

Agriculture Education and market Improvement Programme (AEMIP)

Baseline study for the AEMIP Global Climate Change Integration Pilot



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Acronyms

2iE	International Institute for Water and Environmental Engineering
ACCIC	Adaptation to Climate Change in West Africa by Improving Climate Information
ACMAD	African Centre of Meteorological Applications for Development
ACP	Africa, Caribbean and Pacific Group of States
AEMIP	Agriculture Education and market Improvement Programme
AET	Agriculture Education and Training
AF	Adaptation Fund
AFD	French Agency for Development (Agence française de développement)
AfDB	African Development Bank
AFOLU	Agriculture, Forestry, and Land Use
AGIR	Programme for Natural Resources Integrated Management (Programme d'appui à la gestion intégrée des ressources naturelles)
AMESD	African Monitoring of the Environment for Sustainable Development
ANAFE	African Network for Agriculture, Agroforestry and Natural Resources Education
ANAVICI	National Association of Poultry Farmers of Ivory Coast (Association nationale des aviculteurs de Côte d'Ivoire)
ANAVIG	National Association of Poultry Farmers of Guinea (Association nationale des aviculteurs de Guinée)
ANDASA	National Agency for Agricultural Development and Food Security (Agence nationale de développement agricole et de sécurité alimentaire)
ANPROCA	National Agency for Rural Promotion and Farm Advisory (Agence nationale de la promotion rurale et du conseil agricole)
APDRA	Association for Fish Farming and Rural Development in Africa (Association pisciculture et développement rural en Afrique)
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CAE	Livestock Support and Demonstration Centres (Centre d'appui et de démonstration de l'élevage)
CAMES	African and Malagasy Council for Higher Studies (Conseil africain et malgache pour l'enseignement supérieur)
CCSP	Chimpanzee Conservation and Sensitization Program
CDIAC	Carbon Dioxide Information Analysis Center
CDM	Clean Development Mechanism
CEO	Chief Executive Officer
CEPERMAG	National Chamber of Agriculture, the Training Centre in Agricultural Machinery (Centre de perfectionnement en machinisme agricole)
CERAAS	Regional Research Centre for the Improvement of Adaptation to Drought (Centre d'étude régionale pour l'amélioration de l'adaptation à la sécheresse)
CERESCOR	Scientific Research Centre of Conakry Rogbané (Centre de recherche scientifique de Conakry-Rogbané)
CGC	Guinea Cotton Company (Compagnie guinéenne du coton)
CH ₄	Methane
CIAT	International Centre for Tropical Agronomy
CILSS	Permanent Interstates Committee for Drought Control in the Sahel (Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel)
CIRAD	International Centre for Agricultural Research for Development (Centre international de la recherche agronomique pour le développement)
CNEARC	National Centre for Research and Studies in Hot Regions (Centre national d'étude et de recherche agronomique pour les régions chaudes)
CNOP-G	National Confederation of Farmers' Organisations of Guinea (Confédération nationale des organisations professionnelles de Guinée)
CNRA	National Agriculture Research Centre of Ivory Coast (Centre national de la recherche agronomique)
CNSHB	National Centre of Fishery Sciences of Boussoura (Centre national des sciences halieutiques de Boussoura)
CONAPEG	National Confederation of Fishermen (Confédération nationale des pêcheurs de Guinée)
CONEG	Confederation of Animal Farmers of Guinea (Confédération nationale des éleveurs de Guinée)
COP	Conference of Parties
CORDEX	Coordinated Regional climate Downscaling Experiment
CO ₂	Carbon Dioxide
CSA	Climate-Smart Agriculture
CSE	Ecological Monitoring Centre (Centre de suivi écologique)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTA	Technical Centre for Agricultural and Rural Cooperation
CTFT	Technical Centre for Tropical Forestry (Centre technique forestier tropical, now known as CIRAD-Forêt)
C2D	Debt Reduction-Development Contract (Contrat de désendettement et de développement)
DANIDA	Danish International Development Agency
DMI	Danish Meteorological Institute
DNA	Designated National Authority

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DSRP	Poverty Reduction Strategy Document (Document stratégique de réduction de la pauvreté)
ECOWAP	ECOWAS Agricultural Policy
ECOWAS	Economic Community Of West African States
EIER/ETSHER	Rural Equipment Engineering School / Rural Equipment and Hydraulic Technicians School
ENAE	National Schools of Agriculture and Livestock (Ecole nationale d'agriculture et d'élevage)
ENATEF	National School for Water and Forest (Ecole national des agents techniques des eaux et forêts)
EPAs	Economic Partnership Agreements
ETOA	Environmental Threats and Opportunities Assessment
EU	European Union
FAO	Food and Agriculture Organisation
FAPI	Federation of Bee-keepers of Guinea (Fédération des Apiculteurs de Guinée)
FAR	Network on Agricultural and Rural Training (Réseau formation agricole et rurale)
FeProRiz	Rice Farmers' Federation of Guinée forestière (Fédération des producteurs de riz de Guinée forestière)
FEREPPAH	Regional Federation of Rubber and Oil Palm Farmers' (Fédération régionale des producteurs de palmier à huile et hévéa)
FPFD	Federation of Fouta Djallon Farmers (Fédération des paysans du Fouta Djallon)
FOP-BG	Federation of Farmers' Organisations of Basse-Guinée (Fédération des organisations professionnelles de Basse-Guinée)
FUCPIS	Federation of Unions of Yam and Sesame Farmers' Cooperatives (Fédération des unions de coopératives de producteurs d'igame et de sesame)
FuProRiz	Federation of Rice Farmers' Unions of Haute-Guinée (Fédération des producteurs de riz de Haute-Guinée)
FUTA	Federal University of Technology, Akure
FUT-Minna	Federal University of Technology, Minna
F2F for AET	Farmer to Farmer for AET
GCC	Global Climate Change
GCCA	Global Climate Change Alliance
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
GICI	German International Climate Initiative
GIS	Geographic Information System
GLASOD	Global Assessment of Human-induced Soil Degradation
GoG	Government of Guinea
GTD	Desertification Working Group (Groupe travail desertification)
GWP	Global Water Partnership
HBS	Heinrich Böll Stiftung
HEA	Household Economy Approach
HIPC	Highly Indebted Poor Country
HLPFSN	High Level Panel on Food Security and Nutrition
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid-Tropics
IEC	Information-Education-Communication
IFAD	International Fund for Agriculture Development
IFDC	International Fertilizer Development Centre
IFPRI	International Food Policy Research Institute
IGA	Income Generating Activities
IGN	National Geographic Institute of France (Institut géographique national)
IICA	Inter-American Institute for Cooperation on Agriculture
IMSCE	Inter-Ministerial Steering Committee on Environment
INADER	National Institute for Rural Development Support (Institut national pour l'appui au développement rural)
IPCC	Intergovernmental Panel on Climate Change
IPR-IFRA	Institut polytechnique rural de formation et de recherche appliquée
IRAG	National Agriculture Research Institute of Guinea (Institut de recherche agronomique de Guinée)
IRD	Research Institute for Development (Institut de recherche pour le développement)
ISAVF	Institut supérieur agronomique Valéry GISCARD d'ESTAING de Faranah
IsDB	Islamic Development Bank
ISP	Institutional Support Program for Guinea's Water and Forests Department
IWRM	International Water Resource Management
JFSF	Japan's Fast Start Finance
JICA	Japanese International Cooperation Agency
KNUST	Kwame NKRUMAH University of Science and Technology
LAMIL	Landscape Management for Integrated Livelihoods
LAMIL-TBA	Landscape Management for Integrated Livelihoods – Transboundary Activity

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LDC	Least Developed Country
LDCF	LDCs' Fund
LEG	Least Developed Countries' Experts groups
LULUCF	Land Use, Land Use Change, and Forestry
M	Millions
MAEEEF	Ministry of Agriculture, Livestock, Water and Forestry (Ministère de l'agriculture, de l'élevage, des eaux et forêts)
MDGs	Millennium Development Goals
MEAS	Modernizing Extension and Advisory Services
MIROC	Model for Interdisciplinary Research on Climate
NAIPs	National Agricultural Investment Programmes
NAP	National Plans of Adaptation
NAPA	National Plan of Actions for Adaptation
NC	National Communication
NEPAD	New Partnership for Africa's Development
NERICA	New Rice for Africa
NIE	National Implementation Entities
NLPDA	New Agricultural Development Policy Letter 2006-2015 (Nouvelle lettre de politique de développement agricole)
NRM	Natural Resource Management
NTFP	Non Timber Forest Product
N2O	Nitrous oxide
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
PAE	Programme of Support to Animal Farming (Programme d'appui à l'élevage)
PASEL	Programme of Support to the Livestock Sector (Programme d'appui au secteur de l'élevage)
PEGG	Program in Environmental Governance in Guinea
PEGIR2	Project for Integrated Management of Natural Resources
PEGRN	Expanded Program for Natural Resource Management
PGRN	Program for Natural Resources Management
PIF	Project Identification Form
PNIASA	National Agricultural Investment and Food Security Plan 2012-2016 (Plan national d'investissement agricole et de sécurité alimentaire 2012-2016)
PPCR	Pilot Program for Climate Resilience
PPP	Public-Private Partnership
PRESAGG	Seasonal Climate Prediction for the Gulf of Guinea
PUAPA2	Emergency Project to Support Agricultural Productivity (Projet d'urgence d'appui à la productivité agricole 2)
RAFARGUI	Network of Stakeholders on Agricultural and Rural Formations of Guinea (Réseau des acteurs des formations agricoles et rurales de Guinée)
RAIPs	Regional Agricultural Investment Programs
RAZC	Project "Increasing Resilience and Adaptation to Adverse Impacts of Climate Change in Guinea's Vulnerable Coastal Zones"
RCPs	Representative Concentration Pathways
REDD+	Reduction of GHG Emissions due do Deforestation and Forest Degradation, and Conservation or Enhancement of Forest Carbon Stock
ROPFA	Network of Farmers' and Agricultural Producers' Organisations of West Africa (Réseau des organisations paysannes et de producteurs de l'Afrique de l'Ouest)
SCCF	Special Climate Change Fund
SOBRAGUI	Guinea Brewery Company (Société de brasserie guinéenne)
SOGUIPAH	Guinea Palm Oil and Rubber Company (Société guinéenne de palmier à huile et d'hévéa)
STEWART	Sustainable and Thriving Environments for West African Regional Development
UAC	Université d'Abomey-Calavi
UAM	Université Abdou MOUMOUNI de Niamey
UCAD	Université Cheikh Anta DIOP de Dakar
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UPBM	Banana Farmers' Union of Macenta (Union des producteurs de banane de Macenta)
USFS-IP	US Forest Service - International Programmes
UTG	University of The Gambia
WAAP	West African Productivity Project
WACDEP	Water, Climate and Development Programme
WARDA	West African Rice Development Association (now known as AfricaRice).
WASCAL	West African Science Service Centre on Climate Change and Adapted Land Use
WECARD	West and Central African Council for Agricultural Development (Conseil Ouest et Centre africain pour la recherche et le développement agricoles - CORAF)
WMO	World Meteorological Organisation

Summary for decision-makers

1. Overall context and methodology of the study

1.1. Latest facts on climate change: globally, in West Africa, and in Guinea

The main conclusions of the Fifth Report of the IPCC are alarming: the ground temperature increased by 1°C between 1901 and 2012, each of the past three decades has been successively warmer than any previous decade since 1850, the increase of temperature for the 2081-2100 period, relative to the 1986-2005 period, is likely to be between +0.3-4.8°C, and the current trend leads to +4°C by 2100.

Africa, little contributor to the climate crisis (3.4% of global GHG emissions), would be severely impacted, by a number of climatic factors. In particular: (i) 75 to 250 million people will be affected by a higher water stress in 2020, and these numbers will double in 2050 (IPCC, 2007), (ii) Yields of rainfed agriculture will fall by 50% by 2050 in some countries. Small farmers should be the most affected, their net income may fall by 90% by 2100.

In Guinea, mean annual temperature has already increased by 0.8°C since 1960, an average rate of 0.18°C per decade. It is projected to increase by 1.1 to 3.0°C by the 2060s, and 1.6 to 5.3°C by the 2090s. Beyond the increase of temperature, rainfalls will reduce at national level (with more frequent heavy rainfall events), and the number of hot days will increase. In addition to that, the coastline of Guinea will suffer from sea level rise and correlative effects, salinization in particular.

In West Africa, these impacts will be aggravated by an already significant degradation of natural resources by human activities, as well as existing human and economic factors of vulnerability. It could even be worst in Guinea, which has some specificities: the share of employment in the agriculture sector is higher than in any of the neighbouring countries (76% in 2011), the average grain yield has reduced by -2% from 1990 to 2011 (while it has increased in all the neighbouring countries), the rate of gross deforestation is high (0.5% for the 2005-2010 period) and the number of forest fires (25 fires/100km²/year over 2000-2010) is higher than in any of the neighbouring countries.

The latest IFPRI modelling of food crop production by 2050 in West Africa, taking into account a moderate 2007 IPCC scenario (A1B), do not show clear trend for major food crops in Guinea (i.e. rice and maize). However, the modelling highlight the fact that changes of food crop yields will occur and it calls for more analysis at national level, based in particular on the new 2013 IPCC scenarios.

1.2. USAID activities in Guinea and AEMIP

USAID support for Guinean environmental programs dates back to the 1990s: PGRN, PEGRN, CCSP, LAMIL, LAMIL-TBA, ISP... Currently, USAID is completing the PEGG, which among other results, created and facilitated an Inter-Ministerial Steering Committee on Environment (IMSCE). USAID also support the transboundary STEWARD project (Guinea, Sierra Leone, Liberia, and Ivory Coast) aiming at supporting community-based forest management in National Parks (Outamba-Kilimi in Guinea).

In the agriculture sector, USAID currently supports the AEMIP, launched by Winrock International, with Purdue University, in June 2013 for four years. It aims at strengthening AET within Guinea, focused primarily on organizational capacity building of the ISAV-Faranah, Guinea's only agriculture university, in liaison with the five AET certificate-level institutions of Guinea (ENAE Koba, ENAE Tolo, ENAE Macenta, ENAE Bordo, and ENATEF Mamou).

Indeed, in parallel to AEMIP, USAID also awarded Winrock International a five-year project to strengthen AET within Guinea, Nigeria, and Senegal, F2F for AET. In Guinea, it will complement AEMIP by focusing on organizational capacity building at the five AET certificate-level institutions, allowing for a coordinated and comprehensive approach to AET strengthening, with AEMIP focusing on capacity for technology development at ISAVF, and F2F for AET focusing on capacity for technology dissemination at the five certificate-level institutions.

In the frame of the USAID's Climate Change and Development Strategy 2012-2016 and the USAID's Climate Change Adaptation Plan for 2013, it was decided to merge a third element to the AEMIP: a GCC Integration Pilot project. The aim of merging this third element is to demonstrate that integrating climate change into AET and research has both upstream (policy, planning, etc.) and downstream (more effective community engagement in and management of adaptation processes) impacts.

The GCC Integration Pilot project has three main components: (i) Develop curriculum on climate change, including technical expertise in climate change adaptation, (ii) Implement community-based pilots of adaptation management plans and natural resource and biodiversity inventory tracking, and (iii) Capacity-building and facilitation of cross-sectoral stakeholders' discussions on integrating climate change adaptation into AET. They have been finely merged into the AEMIP results framework.

1.3. Terms of reference and methodology for the baseline study

Four main objectives were set for the GCC Integration Pilot project: (i) Baseline setting based on two USAID research questions, (ii) Assessment of the current AET institutional capacity for integrating climate change adaptation, biodiversity and NRM, (iii) Determining the nature/effectiveness of cross-sectoral cooperation/coordination among AET Stakeholders on the development and dissemination of climate-smart technologies, (iv) Recommendations for implementation of the GCC integration pilot. Tasks were derived from these objectives, for which specific methodological steps were defined:

- Identify appropriate model/benchmark on the integration of climate change adaptation, biodiversity and NRM into AET: a literature review was carried out, with two focuses: (i) status of the adaptation and agriculture issues in international negotiations and climate finance, (ii) description of existing international and regional curricula in terms of integration of climate change adaptation, biodiversity and NRM into AET.
- Identify a roadmap for setting specific definitions of CSA practices and CSA-ET: a literature review was carried out (proceedings of workshops, case-studies, research documents, etc.);
- Identify opportunities for integrating the climate change policy framework with AET and determine whether the adaptation policy framework is gender-responsive: a literature review was carried out (GoG strategies/policies in the environment and agriculture sectors) and data gathered were triangulated during semi-structured bilateral interviews with representatives from key Ministries, key public agencies, and umbrellas of farmers and livestock farmers.
- Collect data for setting the baseline: it was done through
 - Multiple choice questionnaires developed on the basis of the two USAID/Guinea research questions and the 12 Winrock/AEMIP sub-questions and targeted towards seven groups of stakeholders: AET faculty, AET students, agriculture researchers, leaders/members of umbrella farmers' groups (Federation or Union), leaders/members of farmers' groups (grassroot level), private firms, and rural radio. 163 questionnaires were filled in during the mission;
 - Semi-structured bilateral interviews with key informants, to enrich and cross-check the data collected through the questionnaires: National Directorate of Vocational and Technical Training, IRAG, National Directorate for Meteorology, CNOP-G, CONEG, and ANPROCA.
- Establish the baseline and provide recommendations: the data captured via the semi-structured interview were analysed qualitatively, while the data captured via the individual questionnaires were compiled into an Excel database, in order to carry out qualitative and quantitative analysis.

2. CSA: international benchmark and national state of the art

2.1. Adaptation and agriculture under the UNFCCC

NAPAs were created at the Marrakech Climate Conference in 2001: they aim at identifying activities that need to be implemented without delay in LDCs, in order not to increase their vulnerability or increase latter the costs of adaptation. So far, 34 African countries have developed their NAPA (including Guinea): 350 projects are identified for 630 MUS\$.

NAPs were created at the Cancun Climate Conference in 2010: they aim at identifying "medium- and long-term adaptation needs" building on the experience in addressing short-term "urgent adaptation needs" through the NAPAs. All developing countries, LDCs or not, are invited to establish their NAP.

So far, few NAPs are in preparation and guidelines provided by the LEG have still to be officially adopted, may be at COP20 in Lima late 2014. Developing countries, LDCs especially, are concerned about the possible lack of funding for the NAPs, knowing the NAPAs are already not adequately financed. They also wonder how to mainstream adaptation into their sectoral policies, knowing that coordination and mainstreaming of current policies are deficient in most countries.

Four multilateral Funds placed under the supervision of the COP are financing adaptation: LDCF, SCCF, AF, and GCF. Other multilateral (outside the UNFCCC) and bilateral Funds are also financing adaptation in West Africa (in addition to USAID/GCC): GCCA, German ICI, Japan FSF, and PPCR. But, in Sub-Saharan Africa, a few part of the financing pledges is approved, and a few part of what is approved is disbursed, leading to an underfinancing of adaptation needs.

Till now in the climate negotiations, the role of agriculture is only discussed from an adaptation point of view and very little progress has been made. Indeed, some developing countries (especially Brazil and India) are strongly opposed to discuss about the role of agriculture from a mitigation point of view. It seems they fear opening the door

to any kind of future potential mitigation commitments for “emerging countries” in the agriculture sector. The African Union, at the opposite, would like to progress this item.

In the short-term, it seems difficult to agree upon a CSA definition and guidelines to implement it under the UNFCCC process. Indeed, CSA lies on three pillars: adaptation, mitigation, and livelihood.

2.2. Internationally “agreed” definition of CSA and CSA-ET in West Africa

Since the adaptation item is stalled in the climate negotiations under the UNFCCC, a “commonly agreed” definition of CSA (but not officially endorsed by a COP Decision) was forged by the FAO through papers and international meetings organised since 2010. It lies on three pillars:

- **Adaptation:** to reduce farmers' vulnerability to climate change (climate variability and extreme events, as well as slow onset changes). It is a must, as underscored by the catastrophic provisions of the STERN Review: yields of rainfed agriculture will fall by 50% by 2050 in some countries. Small farmers should be the most affected, their net income may fall by 90% by 2100;
- **Mitigation:** to reduce emissions of GHG emissions from agriculture and land use changes. Considering the necessary increase of production, staying within planetary boundaries will require to reduce emissions per kg of output and to enhance carbon sinks: (i) Limit land use changes, (ii) Limit the use of chemical fertilizers, (iii) Innovate in terms of livestock management;
- **Livelihood:** Increasing farmers' income and food production, especially in developing countries. The world population should grow by 1/3 by 2050 (9.6 billion, compared to the current 7.2 billion) and Africans should account for 25% (2.4 billion) of the world population by 2050. In that context, there is a need to produce 70% more food by 2050 while continuing to fight against poverty.

The concept of CSA is therefore fully in line with the MDGs and the objectives of the three Rio Conventions, as well as the World Food Summit. Its implementation involves three challenges:

- Need to integrate “CSA techniques” into “CSA strategies”. Most of the CSA techniques already exist. To be successful, they need to be integrated in CSA strategies, set up according to forecasted agro-ecological conditions, at short, medium, and long-term, taking into account local, sub-national, and national levels of vulnerability and resilience with regard to climate change;
- Need to define ‘farming-system’ specific CSA strategies and techniques. The overarching definition of CSA has to be adapted to local context, be “farming-system” specific, and implemented with flexibility, taking into account trade-off. Triple-win solution is not always possible;
- Need for closer integration of NRM and agricultural outreach efforts to succeed in promoting CSA. In most countries, especially in Sub-Saharan Countries, agricultural and NRM extension efforts are carried out by separate structures, each with its own staff working in different geographic areas and employing different methods to pursue different objectives.

A lot of universities, research centres, NGOs, etc. are active worldwide in the adaptation of agriculture to climate change and NRM (and sometimes CSA). Considering the action-oriented nature of the terms of reference for the baseline study, we focused on Regional and sub-regional AET institutions and research centres, delivering information/training course in French, providing “on-job oriented” curricula or elements of curricula, rather than “academic oriented” ones.

