

State of Climate Change Adaptation and Mitigation Efforts for Agriculture in Mali

National Survey

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A. Overview

One of the particularities of Mali is the massiveness of its land, which creates a variety of environmental realities and requires region-specific approaches on mitigation and adaptation. Indeed, the oversimplified three-zone breakdown of the country's climate tends to overlook several pockets of specificities and varieties of climate realities. As a result of this diverse environmental landscape, programs and projects on environment and climate change are not evenly distributed across the country, and approaches vary depending on regional needs and threats. Thus, as we will see later in *Table 3*, some areas seem more projects-heavy than others, and some projects are more successful in some areas than in others.

Given the size of the country and its location, some of the challenges to agriculture are low rainfall and water supplies, but also concerns over untapped water supplies to some extent. This explains why several adaptation and mitigation projects (as well as projects on agriculture) involve irrigation and water distribution. However, concerns over the effectiveness of such techniques and their consequences on the overall food security are still vivid.

As revealed by some experts¹, despite the relative abundance of water resources – with Niger River and 17 major lakes – Mali is still facing water challenges due to (1) wastes and not-so-rational systems of irrigation, especially in the Office du Niger region; (2) increasing sedimentation of water sources and (3) other pollutions (an estimate of 30,000 billion m³ of water is lost every year in the Niger delta – partly as a consequence of decreasing rainfalls). Furthermore, due to the repetitive cycles of droughts and aridity that have affected the country over the past three decades, numerous water sources have been greatly affected. For instance, the Interior Niger Delta, which used to measure 30,000 km² in 1980, had shrunk by about 5,000 km² by 2004.² Among other approaches, the three coauthors urge the government and partners to consider the following:

- (1) Stepping up campaigns of information and education for local populations
- (2) Promotion and dissemination of research-generated technologies and findings in the fields of agriculture, forestry and livestock
- (3) Strengthening regional cooperation with regard to cross-border environmental resources and rule enforcement
- (4) Improving and Increasing water retention and irrigation
- (5) Use of seeds and crops that are more adapted to climate change – through research on photoperiod sensitivity

¹ Dr. Hamala Diakité, Birama Diarra and Mamadou Macina, “*Elaboration de Stratégie d'Adaptation des Ressources en Eau aux Changements Climatiques [Elaboration of Strategy on Adaptation of Water Resources to Climate Change]*”

² Ibid.

- (6) Use of better agricultural practices
- (7) Establishing a better system for dissemination of agro-meteorological information and advice for the rural community.

When it comes to vegetation matters, some analysts have concluded that reforestation is far from being the silver bullet for mitigation. Reforestation, according to them, has been going on for quite a long time, but due to a lack of proper care and follow-ups, it does not seem to have produced good results. Consequently, reforestation campaigns are now seen by some people more as politically driven initiatives than as a serious mitigation measure. Thus, they suggest more emphasis be put on preservation of existing trees, rather than planting newer ones just to please.

In its ongoing efforts to contain these many challenges, the Malian government has set up and strengthened an institutional mechanism as PNPE (*Politique Nationale de Protection de l'Environnement [National Policy for Environmental Protection]*). PNPE is a nine-program mechanism which aims at helping and guiding policymakers in their approaches to climate change. Among these PNPE programs, there are:

- National Program for Management of Natural Resources,
- National Program on New Renewable Energies,
- National Program for Information Management on Environment,
- National Program for Information, Training and Communication on Environment,
- National Program for Monitoring and Implementation of Conventions on Biodiversity, Climate Change and the Ozone Layer,
- Program for Research against Desertification and for Environmental Protection.

In addition to these nationwide programs, each administrative region is required to elaborate their region-specific programs of action. On the institutional level, CNCCM³ has been created by the government to ensure coordination and execution of the various strategies on adaptation and mitigation. Given the complexity of these strategies and the necessity of proper coordination, CNCCM has been given consequent structural means of operation, including:

- Strengthening of working groups on various existing themes and programs,
- Representation of all the institutions that possess important data and studies on climate change in the Committee,
- Stressing to the various institutions the importance and necessity of their full implication and participation in order to ensure perpetuation and survival of follow-up activities.

Judging from its composition (over 50 institutions represented), CNCCM's extremely long membership list seems to constitute a major handicap to its operations, in terms of decision making as several members have contrasting agendas and interests. For the time being, it seems too early to evaluate the extent of this potential handicap as the Committee is less than 5 months old; hence the necessity to keep an eye on this agency's activities and results moving forward.

Nowadays the center of all attentions in terms of mitigation and adaptation is focused on carbon projects. Mali, indeed, has over forty well defined carbon projects – one of the largest and most detailed carbon program portfolios in the region. They were born to the CDM (Clean Development Mechanism) and include improved cooking stoves, biofuels (*Jatropha Curcas*), solar energy. etc. But, as revealed by Mr. Sékou Koné of the Carbon

³ Comité National sur les Changements Climatiques au Mali [National Committee on Climate Change in Mali]

department of AEDD⁴, so far only one (Project # 2 on Biomass and Energy) has fully been executed⁵ – in part due to the relative newness and limited visibility of the initiative. They are entirely dedicated to private sector funding and implementation, and Mr. Koné and his team have been traveling across continents to identify potential investors for the remaining projects. Judging from the level of enthusiasm that their marketing campaigns have triggered, Mr. Koné believes there are serious reasons to be optimistic.

