towards the successive phases. At the demonstration and scaling up phase, the number of representative farmers involved in the project increased to over 2000 and the districts to five.

1.3.4. Products and services provided

Over the lifetime of the project, farmers were given rain gauges to measure rainfall in their fields, and were trained in taking measurements and using them in conjunction with sowing calendars, which indicated suitable planting dates and appropriate crop varieties in the

different locations. The rainfall data collected reaches the multidisciplinary working group. The data was processed during the multidisciplinary fortnightly meetings. It is also during these meetings that agro-meteorological opinions, warnings and advice are formulated and circulated by means of the national radio and television, to the local community.

Advice given to rural communities generally deal with the following:

- Agro-climatic reference tables, for planning agricultural activities (the appropriate time for preparing the field and the agricultural seeds);
- The right time to begin the planting season, with the help of planting forecast tables, daily rainfall figures, hydrological reports and daily weather forecasts;
- The appropriate time to undertake the various agricultural activities, such as: mobilization, field clearing, the use of different varieties of seeds and pesticides, etc., based on the hydrological report and daily weather forecasts;
- The outbreak of certain crop diseases, especially mildew (warning based on rainfall, temperature and humidity).

During the project lifetime, the following were the products and services provided to the farmers by the GTP through the different stakeholders:

- 10-day bulletins with summary information on hydrological, meteorological, agricultural and pest conditions, as well as corresponding advice and recommendations,
- 3 days weather forecasts were also provided,
- Climatological crop calendar
- Climatological sowing dates
- Estimates of water requirements of the different crops in each of the major agro-climatic zone;
- Crop water balance computations at the end of each dekad;
- Dry and wet spells;
- The probability that the rainfall for the next ten days will be equal to or greater than the climatological plant water demand for that specific ten-day period.

1.3.5. Monitoring and evaluation

In 1993, the project held its first stakeholder workshop in order to encourage participants to evaluate activities. Evaluation workshops were held every two years in each of the six districts where the project was implementedd. This has also coincided with a scaling-up of project activities, resulting in the following:

- The number of farmers trained by the project is now more than 2,500;
- Local production of raingauges has begun and is beginning to replace the more expensive imported gauges;
- Four local-level multidisciplinary teams have been created. These groups complement the national-level group, allowing the project to work more closely with farmers;
- Agrometeorological information is now provided to an expanding number of farmers' organizations, rural programs, development agencies, and NGOs.

Several communications at high level policy events (e.g. Council of Ministers, Parliament Session) were done by staff from the NMHS to update the State and policy-decision makers on the status of the project. This regular sharing and communication of information on the project has led to a strong buy-in by the Mali Government.

1.3.6. Project funding

The Swiss Agency for Development and Cooperation (SDC) provided funding for 23 years (from the onset till 2005) of the Mali agrometeorological project, before handing over full responsibility to the Mali Government to take over the project planning, management and financing. There was a built-in smooth transition in handing over the project to the Mali Government which ensured its sustainability and demonstrated national ownership as a desirable capacity development element.

Other financial supports were provided by the Italian cooperation, Spanish Cooperation to undertake some specific activities such as meteorological advises to farmers (Italian Cooepration in 1995), roving seminars (Spanish Cooperation). Greco (through OMM) funded in 2012 focused in data collection and processing activities.

2. Key enabling factors of the project success

Over the lifetime of the project, several factors have contributed to shape the success and notoriety of the project. The following summarizes the main key enabling factors of success:

- the multidisciplinary team work and approach used at the onset of the project with many relevant public agricultural-related services
- the project farmer-centered approach, which has led to the development and delivery of climate products and services to meet their needs
- the sustained relationships among the diverse groups of stakeholders
- translation of the information into multiple local languages in more user-friendly formats to ensure effective use and sustain the agricultural sector
- the solicitation of user feedback as the engine that drove the process
- innovation, creativity and realism in the design of the project
- commitment by the Mali government in 2001 to strengthen the meteorological service,
- national buy-in of the project and political support for the Mali NMHS by the government
- long-term support from the SDC as well as technical backstopping from WHO and AGRHYMET
- effective communication channels, especially between the multidisciplinary working group that facilitated information flow between representative farmers and the climate information providers at the national and regional level,
- building on existing national systems
- use of radio as en effective medium for information dissemination

3. Key constraining factors

Aside from the successes, the project has come up against some limitations:

- Limitation in providing reliable local-scale information top farmers
- low literacy levels and little formal education among farmers such that highly scientific information is broken down to simplex syntax and translated to local languages for usability by farmers.
- No funding to sustain research development activities

- funding for agriculture extension officers was limited and field visits to farmers reduced
- decline of the national rainfall stations observatories
- limiting factors in the development of relevant climate products included the advancement in weather and climate science, the capability of the NMHS and the funding
- Need capacity building of meteorological agents
- Livestock, forestry, fishing issues were not thoroughly integrated to provide farmers with a broad perspective
- Communication issues were not well developed at that time because only ORTM was active
- Availability of data collection sheets
- Difficulties to access to meteorological data
- Confusion in the methodology, in fact the effects of fertilizer and meteorological advises were not dissociated.

4. The way forward

4.1. Institutional factors necessary for scaling up

- Creation of a multi-institutional frame work leading to a multidisciplinary team (formally recognized by a text adopted by government)
- Organization of farmers through participatory approach
- Training of farmers (alphabetization and data collection)
- Huge use of communication means
- involvement of NGOs and private sector (consultant office)

4.2. The main institutions and their role to success scaling up process should be:

- Farmers organization who will participate to the establishment of climatic balance in their own zones (use of local rain gauge)
- NGOs and Consultant offices as intermediaries since they have qualified human resources

- Extension services which knows very well how to communicate and transfer messages to farmers
- Government to create a formal framework with clear rules
- Communication services (radio, television, Web etc.) to widely broadcast technical messages
- Municipalities and deputies for sensitization of local population and invitation of Government to fund climate related projects.