12 institutions have been identified and classified by level of relevance for our study (i.e. identifying institutions that could serve as appropriate model/benchmark for Guinea on the integration of environmental issues into AET)

- Four providers of information or general guidelines: ANAFE (African Network for Agriculture, Agroforestry and Natural Resources Education), WECARD (West and Central African Council for Agricultural Development, *Conseil Ouest et Centre africain pour la recherche et le développement agricoles* - CORAF), CTA (Technical Centre for Agricultural and Rural Cooperation), FAR (Network on Agricultural and Rural Training, *Réseau formation agricole et rurale*);
- Six providers of elements that could be useful to develop AET curricula on environmental issues: GTD (Desertification Working Group, *Groupe travail desertification*), Inter-Network (*Inter-réseaux*), Rural Hub, IFPRI (International Food Policy Research Institute), GWP (Global Water Partnership), 2iE (International Institute for Water and Environmental Engineering)
- Two providers of curricula on environmental issues that could serve as a model for AET institutions and the AEMIP: WASCAL (West African Science Service Centre on Climate Change and Adapted Land Use), CILSS (Permanent Interstate Committee for Drought Control in the Sahel, *Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel*)

2.3. Implementation of adaptation in agriculture in West Africa

In West Africa, peasant family farms are highly vulnerable to the impacts of climate change, their vulnerability being already high considering the socio-economic and physical environments in which they operate... but their resilience capacities are also important, and proved to be efficient in the past.

The factors of vulnerability are numerous: limited capital and labour force (and land recently in some places), low productivity gains, decreasing fertility (slash-and-burn and very low use of fertilisers), low level of mechanisation and motorisation, limited access to credit, deficient AET, fragile farmers' organisations, inadequate public investments, laissez-faire and uncontrolled open market, season-dependant farming, etc.

These small farms have interesting resilience capacity, which allowed them to survive to past crisis (e.g. wars of conquest and pillage at the time of SAMORY, European colonisation with tax and/or chore that prompting people to flee their villages in some regions, great droughts of the 1970s, etc.): risk-adverse behaviour / risk-management practices, diversification of activities, money transfers, etc.

Since the 2000s, adaptation to climate change policies and measures are mainly developed under the UNFCCC guidance and implemented under the supervision of the Ministries of Environment. In West Africa, agriculture policies set up by the end of the 2000s (regional level: CAADP under the AU and the NEPAD, Sub-Regional level ECOWAP, National levels: NAIPs) gave a limited consideration to adaptation to climate change.

Assessing 18 Sub-Saharan NAPAs, it is worth to note that 90% of their projects (195/217) can be considered as agriculture adaptation projects, attracting 97% of NAPAs' budgets. Using weighting criteria, the main adaptation areas can be identified as follow: "Transversal" (27% of score), followed by "Water" (23%), "Crops" (11%), "Forestry" (9%), "Livestock" (8.5%), "Coastline" (6%), "Energy" (6%), "Food" (5%), and "Fishing" (3%). The main measures are as follows:

- **Transversal:** (i) Observation of climate, water resources, sea level, (ii) Strengthening of institutional capacity (Government and local institutions), (iii) Capacity-building and training of farmers, and rural population in general, (iv) IEC for the general public, (v) Development of alternative IGAs (to compensate for declines in production and/or income in the agricultural sectors)
- **Water:** Maintenance of the availability of agricultural water, itself needed to maintain rainfed agriculture, and the development of irrigated agriculture (in rainy-season or even dry-season): (i) Hydro-agriculture facilities: construction of very simple infrastructures (e.g. zaï or hillside storage reservoir) to more elaborate ones (e.g. dams / irrigated areas with full water management, drip), (ii) Capacity-building in water management: promotion of irrigated agricultural systems.
- **Crops:** Maintenance of the "traditional" slash-and-burn / extensive livestock farming systems with the (i) Promotion of agroforestry or the (ii) Promotion of soil management techniques (seeding under crop cover, mulching, etc.), or promotion of new farming systems with the (iii) Diffusion of new species and/or varieties and/or rotations and/or associations.
- **Forestry:** Maintenance of forest soil fertility, firewood and timber supply, NTFPs' production through: (i) Promotion of sustainable forest management, (ii) Afforestation/reforestation, (iii) Forest fire fighting techniques.
- **Livestock:** Maintenance of animal feeding through: (i) Promotion of fodder or (ii) Promotion of food supplements, and (iii) Adaptation of domestic animal breeds to climate change
- **Coastline:** Protection of the coastline and its ecosystems (dunes, mangroves, mangrove rice fields, etc.) against sea level rise and salinization. There are no subcategories here, because all the projects are integrated (with most of the time: alert system/IEC/IGAs/reforestation).
- **Energy:** (i) Demand-side: increase energy efficiency (for charcoal production, for cooking, etc.), (ii) Offer-side: increase biomass production through afforestation or promote alternative sources of energy to firewood
- **Food:** (i) Design/implementation of food warning system, (ii) Creation of emergency food stocks, (iii) Food diversification.
- **Fisheries:** (i) Strengthening evaluation, monitoring, and control of fish stocks in coastal areas or in the deep sea, (ii) Strengthening monitoring, and control of natural fish stocks in inland fisheries, and promoting fish farming.

PANAs are underfinanced, especially in terms of field activities, and difficult to upscale...And, first and foremost, not really successful: much is still to be done to promote CSA activities in West Africa.

2.4. Adaptation to climate change and CSA in Guinea

The Guinean PANA was developed in 2006 and 2007. The selection of priorities was a complex process: from the 53 initial project ideas, 25 were finally retained, after four successive multi-criteria analyses using seven weighted criteria.

Among the 25 projects, 22 can be classified under adaptation of agriculture to climate change, and amount to 7,335,000 US\$, which is 89% off the total budget of the NAPA. Their distribution is heterogeneous:

- Relatively many for the “Forestry” and “Energy” types: they are more related to mitigation than adaptation. This tends to corroborate the idea that there is a kind of confusion between causes and consequences of climate change in the mind of key Guinean stakeholders, and a belief that stopping deforestation in Guinea could bring back the global climate system to equilibrium;
- Relatively few for “Livestock”: Guinea is a country of highly developed animal husbandry. Fodder availability is an issue, not talking of water availability, increasing animal pests, etc. Therefore, it looks surprising that adaptation of livestock farming to climate change is not higher on the agenda;
- Relatively few for “Crops”: The major part of the food crop production is rainfed and based on slash-and-burn. Rainfed rice, maize, fonio, and cassava are vulnerable to (i) water shortage and (ii) soil degradation. It is surprising to note that there is no project aiming at addressing these issues.

There are three on-going agriculture policies in Guinea:

- 2006-2015 New Policy Letter on Agricultural Development (NLPDA): It does not address climate change issues;
- 2009-2018 National Rice Development Strategy (SNDR): Rice is the main food crop (61% to 69% of daily consumption in 2008, depending on the agro-ecological regions), with an increasing level of consumption (from 92 kg/capita in 1992 to 100 kg/capita in 2008). More than ¾ of the production is done in two vulnerable farming systems: mangrove rice (sea level rice, salinization, acidification, iron toxicity, etc.) and rainfed rice (erratic and/or reduced rainfalls, soil degradation, etc.)

The SNDR plans a doubling of the average rice yields, from 1.43 t/year/ha in 2008 to 2.75 t/year/ha in 2018, but does not mention the challenges of climate change: (i) Creating hydro-agriculture facilities in mangrove area, as foreseen in the SNDR, is not enough: rice breed have to be selected and the cropping calendar has to be revised, (ii) Promoting NERICA seed for rainfed rice is not a silver bullet, they might produce in water stress conditions, but the yield might strongly decrease.

- 2012-2016 National Agriculture Investment and Food Security Plan (PNIASA): one of its sub-programme (4.7 - Climate change) provides clear (even if limited) guidance in terms of adaptation of agriculture to climate change. However, interviews with key stakeholders demonstrated that these planned activities are not yet implemented, and even, not really known or understood.

Climate change is little mentioned across the 170 pages of the DSRP3. When it comes to adaptation of agriculture to climate change, there is clearly a mix between two very different concepts: CSA and input-intensive agriculture. The last concept is promoted, while it may lead to completely opposed results than CSA!

It would be more relevant to adapt the internationally “agreed” definition of CSA at “farming-system” level, rather than national level. “Farming-system” specific CSA strategies and the corresponding CSA-ET could be defined in four steps:

- Identification of farming system per agro-ecological areas: specific farming systems could be defined for each agro-ecological region and the two or three most representative farming systems of each agro-ecological area could be identified.
- Vulnerability and resilience assessment of each specific farming system: using the most up-to-date climate projections and based on current levels of vulnerability and assessment, the levels of vulnerability and resilience could be forecasted for each specific farming system;
- Design of appropriate CSA strategies and techniques: Based on the forecast of vulnerability and resilience, and knowing the CSA techniques available for farmers, CSA strategy and the related CSA techniques could be designed.
- Implement CSA-ET: Once two or three specific farming-system CSA strategies are identified per agro-ecological area, the corresponding CSA-ET curricula can be designed and implemented.

3. Field data collection and treatment for setting the baseline

3.1. GoG Institutions and Donors

Understanding of climate change is low in the Ministries active in the rural development sector. Most of the high level civil servants interviewed are mixing causes and consequences of climate change. As a result of this mixing, the universal nature and the irreversibility (in the short- to medium term at least) of climate change are not known and reforestation is often seen as the adequate solution to address the issue and bring the system back to

equilibrium in the short-term. In that context, the need for long-term adaptation is not identified. It may explain the lack of proactivity of the Ministries in that regard:

- **Agriculture:** ANPROCA does not provide “tailor-made” farm advisory to the farmers in general, and its staff is not informed of and trained in CSA in particular. With support from IFPRI, ANDASA is carrying out an interesting study on modelling future food crop production (rice in first place) according to climate change scenarios. But this study remains confidential (not known by ANPROCA for instance) and the future of ANDASA is uncertain, due to the recent nomination of her DG as Minister of Agriculture, which threatens the national appropriation of such study;
- **Livestock:** It is often considered as one of the best performing Ministry in the rural development sector. However, little or no thought has been given to adaptation measures, such as fodder management, genetic adaptation, fight against diseases, etc.
- **Environment:** Various services are dealing with climate change, with unclear share of tasks and responsibilities, which would explain most of the delay in designing and implementing climate change Strategies and Policies, i.e. 2NC, NAPA (only one NAPA project under implementation), NAP, REDD+ mechanism, etc. The level of understanding of adaptation to climate change, especially CSA, is low. The Forest services are poorly active, do not have a precise knowledge of the extent of Guinean forest (no national forest inventory), and the important rate of deforestation/forest degradation seem to have passed them by. Adaptation/mitigation measures are scarce and old now (community-based forest management, reforestation, training in production of improved charcoal, etc.) and the concept of sustainable management is not promoted enough;
- **Fisheries:** On-going adaptation measures in inland fishery are very few, expecting the promotion (at small scale) of fish farming in Guinée forestière, which could contribute to food and revenue diversification. Examples of on-going adaptation measures in marine fishery were not given, which would let us tend to believe that they do not exist.

Among the development partners active in the development sector (AfDB, EU, WB, IsDB, IFAD, UNDP, and USAID), few are currently supporting projects in the environment sector. In the field of adaptation to climate change, there are only three NAPA projects supported by the GEF and the UNDP (one on-going: RAZC mangrove area of Basse-Guinée, and two about to start: “agroforestry” project in Moyenne-Guinée, “ecosystem-based adaptation” project in Haute-Guinée), plus the AEMIP/GCC Integration Pilot project. UNDP, may be the most active donor in the field of climate change in the past, seems to have a decreased interest in this topic.

3.2. AET Institutions (Faculty and Students) and Research Centres

The civil servants of the National Directorates of Vocational/Technical Training, and On-the-job/Short-term Training, do not understand the climate change phenomenon, its universal nature, its irreversibility (short to medium term), and do not identify adaptation as a key element of AET curricula.

CERESCOR is not very active in the field of climate change, but one of his Senior Researcher, El Hadj DIALLO, is/was involved in the preparation of the 1NC and the 2NC, NAPA Coordinator, Head of the RAZC project, and he is the Team leader of an IFPRI study on modelling of climate impacts on the food crops production. It would be very useful for the AEMIP to meet him and get a clear picture of how climate change issues are addressed in Guinea.

The civil servants of the National Directorate of Meteorology are knowledgeable about climate change, which is rare among the key stakeholders interviewed. They have very valuable meteorological data, but old data get deteriorated and have never been compiled or treated. They are following climate projections research programmes (ENSEMBLE and CORDEX), but country-specific projections are not yet available. The Directorate lack of means to maintain its agro-meteorological and synoptic stations. Having reliable and country-specific meteorological data is necessary to calibrate country-specific climate projections: the Directorate should be involved in and supported by the AEMIP.

IRAG was recently revamped after decades of degradation. Less than 5% of its 150 Researchers may be knowledgeable about climates change issues. The few research carried out in that field are focused on adapting the cropping system. IRAG is poorly active in the livestock and fisheries sectors in general, and is completely inactive in adaptation to climate change in these two sectors. In the 2013-2017 Strategic Plan, three Programmes may focus on NRM (agroforestry, fauna/flora biodiversity, soil fertility management) and another might be drawn on adaptation of agriculture to climate change. The AEMIP should discuss with IRAG to encourage them to draw a specific Programme on CSA and get researchers involved in the development of CSA pilot activities AET institutions and professionals.

Collaborations between the ENAE-ENATEF, IRAG, CERESCOR, National Directorate of Meteorology, and ANPROCA are very limited, if not nil. In particular, there is a great missed opportunity of collaboration between ENAE-ENATEF and IRAG, all the more difficult to understand that ENAE and IRAG antennas are close to each other. The recent creation of the RAFARGUI could be an efficient channel to inform/train the AET stakeholders

about adaptation of agriculture to climate change, and (i) define with them ways and means to introduce CSA into the AET curricula, (ii) liaise them with international/sub-regional institutions active in CSA-ET.

75% of AET Faculty interviewed have a low level of knowledge of (i) the climate change phenomenon, linking it mainly to local deforestation (no idea of its irreversibility in short to medium term and the imperious need to adapt to it) and (ii) the level of progress of international talks/actions on NRM. Only 25% of them say they have a frequent access to information on environmental issues, mostly through the radio or Internet, but most of time they are not able to recall the key messages (apart from the link deforestation / climate change). 10% of them say they give thorough explanations to their Students about environmental issues, but most of them are unable to present these explanations.

85% of AET Students interviewed have a low level of knowledge of (i) the climate change phenomenon (idem as for Faculty) and (ii) the level of progress of international talks/actions on NRM. Only 15% of them say they have a frequent access to information on environmental issues, mostly through their training course. Most of time, they are not able to recall the key messages. 20% of them say they receive training about environmental issues, always done at school and generally included into broader training course as there is no specific training course on NRM. Most of them do not recall the main messages on climate change and biodiversity, but do recall them on soil management.

80% of IRAG Researchers interviewed have a low level of knowledge of the climate change phenomenon (idem as faculty) and (ii) the level of progress of international talks/actions on NRM. This is all the more striking that their research programmes are highly dependent on these global changes and they should be the best informed about it in Guinea. Only 20% of them say they have a frequent access to information on environmental issues, mostly from Internet and the CTA/Spore bimonthly review. Probably less than 10% receive short-term training on environmental issues, provided by projects or donors. 60% of them say they do not address environmental issues in their research. When they do, they mostly mention seed selection and fertilisation trials. Most of the research programmes related to NRM are focused on genetic selection/improvement of food crops.

AET Faculty and Students and IRAG Researchers mentioned 39 trials or transfers on adaptation of agriculture to climate change, focusing (in decreasing order) on seed selection, soil fertility management, fodder management/conservation, cropping system improvement, and reforestation.

3.3. Civil Society: Farmers' Organisations, Agribusiness Firms, Local Radio

CNOP-G gathers 480,000 farmers. They feel climate change impacts, especially the lack of water ("*the water tower is drilled!*"), but the CNOP-G and most of its member Federations do not address this issue in their Strategic Plans. However, the strongest Guinean Federation, FPF, is active in that field and has started implementing adaptation measures (building of hill dams, promotion of compost, diversification of activities). FPF also intends to carry out a water balance of its Sub-Prefectures and to include climate change into its next strategic plan. CNOP-G does not collaborate and does not expect support from IRAG, the National Directorate of Meteorology, or the AET institutions to design adaptation measures. The CNOP-G does not feel heard by the Government and estimates that the massive distribution of improved seeds and chemical fertilisers does not respond to farmers' needs. Their two main priorities are (i) to put in place an early weather warning system at national scale, (ii) to launch local studies on water balance, to assess the water availability/need/gap, month by month.

CONEG officially gathers Guinean animal farmers from diverse sectors, but has faced many problems since its creation in 1998. Since 2011, CONEG entered in dormancy. ANAVIG, National Association of Poultry Farmers, is one of the few CONEG members still active. ANAVIG members feel the impacts of climate change: decrease of feed consumption and rate-of-lay, increase of panting, acidosis, attacks, mortality, etc. Using internet and exchanging with their Ivorian colleagues, they have already started implementing adaptation measures: decreasing the density in the henhouse, increasing the number of watering spots, covering the water tanks, replacing the brick wall by wire grid, introducing vitamins during hot season, etc. Collaborations on technical issues with AET institutions and IRAG are nil, and AET Students are poorly considered (very low academic level and technical know-how).

All the farmers' organisation interviewed observe the climate changes, especially erratic/reduced rainfall and increasing heat, and most of them explain it by deforestation (that would locally reduce the rain and increase the temperature). 33% and 66%, at grassroot level and umbrella level respectively, say they do not change their farming practices, some explaining they are ancestral or that they do not know how to adapt. Others say they have changed their farming practices, mainly by shifting the farming cycle to adapt to the rainy season. Nearly all the farmers say they observe a loss of biodiversity (mostly loss of forest, for 50% of them) and soil degradation (mostly loss of fertility, for 66% of them).

They have a poor access to information/advice on environmental issues: 50% and 40% of them, at grassroot level and umbrella level respectively, say they do not have such information and 33% and 40% of them, at grassroot level and umbrella level respectively, receive it rarely, mostly through the radio, ANPROCA, Forest services, and their Federation. Review/newspaper, Internet, and TV are never mentioned. The main key message relates to the

protection of forest (avoiding slash-and-burn and bushfires, reforestation) and there are very few specific messages. These information are generally considered unhelpful, with little or no improvement in terms of production: farmers say do not have alternative to slash-and-burn or no means to implement the advices or that the advices are too vague or do not address the real issues.

Surprisingly, the level of awareness and information about environmental issues is worst for the high level representatives from agribusiness firms (even large ones like SOBRAGUI, CGC or SOGUIPAH) than for farmers' groups representatives. A majority of them say they do not adapt to climate change, they never have information on climate change / NRM, and the General Director of SOBRAGUI even considers there is no climate change. These results are alarming.

Rural radio is often mentioned as a key source of information on climate change and NRM. But, the interviewees do not understand the climate change phenomenon, lack of knowledge about international talks/actions on NRM, and do not seem to have information/training on climate change/NRM. Therefore, their key messages are focused on limiting slash-and-burn and bushfires

4. Conclusions about the baseline (task 6) and recommendations

4.1. Conclusions about the baseline (task 6)

The responses to the two USAID Research questions are as follow:

- “Q1: To what extent has AEMIP institutionalized gender-responsive climate change into the course/research curriculum?” → The baseline is easily drawn: climate change is generally not understood by the representatives of the National Directorates of (i) Vocational/Technical Training, (ii) On-the-job/Short-term Training, the AET Faculty and Students, and climate change is not present in the course/research curriculum. The vague messages about the necessary protection of forest against slash-and-burn and bushfires are not logically linked to the broader global climate change, and as such may be even counter-productive, as many Faculty and Students believe the climate system could come back to equilibrium if local deforestation decreases and reforestation increases. Therefore, the importance of adaptation to climate change is not well perceived.
- “Q2: To what extent has the new curriculum and research supported by AEMIP led to improved technical extension work and agricultural practices of male and female farmers as they relate to addressing new conditions brought upon through climate change?” → The baseline is easily drawn: design and implementation of CSA technologies is very limited and design and implementation of CSA strategies is even more limited. In addition, AET Stakeholders have a low level of collaboration with regard adaptation of agriculture.

4.2. Recommendations

In order not to disperse efforts and to allow for a quick start of the GCCC Integration Pilot part of the AEMIP, here below are six main recommendations for actions to be implemented in the short term by the AEMIP project unit, and ordered by order of priority:

- Request a meeting with the Minister of Environment and the high level civil servants in charge of climate change issues, in order to get clarity about tasks/responsibilities;
- Facilitate a meeting with an enlarged group of stakeholders that are or that should be active in facilitating the adaptation of agriculture to climate change;
- Facilitate a meeting of the RAFARGUI members to update all of them about adaptation of agriculture to climate change and start a common reflexion about CSA and CSA-ET;
- Launch a restricted working group to implement the four-step work plan aiming at identifying the main farming systems and designing/implementing ad hoc CSA/CSA-ET;
- Liaise the AET Stakeholders (through RAFARGUI if possible) to the international and sub-regional institutions active in AET and CSA-ET;
- Train AET Faculty to the basics of climate change: phenomenon, projections, and actions.