On the regional and international level, Mali is party to most conventions and treaties on climate change and environmental protection⁶. Also, the country has a wide net of partners both internally and from across the globe. But as a country with limited resources, Mali is at the receiving end of most of these treaties and partnerships. This limits the country's independence in terms of priorities and budgetary allocation. In fact, only 7% of the national budget has been allocated this year to climate change and environmental matters, which makes this sector one of the least funded compared to education and health, and the Malian government must rely on foreign donors to satisfy its mitigation and adaptation needs. In terms of technology transfer, Mali, along with other cotton producing countries in the region, has benefited from the EMBRAPA program (*Empresa Brasileira de Pesquisa Agropecuária*) through the Brazilian Technical Cooperation Agency. The state-owned EMBRAPA mainly involves a transfer of agricultural technology from Brazil to cotton producing countries of West Africa. Also, as a relatively new program, its impact could not fully be evaluated until after many years down the road.

B. Profile

1. National government

1.1 Organization and structure of actors

1.1.1 National government coordinating body

The Ministry of Environment and Ministry of Agriculture represent the main pillars on issues related to climate change and food security. The Ministry of Agriculture (in charge of implementing and enforcing food security and agriculture related policies and laws), Ministry of Environment tasked with enforcing and supervising the implementation of environmental regulations. Two of our main partners (AEDD and IER⁷) are affiliated to the Ministry of Environment and Ministry of Agriculture respectively.

As far as missions are concerned, there is no national institution per se with exclusively assigned mission of dealing with issues related to mitigation and adaptation in agriculture, land use and forestry. Due to this institutional vacuum, AEDD steps in to coordinate all environment-related matters and projects nationwide. Along with AEDD, CNCCM has also been established to coordinate government strategies and liaise with UNFCCC.

AEDD has a twofold mission centered on promoting sustainable and long-term development while preserving the environment (that is, adaptation and mitigation programs). It is the focal point for the Kyoto Protocol. As such, it is in charge of the CDM, and

⁴ Agence de l'environnement et du Développement Durable [Agency for Environment and Sustainable Development]

⁵ Project # 2: Contact person: Mr. Ousmane Samassekou (Tel: +223.76.41.77.00/Email: sewakadji@yahoo.fr)

⁶ Treaties and Conventions signed: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, Wetlands, Whaling

⁷ IER is a research center tasked with conducting laboratory studies on crops, seeds and soils for adaptation and mitigation purposes

supervises carbon programs. AEDD is a relatively young agency, created a year ago⁸. It comprises five departments including:

- (1) Department of Partnerships and International Actions (DPIA). It is composed of two Sections: (a) Section of multilateral agreements on environment and (b) Section of Partnerships and Fundraising/Development
- (2) Department of Promotion of Sustainable Development (DPSD): also with two Sections: (a) Section of execution of development projects (prepared and recommended by the National Council on Environment – CNE), and (b) Section of environmental evaluations
- (3) Department of Studies and Planning (DSP) has two Sections: (a) Section of studies and research, and (b) Section of planning. The latter section is responsible of land use issues, for part of its assigned mission is to elaborate, promote, follow up and evaluate national programs on environment and land management, management of natural resources and waters, as well as the overall improvement of living conditions, durable management of lands and adoption of newer and renewable energies.
- (4) Department of Communication and Management of Environment-related Information (DCMEI): made up of two Sections – (a) Section of communication and (b) Section of information management
- (5) Department of Training and Documentation (DTD): (a) Section of training and (b) Section of documentation (archives).

As far as the composition is concerned, this department is managed by a Department Chair, and the Section of Planning is run by a Section Chair – all under the hierarchical leadership of AEDD Chairman. AEDD is a public institution affiliated to the Ministry of Environment and funded on state budget. International donors (such as Germany, Sweden, Norway and Copenhagen Conference funds) and NGOs also contribute financially. Also, as a public institution, the management has no control over staff selection and assignment as decisions are made at higher levels.

CNCCM, on the other hand, was established by a government decree on March 11, 2011 for the following purposes:

- Work on the execution and compliance with all UNFCCC-related obligations and all other bilateral or multilateral agreements on climate change,
- Help secure funding for execution of all UNFCCC-related obligations on both national and international levels,
- Prepare and ensure Mali's participation in climate change-related conferences and meetings,
- Organize minutes for conferences, meetings and other related activities,
- Promote and develop synergy with other conventions, such as Convention on Biological Diversity and Convention on fight against Desertification,
- Promote strengthening of national capacities on climate change,
- Provide the National Council on Environment with information and opinions on all climate change issues.