1. Overall context and methodology of the study

1.1. Latest facts on climate change: Globally, in West Africa, and in Guinea

NB: as these key-concepts are used all over the report, here below are given the definitions approved by the Intergovernmental Panel on Climate Change (IPCC):

Vulnerability: *“The degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change”;*

Resilience: *“The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions”;*

Adaptation: *“In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects”;*

Mitigation: *“The efforts undertaken to reduce anthropogenic greenhouse gas (GHG) emissions or to enhance natural sinks of GHG”*

→ Global situation

Published in late 2013, after six years of work and the analysis of 9,200 scientific publications, the Fifth Report “Climate Change 2013: The Physical Science Basis” from the Working Group I of the IPCC¹ demonstrates that the link between human activities and increasing global temperature is extremely likely. Its main conclusions are alarming:

- The level of atmospheric carbon dioxide (CO₂) concentration is the highest since 800,000 years. It increased by 20% since 1958, and 40% since 1750;
- Each of the past three decades has been successively warmer than any previous decade since 1850. The years 1983-2012 are probably the 30 warmest years ever in the Northern hemisphere since 1,400 years. The ground temperature increased by 1°C between 1901 and 2012;
- It is almost certain that the surface temperature of oceans (up to 700 m deep) has increased between 1971 and 2010, and this temperature has probably increased between 1870 and 1971;
- Over the past two decades, the mass of ice sheets in Greenland and Antarctica decreased; the extent of Arctic sea ice and the spring snow cover of the Northern hemisphere continued to decline, and glaciers in almost all regions of the globe have continued to reduce. Melting has accelerated since 1950: 750 millions of tons per day since 1990 in the mountains and 990 millions of tons per day since 2000 in Greenland and Antarctica;
- Since the mid-nineteenth century, the rate of rise in mean sea level is higher than the average rate of the last two millennia. Between 1901 and 2010, the mean sea level has risen by 0.19 m.

In the Fourth Report of the Working Group I of the IPCC², four set of scenarios (A1, B1, A2, and B2) were analysed and the projected temperatures were ranging from +1.4°C to +6.4°C for the 2090-2099 period, relative to the 1980-1999 period. In the Fifth Report, new sets of scenarios, called Representative Concentration Pathways (RCPs), were used:

- The increase of ground temperature for the 2016-2035 period, relative to the 1986-2005 period, is likely to be between +0.3°C and +0.7°C. Global warming will strongly accelerate;
- The increase of ground temperature for the 2081-2100 period, relative to the 1986-2005 period, is likely to be between +0.3°C and +4.8°C, and the current trend leads to +4°C, as shown below:

¹ IPCC. The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the IPCC. Cambridge University Press, Cambridge. November 2013. 1552p

² IPCC. The Physical Science Basis: Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Cambridge University Press, Cambridge. November 2007. 1007p

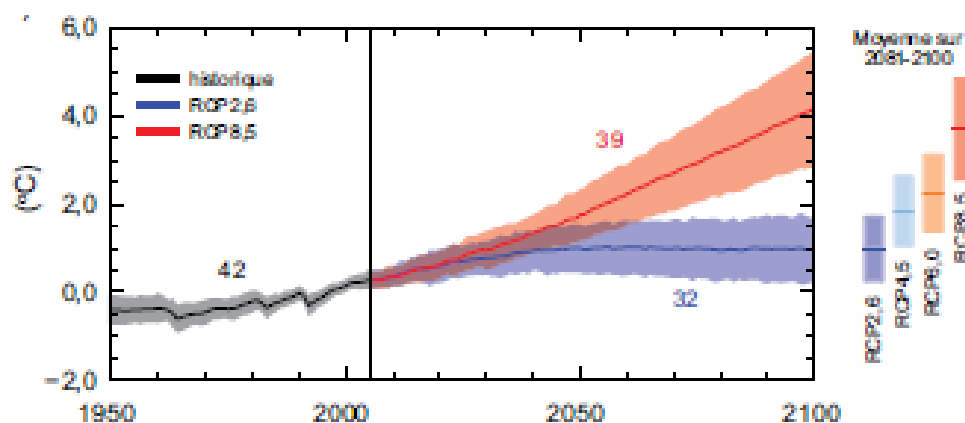


Figure 1 - Predicted increase of ground temperature by 2100 (IPCC, 2013)

- The change of temperature is likely to be unequally distributed over the globe, as shown below:

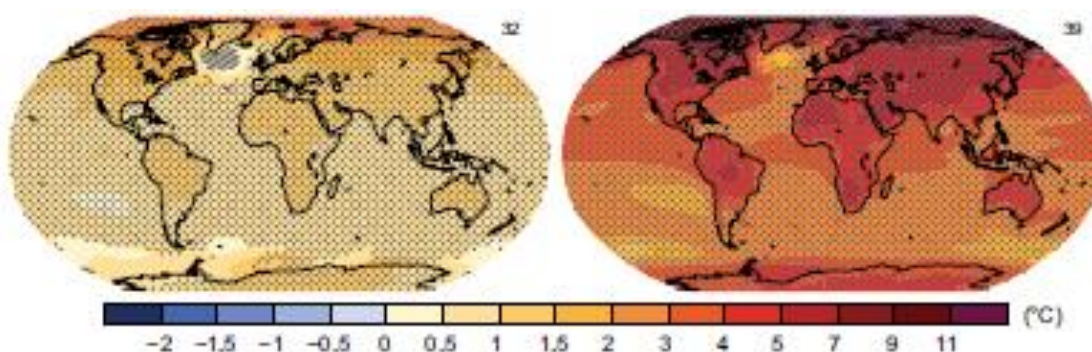


Figure 2 – Predicted change in temperature (2081-2100 vs 1986-2005) for RCP2,6 (left) and RCP8,5 (right) (IPCC, 2013)

- The change of rainfall is also likely to be unequally distributed over the globe, as shown below:

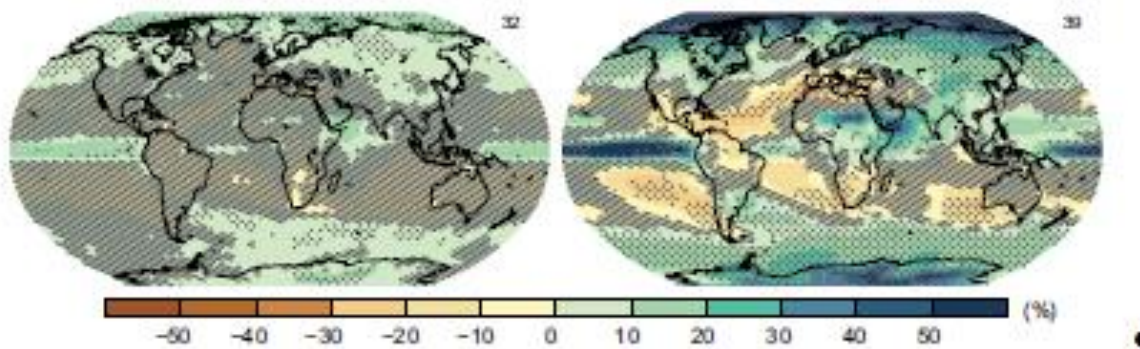


Figure 3 - Predicted change in rainfall (2081-2100 vs 1986-2005) for RCP2,6 (left) and RCP8,5 (right) (IPCC, 2013)

→ In West Africa

Using data compiled by the Carbon Dioxide Information Analysis Center (CDIAC), the Global Carbon Atlas³ estimates that GHG emissions for the African continent as a whole represents only 3.4% of global emissions.

According to data compiled by the Shift Project⁴, the GHG emissions profile of the African continent is well different from other regions of the globe:

- Methane (CH₄) and nitrous oxide (N₂O) are proportionally greater, due to the importance of the agricultural sector in most African countries, and especially for the Economic Community Of West African States (ECOWAS), as shown below:

³ www.globalcarbonatlas.org

⁴ <http://theshiftproject.org>

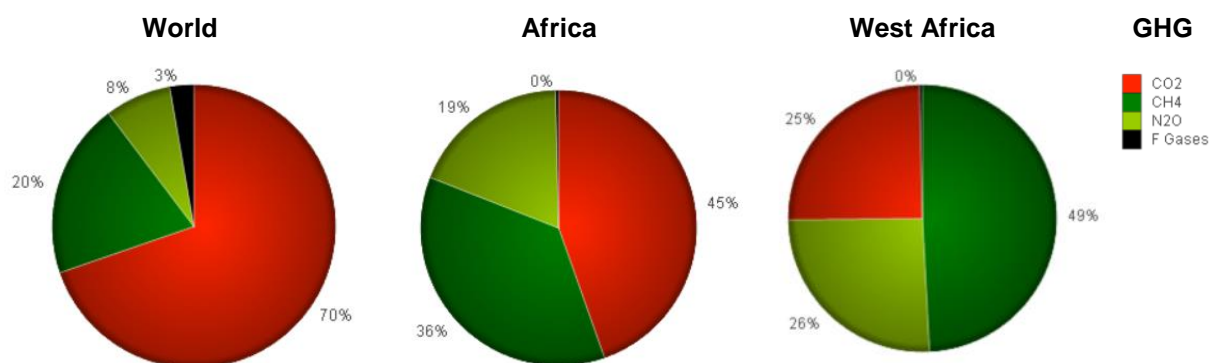


Figure 4 - GHG profile (CO₂, CH₄, N₂O, F gases) in the world, in Africa, in ECOWAS area (the Shift Project, 2010)

- According to the CarboAfrica Project⁵, the Land Use, Land Use Change, and Forestry (LULUCF) sector is a net source, at the contrary to the global situation, as shown below (NB: NPP = Net Primary Production and Rh = Heterotrophic Respiration):

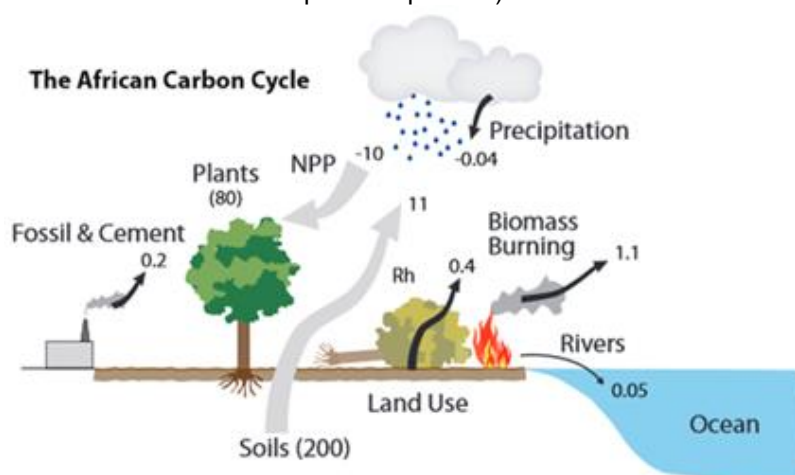


Figure 5 – African Carbon cycle, in billions of tC (FAO – CarboAfrica project, 2011)

The key impacts of climate change in West Africa were estimated in the Fourth Report on “Climate Change 2007: Impacts, Adaptation and Vulnerability” of Working Group II of the IPCC⁶ (IPCC, 2007) (NB: the Fifth Report of Working Group II of the IPCC is not yet published) and the STERN Review – the Economics of Climate Change⁷ (STERN, 2007):

- **Reduced rainfall:** 75 to 250 million people will be affected by a higher water stress in 2020, and these numbers will double in 2050. It will impact the availability, accessibility, and water demand for human consumption and livestock (IPCC, 2007). Rainfalls in Africa will decline by than 30%, resulting in lower crop yields and migrations, beginning with the marginal regions of the Sahel and inducing potential conflicts (STERN, 2007);
- **Sea level rise:** Floods from rising sea levels will also lead to migrations Mangrove areas are expected to get degraded, reducing fish stocks (STERN, 2007);
- **Extreme weather events:** Storms, forest fires, droughts, severe flooding, and heat waves will increase, both in frequency and magnitude (IPCC, 2007);
- **Agriculture productivity:** Yields of rainfed agriculture will fall by 50% by 2050 in some countries. Small farmers should be the most affected, their net income may fall by 90% by 2100 (STERN, 2007);

⁵ FAO. Africa and the Carbon Cycle - Proceedings of the Open Science Conference held in Accra (Ghana) 25-27 November 2008 on “Africa and Carbon Cycle: the CarboAfrica project”. FAO. 2011. 208p

⁶ IPCC. Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Cambridge University Press, Cambridge. November 2007. 976p

⁷ Sir Nicholas STERN. The STERN review – The Economics of Climate Change. Cambridge University Press, Cambridge. January 2007. 712p

2007). Arid and semi-arid areas will range from 5% to 8% by 2080, reducing agricultural productivity in marginal areas (slower growth, stronger water stress, etc.) (IPCC, 2007).

→ In Guinea

The main findings of the Climate Change Country Profile for Guinea⁸ (Mc SWEENEY et al., 2012, study financed by the United Nations Development Programme - UNDP) are as follows:

- **Temperature:** Mean annual temperature has increased by 0.8°C since 1960, an average rate of 0.18°C per decade. It is projected to increase by 1.1 to 3.0°C by the 2060s, and 1.6 to 5.3°C by the 2090s. The range of projections by the 2090s under any one emissions scenario is 1.0 to 2.5°C. The projected rate of warming is most rapid in the Northern regions of Guinea;
- **Rainfalls:** Mean annual rainfall over Guinea has decreased since 1960. This is mainly due to a period of particularly high wet-season rainfall in the 60s. April-May-June rainfall has declined with a more consistent trend of around 5.3 mm per month (3.0%) per decade. Projections of mean annual rainfall averaged over the country from different models in the ensemble project a wide range of changes in precipitation for Guinea. Projections tend towards decreases in the North of Guinea, and increases in the South. Despite the projected decreases in total rainfall, the proportion of total annual rainfall that falls in heavy events tends towards increases in the ensemble projections;
- **Hot days:** All projections indicate substantial increases in the frequency of days and nights that are considered “hot” in current climate. Annually, projections indicate that “hot” days will occur on 21-52% of days by the 2060s, and 27-78% of days by the 2090s;
- **Sea level rise:** Projected scenarios demonstrate losses of 17 to 30% of coastal rice fields by 2050 and up to as much as 60% by 2100. With more than a third of the population, pressure from erosion compounded by increased incidence salinization and flooding in coastal zones, changes in temperatures and rainfall as well as sea level rise will have serious effects on Guinean livelihoods.

The heterogeneity of past and projected rainfalls in Guinea are corroborated by the historical data series 1961-2004 mentioned in the National Plan of Actions for Adaptation (NAPA)⁹ for four synoptic stations, with standard rainfall (ratio: rainfall in a given year / average rainfall per year from 1961 to 2004) in abscissa axe and year (from 1961 to 2004) in ordinate axes.

Synoptic station	Starting point in 1961 (in % of average rainfall from 1961 to 2004)	Change of rainfall (% per year, compared to average)
Labé (Moyenne-Guinée)	Positive: 146%	Decrease of around 2%
Kindia (Basse-Guinée)	Slightly negative: 95%	Decrease of around 0.2%
Siguiri (Haute-Guinée)	Positive: 155%	Decrease of around 2.6%
N'Zérékoré (Guinée forestière)	Negative: 79%	Increase of around 0.9%

Table 1- Change in annual rainfall from 1961 to 2004 in the four Regions of Guinea (NAPA, 2007)

In short, Guinea, as well as other West African countries, is likely to suffer from reduced rainfall (but more frequent heavy rainfall events), increased temperature, and greater hot days. In addition to that, the coastline of Guinea will suffer from sea level rise and correlative effects, salinization in particular.

These impacts will be aggravated by an already significant degradation of natural resources by human activities, as well as existing human and economic factors of vulnerability, when assessing the key human and economic factors for Guinea and neighbouring countries (see **Annex 1** infra).

In this annex, it is worth to note some specificities of Guinea, compared to the neighbouring countries: the share of employment in the agriculture sector (76% in 2011) is the highest, the average grain yield has reduced by -2% from 1990 to 2011 (while it has increased in all the neighbouring countries, from +2% in Bissau Guinea to +122% in Mali), the rate of gross deforestation is high (0.5% for the 2005-2010 period) and the number of forest fires (25 fires/100km²/year over 2000-2010) is the highest...

⁸ Mc SWEENEY et al. Climate Change Country Profile of Guinea. UNDP. February 2012. 26p

⁹ Minister of Agriculture, Livestock, Environment, Water, and Forestry (MAEEEF). National Adaptation Plan of Actions of Guinea. GoG. July 2007. 118p

→ Vulnerability and impacts in terms of agriculture productivity and food security in West Africa

According to the FAO classification of Sub-Saharan farming systems¹⁰, the major part of Guinea is covered with two farming systems, as can be observed below: one based mainly on cereals and tubers (#8) in the Northern part of the country, and one based mainly on tubers (#7) in the Southern part of the country.

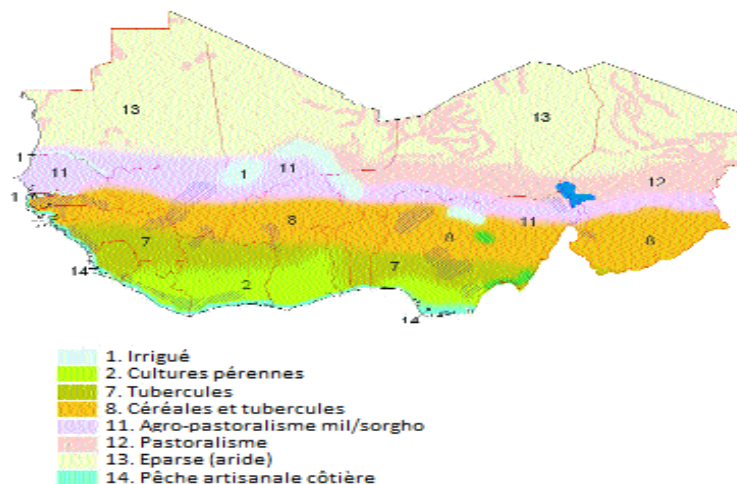


Figure 6 – Major Sub-Saharan farming systems in West Africa (FAO, 2001)

A recent programme, called Household Economy Approach in Sahel (HEA-Sahel)¹¹, assessed the socio-economic vulnerability of Sub-Saharan farming systems. For the ones based on tuber and tuber and cereals, the main conclusions are as follows:

- Uneven rainfall distribution, floods, and droughts constrain both agriculture and livestock, the former being mostly rainfed, the latter being fully dependent on pastures;
- The lack of investment capacity, and consequently the very limited use of input and the limited area cropped per household limit their ability to be self-sufficient and expose them to market fluctuations;
- Diseases and pests (locusts, grasshoppers, birds, etc.), wandering livestock, uncontrolled bushfires, etc. are additional pressure factors to the cropping systems;
- Livestock are vulnerable to infectious animal diseases (foot and mouth disease, sheep and goat plague, Newcastle disease, etc.);
- Cattle rustling, degradation of grazing areas, lack of harvest residues in dry years, farmer/rancher conflicts, etc. are additional pressure factors to the livestock systems;
- Finally, the weakening of solidarity mechanism (in a context of urban exodus) and isolation further aggravate these vulnerabilities.

The high level of vulnerability of rural households in these farming systems will be further aggravated by the impacts of climate change on agriculture productivity. A recent study carried out by the International Food Policy Research Institute (IFPRI) on the impacts of climate change on West African agriculture¹² gives detailed previsions by 2050, in terms of changes of average annual rainfall and changes in yields.

These previsions are generated by two models: Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Model for Interdisciplinary Research on Climate (MIROC), and based on the same global climatic scenario A1B from the Fourth Report of the IPCC.

¹⁰ DIXON et al. Farming Systems and Poverty - Improving farmer's livelihoods in a changing world. FAO - World Bank. 2001. 407p

¹¹ <http://www.hea-sahel.org/HEA-Sahel-The-Household-Economy-Analysis>, initiative supported by the European Union (EU), the Famine Early Warning System Network (FEWS-NET), the Permanent Interstates Committee for Drought Control in the Sahel (*Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel* – CILSS), OXFAM, and Action against Hunger.

¹² JALLOH et al. West African Agriculture and Climate Change: a Comprehensive Analysis. IFPRI. 2013. 444p.

According to the two models, the average annual rainfall will decrease in the coastal area of West Africa, and in Guinea in particular (NB: the MIROC model predicts a slight increase in the North-West, but a slight decrease in the South):

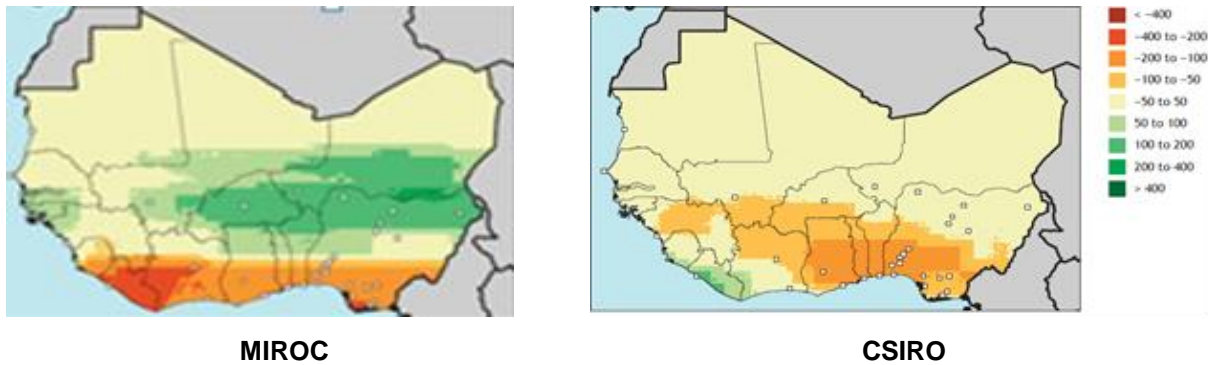


Figure 7 - Projections of changes of average rainfall (mm/year) by 2050 with MIROC and CSIRO (IFPRI, 2013)

The two models also predict the change in yield (by 2050 compared to actual level) for the major food crops in West Africa (rainfed rice, maize, millet, groundnut, etc.). Below are presented the specific case of rainfed rice and maize:

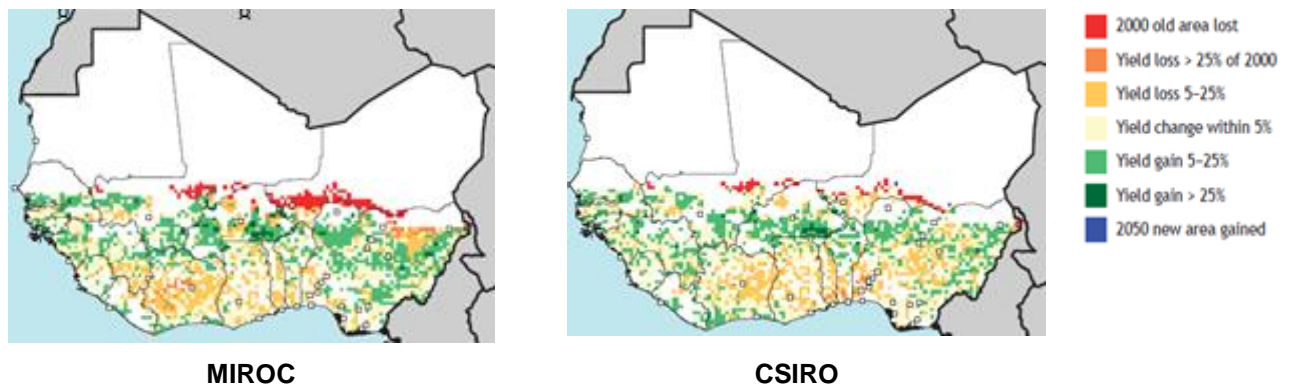


Figure 8 - Projections of changes of rainfed rice yields (%) by 2050 with MIROC and CSIRO (IFPRI, 2013)

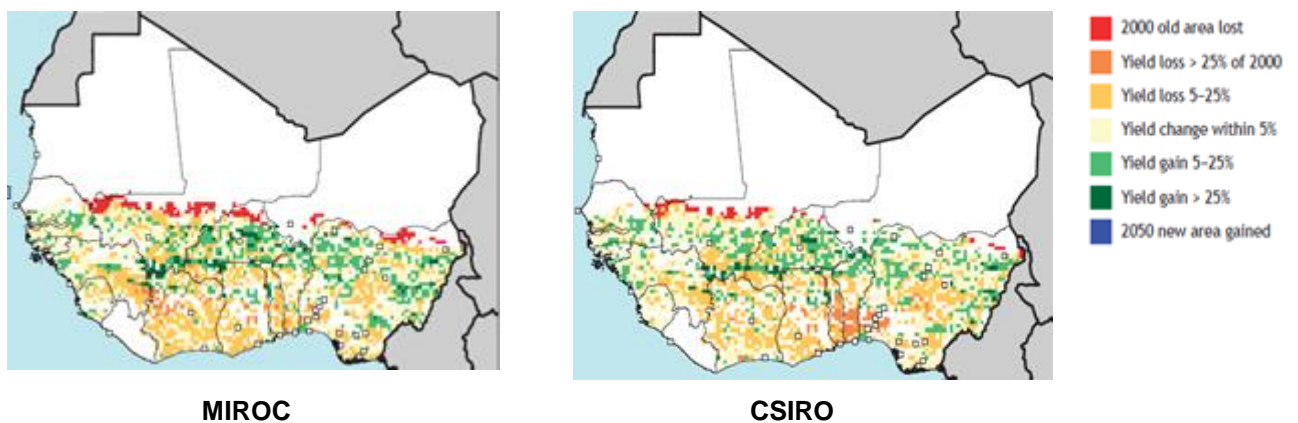


Figure 9 - Projections of changes of maize yields (%) by 2050 with MIROC and CSIRO (IFPRI, 2013)

It is worth to be noted that there is no clear trend for these two crops in Guinea, with a mosaic of green (increased yield) and yellow (decreased yield) dots. However, these maps highlight the fact that changes of food crop yields will occur and that it calls for more analysis at national level, based in particular on the new RCPs, used in the Fifth Report of the IPCC.

1.2. USAID activities in Guinea and AEMIP

→ USAID activities in Guinea in the rural sector

As recalled in the Guinea Threats and Opportunities Assessment¹³, “USAID support for Guinean environmental programs dates back to the 1990s [...] These included the Program for Natural Resources Management (PGRN), the Expanded Program for Natural Resource Management (PEGRN), the Chimpanzee Conservation and Sensitization Program (CCSP), the Landscape Management for Integrated Livelihoods (LAMIL), Landscape Management for Integrated Livelihoods – Transboundary Activity (LAMIL-TBA), and the Institutional Support Program for Guinea’s Water and Forests Department (ISP)”.

USAID is completing the Program in Environmental Governance in Guinea (PEGG), with the Ministry of Environment. PEGG has three components, focusing on key ministries (Environment, Agriculture and Livestock): (i) Improving their technical capacity (e.g. environmental impact assessment and judiciary training), (ii) Improving their management practices, and (iii) Improving communication, public dialogue, and transparency.

Of particular importance for the AEMIP is the formation and facilitation by PEGG of an Inter-Ministerial Steering Committee on Environment (IMSCE), gathering 16 Ministries: this IMSCE is indeed expected to advise on AEMIP work in climate change and related programs¹⁴.

USAID also supports the transboundary project (Guinea, Sierra Leone, Liberia, and Ivory Coast) entitled Sustainable and Thriving Environments for West African Regional Development (STEWARD)¹⁵, carried out by the US Forest Service - International Programmes (USFS-IP).

In Guinea, STEWARD operates in the Priority Zone #1, the National Park of Outamba-Kilimi, in the Sub-Prefectures of Madina Oula, Soya and Oure Kaba, with the promotion of community-forest management, co-management of protected forests, and promotion of community institutions on Natural Resources Management (NRM). As far, nine community forests have been established and supported (bye-laws, forest management Committee, training on forest management, forest fire prevention, agroforestry, non-timber forest products, water, sanitation, and hygiene, etc.) (pers. com. from F. KANU, STEWARD staff, March 2014).

→ Links between the AEMIP, F2F for AET, and the Global Climate Change Integration Pilot

The AEMIP was launched by Winrock International, with Purdue University, in June 2013 for four years. It aims at strengthening Agriculture Education and Training (AET) within Guinea, focused primarily on organizational capacity building of the National Institute of Agronomy of Faranah (*Institut supérieur agronomique Valéry GISCARD d’ESTAINING de Faranah* – ISAVF), Guinea’s only agriculture university, in liaison with the five AET certificate-level institutions of Guinea (see explanations below).

In parallel to AEMIP, USAID also awarded Winrock International a five-year project to strengthen AET within Guinea, Nigeria, and Senegal, the Farmer to Farmer for AET (F2F for AET) Program. In Guinea, this Program will complement AEMIP by focusing on organizational capacity building at the five AET certificate-level institutions: the National Schools of Agriculture and Livestock (*Ecole nationale d’agriculture et d’élevage* – ENAE) of Boffa (Basse-Guinée), Tolo (Moyenne-Guinée), Macenta (Guinée forestière), and Kankan (Haute-Guinée), as well as the National School for Water and Forest (*Ecole national des agents techniques des eaux et forêts* – ENATEF) of Mamou (Moyenne-Guinée).

As outlined in the AEMIP First Year Work Programme¹⁶, “F2F for AET will follow the capacity building framework and approaches developed under AEMIP [...] The collaboration between these two projects will allow for a coordinated and comprehensive approach to AET strengthening in Guinea, with AEMIP focusing on capacity for technology development at ISAVF, and F2F for AET focusing on capacity for technology dissemination at the five certificate-level institutions”.

¹³ DENNISON S. et al. – Guinea Environmental Threats and Opportunities Assessment – USAID. October 2012. 98p

¹⁴ USAID Guinea – AEMIP Global Climate Change Integration Pilot Baseline Study – Terms of Reference – USAID. January 2014. 9p

¹⁵ <http://stewardprogram.org/fr/>

¹⁶ COOK D. – AEMIP First Year Work Plan – Revised December 2013. AEMIP/USAID. December 2013. 32p

In January 2012, the USAID released its Climate Change and Development Strategy 2012-2016¹⁷, which contains, in particular, the two following sub-objectives:

- SO 2 - Increase resiliency of people, places, and livelihoods: 1) improve access to science and analysis for decision making, 2) establish effective governance systems, and 3) identify and take actions that increase climate resilience;
- SO 3 - Integrate climate change into programming, policy dialogues, and operations to build resilience: 1) integrate climate change across USAID's development portfolio, 2) elevate the role of development in climate change dialogues and policy, and 3) lead by example.

Based on this Strategy and these two specific sub-objectives, the USAID elaborated its Climate Change Adaptation Plan for 2013¹⁸, which focuses on agency-level actions to understand and address climate change risks and opportunities for USAID mission, programs, and operations.

As part of this Adaptation Plan is outlined the interest of developing "Integration Pilots" aiming at *"integrating climate change adaptation into USAID development programs in areas like food security [...] allowing for leadership to emerge, new approaches to be tested, and best practices, lessons, and tools to be generated [...] The results of adaptation-focused pilot activities will help to inform the priorities of USAID's climate and development strategy beyond 2016"*.

In that context, USAID Guinea proposed a GCC integration pilot project entitled "Agriculture and Climate Change: Education, Research, and Practical Application"¹⁹, putting forward the following rationale: *"USAID is already leader in this area through efforts [...] to integrate conservation and NRM into the curriculum, research and application priorities of the national agriculture university and regional institutes [...] It is the objective of USAID/Guinea to show that integrating climate change and agriculture at this level (agricultural education, training and research) has both upstream (policy, planning, etc.) and downstream (more effective community engagement in and management of adaptation plans and processes) impacts"*.

The GCC integration pilot proposal was accepted late 2013, with three components to be integrated within the AEMIP (AEMIP/GCC initial proposal, 2013):

- ***"Develop curriculum on climate change, including technical expertise in climate change adaptation: [...] One of the things Guinea lacks is solid information on how climate change will impact key export and subsistence crops [...] As such, curriculum will include a component of vulnerability and adaptation assessment and development of adaptation strategies as well as on review and assessment of current on the ground activities to inform the pilots in the next section"***;
- ***"Implement community-based pilots of adaptation management plans and natural resource and biodiversity inventory tracking: These pilots are meant to take the theoretical/academic work and capacity building and apply it to field-level activities serving as a laboratory to test new approaches and further build the capacity of both researchers/technicians and participating communities. By including pilots as part of the second expected result of the AEMIP, they will also be driven more directly by field based research and community level priorities"***;
- ***"Capacity-building and facilitation of cross-sectoral stakeholders' discussions on integrating climate change adaptation into AET: AEMIP will form an AET Stakeholder Group [...] AEMIP will build the capacity of the AET Stakeholder Group to: (i) Support the strengthened relevance of AET to the realities in climate change-related policies and initiatives [...], (ii) Support/facilitate the development of Public-Private Partnerships (PPPs) for climate-smart AET [...], (iii) Conduct policy analysis and preparing evidence-based white papers on policy reforms or adjustments needed to strengthen climate-smart AET [...]"***.

USAID/Guinea requested 2 MUS\$ to USAID for implementation of the first and third activities, as well as contributing to the second activity of the GCC Integration Pilot. USAID/Guinea said it will fund the AEMIP (around 4.8 MUS\$) and use this funding to support the second activity of the GCC Integration Pilot. Nearly 0.9 MUS\$ would be leveraged by USAID/Guinea from the PEGG project to engage with the Steering Committee.

¹⁷ USAID. USAID Climate Change and Development Strategy 2012-2016. USAID. 2012. 36p

¹⁸ USAID. USAID Climate Change Adaptation Plan for 2013. USAID. February 2013. 123p

¹⁹ USAID. GCC integration pilot projects FY2012 – Initial proposal cover and template. USAID. June 2013. 12p

**Agriculture Education and market Improvement Programme (AEMIP)
Baseline study for the AEMIP Global Climate Change Integration Pilot**

As a result, the GCC Integration Pilot project's activities were merged late 2013 with the AEMIP and the concept of "Climate-Smart Agriculture" (CSA) included in a revised AEMIP framework, as follows:

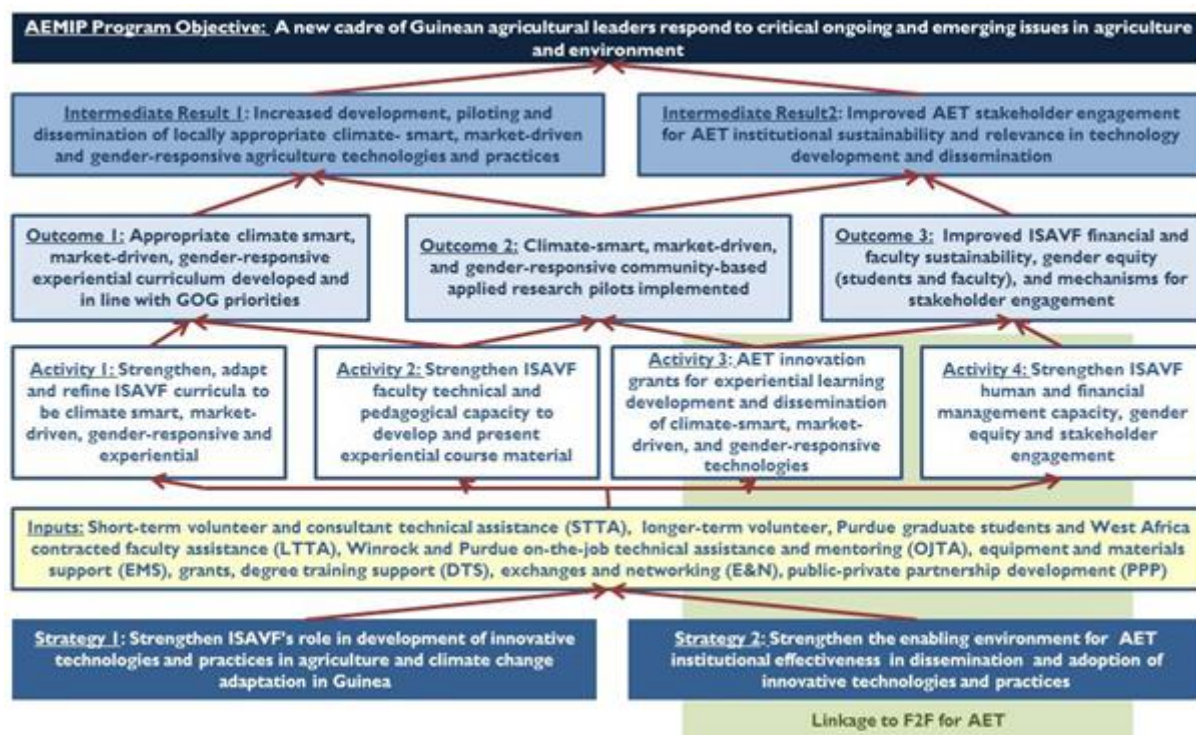


Figure 10 - Revised AEMIP Results Framework (USAID/AEMIP, 2013)

In this framework, the collaboration between F2F for AET Program and the AEMIP can be noticed (area in light green). Indeed, "AEMIP support will focus on ISAVF institutional capacity with emphasis on technology development [...] This vision includes training of trainers to enable ISAVF staff to replicate trainings and information dissemination for target F2F for AET institutions [...] F2F for AET support will focus on institutional capacity for technology dissemination [...] AEMIP's grants program will link ISAVF and the target F2F for AET institutions: faculty and students at ISAVF will design grant projects [...] the F2F for AET institutions will field test the technologies among farmers, agripreneurs, and communities" (AEMIP First Year Work Programme, 2013).

1.3. Terms of reference and methodology for the baseline study

→ Summary of objectives and tasks in the terms of reference

Four main objectives were set and can be summarised as follow:

1. **Baseline setting** (gathering objectives #1 and #4 of the terms of reference): define the benchmark for success of the AEMIP GCC Integration Pilot based on the two USAID research questions (detailed below) and collect baseline data;
2. Assessment of the **current AET institutional** capacity for integrating climate change adaptation, biodiversity and NRM;
3. Determining the nature and effectiveness of **cross-sectoral cooperation and coordination** among GoG, private sector, civil society, and AET institutions, on the development and dissemination of climate-smart technologies;
4. **Recommendations** for AEMIP's implementation on the GCC integration pilot.

Based on these objectives, six tasks were set and can be summarised as follow:

1. **Model/benchmark:** Identification of an appropriate model/benchmark for Guinea on the integration of climate change adaptation, biodiversity and NRM into AET;

2. **Definition:** Development of a common and internationally credible definition of [CSA and] CSA Education and Training (CSA-ET). NB: this task was expected to be carried out with the AET Stakeholders' Group, but this last was not created at the time of the mission;
3. **Policies:** Review of applicable GoG policies on climate change adaptation in order to: (i) Identify opportunities for integrating the climate change policy framework with AET, (ii) Determine whether the adaptation policy framework is gender-responsive, and identify gaps to be addressed;
4. **Data:** Development of data collection protocols and tools based on the two USAID/Guinea research questions, and AEMIP's proposed sub-questions;
5. **Informants:** Collection of data from AET stakeholder informants (AET institutions, GoG institutions, civil society, agribusiness, donors);
6. **Baseline and recommendations:** Capture and analyse of data (i) to establish the baseline for the AEMIP/GCC Integration Pilot, and (ii) to formulate recommendations for its implementation.

→ **Methodology for the study**

The methodology for the study is detailed task by task, as follow:

1. **Model/benchmark**

To identify appropriate model/benchmark for Guinea on the integration of climate change adaptation, biodiversity and NRM into AET, a literature review was carried out, before and after the field mission, with two focuses:

- Describing the status of the adaptation and agriculture topics in the international negotiations, the multilateral and bilateral adaptation funds (with a particular attention to the financing of adaptation of agriculture to climate change). The sources of information were: (i) ad hoc United Nations Framework Convention on Climate Change (UNFCCC) Decisions in terms of adaptation (PANA, Cancun Adaptation Framework, National Plans of Adaptation, role of the Least Developed Countries' Experts groups, etc.) and agriculture, (ii) Funds profile (LDCs' Fund, Adaptation Fund, Green Climate Fund, and other bilateral initiatives).
- Describing the existing curricula for initial/continuous, short term/long term, training in terms of integration of climate change adaptation, biodiversity and NRM into AET. The sources of information were the international and regional institutions websites.

→ Results for this task are presented in **Parts 2.1, 2.2, and 2.3** infra.

2. **Definition**

According to the terms of reference, the idea was to develop a common and internationally credible definition of [CSA and] CSA-ET, and to submit it for approval to the AET Stakeholders' Group. This was not possible for two reasons: (i) a practical one: the said group did not exist at the time of the field mission, (ii) a theoretical one: as we will explain latter (see **Part 2.2** infra), the concept of CSA is "farming-system-specific", e.g. it is not possible to go further than the internationally commonly agreed definition developed by the Food and Agriculture Organisation (FAO) without linking it to specific farming systems.

Therefore, we do not propose in this report "country-specific definitions" of CSA and CSA-ET, but rather a roadmap to define "farming-system-specific" CSA practices and the related AET.

To present the outlines of an international definition of CSA and to identify a roadmap for setting more specific definitions of CSA practices and CSA-ET in Guinea, a literature review was carried out, based on proceedings of workshops, case-studies, research documents, etc. published by the FAO, the Organisation for Economic Co-operation and Development (OECD), etc.

→ Results for this task are presented in **Parts 2.4** infra.

3. **Policies**

To review the applicable GoG policies on climate change adaptation in order to: (i) Identify opportunities for integrating the climate change policy framework with AET, (ii) Determine whether the adaptation policy framework is gender-responsive, and identify gaps to be addressed, a literature review was carried out and data gathered were triangulated during semi-structured bilateral interviews.

The sources of information for the literature review were the GoG strategies and policies published in the environment and agriculture sectors. The semi-structured bilateral interviews were carried out with GoG officials from key Ministries (Environment, Agriculture, Fisheries, Livestock, Forestry, Vocational and Technical Training), key agencies (agriculture research, meteorology), and umbrellas of farmers and livestock farmers.

→ Results for this task are presented in **Parts 2.4** infra.

4. Data

Data collection protocols and tools were developed based on the two USAID/Guinea research questions, and the 12 Winrock/AEMIP sub-questions (see **Annex 2** infra). This was done in two steps.

Firstly, seven groups of stakeholders were identified: AET faculty, AET students, agriculture researchers, leaders/members of umbrella farmers' groups (Federation or Union), leaders/members of farmers' groups (grassroot level), private stakeholders, and rural radio. The questionnaires (see **Annex 2** infra) are registered as is: PROF = AET faculty, ETUD = AET student, IRAG = agriculture researchers, FAIT = leaders/members of umbrella farmers' groups, OPA = leaders/members of farmers' groups, PRIV = private stakeholders, and RADIO = rural radio.

Secondly, for each group, the USAID questions and Winrock/AEMIP sub-questions were "translated" into simpler multiple choice questions (in easy French and avoiding conceptual terms to the extent possible), with the possibility to add comments any time deemed necessary by the investigator and/or the person investigated. Therefore, in the questionnaires, most of the questions (number in the first column) are linked to one or two sub-questions (number in the second column, e.g. 1.3 corresponds to the third sub-question of question 1).

Four sub-questions were not included into the questionnaires, as the related information was captured during the semi-structured bilateral interviews. These sub-questions are (see **Annex 2** infra):

- Q1.7: What efforts have been made by the GoG to integrate climate change adaptation into AET?
- Q2.3: What are the current mechanisms/platforms to coordinate with AET institutions to advance climate change policies, and develop/disseminate CSA technologies - among the public sector, private sector, and civil society sector? How effective are these mechanisms/platforms?
- Q2.4: What are the current mechanisms/platforms for civil society to coordinate with government and AET institutions to advance climate change policies, and develop/disseminate CSA technologies? How effective are these mechanisms/platforms?
- Q2.5: What are the current mechanisms/platforms for the agribusiness private sector to coordinate with government and AET institutions to advance climate change policies, and develop/disseminate CSA technologies? How effective are these mechanisms/platforms?