⁸ AEDD was established by law: Loi N°10-027 of July 12, 2010. Its predecessor (STP/CIGQE: Secretariat Technique Permanent du Cadre Institutionnel de la Gestion des Questions Environnementales) was established by a government's decree of December 24, 1998 – which in part explained its operational handicap as it was not established by law

In terms of institutional structure, CNCCM is led by the Minister of Environment (as the national chairman) and AEDD presides over its secretariat. In terms of membership pool, CNCCM comprises a representative of 55 major national, regional and international stakeholders or environment-related agencies⁹ (including: Department of Meteorology, IER, AEDD, National Coordination of Farmers' Organizations, West-African Development Bank, National Youth Council, Coordination of Nongovernmental Women Associations and Organizations, and many others). Decisions are made based on simple majority vote of all the members; but in case of ties, the chair's position weighs more.

CNCCM has been broken down into five thematic groups, including:

- Adaptation to climate change, which includes risks and catastrophes,
- Mitigation, reduction of GHG emission, prevention of deforestation,
- Transfer of technology,
- Funding,
- Capacity strengthening

1.1.2 Major government units

The newly established CNCCM is the main national liaison to UNFCCC. As a new agency, CNCCM has yet to prove its capabilities through results. However, it would not be unfair to point to the Committee's lack of experience as one of its early challenges – that is how to reconcile interests of the various members and create a harmonious work environment.

IER (Institute for Rural Economy). Its core mission is to conduct researches and studies on the implementation of national agricultural policies. On the national level, IER represents over 70% of the research potential. Over the past 20 years, IER has undertaken some important steps towards internal restructuring, which have enabled it to improve technical and scientific performances, while strengthening relationships with the downstream actors (users of final products). Part of this restructuring process has involved a push for decentralization, which has been credited for opening up all agro-economy-heavy regions across the country to research centers. As a public institution, IER is funded by the state through its annual budgeting mechanisms. IER is composed of: (1) Chairman, (2) Deputy Chairman, (3) Director for Scientific Research, (4) Director of Technical Support, (5) Human Resources, (6) Office of Documentation, Information and Publication, (7) Office of Management, (8) Financial Resources. On the local levels, IER is represented by numerous local research centers (CRRA¹⁰) throughout the country: Sotuba (rainfall: 800-1000mm), Kayes (rainfall: 600-800mm), Sikasso (rainfall: 1000-1200mm), Niono (rainfall: 600-800mm), Mopti (rainfall: 400-600mm), Gao (rainfall below 400mm). In addition to these regional centers, there are nine sites for research on agriculture: Samé, Sotuba, Baguinéda, Sikasso, N'Tarla, Niono, Cinzana, Mopti and Diré – major countrywide or region-wide researches are conducted in these sites. To ensure full coverage of the country, another thirteen sub-sites (Ségala, Béma, Kita, Katibougou, Kolombada, Tiérouala, Kébila, Finkolo, Farako, Koula, Baramandougou, Koporo and Bagoundié) have been erected in other remote areas.

The first observation of the management team and senior position in each of these centers is the male domination. Contact information for IER Sotuba in *Table 3* below.

⁹ These agencies include international funding agencies, donors, governmental agencies, NGOs, women organizations, unions, and other civil society

¹⁰ Centres de Recherche Agricole

1.2 National policy

1.2.1. NAMAS, NAPAS:

NAMAS do not exist for now, though discussions are underway.

NAPAS: the first one was completed and submitted in 2007. Several institutions participate in the preparation of the NAPAS, including government agencies (AEDD, Mali Meteorology), international organizations (UNDP) and NGOs (Global Environment Facility). As the new coordinating agency, AEDD will assume coordination for the future NAPAS. In terms of priorities, Agriculture has a lion's share in the 2007 NAPAS, representing at least 7 out of the 19 top projects on adaptation.

1.2.2 National Communications to UNFCCC

It was prepared by numerous institutions (as listed in *Table 1*) under the coordination of Mr. Abdoulaye Bayogo of CNRST¹¹ (working now at UNDP). Each one of these participating agencies provided a set of data related to its department and expertise. But since the establishment of AEDD, the coordination is being transferred into this new agency, and this includes the 2nd communication that is currently being worked on. The first (and so far only) one was submitted in September 2000.

Agriculture, livestock, transportation and energy have been identified as among the most polluting sectors. In the energy sector, the CO₂ represents over 97% of GHG emissions (or a total of 945.03 Gg). Plans of improvement include a push for clean energy technology, including solar energy, wind energy and biofuels.

1.2.3.2 If Low carbon development plan or equivalent exists:

As mentioned earlier, Mali has one of the most detailed and extensive carbon programs in the region. A catalogue of carbon projects (*Portefeuille de projets carbone au Mali*) describes each project in detail, including their target emission reduction levels. It is prepared by the carbon department of AEDD – Mr. Sékou Koné is the contact person for carbon projects within AEDD. A number of these projects involve agriculture directly or indirectly. *Table 2* lists some of these projects along with their description and strategic areas of focus.

1.2.3.3 For agricultural development plan

The national agriculture plan is embedded in a large pool of projects and programs on the national, regional and international levels. These programs include PDA¹², PNISA¹³ and PNIP-SA¹⁴. The latter (PNIP-SA) is a five-year (2011-2015) ECOWAS-inspired and AU-supported plan intended to step up funding and technical support to national agriculture projects within the region. Other supporting organizations include NEPAD, USAID, Spain, France, World Bank, EU (details on objectives in *Table 4 below*)

¹¹ Centre National de la Recherche Scientifique et Technologique [National Center for Scientific and Technological Research]. CNRST was established by law (loi n°86-10/AN – RM of 8 March 1986).