The questions which are not linked to sub-questions serve as "revealing questions":

- For PROF, ETUD, IRAG, and RADIO questionnaires: the six first questions are straightforward (Yes I know, No I do not know): (i) Can you explain the greenhouse effect phenomenon? (ii) if yes, can you name the three main GHG in the agricultural sector? (iii) If yes, do you know what is the increase of T considered dangerous by the international community? (iv) Do you know what is the major objective that came out of the Nagoya conference on biodiversity? (v) Do you know the names of the three Rio conventions? (vi) What is the "Great Green Wall"?

If, for instance, a person investigated has no any clue about the greenhouse effect phenomenon, or mix it with other issues (e.g. ozone layer, earthquake, etc.), the investigator will be vigilant in the following questions and avoid taking answers as face value if they are apparently contradictory with the revealed level of knowledge of the investigated person (e.g. contradiction if an investigated person has no clue about climate change but claims having frequent training/information about it).

The "multifaceted" natures of the concepts and the openness of the questions are indeed favourable to questionnaire bias, i.e. an investigated person tending to respond the way he expects the investigator would like (e.g. an investigated person having no clue about climate change could claim receiving information about these topics and be interested in it if they assume the investigator would then latter facilitate their involvement in a project focused on climate change).

- For PRIV, FAIT, and OPA questionnaires: the six first questions aim at assessing the level of perception by the person investigated of global/local environmental changes (i.e. whether she/he

noticed a change in terms of climatic conditions, biodiversity richness, or soil fertility/texture), as well as her/his perception of the impacts caused on her/his production, and her/his (potential) change of practices to cope with these global/local environmental changes.

Once again, having these questions/answers exchanges at the beginning of the interview allow the investigator to triangulate answers given to the following questions.

The data collected with the questionnaires were then enriched and cross-checked during semi-structured bilateral interviews with key informants:

- For AET faculty and students: National Directorate of Vocational and Technical Training;
 - For researchers: National Agriculture Research Institute of Guinea (*Institut de recherche agronomique de Guinée* – IRAG) and National Directorate for Meteorology;
 - For leaders/members of umbrella farmers' groups (Federation or Union), leaders/members of farmers' groups (grassroot level), and private stakeholders: National Confederation of Farmers' Organisations of Guinea (*Confédération nationale des organisations professionnelles de Guinée* – CNOP-G), Confederation of Animal Farmers of Guinea (*Confédération nationale des éleveurs de Guinée* – CONEG), National Agency for Rural Promotion and Farm Advisory (*Agence nationale de la promotion rurale et du conseil agricole* - ANPROCA).
- Results for this task are presented in **Part 3** infra. A separate Excel database gather all the results.

5. Informants

As said earlier, two types of data collection tools were used: semi-structured bilateral interviews and individual questionnaires.

For the bilateral interviews, the following key informants were identified and interviewed:

- Ministry of Environment - Division on Pollution Prevention → Mr. Joseph SYLLA, Head of Division on Pollution Prevention / National Designated Authority on Adaptation to Climate Change / Focal Point of the UNFCCC + Mrs Moussa DOUMBOUYA, Assistant to the Head of Division;
- Ministry of Environment - National Directorate for Forest and Fauna → Mr. Alkhaky BANGOURA, Head of Division of Forest Management + Mr. Ousmane TRAORE, Head of Division of Forest Economics + Mr. Alsény CAMARA, Head of Service of the Botanical Garden of Conakry;
- Ministry of Livestock → Mr. Joseph Boniface SANGARE, Deputy National Director of the National Directorate of Livestock Production and Livestock Industries + Mr. Lansana Calla CAMARA, Head of the Natural Grazing Management Department + Mrs BALDE, Head of the Livestock Industries Department;
- Ministry of Fisheries → Mr. Fodé SANKHON, Head of the Strategy and Development Office (*Bureau de la stratégie et du développement* – BSD) + Mr. Sékou TOURE, Advisor to the Minister;
- National Directorates of Vocational and Technical Training // On-the-job and Short-term Training → Mrs. DIANE, National Director of Vocational and Technical Training + Mr. DIABY, Deputy National Director + Mr. DIALLO, Head of Division of Vocational Training + Mr. BAH, Deputy National Director of On-the-job and Short-term Training (and former Director of the ENAE of Tolo);
- Scientific Research Centre of Conakry Rogbané (*Centre de recherche scientifique de Conakry-Rogbané* – CERESCOR) → El Hadj Lamarana DIALLO, Senior researcher and National Coordinator of the UNDP-GEF funded project “Increasing Resilience and Adaptation to Adverse Impacts of Climate Change in Guinea’s Vulnerable Coastal Zones (RAZC project)”;
- National Directorate for Meteorology → Dr. Mamadou Lamarana BAH, National Director + Dr. Yaya BANGOURA, Deputy National Director + Mr. Namory DIAKITE, Head of the Division for Applied Meteorology + Mr. Alpha Boubakar BARRY, Head of the Division for Data Production and Management + Mr. Mamady TOUNKARA, Head of the Division for Research and Study;
- Institute for Agricultural Research in Guinea (*Institut national de la recherche agronomique de Guinée* – IRAG) → Dr. Famoï BEAVOGUI, General Director;
- National Agency for Rural Promotion and Farm Advisory (*Agence nationale de la promotion rurale et du conseil agricole* - ANPROCA) → Mr. Aly CONDE, General Director;

- National Agency for Agricultural Development and Food Security (Agence nationale de développement agricole et de sécurité alimentaire - ANDASA) → Mr. Mamady TRAORE, Senior Desk Officer;
- National Confederation of Farmers' Organisations of Guinea (Confédération nationale des organisations professionnelles de Guinée – CNOP-G) → Mr. Ibrahima BAH, National Coordinator + Mr. Kourayohe DIALLO, Advisor to the President + Mr. Abdulla 2 BAH, Training Officer;
- National Confederation of Animal Farmers of Guinea (Confédération nationale des éleveurs de Guinée – CONEG) → El Hadj Bachir DIALLO, President of the National Association of Poultry Farmers of Guinea (*Association nationale des aviculteurs de Guinée - ANAVIG*) and board member of the CONEG, in charge of poultry farming;
- UNDP → Mr. Soumaïla DAN BARIA, UN volunteer, focal point for the environment sector (replacement of Mr. SYLLA, retired in February 2014);
- French Agency for Development (Agence française de développement – AFD) → Mrs. Anya BELLALI, desk officer in charge of the rural sector (agriculture, livestock, fisheries, forestry, and environment);
- USAID/Guinea → Mrs. Melody Mc NEIL, Agriculture and Environment Team Leader for USAID/Guinea and Sierra Leone;
- USAID-funded STEWARD Programme → Mr. Foday KANU, STEWARD Monitoring & Evaluation Coordinator.

For the individual questionnaires, as said earlier, seven groups of stakeholders were identified: AET faculty, AET students, agriculture researchers, leaders/members of umbrella farmers' groups (Federation or Union), leaders/members of farmers' groups (grassroot level), private stakeholders, and rural radio. To gather robust results, it was proposed to have the largest sample possible for each group, taking into account the travel time (50 km/h in average, no travel during the night), and the time available for the field mission. The numbers of planned and realised questionnaires are as follows:

Number of questionnaires	Planned	Realised
AET Faculty	24	28
AET Students	60	59
IRAG Researchers	25	16
Umbrella Farmers' Groups	18	14
Grassroot Farmers' Groups	24	33
Private agri-business	8	7
Rural radio	4	6
TOTAL	163	163

Table 2 - Numbers of planned and realised questionnaires (GCC Baseline Study, 2014)

For the AET Faculty and Students, the five ENAE and the ISAVF were targeted (five Faculty and 10 Students per AET in average).

For the IRAG Researchers, the local offices of Koba (Basse-Guinée), Kilissi (Basse-Guinée), Bareng (Moyenne-Guinée), Sérédou (Guinée forestière), and Kankan (Haute-Guinée) were targeted (five researchers in each local centres). Unfortunately, few questionnaires were administered in Moyenne-Guinée, Guinée forestière, and Haute-Guinée. However, having 16 questionnaires allows capturing the main data and trends.

For the Farmers' Groups, it was planned to gather data with 18 umbrella-level and 24 grassroot-level organisations, thus totalling to 42 Farmers' Organisations. Finally, 47 were interviewed, with a bit less umbrella-level organisations than planned and more grassroot-level organisations than planned. The selection of Farmers' Organisations was done taking two criteria in consideration:

- Targeting productions representatives of the agro-ecological regions: mangrove rice and vegetable in Basse-Guinée, honey, potato, onion and tomato in Moyenne-Guinée, banana, palm oil and rubber in Guinée forestière, rainfed rice, sesame and yam in Haute-Guinée;
- Having a balanced representation of “weak” and “robust” organisations: this balancing was done according to our general knowledge of the organisations.

Animal farmers' groups, fishermen's groups, and community-forest or community-NRM groups were not targeted, since they are few "active" groups in the field (most of them are "in dormancy", after the stop of sectoral programme) and having dormant groups in our sampling would have brought more bias than relevant information (i.e. no "concrete" activities on which to base the discussion; group leaders eager to attract a potential donor and have its support, leading to possible bias).

For the private agri-business stakeholders, the sampling size is reduced, but it illustrates the situation in the agriculture sector: due to the degraded business climate, the absence of agricultural bank, the weaknesses of rural infrastructures, etc. very few private stakeholders invest in the sector.

The seven interviewees were representatives of the following companies: Farm El Hadj BERETE (poultry farming) in Kankan, Guinea Cotton Company (*Compagnie guinéenne du coton - CGC*) in Kankan, Guinea Palm Oil and Rubber Company (*Société guinéenne de palmier à huile et d'hévéa – SOGUIPAH*) in Yomou, Guinea Brewery Company (*Société de brasserie guinéenne – SOBRAGUI*). They crop and purchase maize) in Kissidougou, Daboya Fruit Company (*Compagnie fruitière de Daboya*. The only mango exporter in Guinea), Farm Boubacar CAMARA (poultry ranching) in Mamou.

The data collection was done by two teams, with the following itineraries (see the detailed planning of meetings in **Annex 3** infra):

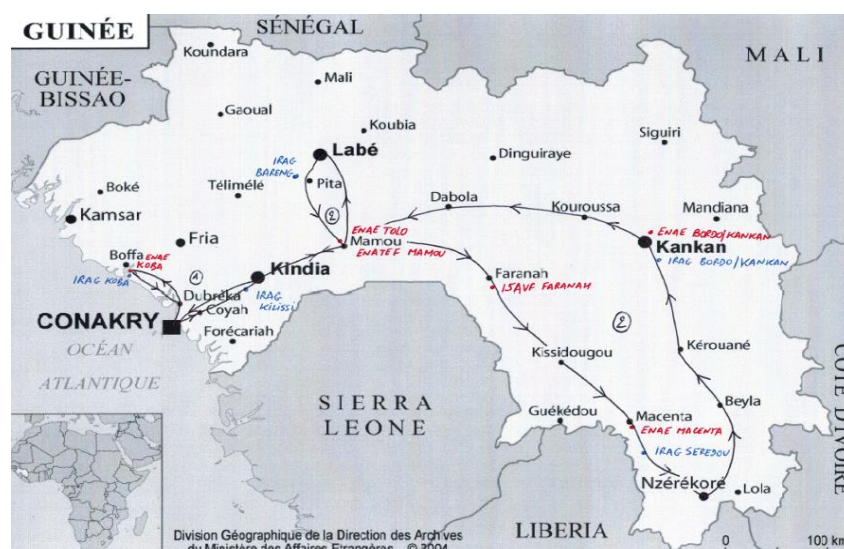


Figure 11 - Itineraries for the field mission (AEMIP/GCC baseline study, 2014)

(1) Olivier BOUYER: semi-structured interviews in Conakry with key informants and individual questionnaires with AET Faculty and Students (ENAE Koba), IRAG Researchers (local centres of Koba and Kilissi), Farmers' Organisations (in Dubréka, Kindia, and Koba), private agri-business (Daboya Fruit Company);

(2) Mohamed DIAKITE, Aliou CAMARA, and Saliou NIASSY: individual questionnaires with AET Faculty and Students (ENAE Tolo, Macenta, Kankan, ISAVF Faranah and ENATEF Mamou), IRAG Researchers (local centres of Bareng, Sérédou, and Kankan), Farmers' Organisations (in Mamou, Labé, Timbi-Madina/Pita, Kissidougou, N'Zérékoré, Kérouané, and Kankan), private agri-business (Farm Boubacar CAMARA in Mamou, SOBRAGUI in Kissidougou, SOGUIPAH in Yomou/N'Zérékoré, CGC in Kankan, Farm El Hadj BERETE in Kankan), and rural radio (Mamou, Faranah, Kissidougou, Guékédou, N'Zérékoré, and Kankan).

→ Results for this task are presented in **Part 3** infra.

6. Baseline and recommendations

The data captured via the semi-structured interview were analysed qualitatively, while the data captured via the individual questionnaires were compiled into an Excel database, in order to carry out qualitative and quantitative analysis. The results of this analysis were used (i) to establish the baseline for the AEMIP/GCC Integration Pilot, and (ii) to formulate recommendations for its implementation.

→ Results for this task are presented in **Parts 3 and 4** infra.

→ Concepts of “biodiversity” and “NRM” in the baseline study

The description of the GCC Integration Pilot project, as well as the terms of reference for the baseline study, refer at many occasions to biodiversity and NRM, in liaison with climate change. This is indeed of particular importance, since the impacts of climate change will aggravate the degradation of natural resources, especially in Sub-Saharan Africa (see **Part 1.1** supra).

In the agricultural sector, two natural resources are of critical importance in terms of vulnerability and resilience of farming systems: biodiversity and soils. In short, farming systems where there is biodiversity erosion (e.g. disappearance of certain local rice seed tolerant to salinity or drought) or soil degradation (e.g. loss of organic matter, leading to reduced fertility and water holding capacity) are more vulnerable and less resilient to climate change impacts.

AET institutions need to mainstream not only climate change into their curricula, but also the interlinkages between climate change and other natural resources, in order to prepare their students to implement “ecosystem-based adaptation” practices. This point is highlighted in the World Agroforestry Centre (ICRAF) Working paper n°82²⁰: *“Climatic changes, in combination with other drivers, are expected to substantially alter agricultural biodiversity [...] This can be particularly serious for wild relatives of crops, which may contain valuable genes for plant breeding programmes for increasing heat and drought resistance or resistance to pests and diseases”*. Therefore, in our questionnaires, biodiversity and NRM are considered in conjunction with the adaptation to climate change.

→ Concept of “gender” in the baseline study

The New Agricultural Development Policy Letter 2006-2015 (*Nouvelle lettre de politique de développement agricole - NLPDA*)²¹ provides an interesting overview of the status of women in the rural sector: *“Over 75% of women live in rural areas, they represent 53% of the agricultural labour, spend 80% of their working time to agricultural tasks, and account for about 80% of food production. The vast majority practice subsistence agriculture, receive no remuneration (78.5% of them are caregivers) and have no control on the farm revenue, even if they provide considerable work force”*.

The NLPDA further states that *“Women have benefited little from new technologies”*, while they are active in nearly all the rural activities: food cropping (cereals, tubers, vegetable, etc.), harvesting and processing of agriculture and non-timber forest products, collection of firewood, small ruminants rearing, poultry farming, fishing in the ponds and the shore... Finally, the few activities in which women are not represented, or marginally, are cattle ranching, deepsea fishing, and bush meat hunting.

The National Agricultural Investment and Food Security Plan 2012-2016 (*Plan national d'investissement agricole et de sécurité alimentaire 2012-2016 - PNIASA 2011*)²² recognises the importance of women in the agriculture sector and states that it *“will focus on the target groups such as women, young people who, in addition, to be poor, are vulnerable. PNIASA design is based on the national policy for equity and gender equality in Guinea.”*

As a logical consequence, an “AEMIP/GCC Pilot Integration Project Gender Analysis”²³ highlighted the fact that *“The project must internalize an awareness of complex gender dimensions impacting higher education and research, land tenure issues as they relate to agriculture and potential climate change adaptation practices and leadership in civil society and public institutions [...] While the project cannot reverse these trends, it can exert considerable influence on institutions, students and faculty, and new research initiatives through curriculum development, faculty training, and small grants funding to incorporate gender-responsive methods and strategies”*.

This Gender Analysis further recalls the unbalanced access of Guinean girls and women to education: *“The overall illiteracy rate for males is 55% against 74% for women [...] The net enrolment rates in primary and secondary school are (respectively) 79% and 35% for boys and 69% and 22% for girls. Girls' education tends to be less valued than boys' education for a variety of factors including early marriage, household labour requirements, and the high cost of formal education”*.

²⁰ CHAKEREDZA S. et al.. Mainstreaming Climate Change into Agricultural Education: Challenges and Perspectives. ICRAF Working Paper no. 82. World Agroforestry Centre. 2009. 30 p

²¹ MAEEEF. Nouvelle lettre de politique de développement agricole 2006-2015. GoG. 2007. 56p.

²² Ministère de l'agriculture. Plan national d'investissement agricole et de sécurité alimentaire 2012-2016. GoG. 2011. 104p

²³ Unknown. USAID/Guinea GCC integration Pilot Gender Analysis. AEMIP. December 2012. 3p

Finally, recommendations are made at the end of this Gender Analysis: *“In terms of indicators, all individual level indicators will be sex-disaggregated [...] As well, the Mission will ensure that the initial assessment to be carried out at the start of the overall project - including the agriculture program - will include a gender assessment”*.

These recommendations were taken into account when selecting the sampling for each questionnaire, by introducing a voluntary bias and giving priority to women for the interviews. Unfortunately, we did not get the chance to interview any female faculty (upon 28 interviewees), or female researchers (upon 18 interviewees), or private agri-business representative (upon 7 interviewees), or radio manager (upon 6 interviewees), due to the very poor representation of women in these organisations.

At least, we were able to interview 15 female students upon 59 interviewees: 25%, which is good when looking at the rate of women in the Guinean AET (see **Part 3** infra), but only 12 female representatives of farmers' groups upon 47 interviewees: 25%, which is low if we consider the fact women represent 53% of the labour force in the agriculture sector (NLPDA, 2007).

This can be explained by the fact that most of farmers' leaders are male and we booked the appointments with these leaders: even if they were said to give priority to women for the interviews, most of them preferred to gather men. There is still much to be done in terms of women promotion.

2. CSA: international benchmark and national state of the art

2.1. Adaptation and agriculture under the UNFCCC

→ Overview of UNFCCC Decisions in terms of adaptation: NAPAs, NAPs and LEG

The Decision 5/CP.7 of the Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC)²⁴ recognised that LDCs are the most vulnerable to climate change and the least able to cope with it. It provides a framework to identify activities that need to be implemented without delay, in order not to increase their vulnerability or increase latter the costs of adaptation.

To implement this Decision 5/CP.7, LDCs were invited to elaborate a National Action Plan for Adaptation (NAPA): (i) Participatory spatial and sectoral assessment of vulnerability to current and future climate variability, (ii) Identification of potential adaptation measures, and (iii) Prioritisation of these measures and selection of urgent activities.

NAPAs are published on the UNFCCC website and the Global Environment Facility (GEF) website. Identified priorities and the related amounts are reported in the UNFCCC NAPAs' database²⁵. So far, 50 countries have developed a NAPA: 510 priority projects identified for 1 GUS\$. In Africa, 34 countries have developed their NAPA (including Guinea: see **Part 2.4** infra): 350 priority projects identified for more than 630 MUS\$.

National adaptation plans (NAPs) were defined by the Decision 1/CP.16²⁶ as a process to enable LDCs to plan and implement "medium- and long-term adaptation needs," building on their experience in addressing short-term "urgent and immediate adaptation needs" through the NAPAs. Other developing countries were also invited to use the modalities for formulating their NAPs.

The Decision 5/CP.17²⁷ further defines the objectives of the NAP process: (i) to reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience; and (ii) to facilitate integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

Therefore, the NAPA and NAP processes can be illustrated as follows²⁸:

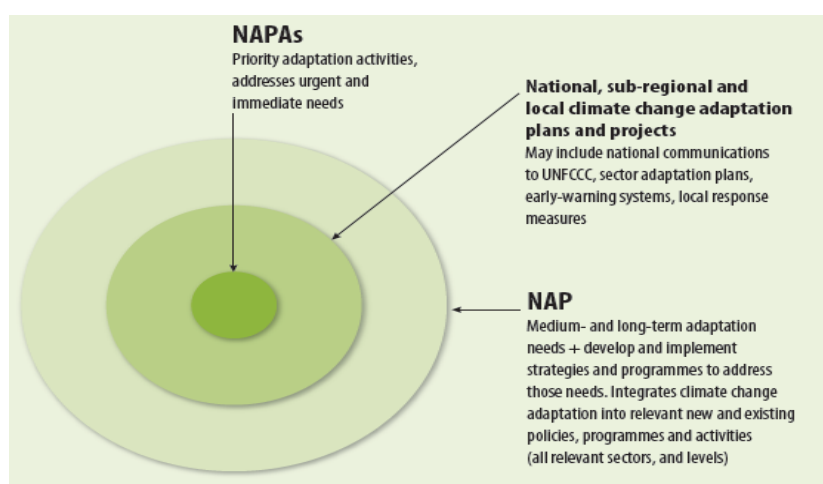


Figure 12 - NAPA and NAP processes (KISSINGER G. and NAMGYEL V., 2014)

²⁴ UNFCCC. Decision 5/CP.7 on NAPA, from the Marrakech Climate Conference. UNFCCC. 2001. 8p

²⁵ http://unfccc.int/adaptation/workstreams/national_adaptation_programmes_of_action/items/4583.php

²⁶ UNFCCC. Decision 1/CP.16 on the Cancun Agreement and the Cancun Adaptation Framework, from the Cancun Climate Conference. UNFCCC. 2010. 31p

²⁷ UNFCCC. Decision 5/CP.17 on the NAPs, from the Durban Climate Conference. UNFCCC. 2011. 7p

²⁸ KISSINGER G. and NAMGYEL V. LDC paper Series – NAPAs and NAPs in LDCs. March 2014. 26p.

The LDCs' Experts Group (LEG) prepared technical guidelines for the NAP process in 2012, based on the COP's initial guidelines. The review of the guidelines planned for November 2013 at COP19 in Warsaw, has now been postponed to COP20 in Peru, in 2014, given that the LDCs have not had enough time to try out the existing guidelines. To inform this review, Parties were invited to submit comments by March 2014, on their experience with the application of the initial NAP guidelines.

At COP20, guidelines for concrete design and implementation of the NAPs have to be adopted. In that context, some key issues will need to be addressed:

- Of great concern to LDCs, based on the NAPA experiences, is whether adequate levels of climate finance will be available to support NAPs (and pre-existing NAPAs), the timing of finance delivery, and the modalities for access. The GEF Council has affirmed support via the LDCs' Fund and the Special Climate Change Fund (SCCF) for both planning and preparatory activities. However, it is unclear whether funding levels will be sufficient, and how these sources will relate to the Green Climate Fund (GCF);
- A critical objective of NAPs is to facilitate the integration of climate change adaptation into development policies and activities. This is a real challenge: (i) In the LDCs, there is a multiplication of sector policies, theoretically supposed to be "coordinated" and "mainstreamed", which is not done in reality, (ii) Few examples exist of LDCs mainstreaming climate plans into national development and sector plans, which could provide models for NAP processes and interventions;
- Clear guidance from the COP is needed in order to support "country-driven" approaches and define measurement, reporting and verification systems for climate finance in order to help differentiate adaptation support from official development assistance.

→ Overview of international financing for adaptation

Four multilateral Funds, supervised by the UNFCCC, are financing adaptation to climate change²⁹:

- LDCs' Fund (LDCF), managed by the GEF (grant):
 - Support to NAPA preparation and NAPA projects (following the GEF project cycle);
 - "balanced access": ceiling per country to ensure that all countries have access to the Fund;
 - Full cost financing of priority activities, co-financing for non-priority actions (Decision 3/CP11);
 - 537 MUS\$ by mid-2012, of which 346 MU\$ allocated for the financing of 49 NAPA and 82 projects in 44 countries. 56% of funding is allocated to Africa. Funding to Sub-Saharan LDCs amounted to 130 MUS\$ from 2003 to 2012.
- Special Climate Change Fund (SCCF), managed by the GEF(grant):
 - Two windows: "adaptation" and "technology transfer";
 - Access to all developing countries, with priority to the most vulnerable countries in Africa and Asia, as well as the small island developing countries;
 - 241 MUS\$ by mid-2012, of which 162 MUS\$ allocated for the financing of 39 projects. 26% of funding is allocated to Africa.
- Adaptation Fund (AF), managed by the World Bank (grant):
 - Focus on the most vulnerable areas;
 - Specific criteria: vulnerability, emergency, up-scalability, co-benefits, etc. + priority given to LDCs unable to access the LDCF;
 - Direct access by accredited National Implementation Entities (NIEs). NB: for now, among the Sub-Saharan LDCs, there are only two NIEs: Ecological Monitoring Centre (*Centre de suivi écologique* – CSE) in Senegal and the National Fund for Environment in Benin;
 - 283 MUS\$ by mid-2012, of which 180 MUS\$ allocated to 27 countries (including Mauritania and Senegal in West Africa).

²⁹ SalvaTerra. Training manual for the Workshop of preparation of West African negotiators to the COP19 in Warsaw. CILSS. October 2013. 165p

- Green Climate Fund (GCF), created by the Decision 1/CP16 and qualified as entity of the financial mechanism of the UNFCCC (together with the GEF). Operationalization foreseen in 2014. 6 MUS\$ in pledges so far.

Other multilateral and bilateral Funds are financing adaptation to climate change in West Africa (in addition to the USAID/GCC already mentioned in **Part 1.2** supra):

- Global Climate Change Alliance (GCCA): grant, with focus on LDCs and small island developing countries. 2012-2013: budget of 85 MUS\$. For 2008-2012: 60% of funding allocated in Sub-Saharan Africa. Four projects in Benin, Ethiopia, Gambia, and Senegal (40 MUS\$);
- German International Climate Initiative (German ICI): grant, worldwide. Late 2012: budget of 851 MUS\$ and 770 MUS\$ already allocated, of which 9.1 MUS\$ for four projects in Central Africa Republic, Ethiopia, and Mali (two projects);
- Japan's Fast Start Finance (Japan FSF): grant and loan, for public or private initiatives worldwide. 1.6 GUS\$ allocated in 2012, of which 60 MUS\$ for five projects in Benin, Burkina-Faso, Djibouti, Ethiopia, and Sudan;
- Pilot Program for Climate Resilience (PPCR): grant and loan, with focus on vulnerable countries (LDCs and small island developing countries). 1.12 GUS\$ pledged, and 13 programmes approved for 800 MUS\$ (four in Niger for 100 MUS\$).

These data being presented, there is many a slip twixt cup and lip for Sub-Saharan countries: a review of climate finance in Sub-Saharan Africa³⁰ made in 2011 highlighted that a few part of the financing pledges was approved and a few part of the approved financing was disbursed, as can be seen below:

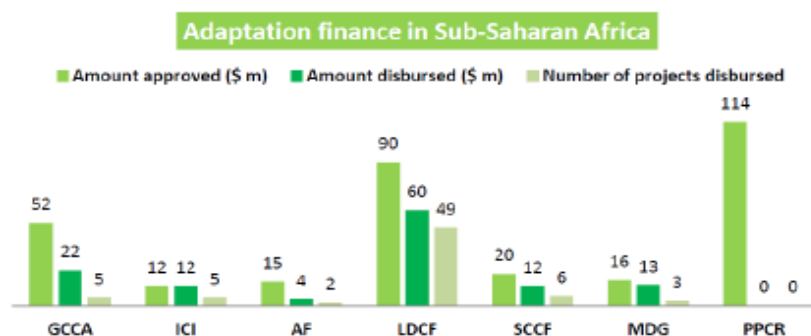


Figure 13 - Funding disbursed and approved for adaptation in Sub-Saharan Africa in 2004-2011 (ODI & HBS, 2011)

→ Current status of the “agriculture item” in the UNFCCC negotiations

An agriculture item has been introduced in the UNFCCC negotiations at the Cancun Climate Conference in 2010. Till then, there is very little progress and the role of agriculture is only discussed from an adaptation point of view. Indeed, some developing countries (especially Brazil and India) are strongly opposed to discuss about the role of agriculture from a mitigation point of view.

It seems they fear opening the door to any kind of future potential mitigation commitments for “emerging countries” in the agriculture sector, which would, either weaken their goals to achieve food security, or stigmatize their agricultural exports (in case of mitigation commitments to be measured, reported, and verified according to the “carbon content” of their exported agriculture products).

A technical workshop was held on the agriculture item at the Warsaw Climate Conference, but “political” negotiations on this item have stalled, some developing countries (Brazil and India ahead) opposing the establishment of a contact group. Conclusions³¹ are thin and only mention the fact that this item will be discussed again in 2014.

In that context, it seems difficult to agree in the short-term under the UNFCCC process on a CSA definition and technical guidelines to implement it, as the CSA lies on three pillars: adaptation, mitigation, and livelihood (see **Part 2.2** infra).

³⁰ Overseas Development Institute (ODI) & Heinrich Böll Stiftung (HBS). Climate Finance Policy Brief - Climate Finance in Sub-Saharan Africa. ODI & HBS. November 2011. 8p

³¹ <http://unfccc.int/resource/docs/2013/sbsta/eng/l35.pdf>

Moreover, the lack of progress on the agriculture item in the UNFCCC negotiations is clearly a pity for Africa. African Ministers of Environment, in the Gaborone Declaration on Climate Change towards 2015³², made clear they wanted swift and ambitious progress on this item: “*Since agriculture is the backbone of African economies and livelihoods for people, we must create a special working group on the subject of adaptation of agriculture and may process this item [...] In this context, the Africa Group has also supported the establishment of a platform for dialogue on food security and adaptation to climate change based on ecosystems*”.

2.2. Internationally “agreed” definition of CSA and CSA-ET in West Africa

➔ **Internationally “agreed” definition of CSA**

As said earlier (see **Part 2.1** supra), the agriculture item was introduced in the negotiations late 2010, at the Cancun Climate Conference. Till then, very little progress has been made. Therefore, the concept of CSA was almost entirely discussed and finally commonly “agreed” (but not officially endorsed by a COP Decision...) through papers and international meetings supervised by the FAO.

The first meeting was the Hague Conference on Agriculture, Food Security, and Climate Change held from October 31 to November 5, 2010, just before the Cancun Climate Conference³³. A paper was produced one year later, focusing on investment opportunities for CSA in Africa³⁴. Soon after, in April 2012, a joint FAO/OECD workshop entitled “Building Resilience for Adaptation to Climate Change in the Agriculture Sector” was organised in Roma³⁵.

Finally, a CSA Sourcebook³⁶ was published by the FAO in June 2013, summarising all the common knowledge and best practices with regard to CSA. This Sourcebook is organised in modules, focused on specific issues (landscape, water, soils, energy, genetic resources, crop production, livestock, forestry, and fisheries and aquaculture), as well as transversal issues (food value chains, local institutions, mainstreaming into national policies, finance, disaster risk prevention, safety net, capacity development, and monitoring and evaluation).

Roughly summarised, the concept of CSA lies on three pillars: (i) ADAPTATION: to reduce farmers' vulnerability to climate change (climate variability and extreme events, as well as slow onset changes), (ii) MITIGATION: to reduce emissions of GHG emissions from agriculture and land use changes, (iii) LIVELIHOOD: to increase the food production and farmers' income.

The concept of CSA is therefore fully in line with the Millennium Development Goals (MDGs) and the objectives of the three Rio Conventions, as well as the World Food Summit, as figured below:



Figure 14 - Links between CSA, MDG, the 3 Rio Conventions and the World Food Summit (FAO, 2014)

³² African Ministerial Conference on the Environment. Gaborone Declaration on climate change towards 2015. 5th Session of the African Ministerial Conference on the Environment. October 2013. 6p

³³ FAO. CSA – Policies, practices, and financing for food security, adaptation, and mitigation. Input to the Hague Conference on Agriculture, Food Security, and Climate Change held from October 31 to November 5, 2010. FAO. October 2010. 41p

³⁴ FAO. Identifying opportunities for CSA investments in Africa. FAO. December 2011. 129p

³⁵ FAO/OECD. Proceedings of a joint FAO/OECD workshop: Building Resilience for Adaptation to Climate Change in the Agriculture Sector, held in Roma in April 23-24, 2012. FAO/OECD. April 2012. 346p

³⁶ FAO. CSA Sourcebook. FAO. June 2013. 570p

- **Adaptation:** We already presented the current and foreseen impacts of climate change at global level and in Sub-Saharan Africa, with a focus on the agriculture sector (see **Part 1.1** supra). Adaptation of agriculture to climate change is a must, as underscored by the provisions of the STERN Review: yields of rainfed agriculture will fall by 50% by 2050 in some countries. Small farmers should be the most affected, their net income may fall by 90% by 2100 (STERN, 2007);
- **Mitigation:** According to the FAO³⁷, the agriculture sector directly accounts for 14% of GHG emissions³⁸ and the deforestation, forest degradation, and land use changes accounts for an additional 17% of GHG emissions. In Africa, as presented earlier (see **Part 1.1** supra), even if the absolute contribution to global GHG emissions is reduced (3.4% according to the Global Carbon Atlas, 2014), the relative contribution of agriculture to GHG emissions is much more than the global average: 75% of West African GHG emissions are made of CH₄ and N₂O, to be compared to 31% at global level.

In short, “considering the necessary increase of production, staying within planetary boundaries will require to reduce emissions per kg of output and to enhance carbon sinks” (MEYBECK et al. 2012)³⁹: (i) Limit land use changes: to bring more surface under cultivation would require either deforestation or grasslands being converted to croplands, which would induce CO₂ emissions from forest biomass or the soils, (ii) Limit the use of chemical fertilizers whose production is an important source of CO₂ and which at the field level translate in N₂O emissions, (iii) Innovate in terms of livestock management, which is an important source of CH₄ and N₂O (*Ibid*).

- **Livelihood:** The development needs of LDCs, including most of Sub-Saharan countries, are known for long and the setting of the MDGs in 2000 materialise it. The target of MDG1 – Eliminate Poverty and Hunger has been revised upwards with the latest world population prospects⁴⁰: the world population should grow by 1/3 by 2050 (9.6 billion peoples, compared to the current 7.2 billion) and Africans should account for 25% (2.4 billion) of the world population by 2050. In that context, the High Level Panel on Food Security and Nutrition (HLPFSN) foresees the need to produce 70% more food by 2050⁴¹.

However, the implementation of CSA strategies and techniques involves three main challenges:

Need to integrate “CSA techniques” into “CSA strategies”. It is pointed out by the Rural Hub⁴²:

- Techniques are usually used at farm level, to increase farming revenue: water harvesting techniques, soil management techniques, seed selection, cropping-livestock integration, etc. Most of these techniques are known for long and were not specifically designed to address adaptation needs. Usually, they were, and still are, called “good practices”. It is for instance the case of the Zai and Stone Barrier (*cordon pierreux*) techniques, to increase water retention in the soils:



Figure 15 - Zai in Niger (Inter-réseaux, 2012)



Figure 16 - Stone Barrier in Burkina-Faso (UNDP, 2011)

³⁷ FAO. CSA: Managing Ecosystems for Sustainable Livelihoods. FAO. 2014. 14p

³⁸ e.g. CO₂ emissions from fossil fuel and cultivated soils, CH₄ from anaerobic fermentation (incl. enteric fermentation) and biomass burning, N₂O from aerobic fermentation and chemical fertilisers, etc.

³⁹ MEYBECK A. et al. CSA, presented at the Workshop “Planet Under Pressure, New Knowledge Towards Solutions”, March 26-29, 2012. FAO. 4p

⁴⁰ UN. World Population Prospects: The 2012 Revision – Key Findings and Advance Tables. UN. August 2013. 54p

⁴¹ HLPFSN. Food Security and Climate Change. June 2012. 119p

⁴² Rural Hub. Preparatory Note for the Forum of National and Regional Stakeholders on CSA in West Africa for the setting of an ECOWAS intervention, funding, monitoring and evaluation framework on CSA, associated with an Alliance for the consistency and coordination of CSA initiatives, as part of ECOWAP/CAADP implementation. Rural Hub. March 2014. 27p

These two techniques appeared in the 1960s as “soil fertility improvement techniques” and were successively labelled as “Agriculture development techniques” in the 1970s, “Water harvesting techniques” in the 1980s, “Soil fertility improvement techniques” (again) in the 1990s, “Integrated water management techniques” in the 2000s, “CSA” now, and may be “Green agriculture techniques” in the future. Most of the CSA techniques are therefore already existing “Good agricultural practices”;

- CSA strategies are set up according to forecasted agro-ecological conditions, at short, medium, and long-term, taking into account local, sub-national, and national levels of vulnerability and resilience with regard to climate change. CSA strategies are meant to accelerate and rationalise the deployment, in space and time, of already existing (for most of them) “good agricultural practices”. In short, if CSA techniques are not new, CSA strategies are.

Need to define ‘farming-system’ specific CSA strategies and techniques. There are many opportunities for capturing synergies between the three pillars of CSA, often leading to “triple win” solutions, but trade-offs are also inevitable in some situations, e.g. converting wooded lands for cropping, in order to achieve food security locally and to support vulnerable rural populations, will lead to increasing GHG emissions. Therefore, the overarching definition of CSA has to be adapted to local context, be “farming-system” specific, and implemented with flexibility, taking into account trade-off, e.g. if the triple-win solution is not possible, the second-best optimum is to have at least a win-win solution (addressing adaptation needs and livelihood needs).

Need for closer integration of NRM and agricultural outreach efforts to succeed in promoting CSA. Indeed, the individual country assessments carried out by the USAID-funded Modernizing Extension and Advisory Services (MEAS) project⁴³, and the Worldwide Extension Study⁴⁴ carried out by IFPRI (supported by USAID, the FAO and the Inter-American Institute for Cooperation on Agriculture - IICA) show that, in most countries, agricultural and NRM extension efforts are carried out by separate structures, each with its own staff working in different geographic areas and employing different methods to pursue different objectives.

In Sub-Saharan Africa, in particular, the provision of extension services tends to be separated among crop, livestock, fisheries and forestry line Ministries, often with weak or no cross-ministerial communication.

A review of literature made under the same MEAS project⁴⁵ further stresses that “*few national extension and advisory service programs have launched initiatives aimed specifically at assisting farmers in adapting to climate change. It is unclear whether this is an indication that conditions have not yet reached a management switching point where change is required, an indication of the time lag in accepting, understanding and preparing responsive measures, or simply confirmation that many of the early adaptive responses are not sufficiently different from many ongoing development interventions targeting natural resource-dependent smallholder farmers and thus are not being recognized for their climate change adaptive qualities*”.

→ International and sub-regional institutions active in the field of CSA-ET

A lot of universities, research centres, NGOs, etc. are actives worldwide in the adaptation of agriculture to climate change and NRM (and sometimes CSA). Here, considering the action-oriented nature of the terms of reference for the baseline study, we focused on (i) Regional and sub-regional AET institutions and research centres, more easily linkable with the Guinean AET, (ii) Delivering information/training course in French, as many AET faculty/students do not know English, (iii) Providing “on-job oriented” curricula or elements of curricula, rather than “academic oriented” ones, considering that ISAVF students lack of on-job training course (ISAVF institutional assessment, 2013) and the situation may be the same in the ENAEs and the ENATEF.

12 institutions have been identified, with different levels of interest for “*servng as appropriate model/benchmark for Guinea on the integration of climate change adaptation, biodiversity and NRM into AET*”. Indeed, we can consider that only two of them provide curricula that would respond to this

⁴³ www.meas-extension.org/meas-offers/country_studies

⁴⁴ www.worldwide-extension.org and www.g-fras.org/en/world-wide-extension-study

⁴⁵ SIMPSON B. M and BURPEE.C G. Modernizing Extension and Advisory Services (MEAS) Discussion paper 3 – Adaptation under the “New Normal” of climate change: the future of agricultural extension and advisory services. January 2014. 40 p

objective. However, some institutions provide useful information/material, either to illustrate AET training course about environmental issues, or to build AET curricula on environmental issues.

Therefore, in what follows, we present the 12 institutions classified by level of relevance:

- Four providers of information or general guidelines (in orange);
- Six providers of elements that could be useful to develop AET curricula on environmental issues (in green);
- Two providers of curricula on environmental issues that could serve as a model for AET institutions and the AEMIP (in red).

ANAFE - African Network for Agriculture, Agroforestry and Natural Resources Education⁴⁶

ANAFE is a network of 132 educational institutions in 37 African countries (NB: Guinea is not part of it) whose objective is to strengthen the teaching of multi-disciplinary approaches to land management. The ANAFE Secretariat is hosted at the World Agroforestry Centre (ICRAF) headquarters in Nairobi.

ANAFE published a Working Paper on “*Mainstreaming Climate Change into Agricultural Education: Challenges and Perspectives*”⁴⁷, which highlighted that “*Climate Change should be integrated into the curricula of tertiary agricultural institutions as a matter of urgency. There is need for concrete scientific data based on African experiences to be infused into the curricula [...] The curricula can be handled as a separate subject or infused and integrated into the various agricultural and NRM subjects*” (

Possible elements of such curricula were also presented: (i) Introduction to climate change (causes, projections, impacts on livelihood), (ii) Agrobiodiversity (impacts of climate change on agrobiodiversity at ecosystems, species and within-species levels, facilitating adaptation to climate change with agrobiodiversity), (iii) Biofuels (alternative sources of energy, socio-economic implications), (iv) Adaptation strategies (options available), (v) Mitigation strategies (current thinking, geo-engineering concepts and practices), (vi) Global policy issues (UNFCCC, Kyoto Protocol, CDM, NAPA).

Apart from this Working Paper, the ANAFE 2013-2017 Strategic Plan⁴⁸ also touches upon the importance of considering climate change and NRM when implementing the Strategic Objective #1 - Review and Reform Curricula: “*The increasing recognition of the complex interdependence of agriculture and NRM are also critical dimensions for consideration in curriculum architecture [...] ANAFE will support universities to develop teaching and research programmes that expose students to climate change adaptation and mitigation options in different agro-ecological zones, with a special focus on sustainable agriculture, forestry, water management, energy, etc.*”

Unfortunately, these strategic orientations are not yet materialised: there is no curricula documents online with regard to adaptation to climate change⁴⁹. Although; there are interesting ideas in the ANAFE Strategic Plan 2013-2017 and interesting elements in the Working Paper #82, they remain too vague to be used as an input for facilitating the introduction of CSA-ET in Guinea.

WECARD - West and Central African Council for Agricultural Development (Conseil Ouest et Centre africain pour la recherche et le développement agricoles - CORAF)⁵⁰

Created in 1987 and based in Dakar, WECARD is a network of 22 National Agriculture Research Centres of West Africa (including IRAG in Guinea) and Central Africa. WECARD aims at sharing knowledge and good practices, in order to sustainably improve agriculture productivity, competitiveness and marketing. It has eight research programmes: livestock and fisheries, food crops, cash crops, NRM, biotechnology, market and trade, capacity-building, and knowledge management. Looking in detail at the NRM research programme, climate change does not appear.

Moreover, in its 2007-2016 Strategic Plan⁵¹, WECARD did not clearly identify climate change as a real threat for the sub-region, as can be noticed by the use of conditional when referring to its impact on

⁴⁶ <http://anafe-africa.org>

⁴⁷ CHAKEREDZA S. et al. Working Paper: Mainstreaming Climate Change into Agricultural Education: Challenges and Perspectives. ANAFE and ICRAF. 2009. 30p

⁴⁸ ANAFE. Strategic Plan 2013-2017. ICRAF. 36p

⁴⁹ http://anafe-africa.org/?page_id=54

⁵⁰ <http://www.coraf.org/>

⁵¹ WECARD. 2007-2016 Strategic Plan. WECARD. November 2007. 44p

agriculture: "The Sub-region is characterized by biophysical constraints to agricultural development: drought, nutrient depletion, acidity and soil degradation, etc. Climate change that we are currently experiencing could be an additional danger to already very vulnerable production systems".