¹² PDA: Politique de Développement Agricole [Policy on Agricultural Development]

¹³ PNISA: Programme National d'Investissement dans le Secteur Agricole [National Program for Investment in the Agriculture Sector]

¹⁴ Plan National d'Investissement Prioritaire du Secteur Agricole du Mali [National Plan for Priority Investment in the Agricultural Sector of Mali]

Food security and self-sufficiency are among the top priorities of the Malian government. The government, indeed, prides itself on its efforts and successes in rice production – per the first national communication, Mali is the fourth largest rice producer in the UEMOA¹⁵ region, and one of the few countries in the region projected to meet all of their needs in a near future – as of now, rice represents 20% of national consumption in cereals. However, rice is not the only focus of the policymakers’ attention. As the most consumed crop in the country (with 81% of the population), sorghum attracts a great deal of attention in terms of research priorities and government funding.

Speaking of research priorities, Sorghum research department is one of the success stories at IER, according to Mr. Abocar Oumar Touré¹⁶. Mr. Touré and his department have been working on finding the most cricket-resisting and climate-adapted crop seeds. One of the main findings is a 100-day cycle variety for the northern and most rain-scarce region.

1.2.3.4 Climate change policies:

From agro-meteorological forecasts to research findings, to national communications, to climate policies, technicians have been relying on scenarios and predictions (based on past experiences). Using scenarios (best-case scenarios and worst-case scenarios), researchers and meteorology technicians enable policymakers to prepare for eventualities and prevent possible crises. For instance, past experiences on cricket attacks and rainfall scarcity led IER (sorghum department) to push for more funding for the *diakoumbé*¹⁷ variety, proven more adapted and more resistant (as revealed in its name – Jakunben meaning, in Bamanankan, “drought-enduring”).

1.2.4 Financing

Public climate change agencies are funded on government budget (about 7% of national budget last year). However, given this limited size of budget allocation, most agencies (especially research centers such as IER) rely more and more on foreign donors (public, private and NGOs). As government agencies, these organizations (despite their relative autonomy) have binding requirements to operate within their budgetary allocation and partners’ donations, and not take on loans without central government’s approval. Only the central government (budget generator) has the legal right to incur deficits and take on loans.

1.2.5 National issues or debates

Although there is no record of serious protests or debates, Mr. Djiriba Traoré and Dr. Mahamadou Traoré (of AEDD) recall a series of mild protests by civil society organizations against GMOs and some biotechnology policies in the past. To remedy further dissatisfactions and prevent potential future protests on major policies, the National Council for Civil Security and numerous NGOs and unions are represented in decision making structures (such as CNCCM).

1.2.5.1 Priorities

¹⁵ UEMOA: Union Economique et Monétaire Ouest-Africaine [West African Economic and Monetary Union] is an eight-member union of West African nations (Benin, Burkina Faso, Cote d’Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo) which share the CFA currency.

¹⁶ See Mr. Touré’s contact information in Table 4 below

¹⁷ Diakoumbé comes from two words in the local language: *dja* (meaning “dryness” or “drought”) and *koumbé* (meaning “fight”) → dryness-resisting sorghum.

Mali presents numerous opportunities for investment in various adaptation/mitigation projects and initiatives. As listed by Dr. Hamala Diakité (of IER), Dr. Mamadou Macina and Mr. Birama Diarra (of Meteo Mali), the new priorities in adaptation and mitigation involve modernization of irrigation and water retention. Given its limited resources, the government cannot undertake all these initiatives by itself. External investment is also needed. As far as carbon programs go, investments are already underway, and given the long list of still-pending projects, great opportunities of investment are expected in the coming years – judging from Mr. Koné’s projections. Thanks to an aggressive international marketing for these carbon projects, the Ireland-based Ecosurety and its affiliate in Morocco have promised to look further into them for potential investments. Also, as a result of their participation in two global fairs in Barcelona and Marrakech, Mr. Koné and his team were able to convince several potential investors to visit Mali and explore investment opportunities. Speaking of CDMs and carbon programs, Mali and Senegal are the two pillars of jatropha biofuel projects in the region. This ambitious and money-consuming program requires heavy investments.

1.2.5.2 Linkages between adaptation and mitigation and potential for coordination

There is no clear separation of structures dealing with them. Mitigation projects are usually embedded in adaptation initiatives. Mali puts more emphasis on adaptation, because it’s a net pollution consuming country (it receives more pollution than it emits). Nevertheless, as a result of recently elaborated NAPAS and CDMs, projects are becoming more and more specific.

Irrigation projects (such as *Programme National de Petits Barrages et Bas-Fonds [National Program for Small Dams and Low-Grounds]*), initially designed for adaptation purposes, have a positive impact on carbon reduction as it improves vegetation, which helps contain CO₂ pollution. On the other hand, some mitigation projects (including biofuel program) aim to develop and disseminate more resisting and resilient varieties such as jatropha.