However, it is worth to mention the existence of the Regional Research Centre for the Improvement of Adaptation to Drought (*Centre d'étude régionale pour l'amélioration de l'adaptation à la sécheresse – CERAAS*)⁵². Created in 1982, it is a resource centre for the WECARD. One of the four CERAAS's research programme called "Improving cropping systems for better adaptation to drought" is relevant for adaptation of agriculture to climate change, but there are few recent publications on this topic, which suggests the CERAAS is not very active on it.

CTA - Technical Centre for Agricultural and Rural Cooperation⁵³

CTA is a joint international institution of the Africa, Caribbean and Pacific Group of States (ACP) and the European Union (EU). Financed by the EU, CTA operates in ACP countries under the Cotonou Agreement to improve food and nutritional security, increase prosperity in rural areas and ensure proper management of natural resources. It facilitates access to information and promotes the development of agricultural policies. Created in 1983, it gathers 79 members States, including Guinea.

CTA publishes a bimonthly review, called "CTA Spore". This review includes a section dedicated to climate change⁵⁴, where one can gather useful information in terms of CSA techniques. For instance, in the latest issues, there were articles about genetic improvement of dairy cattle in Senegal, polyvalent craft mill to produce food supplements in Burkina Faso, improved fishing techniques to keep fry in South Sudan, etc. The CTA website also provides a lot of publications online, but there is no specific section on climate change.

FAR - Network on Agricultural and Rural Training (Réseau formation agricole et rurale)⁵⁵

FAR was created during an international workshop held in Ouagadougou in 2005: "Mass Training in Rural Areas: Element to Define a National Policy". FAR participates, supports and enhances reflection on training schemes for rural areas. It has three areas of work: (i) Dissemination of information, (ii) Organisation of events and lobbying, (iii) Construction of collective knowledge. FAR gathers 13 member countries, including Guinea: a Network of Stakeholders on Agricultural and Rural Formations of Guinea (*Réseau des acteurs des formations agricoles et rurales de Guinée - RAFARGUI*)⁵⁶ was created in April 2013 (see explanations in **Part 3.2** infra).

Climate change and NRM do not seem to be on the agenda of FAR: their recently published report on "Issues at Stake, Challenges, and Innovations related to Agricultural and Rural Training in Francophone Africa; Reflection and Roadmap"⁵⁷ does not mention climate change and NRM. However, since the RAFARGUI is in place, it would be worth using it as a forum of discussion to exchange about the integration of environmental issues into AET curricula.

GTD - Desertification Working Group (Groupe travail desertification)⁵⁸

Created in 2001, it is a network of 16 French NGOs active in Sahel in the field of the fight against desertification (e.g. SOS Sahel, *Agronomes et Vétérinaires Sans Frontières*, etc.). It has three areas of work: (i): Advocacy, (ii) Knowledge transmission to the general public, (iii) Capacity building. GTD does not produce curricula for initial training, but very technical and focused leaflets for continuous short-term training on NRM, fight against desertification, and agro-ecology. 16 of them are online (e.g. living fence, zaï, conservation tillage, fodder conservation, turning pastures, grass strips, etc.)⁵⁹ and could be very useful for enriching AET curricula with examples of CSA techniques. In addition to these leaflets, there is also an online database of successful NRM projects in the Sub-Region⁶⁰.

⁵² <http://www.ceraas.org/>

⁵³ <http://www.cta.int/fr/>

⁵⁴ <http://spore.cta.int/fr/component/content/article/37-spore/31/8420-changement-climatique-168>

⁵⁵ <http://www.reseau-far.com>

⁵⁶ <http://www.reseau-far.com/dynamiques-des-reseaux-nationaux/guinee.html?L=%2Fproc%2Fself%2Fenviron>

⁵⁷ BESSON I. Issues at Stake, Challenges, and Innovations related to Agricultural and Rural Training in Francophone Africa; Reflection and Roadmap. FAR and Association for the Development of Education in Africa. January 2012. 86p

⁵⁸ <http://www.gtdesertification.org>

⁵⁹ <http://www.gtdesertification.org/rubrique61.html>

⁶⁰ <http://www.gtdesertification.org/rubrique58.html>

Inter-Network (Inter-réseaux)⁶¹

Established in the 80s, and formalised in 1996, Inter-réseaux is led by 20 NGOs active in the rural sector in Africa (e.g. Network of Farmers' and Agricultural Producers' Organisations of West Africa / Réseau des organisations paysannes et de producteurs de l'Afrique de l'Ouest - ROPPA, Green Africa International, SOS hunger Belgium, etc.) and has 6,000 members, from North and South (farmers' organisations, universities, research centres, NGOs, projects, etc.). It aims at sharing information and good practices on rural development, with a special focus on farmers' organisations.

It has five online forums: agricultural policies, chains of value and market access, rural extension, rural financing, and family farms. Climate change will normally be included in the first area (agricultural policies), but it still has to be confirmed, since the terms of reference of this forum are being revised. Apart from that, Inter-réseaux could also provide valuable inputs to build curricula on climate change:

- A 40-page quarterly review called Grain of Salt (*Grain de sel*) regularly provides information on climate change and CSA. There was even a special issue on "Agriculture and Climatic Risks: from the Field to the Policies"⁶², published in the first quarter of 2010;
- A 10-page biweekly warning bulletin that provides lighter information, including on climate change. For instance, the lastly published bulletin (February 21 2014)⁶³, gave an overview of the climate finance in West Africa;
- Publications on vulnerability, resilience, and adaptation of agriculture, e.g. Vulnerability and fight against hunger at the regional level?⁶⁴, Strengthening the resilience of pastoralism?⁶⁵, etc.

Rural Hub⁶⁶

Information sharing platform to support rural development and food security in 21 countries of West Africa and Central Africa, the Rural Hub was created in 2004. It is chaired by the ROPPA and its board gathers six regional organisations (ECOWAS, CILSS, etc.) and 21 technical and financial partners (e.g. USAID, EU, IFAD, IFPRI, CORAF, etc.). It has five online forums: agricultural policies, land tenure policies, rural financing, bioenergy, and climate change.

Apart from these forums, especially the one on climate change, other resources may be useful to build curricula on climate change: (i) An online database with 1,187 referenced documents related to climate change and environment, (ii) A monthly bulletin "*Adaptation of Agriculture to Climate Change in West and Central Africa*": the last one was published on March 12, 2014 and 11 bulletins have been published since July 2012.

In addition to these resources, it is worth to mention the organisation by Hub Rural of a West African Forum on CSA from 27 to 30 May 2014 in Bamako⁶⁷. It is sponsored by many donors (e.g. USAID, ECOWAS, GIZ, etc.) and supported by 19 technical and financial partners (e.g. CORAF, IFPRI, AfricaRice, FAO, IUCN, ROPPA, etc.). Reading the concept note explaining the rationale and objectives of this forum, and detailing all the planned key-note speakers, there is no doubt this forum could be extremely useful for the AEMIP/GCC Integration Project: a group of AET Faculty and Students could be sent there, with the mandate to report back to the other AET Faculty and Students.

IFPRI - International Food policy Research Institute⁶⁸

Created in 1975, it aims at "*providing research-based policy solutions that sustainably reduce poverty and end hunger and malnutrition*". It is based in Washington, with sub-regional office in Dakar. IFPRI is a member of the Consultative Group on International Agricultural Research (CGIAR)⁶⁹.

⁶¹ <http://www.inter-reseaux.org>

⁶² <http://www.inter-reseaux.org/revue-grain-de-sel/>

⁶³ <http://www.inter-reseaux.org/bulletin-de-veille/>

⁶⁴ http://www.inter-reseaux.org/IMG/pdf/GDS59_cedeao2.pdf

⁶⁵ http://www.inter-reseaux.org/IMG/pdf/GDS59_Pastoralisme.pdf

⁶⁶ <http://www.hubrural.org>

⁶⁷ Rural Hub. Preparatory Note for the Forum of National and Regional Stakeholders on CSA in West Africa for the setting of an ECOWAS intervention, funding, monitoring and evaluation framework on CSA, associated with an Alliance for the consistency and coordination of CSA initiatives, as part of ECOWAP/CAADP implementation. Rural Hub. March 2014. 27p.

⁶⁸ <http://www.ifpri.org/>

⁶⁹ www.cgiar.org

IFPRI's 2013-2018 Strategy⁷⁰ highlights six strategic research areas, with one entitled "Building resilience" directly focused on adaptation of agriculture to climate change. Of particular interest is their subtheme of research #1.2 on climate change⁷¹, with four areas of work: (i) Adaptation to progressive climate change, (ii) Adaptation pathways for current climate risk, (iii) Pro-poor climate change mitigation, and (iv) Integration for decision making.

This subtheme of research #1.2 is related to the following CGIAR priorities, included in the CGIAR Mega Program #7: 2A - Maintaining and enhancing yield potential of food staples, 2B - Tolerance to selected abiotic stresses, 4A - Integrated land, water and forest management and landscape level, 4C - Improving water productivity

IFPRI clearly addresses CSA, as can be read in its 2013-2018 Strategy: "*Researchers at IFPRI are dedicated to helping farmers achieve the triple win of adapting to climate change, increasing crop yields, and mitigating greenhouse gas emissions*". Even if IFPRI does not develop curricula on climate change and CSA, valuable materials produced by IFPRI can be integrated into such curricula, i.e. yields projections produced by sophisticated climate, crop and economic models to simulate the impact of climate change on agricultural activities (see **Part 1.1** supra).

GWP - Global Water Partnership⁷²

Following the International Conference on Water and the Environment held in Dublin in 1992, the GWP was created in 1996. It aims at promoting the principles of International Water Resource Management (IWRM) and Water Efficiency plans towards an equitable and efficient management and sustainable use of water. It gathers 84 member States, including Guinea. There are 13 Regional Water Partnerships, including one for West Africa, with headquarters based in Ouagadougou.

The 2014-2019 GWP Strategy includes six thematic areas of work⁷³, including one on Climate resilience and water security. The GWP do not provide training course as such, but it is worth to note that, in the frame of its Water, Climate and Development Programme (WACDEP), the GWP has set up a Young Professional Development Initiative.

Under this initiative, nine youth professionals will serve on an internship basis in each of the eight WACDEP countries (only Ghana and Burkina-Faso in West-Africa) and in the WACDEP Coordination Unit in Pretoria, for a period of between six to twelve months. During their internship, the young professionals will obtain mentorship, technical support and training from the WACDEP Country and Regional Managers. The WACDEP Coordination Unit may be contacted, in order to exchange about the curricula they intend to develop for these youth professionals.

2iE - International Institute for Water and Environmental Engineering⁷⁴

Created in 1968 and formerly known as the Rural Equipment Engineering School / Rural Equipment and Hydraulic Technicians School (EIER / ETSHER), the 2iE is based in Ouagadougou and trains students from all across Africa. Some of its curricula could be of interest for the Guinean AET, as they relate to water management, which is a key challenge for CSA in Sub-Saharan countries: (i) Bachelor's degrees in Water and Environmental Engineering (3-Year Courses, thus of interest for both ENAE and ISAVF), (ii) 2iE's Master of Water and Environmental Engineering (5/6-Year training: of interest only for ISAVF), (iii) PhD Degree in Water and Environmental Sciences (8-Year Training: of interest only for ISAVF).

Even if climate change and CSA are not the focus of the curricula, water management is a key block on any AET curricula on CSA and NRM. 2iE may be contacted, in order to exchange about their curricula on water management.

WASCAL - West African Science Service Centre on Climate Change and Adapted Land Use⁷⁵

Created in 2010 and based in Accra, WASCAL is a large-scale research-focused program designed to help tackle the climate change challenge and thereby enhance the resilience of human and

⁷⁰ IFPRI. IFPRI Strategy 2013–2018: Food Policy Research in a Time of Unprecedented Challenges. IFPRI. 2013. 34p

⁷¹ <http://cgmap.cgiar.org/factsheets/2011-2013/IFPRI/Subtheme+1.2/Subtheme+1.2:++Climate+Change+%28GRP+43%29.htm>

⁷² <http://www.gwp.org>

⁷³ GWP. Summary of the 2014-2019 GWP Strategy. GWP. 2014. 2p

⁷⁴ <http://www.2ie-edu.org>

⁷⁵ <https://icg4wascal.icg.kfa-juelich.de/>

environmental systems to climate change and increased variability. It does so by strengthening the research infrastructure and capacity in West Africa related to climate change and by pooling the expertise of ten West African countries (Benin, Burkina-Faso, Gambia, Ghana, Ivory Coast, Mali, Niger, Nigeria, Senegal, and Togo) and Germany. WASCAL is organized around three principle components: (i) Competence Centre, (ii) Core Research Program, (iii) Graduate Studies Program.

This last component is of interest for our study: involving the creation of seven graduate schools in West Africa, it aims at contributing to the education of the next generation of African scientists and policy makers in the field of climate change and land management. It consists of six Doctoral programs and four Master's programs:

- Doctoral Programs: (i) West African Climate System [Federal University of Technology, Akure (FUTA), Nigeria], (ii) Climate Change and Water Resources [Université d'Abomey-Calavi (UAC), Benin], (iii) Climate Change Economics [*Université Cheikh Anta DIOP de Dakar* (UCAD), Senegal], (iv) Climate Change and Land Use [Kwame NKRUMAH University of Science and Technology (KNUST), Ghana], (v) Climate Change and Agriculture [*Institut polytechnique rural de formation et de recherche appliquée* (IPR-IFRA), Mali and University of Cape Coast, Ghana], (vi) Climate Change and Biodiversity [*Université Felix H. BOIGNY* (ex Université de Cocody), Ivory Coast];
- Master's Programs: (i) Climate Change and Human Security [*Université de Lomé* (UL), Togo], (ii) Climate Change and Adapted Land Use [Federal University of Technology, Minna (FUT-Minna), Nigeria], (iii) Climate Change and Energy [*Université Abdou MOUMOUNI de Niamey* (UAM), Niger], (iv) Climate Change and Education [University of The Gambia (UTG), The Gambia].

With support from the AEMIP, three areas of collaboration could be envisaged with WASCAL:

- In the short-term: ISAVF Faculty and Students could be incorporated in some of these Doctoral and Master's Programs;
- In the short to medium term: ISAVF Faculty could exchange with the WASCAL coordination team to identify relevant Universities and key persons to help ISAVF in elaborating its own curricula on climate change and CSA. In that context, looking at the Doctoral and Masters' Programs, IPR-IFRA in Mali and FUT-Minna in Nigeria seem to be the most relevant Universities;
- In the medium to long-term: ISAVF could propose to WASCAL joining its network and proposing its own curricula on climate change. That would reinforce the integration of ISAVF into this sub-regional network, being a supplier of curricula and not only a simple beneficiary of the network.

***CILSS - Permanent Interstates Committee for Drought Control in the Sahel (Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel)*⁷⁶**

It was established on September 1973 in the aftermath of major droughts in the Sahel in the 70s. It includes 13 Member States including eight coastal States (Benin, Bissau Guinea Gambia, Guinea, Mauritania, Senegal, and Togo), four landlocked countries (Burkina-Faso, Chad, Mali, and Niger) and one island State (Cape Verde). Its headquarters are in Ouagadougou, its scientific research centre (Agrhymet⁷⁷) is in Niamey, and its capitalisation centre (Sahel Institute) is in Bamako.

CILSS has five areas of work: (i) Supporting the definition and implementation of sectoral strategies and policies relating to food security, fight against desertification, and domestic energy. Since 2012, mitigation and adaptation of climate change are in the scope of the CILSS, (ii) Providing initial and continuous training, of short, medium and long term, via Agrhymet. These training are primarily provided for technical services of the member States, (iii) Information sharing, (iv) Research and development, and (v) Design and implementation of multi-country pilot projects.

In terms of training, two are of particular interest for our study:

- Master on adaptation of agriculture to climate change: the curriculum is ready and it should be implemented for the first time this year. Candidates should know about agronomy, rural economics, and food security. The Master includes seven modules: (i) Scientific basis of climate change and climate variability, (ii) Vulnerability, impact and adaptation, (iii) Statistics and geomatics, (iv) Mitigation in the Agriculture, Forestry, and Land Use (AFOLU) sector, (v) Communication and management, (vi) Global governance and international climate negotiations, (vii) Master's thesis.

⁷⁶ <http://www.cilss.bf/>

⁷⁷ <http://www.agrhymet.ne/>

- Master on agrometeorology: this training has been carried out for some years. Candidates should know about agronomy, rural economics, and food security. The Master is not organised in modules, but consists of various training courses: agronomy, animal production, ecology and NRM (soil and water), rural economics, agriculture machinery, meteorology (general, agrometeorology, tropical, dynamic, physical, synoptic, and satellite), cartography, remote sensing and Geographic Information System (GIS), statistics and biometrics, etc. there are specific training courses related to climate change: climatology, climate change and agriculture, early warning system.

With support from the AEMIP, two areas of collaboration could be envisaged with CILSS/Agrhymet:

- In the short-term: ISAVF Faculty and Students could be incorporated in the two Master's Programs;
- In the short to medium term: ISAVF Faculty could exchange with Agrhymet to identify key persons to help ISAVF in elaborating its own curricula on climate change and CSA.

2.3. Implementation of adaptation in agriculture in West Africa

→ Mainstreaming of adaptation to climate change into public policies

As outlined earlier (see **Part 2.1** supra), since the 2000s, adaptation to climate change policies and measures are mainly developed under the UNFCCC guidance and implemented under the supervision of the Ministries of Environment. In this context, NAPAs were set up, with a key priority given to agriculture (in broad sense: cropping, livestock farming, forestry, fisheries, and other rural activities).

Later on, by the end of the 2000s, were launched (i) the Comprehensive Africa Agriculture Development Programme (CAADP) under the joint auspices of the African Union (AU) and the New Partnership for Africa's Development (NEPAD) and (ii) the ECOWAS Agricultural Policy (ECOWAP).

Regional Agricultural Investment Programs (RAIPs) and National Agricultural Investment Programmes (NAIPs) were developed latter on, at the end of the 2000s - early 2010s. In West-Africa, climate change was little, if any, considered in the RAIP and the NAIPs.

Therefore, in this Part 2.3, we will summarise the key findings of a meta-analysis of 18 Sub-Saharan NAPAs⁷⁸: (i) Key aspects in terms of vulnerability and resilience to climate change, (ii) Key adaptation measures planned and sometimes implemented in the agriculture sector.

The 18 countries considered are all LDCs (NB: as explained in **Part 2.1** supra, developing countries not classified as LDC - e.g. Ivory Coast – did not develop a NAPA): Benin, Burkina-Faso, Central African Republic, Chad, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone, Sudan (NB: now split in North and South Sudan), and Togo.



Figure 17 - 18 countries considered in the Sub-Saharan NAPAs' analysis (SalvaTerra, 2013)

→ Key-aspects in terms of vulnerability and resilience to climate change

⁷⁸ SalvaTerra. Meta-Analysis of 18 Sub-Saharan Countries, with Focus on Adaptation of Agriculture to Climate Change. FAO (under press). 2013. 120p

Sub-Saharan agriculture is considered vulnerable, due to the following reasons:

- Capital and labour force are the “historical” limiting factors, but a new one now appears in many places: land, with the population growth;
- Productivity gains are usually low;
- Slash-and-burn practice is very commonly used to ensure the restoration of fertility;
- Rates of use of chemical fertilisers and improved seeds are the lowest in the world;
- There is a low level of mechanisation and motorisation is almost zero;
- There is almost no access to “formal” agricultural credit and limited access to micro-finance;
- AET (initial and continuous) and agriculture extension are often deficient. Agriculture extension in particular is undermined by the "training and visit" approach promoted in the 90s;
- Farmers’ organisations are emerging, with large disparities in countries and sectors. They are most of time unable to organise collective services formerly provided by the State;
- Public investments are inadequate with regard the importance of agriculture in terms of GDP and jobs⁷⁹;
- Laissez-faire and open market principles, exacerbated by globalisation and the Economic Partnership Agreements (EPAs), accelerate the decapitalization of small farms;
- Crop productions is season-dependant (especially to rainfalls) and the level of dependence increases from South to North (Guinean zone > Sudanese zone > Sahel).

...But these small farms have interesting resilience capacity, which allowed them to survive to past crisis:

- Small-scale farmers are generally "risk-adverse" and use risk-management practices (e.g. crop associations: cowpea/millet, rice/maize, Bambara bean/peanut/yam, etc.);
- Rural activities are generally diversified: agriculture, forestry, livestock, NTFP harvesting, hunting, fishing, etc.;
- Other activities are also common: small commercial business, craft, etc.;
- Money transfers are common, either domestically (urban/rural) or internationally (South/South, e.g. Sahel migrants working in the coastal countries or North/South for most countries. It can be very developed in some areas: Sarakolés of the Kayes Region in Mali, Peulhs in Fouta Djallon in Guinea, etc.).

In short, peasant family farms are highly vulnerable to the impacts of climate change, their vulnerability being already high considering the socio-economic and physical environments in which they operate ... but their resilience capacities are important, and proved to be efficient during past crisis: e.g. wars of conquest and pillage at the time of SAMORY (with large displacement of populations), European colonisation and “capitation” (tax per capita) and/or chore that prompting people to flee their villages in some regions, great droughts of the 1970s, etc.

→ The nine main types of adaptation measures in the agriculture sector

Of 217 NAPAs’ projects, 195 (90%) can be considered as agriculture adaptation projects. Considering the total of budgets for the "agricultural projects" compared to the grand total of budgets for all projects, it can be considered that 97% of NAPAs’ budgets go to agriculture adaptation.