1.2.5.3 REDD:

Although in its very early stages – no document on REDD has been structured as of now –, Mali has included at least one REDD project¹⁸ in its CDMs and carbon programs. Indeed, the 20000 hectare project (in the carbon project catalogue) is a test for investors’ enthusiasm vis-à-vis the REDD. This project has not been funded yet, but it has the merit to represent a starting point. Per Mr. Sékou Koné (AEDD), there is no clear idea as to when the first REDD documents will be made available.

1.2.5.4 Capacity strengthening:

Mali is a member of many regional organizations such as CILSS¹⁹ and, as such, hosts one of CILSS’s training centers (*Institut du Sahel*). The other training center (Agrhymet) is located in Niamey (Niger). Given the relative high cost for admission to these training institutes, only those who can afford to pay attend them. This explains the low rate of attainment by Malians and nationals of neighboring countries. Nonetheless, some international

¹⁸ Portefeuille de Projets Carbone du Mali [Portofolio of Carbon Projects in Mali], June 2011, p 12.

¹⁹ Comité Permanent Inter Etats de Lutte contre la Sécheresse au Sahel (CILSS) has nine members: Bissau Guinea, Burkina Faso, Cape Verde, Chad, Gambia, Islamic Republic of Mauritania, Mali, Niger and Senegal.

scholarships and sponsorships are available for those who qualify. On the national level, National Engineering School is one of the rare training institutions.

The number of aging and retiring public sector staff is on the rise. Over the next five years, up to 60% might retire. To address this potential challenge and avoid potential disruptions of mitigation/adaptation projects, there is a pressing need to help the various government units in charge of climate change issues to prepare new generations of technicians and civil servants. It's not just about quantity, but also quality; hence a necessity to step up efforts in building human capacity as a mean to address this issue. Capacity building needs span from a lack or insufficiency of data in the sectors of agriculture, forestry and soil affectation (which makes it hard to elaborate viable scenarios for reference on climate) to a lack of high tech means/methods of mitigation and adaptation, to insufficiencies in the training of national experts. According to some experts, including Dr. Diakité (IER) and Mr. Diarra of Mali Meteo, any national strategy on capacity building should revolve around the following points:

- (1) An elaboration of a national program of development and strengthening of capacities in order to improve data collection on the national level
- (2) Transfer of technology (including improvement of farmers' production tools and equipments – adoption of better techniques)
- (3) An elaboration of a nationwide program of information and education
- (4) An elaboration of a strategy for training and research.

1.2.5.5 Research priorities on agricultural adaptation and mitigation

As an agriculture-dependending country, Mali has a track record of tailoring many of its adaptation and mitigation projects to its agricultural needs. Up until recent years (with the rise of CDMs and carbon projects), mitigation and adaptation projects were quasi-exclusively linked to agriculture and livestock. As shown in *Table 4* below, the overwhelming majority of projects are focused on agriculture and food security. CDMs are yet to attract the enthusiasm that agriculture and livestock have had so far. According to Mr. Abdoulaye Kanté (of AEDD), out of the 19 NAPAS projects, two have received full funding, and both of them deal directly or indirectly with agriculture. Indeed, *le Projet sur la Résilience du Sector Agricole aux Changements Climatiques [Project on Resiliency of the Agriculture Sector to Climate Change]* is one of the favorite projects in terms of adaptation and mitigation. Per Mr. Abocar Oumar Touré of IER (sorghum department), finding the best quality and the most productive varieties is the priority of all priorities within his agency.

2 Other major actors

2.1 Non-governmental institutions

Like in many other countries in the region, numerous NGOs (both national and international) have been active on climate change issues in Mali. The noticeable include:

- AGRA – its intervention in Mali aims to help develop seed and crop policies in order to increase adoption of better, more adapted and more resilient varieties. AGRA has stepped up its assistance in irrigation projects as well as the dissemination of better agricultural practices. It also helps the government to develop policies aiming to improve soil quality. Furthermore, AGRA encourages the government to fully enforce policies and rules on property rights in order to encourage private and international investment in the agricultural sector.

- ICRISAT – intervening in various research initiatives through its Samanko center. It also provides support to local research agencies, including IER.
- Mali Folke Center – intervening mainly in clean energy and renewable energy sectors. Mali Folke Center, which is part of REEEP (Renewable Energy and Energy Efficiency Partnership), is on the front line in the nascent CDMs and clean energy initiatives.

Moreover, as mentioned earlier, the newly established CNCCM is a conglomerate of government agencies, international institutions, civil society (unions, women organizations, youth organizations, national and international NGOs). Each of these institutions has a representative and equal voting right during CNCCM's biannual meetings and other important gatherings on climate change policies.

2.2 Private Sector

The massive list of carbon projects (newly published) is entirely dedicated to the private sector. Not only is the government withdrawing from these projects, but also its marketing hand (carbon department of AEDD) has been pursuing an aggressive international campaign to lure potential investors. On the policy level, the private sector's main lobby and negotiation voice (Malian Chamber of Trade and Industry) has an active representation and a voting right within CNCCM.

2.3 Agricultural input providers

IER is the main national research agency in the country. The sorghum department of IER, for instance, works on not only creating more adapted and resilient varieties, but also finding varieties which are more likely to satisfy farmers and consumer preferences and desires. By creating the *diakonbé* and *Segfa* varieties for example, IER greatly contributed to transforming the desert-threatened far northern region of the country into an agricultural land.

The seed creation process, as described by Mr. Abocar Oumar Touré, is a seven-step (eleven-year long in average) series of tests and selection by IER researchers and their partners in rural areas. At each one of these seven steps, there is a laboratory of seeds that certifies the finding. Upon completion of this multiple-step process, the final result is submitted to a homologation commission for certification.

2.4 Influential individuals

See *Table 3*

2.5 Major donors

FAO

WFP

World Bank through West Africa Agricultural Productivity Program (WAAPP)

Norway

Germany

INTSORMIL²⁰

²⁰ The International Sorghum and Millet Collaborative Research Support Program (INTSORMIL) was established in 1979. It supports international collaborative research to improve nutrition and increase income in developing countries and the United States. The program focuses on enhancing production and use of sorghum, millet and some other grains (finger millet, fonio and tef). This work has also identified new farming practices that improve yields, reduce crop losses to pests and protect natural resources and helped to develop

Japan
CIDA (Canada)
USAID
UNDP
African Development Bank
BOAD
UEMOA
ECOWAS through West Africa Agricultural Productivity Program (WAAPP)

3 Project and program inventory: Climate change and agriculture

3.1 Overview

Despite the slow and timid reaction to Mali NAPAs projects, there are numerous cases of successful mitigation and adaptation projects. Judging from their priorities and goals, numerous adaptation projects in Mali have at least one thing in common: they revolve around irrigation and farmer empowerment. This makes these projects achieve more than their initially intended purposes because irrigation, for example, helps farmers to adapt and improve productivity while promoting humidity and forest-friendly soils (i.e. mitigation).

As one of the largest West African countries (with one of the most diverse climate landscapes), Mali is in constant need of area-specific projects, especially in the northern region of the country. Unfortunately, the lack of enthusiasm around some countrywide adaptation/mitigation projects such as EER, PAFS and PADFP-Mali (details in *Table 4* below) cripples or delays some important projects. This added to the already slim government budget allocation to environment-related projects. Mr. Abocar Oumar Touré of IER, while gratefully acknowledging the financial support from ICRISAT and INTSORMIL, revealed some serious financial paralyses during the execution of their multiple-step laboratory experiments and seed creation projects. This has the potential of disrupting or discontinuing some important projects. Nonetheless, in many pilot projects, Mali has been a trusted choice for many international organizations.

Given its location and the uniqueness of the challenges it faces, Mali has served as a pilot country for some new and innovative projects aiming either at adaptation or at mitigation (or at both). For instance, Mali is the only West African country selected to host a recent World Bank/FAO-sponsored program on BioCarbon Fund. This public/private, four-project initiative administrated by the World Bank “aims to deliver cost-effective emission reductions, while promoting biodiversity conservation and poverty alleviation. The fund can consider purchasing carbon from a variety of land use and forestry projects (including Afforestation and Reforestation, Reducing Emissions from Deforestation and Degradation) and is exploring innovative approaches to agricultural carbon.”²¹ Along with three other countries – India (Afforestation project in Himachal Pradesh), Ethiopia (Assisted natural regeneration project in Humbo) and Moldova (Soil conservation project) –, Mali (Acacia Senegal Plantation) has been chosen as the test country for the BioCarbon Fund projects. The Acacia Senegal Plantation (ASP) project in Mali aims at reforesting around 6,000 ha of Acacia Senegal; endemic specie that covers the whole African Sahel in the

new markets for these important grains. Access to foreign genetic material has also improved U. S. sorghum and millet production and utilization [Source: intsormil.org].

²¹ United Nations Food and Agriculture Organization. *Comparing results of Carbon balance appraisal using on-going Bio-Carbon fund projects*. March, 2010 <
http://www.fao.org/fileadmin/templates/ex_act/pdf/Comparing_Carbon_balance_results.pdf>

northern region of Nara. The project shall also re-introduce agricultural activities through intercropping with groundnuts and cowpeas. The project will respond to the disappearance of Mali natural dry forests, which is provoked by the growing demand of firewood and cattle grazing. This deforestation has particularly affected gum-producing *Acacia Senegal*.²² If proven successful, the ASP could potentially be spread across the Sahel region thanks to shared climate landscape and soil requirements.

3.2 Tables with basic information

(Table 4)

²² United Nations Food and Agriculture Organization. *Four BioCarbon Fund projects* <
<http://www.fao.org/tc/exact/ex-act-applications/on-projects/biocarbon-fund-projects/en/>>

Appendix

Table 1: List of Participating Agencies for National Communication

Sectors	Participating Institutions
Agriculture, Forestry and Soil Change	<ul style="list-style-type: none"> - Department of Forestry, Fauna and Fishing Resources - Center for Scientific and Technological Research (CNRST) - Department of Livestock - IER - Department of Meteorology - Department of Agriculture
Wastes (including Industrial)	<ul style="list-style-type: none"> - Department of Roads and Dump - Ecole Normale Supérieure (University) - National Center for Solar Energy and Renewable Energies - School of Engineering (University) - National Center for Scientific and Technological Research - Private industrial company (maker of plastics, soap, vinegar and bleach) - Department of Public Hygiene and Sanitation - Department of Industry
Energy	<ul style="list-style-type: none"> - Department of Hydraulic and Energy - Technological Applications Research Group - Training Agency for Research in Technological Innovation (NGO) - Department of Oil Products - National Centre for Solar Energy and Renewable Energies

Table 2: Carbon Projects and Agriculture

Carbon Projects in Mali					
Project Title/Description	Project Type	Conformity	Project Sponsors	Contact Person	Average tCO ₂ /Year Reduction
ALTERRE ²³	Forestation/ Tree planting	CDM & Free Market	GERES/AMEDD	Bougouna Sogoba ²⁴	188,282
MJCPP ²⁵	Planting / Fossil fuels	Free Market	Degussi Vert/ Novartis/ Eco-Carbon	Baba Siby	130,000
PPPERM ²⁶	Planting	CDM & Free	Cali/	Mamadou L.	120,000

²³ Agroc carburants Locaux, Territoire Rural et Energie au Mali [Local Agrofuels, Rural Territory and Energy in Mali]

²⁴ Contact: bougouna.sogoba@ameddmali.com

²⁵ Mali Jatropha Curcas Plantation Project

²⁶ Projet de Plantation de Pourghère pour l'Électrification Rurale au Mali [Project on Jatropha Plantation for Rural Electricity]

		Market	Carbon2Green Developments	Diallo ²⁷ / Louis Tourillon ²⁸	
VTDPJCS ²⁹	Planting	CDM & Free Market	SUDAGRI SARL	Mohamed Diarra ³⁰	1,100,000
PBTC ³¹	Planting	CDM	Zanbal SARL	Xavier Lacan ³²	1,400
1000 HM ³³	Planting	CDM & Free Market	Alassana Koite	Alassana Koite ³⁴	TBD

Table 3: Contact Information

Name	Organization	Title/Responsibility	Contact
Djiriba Traoré	AEDD	Technical Advisor	+223 65624467 djiriba.traore@gmail.com
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Birama Diarra	Mali Meteorology	Engineer (Agrometeorology)	+223.20206204 biramadia@yahoo.fr
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Abocar Oumar Touré	IER (Sorghum Department)	Seed Selection	+223.76036395 abocar2006@yahoo.fr
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Youssouf Coulibaly	Cinzana Agricultural Development	Sub-Section Leader	+223.75123622 precad@mali.net
Sékou Koné	AEDD (Carbon Department)	Section Leader	sekou_kone1000@yahoo.fr
Boubacar Dembélé	AEDD	Focal Point CDM	boubacarsdembele@gmail.com
Mamadou Camara	Commissariat pour la Sécurité Alimentaire/USAID	Documentation	layakamadou@yahoo.fr
Abdoulaye Kanté	AEDD (Division of Studies)	Division Chair	abkant@yahoo.fr

Table 4: Projects and Programs on Mitigation and Adaptation

Project/ Program	Goal/objective	Beneficiaries	Cost	Duration	Funding/ partnerships
PNPBBF ³⁵ minta_mama@yahoo	Food security/ Adaptation/ Rural	Countrywide	XOF 2.958 mil	2005-2010	Japan (KRII)/GRM

²⁷ Contact info: diallo_mamadoulamine@yahoo.fr

²⁸ Contact info: ltourillon@carbon2green.ca

²⁹ Valorisation des terres dégradées par la plantation de jatropha curcas et la culture de soja [valorization of degraded soils through jatropha and soja planting]

³⁰ Email: mohamed.diarra@sudagri-jatropha.com

³¹ Projet de Boisement de Terres Cultivées: Zanbal 2011 [Project of Tree Planting on Cultivated Lands]

³² Email: xavier@zanbal.net

³³ 1000 hectares de Moringa [1000 hectare-Moringa]

³⁴ Email: alassanakoite@yahoo.fr

³⁵ Programme National de Petits Barrages et Bas-Fonds [National Program for Small Dams and Low-Grounds]

oo.fr	development ³⁶				
RAIIZON ³⁷	Adaptation/Food security ³⁸	Ségou region	\$ 20,000,000	2010-2014	CIDA/Office du Niger
CP-OHVN ³⁹ ohvnagro@hotmail.com	Food security/environmental protection ⁴⁰	Kolikoro	XOF 346 mil	2007-2009	GRM ⁴¹
SCI ⁴²	Adaptation/ Food security ⁴³	25,000 people	\$ 19,900,000	2008-2012	CIDA/GSIC ⁴⁴
PDRN ⁴⁵ pdrn_mali@ier.ml	Adaptation/food security/transfer of technology ⁴⁶	Sikasso/Bougouni / Kolondieba/ Yanfolila/ Koutiala	XOF 3.050 mil	2005-2009	BAD/GRM
WAAPP ⁴⁷ bkeita@pasaop.gov.ml goussou.traore@ier.ml	Adaptation/Food security/ Mitigation/ Transfer of technology and knowledge ⁴⁸	Ségou/ Mopti/ Sikasso	XOF 3.797 mil	2008-2012	WB/GRM
EER ⁴⁹ assistanbrehima@yahoo.fr	Capacity building/ Access to credit/ rural development ⁵⁰	Countrywide ⁵¹	XOF 1.933 mil	2001-2008	GRM

³⁶ This program aims at water retentions for improvement in agricultural production and diversification of incomes for rural communities.

³⁷ Rehabilitation of Agricultural Irrigation Infrastructures in the Zone of the Office du Niger

³⁸ In order to help Mali feed its ever-growing population, this project is helping to develop and rehabilitate the agricultural irrigation infrastructure in the zone of the Office du Niger. This support is expected to contribute to increasing Mali's agricultural production to 10 million tons of cereal per year by 2012. L'Office du Niger is the organization responsible for promoting the development of Mali's rice production in the Ségou region. It has put in place a massive gravitation irrigation system capable of serving 960,000 ha, 85,000 ha of which have been developed and are being exploited [Source: CIDA]

³⁹ Contrat Plan Etat/Office/Producteurs

⁴⁰ The goals are: (1) income improvement for farmers; (2) food security; (3) environmental protection and development of the agricultural sector; (4) capacity strengthening for farmers' organizations

⁴¹ Government of Republic of Mali

⁴² Support to Community Irrigation

⁴³ The project aims to contribute in improving food security by increasing the production and accessibility of agricultural products. The allocated resources are to help fund tangible measures to develop knowledge and tools, to coordinate development of proximity irrigation, strengthen the Ministry of Agriculture, and for the construction of productive and commercialization infrastructures. The project goal is to increase annual agricultural production of rice and market garden produce; improve access to financial services and technical supervision; build mini-dams and storehouses; and rehabilitate rural path [Source: CIDA]

⁴⁴ German Society for International Cooperation

⁴⁵ Projet de Diffusion du Riz Nerica

⁴⁶ The project aims to contribute to poverty reduction and food security in West Africa through an increase and dissemination of more productive and more adapted rice varieties. It also aims to increase production of local rice and its substitutions, and reduce dependency on imported rice.

⁴⁷ Programme de Productivité Agricole en Afrique de l'Ouest [Program on Agricultural Productivity in West Africa]

⁴⁸ The project's purpose is twofold: (1) creation of more suitable conditions for regional cooperation in technology dissemination – for productivity, adaptation and mitigation purposes; (2) creation of a national rice specialization centre.

⁴⁹ S'équiper en Reboisant [agricultural equipment and reforestation]

PNIR ⁵² ydiarra@pnir.org	Mitigation/Adaptation/ Technology ⁵³	Countrywide	XOF 97.510 mil	2001-2008	WB/ GRM/ Netherlands/
PCDA ⁵⁴ pcda@pcda.mali.org	Mitigation/ Adaptation/ Food security/technology/ rural development ⁵⁵	Bamako/ Koulikoro/ Ségou/ Sikasso	XOF 24 bil	2006-2011	WB (IDA) ⁵⁶ / GRM
PAFR ⁵⁷ hsow@cpsma.gov.ml	Food security/ adaptation/ mitigation ⁵⁸	Ségou (zone Office du Niger)	XOF 10.495 mil	2002-2009	European Union
PAFS ⁵⁹	adaptation/ mitigation/ food security ⁶⁰	Kayes/ Koulikoro/ Sikasso/ Ségou/ Mopti	XOF 260 mil	2007-2009	GRM
PADFP-Mali ⁶¹	adaptation/mitigation	Kayes/ Koulikoro/ Ségou/ Sikasso/ Mopti	XOF 785 mil	2008-2012	GRM

⁵⁰ Strengthening farmers' technical capacities; doubling levels of poor and smallholder farmers' material equipments; facilitating access to credit for smallholder farmers; inciting famers to adopt income generating activities

⁵¹ Beneficiaries of these actions include farmers who possess at least ¼ ha of land and pledge to plant trees on it

⁵² Programme National d'Infrastructures Rurales [National Program on Rural Infrastructures]

⁵³ Purification of drinking water; rural paths/roads; large scale irrigation and small scale irrigation; environmental sustainability

⁵⁴ Programme Competitivite et Diversification Agricole [Program on Agricultural Competitively and Diversification]

⁵⁵ Poverty alleviation; increase in farmers' revenues; economic growth for the country; environmental protection → commercialization of agricultural products

⁵⁶ World Bank – International Development Association

⁵⁷ Programme d'Appui a la Filiere Riz [Program for Assistance to Rice Production]

⁵⁸ Contribute to food security and economic integration of Mali into the broader UEMOA region. Such integration could occur through a push for investments in hydro-agricultural initiatives within the Office du Niger zone. → productivity thanks to better adaptation methods

⁵⁹ Plan d'Action pour la Fertilité des Sols [Plan for Soil Fertility]

⁶⁰ Increase of productions, improvement of soil fertility; help incorporate agricultural exploitations into a greater system of sustainable and environment-friendly agriculture

⁶¹ Projet d'appui au developement de la filiere poughère au Mali [Project on Support and Development of Jatropha Sector]