Using weighting criteria, the main types of adaptation measures can be identified as follow: "Transversal" (27% of score), followed by "Water" (23%). Then, far behind come "Crops" (11%), "Forestry" (9%), "Livestock" (8.5%), "Coastline" (6%), "Energy" (6%), "Food" (5%), and "Fishing" (3%).

Here below, for each type of adaptation measures are given the rationale, the measures themselves and three examples of NAPAs’ projects (identifying the host country and the project number in the NAPA):

⁷⁹ African Union (AU). Maputo Declaration on Agriculture and Food Security in Africa. AU. July 2003. 2p

Transversal



Figure 18 - Farmers' group meeting in Kankan (BOUYER, 2006)

Rationale: To adapt production systems to climate change (extreme events such as droughts, floods, etc. and slow onset changes) exacerbated by anthropogenic dynamics (strong population growth and degradation of natural resources), transversal challenges have to be overcome: (i) Observation/warning systems on climate change and natural resources (sea level rise, rainfall, etc.) non-functional (lack of qualified human resources, equipment, funding, etc.), (ii) Low capacity for prevention of and response to extreme weather events (lack of NICTs, IEC, etc.), (iii) Low capacity for planning/implementation of adaptation strategies at household level (lack of capacity-building training, lack of alternative Income Generating Activities (IGAs), etc.), community-level, and State-level.

Measures: (i) Observation of climate, water resources, sea level, (ii) Strengthening of institutional capacity (Government and local institutions), (iii) Capacity-building and technical training of farmers, and rural population in general, (iv) IEC for the general public, (v) Development of alternative IGAs (to compensate for declines in production and/or income in the agricultural sectors)

Examples: *Promotion of community-level NRM (Mali, #12), Large scale diffusion of UNFCCC objectives and IPCC findings (Senegal #8), Support to women farmers' groups in accessing land titles (Niger #6)*

Water



Figure 19 – Well in a vegetable garden in Siguiri (BOUYER, 2004)

Rationale: Droughts are observed in the Sahel since the 1970s'. Agricultural activities are often in their upper limits of existence in Sahel and Sahara zones: high temperatures, strong sunlight, high evapotranspiration, limited rainfalls, etc. the water shortage worsens in these areas and the problem is now spreading to the coastal countries: (i) Erratic rainfall and lower rainfalls, more frequent droughts or floods, rising evapotranspiration) and/or insufficient or degraded hillside storage reservoirs, (ii) Decreased water availability and/or fluctuating availability in time, (iii) Declining productivity/plant production: shift of growth period or shorter periods of growth, opportunistic diseases because of bad growth, production impossible for some photoperiodic varieties (often dominant on-farm)

Measures: Maintenance of the availability of agricultural water, itself needed to maintain rainfed agriculture, and the development of irrigated agriculture (in rainy-season or even dry-season): (i) Hydro-agriculture facilities: construction of very simple infrastructures (e.g. zaï or hillside storage reservoir) to more elaborate ones (e.g. dams / irrigated areas with full water management, drip), (ii) Capacity-building in water management: promotion of irrigated agricultural systems

Examples: *Trapping runoff water by planting fodder trees or shrubs, e.g. Acacia nilotica and Sporobolus helvolus (Djibouti #6) or Acacia Senegal (Sudan #2), Supporting community water management Committees (Eritrea #4), developing flood recession agriculture, with river diversion structures and/or mounds of earth retaining water a little longer at the end of the wet season (Eritrea #2 and #5)*

Crops

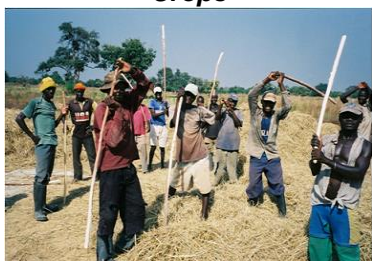


Figure 20 – Farmers threshing rice in Mandiana (BOUYER, 2004)

Rationale: Weather conditions are harsh, and get aggravated with climate change: strong sunlight, high temperatures, low or erratic rainfalls, causing disruption of vegetative cycles, water stress, depletion of groundwater and emergence of diseases (rust, whitefly, etc.). It is sometimes aggravated by the erosion of genetic resources and, in coastal areas, sea level rise causing salinization, mangrove degradation and loss of agricultural land. It is often aggravated by unsustainable farming techniques: slash-and-burn practices with shorter fallow, use of poor quality seed, export of straws that deplete the soil organic matter, etc. Techniques and adapted species exist but are not widely distributed. Farm inputs (seeds, tools, etc.) are poorly accessible. Water and wind erosion result in soil stripping, declining fertility and siltation of irrigation canals. As a result of all these factors, crop/fodder production decrease, leading to food insecurity, poverty, and displacement of population.

Measures: Maintenance of the "traditional" slash-and-burn / extensive livestock farming systems with the (i) Promotion of agroforestry or the (ii) Promotion of soil management techniques (seeding under crop cover, mulching, etc.), or promotion of new farming systems with the (iii) Diffusion of new species and/or varieties and/or rotations and/or associations.

Examples: *Recovery of salty soils ("tannes") with anti-salt dikes and salt-tolerant plants (Senegal #2 and #3), Promotion of farming systems (e.g. lowland rice, rainfed soya) alternative to slash-and-burn (Liberia #1), Promotion of drought resistant crops, like pearl millet (Guinea #8)*

Forestry



Figure 21 – Pitsawyers in Kissidougou (BOUYER, 2004)

Rationale: Forest and woodland ecosystems are under increasing pressures: (i) Anthropogenic ones: slash-and-burn farming, overgrazing, harvesting of firewood and timber, forest fires (favoured by climatic conditions), etc. accelerating with population growth, (ii) Climatic ones: droughts and high temperatures increasing water stress and the spread of forest fires, degradation of mangroves with sea level rise and salinization, fungal attack favoured by climate change.

These pressures are aggravated in savannah dry forest by the low forest growth. Overall, for all types of forest, laws are often not well designed or enforced.

Measures: Maintenance of forest soil fertility, firewood and timber supply, NTFPs' production through: (i) Promotion of sustainable forest management, (ii) Afforestation/reforestation, (iii) Forest fire fighting techniques.

Examples: *Community afforestation (Sierra Leone #18), Hedgerows with tree fodder species (Senegal #1), Creation and training of community-level forest fire fighting committees (Guinea #12)*

Livestock



Figure 22 – Sheep market near Mamou (BOUYER, 2005)

Rationale: Climate change, together with the population growth, lead to lower crop and fodder yields and/or the reduction of grazing land areas. This lead to insufficient feed, especially during the dry season, for the meat production, sometimes even for the simple maintenance of animals. In reaction, there are overgrazing and/or pruning of trees and/or transhumance (from the Sahel strip to the Sudanese strip) and/or concentration and trampling around water points and/or livestock inadequately fed and subject to diseases and/or collection of straw and/or decreased production of manure. These factors can also lead to breeders/farmers conflicts and/or degradation of natural resources (grazing land, soils, pastures, forests, water) and/or invasion of opportunistic species (e.g. *Prosopis juliflora*)

Measures: Maintenance of animal feeding through: (i) Promotion of fodder or (ii) Promotion of food supplements, and (iii) Adaptation of domestic animal breeds to climate change.

Examples: *Creation of improved grassland with selected seeds, e.g. bourgou, cowpea, pigeon pea (Mauritania #1, Mali #2), Creation of secured transhumance corridors (Mauritania #3), Creation of food banks to distribute cottonseed, groundnut cake, bagasse, brewer's spent grains (Chad #9, Mali #17, Niger #2)*

Coastline



Figure 23 – Mangrove reforestation near Kito Island (BOUYER, 2005)

Rationale: Since long, Sub-Saharan populations have been settled on the coastlines, progressively degrading marine and terrestrial ecosystems, as a result of multiple human activities: overfishing; deforestation for firewood harvesting, rice cropping, fish smoking, fuel-based evaporation for salt production, etc.; extraction of sand/gravel; creation of infrastructure; chemical pollution (agricultural or industrial waste), etc. These effects are now worsening with climate change: sea level rise, salinization, etc. leading to the degradation or destruction of infrastructure and ecosystems, including mangroves, a decline in fishing (fish, shellfish, etc.) and cropping, themselves leading to increasing poverty and/or food insecurity and/or rural exodus.

Measures: Protection of the coastline and its ecosystems (dunes, mangroves, mangrove rice fields, etc.) against sea level rise and salinization. There are no subcategories here, because all the projects are integrated (with most of the time: alert system/IEC/IGAs/reforestation).

Examples: *Design/implementation of integrated management plans for coastal areas (Senegal #17, Benin #5), Stabilisation of coastline with groin systems and afforestation with casuarina, eucalyptus, coconut, etc. (Gambia #9, Guinea Bissau #3, Senegal #7), Improvement of wood energy supply (supply schemes, dissemination of improved cook stoves, solar fish smoking techniques, solar salt production techniques, etc. (Benin #5, Senegal #7)*

Energy



Figure 24 – Firewood harvesting in Kérouané (BOUYER, 2004)

Rationale: Pressures on forest and woodland ecosystems are increasing because of (i) Human activities: slash-and-burn farming, harvesting of firewood for cooking, fish smoking, brick cooking, salt production (boiling salted water...with low energy efficiency rates, etc. exacerbated by population growth, (ii) Climate change: droughts and high temperatures increasing water stress, sea level rise, and salinization in mangroves areas.

Wood energy supply is threatened, time spent for firewood harvesting is increasing, and unsustainable firewood harvesting aggravates environmental damages: local climate disruption, loss of soil fertility, coastal erosion, loss of income sources (timber and NTFPs).

Measures: (i) Demand-side: increase energy efficiency (for charcoal production, for cooking, etc.), (ii) Offer-side: increase biomass production through afforestation or promote alternative sources of energy to firewood

Examples: *Fast-growing species plantations for energy production (Benin #2, Mauritania #22), Promotion of solar energy: water heater, pressure cookers, dryers (Benin #2, Burkina-Faso #12, Senegal #8, Mali #10), Promotion of compressed earth brick to replaced cooked brick (Guinea #7)*

Food



Figure 25 – Yam chips preparation in Tintioulen-Körö (BOUYER, 2006)

Rationale: Sahelo-Sahara and Sahara fringes are structurally deficient in cereals. The high growth of population and the slow growth of productivity gains exacerbate this problem for the past decades. Climate change now adds to the food insecurity: slow onset events (sea level rise, reduced rainfall and increased variability, increased temperature, etc.) and extreme weather events (floods, droughts, etc.) leads to lower productivity/production of livestock and/or crops.

Food crises are not mitigated, because food security policies are often built on two weak pillars: (i) Inefficient agricultural market information systems, (ii) inadequate, or even inexistent, emergency food stocks. This lead to increased poverty and/or food insecurity and/or rural exodus, and sometimes to loss of human life.

Measures: (i) Design/implementation of food warning system, (ii) Creation of emergency food stocks, (iii) Food diversification.

Examples: *Promotion of tubers (cassava, yam, sweet potato) in substitution of mangrove rice (Guinea Bissau #1), Promotion of poultry farming / fish farming integrated systems (Togo #6), Creation of cereal banks (Burkina-Faso #1, Mali #5, Niger #9)*

Fisheries



Figure 26 – “Pond party” in Baro (BOUYER, 2006)

Rationale: Marine coastal areas are rich in fish, attracting many fishers, who are often not respecting environmentally-friendly fishing rules (regulatory net, ban on certain species, etc.). This is further aggravated by pressure on spawning areas (mangroves and other wetlands), either due to human activities (firewood harvesting, use of pesticides, etc.) or climate change (sea level rise, salinization, etc.). In deep sea, the increased atmospheric CO2 concentration leads to acidification of seawater, change of laminar flows, disruption of upwelling, and finally decreasing of plankton.

Climate change also impacts inland fisheries (drought, eutrophication, etc.) resulting in decreasing fish production, lower incomes and food insecurity.

Measures: (i) Strengthening evaluation, monitoring, and control of fish stocks in coastal areas or in the deep sea, (ii) Strengthening evaluation, monitoring, and control of natural fish stocks in inland fisheries, and promoting fish farming.

Examples: *Evaluation and monitoring of fish stocks in the coastal area (Sierra Leone #5), Construction of aquaculture ponds (Togo #7)*

→ **Have Sub-Saharan NAPAs promoted the deployment of CSA practices?**

According to the Concept note presenting the rationale of the CSA Forum to be held in May 2014, four conclusions can be drawn from the implementation of Sub-Saharan NAPAs (Rural Hub, 2014):

- The landscape of climate finance in Sub-Saharan Africa is changing: there is a gradual domination of funding for mitigation (61%, including 14% for REDD+) at the expense of funding for adaptation (39%) (ODI & HBS, 2011);
- Field activities tend to receive less funding at the contrary to early warning systems, which have recently become dominant in projects approved by climate funds;
- The NAPA process follows a project approach: countries are struggling to build on the achievements of their projects, contributing to the isolated nature of the actions;
- The projects related to agriculture have not been sufficiently effective and efficient, considering their results and impacts.

In short, PANAs are underfinanced, especially in terms of field activities, and they are difficult to upscale...And, first and foremost, not really successful: much is still to be done to promote CSA activities in West Africa.

2.4. Adaptation to climate change and CSA in Guinea

The USAID/Guinea's 2012 Environmental Threats and Opportunities Assessment (ETOA) found "very little evidence that climate change is on anyone's agenda at this point. There have been workshops and institutions charged with conducting superficial assessments of vulnerability, but no coordinated, visible, and aggressive actions are evident." (DENNISON S. et al, 2012).

Here below we will review the different Strategies and Policies of the GoG related to adaptation to climate change on the one hand, and agriculture in the other hand, in order to assess where Guinea stands in terms of adaptation of agriculture to climate change.

→ **PANA⁸⁰**

It was developed in 2006 and 2007. The selection of priorities was a complex process:

- Public consultations were held and 53 project ideas were identified, as follow (using the typology presented in **Part 2.3** supra): five on "water", 10 on "livestock", 11 on "forest", 13 on "coastline", and 14 on "crops". A synthesis report of the public consultations proposed to group similar project ideas: there were 13 "main" project ideas left;
- Then, four successive multi-criteria analyses were done, using seven weighted criteria. The final classification was based on an average of the four multi-criteria analyses. The selection of the six first criteria and their relative weight was done during stakeholders' workshops: (i) Ability to ensure adaptation to climate change (weight = 23%, scoring from 1 to 5), (ii) Local conditions favourable to the realisation of the project (weight = 21%, scoring in %), (iii) Environmental impact (weight = 12%, scoring from 1 to 5), (iv) Socio-economic impact (weight = 14%, scoring in %), (v) Consistency with GoG's Strategies and Policies (weight = 12%, scoring from 1 to 5), (vi) Cost weight = 8%, scoring in US\$). The seventh criteria, (vii) Synergy with multilateral environmental agreements (weight = 10%, scoring from 1 to 5), was identified by the PANA's experts.
- 10 project ideas were then retained (with limited explanations: "the NAPA team, after consultation, holds that it is possible to develop NAPA project profiles within the first ten options")...But 25 project ideas were finally presented in the NAPA!

Among the 25 projects, 22 can be classified under adaptation of agriculture to climate change, the three others are related to the provision of drinkable water (#18 - Creation of improved wells, #19 - Purification of surface water by Hydropur, #20 - Creation of impluviums). In total, these 22 projects amount to 7,335,000 US\$, which is 89% off the total budget of the NAPA.

⁸⁰ Minister of Agriculture, Livestock, Environment, Water, and Forestry (MAEEEF). National Adaptation Plan of Actions of Guinea. GoG. July 2007. 118p

If we classify these 22 projects according to the typology presented earlier (see **Part 2.3** supra), it can be noticed that there are projects in all the nine types, with a heterogeneous distribution:

- Relatively many for the “Forestry” and “Energy” types: since most of the projects in these two types are about reducing firewood consumption and deforestation, it seems they are more related to mitigation than adaptation. This tends to corroborate the idea that there is a kind of confusion between causes and consequences of climate change in the mind of key Guinean stakeholders, and a belief that stopping deforestation in Guinea could bring back the global climate system to equilibrium... This point is further explained in **Part 3** infra;
- Relatively few for “Livestock”: Guinea is a country of highly developed animal husbandry, mainly dependant on rainfed grazing land. During the dry season, herds, mainly located in Moyenne-Guinée and Haute-Guinée, are more and more often displaced in the Southern part of Moyenne-Guinée or Haute-Guinée, or even to Guinée forestière and Basse-Guinée. Fodder availability is an issue, not talking of water availability, increasing animal pests, etc. Therefore, it looks surprising that adaptation of livestock farming to climate change is not higher on the agenda;
- Relatively few for “Crops”: The major part of the food crop production in Guinea is rainfed and based on slash-and-burn techniques. Way ahead in terms of volume is rainfed rice, followed by maize (especially in Haute-Guinée and Guinée forestière), fonio (especially in Moyenne-Guinée and Haute-Guinée), and cassava (everywhere, especially on degraded soils). These farming systems are vulnerable to (i) water shortage (erratic and/or insufficient rainfalls) and (ii) soil degradation (reduction of fallow period: loss of fertility, degradation of the soil texture, erosion). It is surprising to note that there is no project aiming at addressing these issues.

#	Project title	Type	Budget (US\$)
#3	Promotion of indigenous knowledge and practices in terms of adaptation (pp. 44-45)	Transversal	300 000
#11	Setting up an early warning system to secure food production (pp. 54-55)	Transversal	150 000
#14	Information to the public on international and national regulations on environment (pp. 58-59)	Transversal	300 000
#16	Creation of multi-fonctionnal wells (pp. 61-62)	Water	600 000
#17	Creation of hillside storage reservoir (pp. 62-63)	Water	180 000
#22	Promotion of irrigated rice cropping in Moyenne-Guinée and Haute-Guinée (pp. 67-68)	Water	300 000
#5	Extension of anti-erosion techniques (pp. 46-47)	Crops	300 000
#8	Promotion of pearl millet cropping in the Northern areas (p. 51)	Crops	350 000
#1	Support to the development of private and community-based cashew nut plantations (pp. 41-42)	Forestry	600 000
#2	Support to the creation of community-forest management plans (pp. 42-43)	Forestry	600 000
#12	Promoting forest fire fighting techniques and forest reservation measures (pp. 55-56)	Forestry	300 000
#25	Creation of grasscutter ranches to limit forest fires and improve rural livelihood (pp. 71-72)	Forestry	300 000
#6	Promotion of solar energy to reduce firewood consumption (pp. 48-49)	Energy	300 000
#7	Promotion of compressed brick to replace cooked bricks (pp. 49-50)	Energy	600 000
#9	Promotion of solar salt production to reduce firewood consumptions (p. 52)	Energy	200 000
#10	Promotion of chainlink fencing and hedgerows in Moyenne Guinée (pp. 53-54)	Livestock	350 000
#4	Initiation of coastal populations to the technique of oyster farming mangrove (pp. 45-46)	Coastline	250 000
#13	Protecting cropping areas on the coastline (pp. 57-58)	Coastline	350 000
#15	Information, Education and Communication in favour of rural population on the coastline (pp. 59-60)	Coastline	200 000
#21	Protection of spawning areas in the Fatala, Konkouré and Méllacoré estuaries (p. 66)	Fisheries	250 000
#23	Promotion of small ruminants rearing (pp. 68-69)	Food	325 000
#24	Promotion of vegetable gardening (pp. 69-70)	Food	250 000

Figure 27 - List of Guinea PANA's projects related to agriculture (PANA, 2007)

Till now, the level implementation of the NAPA is still low (see **Part 3.1** infra).

➔ **Agriculture Strategies and Policies: NLPDA, SNDAR, and PNIASA**

The GoG has three main on-going agriculture Strategies and Policies:

- NLPDA⁸¹: the 2006-2015 New Policy Letter on Agricultural Development (*Nouvelle lettre de politique de développement agricole 2006-2015 – NLPDA*) is a logical follow-up to the 1991-1997 Policy Letter on Agricultural Development (*Lettre de politique de développement agricole 1991-1997 – LPDA1*) and the 1998-2005 Policy Letter on Agricultural Development (*Lettre de politique de développement agricole 1998-2005 – LPDA2*);

⁸¹ Ministry of Agriculture, Livestock, Environment, Water, and Forestry (MAEEEF). 2006-2015 New Policy Letter on Agricultural Development. GoG. May 2007. 56p

- SNDR⁸²: The 2009-2018 National Rice Development Strategy (*Stratégie nationale de développement de la riziculture 2009-2018 – SNDR*);
- PNIASA⁸³: the 2012-2016 National Agriculture Investment and Food Security Plan (*Plan national d'investissement agricole et de sécurité alimentaire - PNIASA*) fits into the framework of the ECOWAS Agricultural Policy (ECOWAP) and the Comprehensive development program of African agriculture (CAADP) adopted at the 2003 Summit of the African Union in Maputo (Mozambique).

In what follows, we will assess how they address the issue of agriculture adaptation to climate change:

2006-2015 NLPDA

It is composed of three main strategic axes: (i) Support food security through the diversification and the increase of food production, (ii) Increase agriculture revenue through the increase of agriculture exports, (iii) Support transversal measures to secure agriculture investments.

As part of this last axis, the activity 6.3.1 is about the “*improvement of NRM*”, but it does not mention climate change, nor adaptation to climate change, and focus mainly on the protection of forests. Still in the same axis, the activity 6.3.5.4 is about the “*Prevention and management of major agricultural risks*”: it mentions the creation of early warning systems and insurance mechanisms, but does not mention climate change, nor adaptation to climate change.

In short, the 2006-2015 NLPDA does not address climate change issues.

2009-2018 SNDR

The SNDR recalls the importance of the rice sector in Guinea: main food crop (61% to 69% of daily consumption in 2008, depending on the agro-ecological regions), with an increasing level of consumption (from 92 kg/capita in 1992 to 100 kg/capita in 2008) and an increasing share in the total values of imports (from 5.4% in 2000 to 11.3% in 2008. In 2008, 0.30 Mt/year of rice are imported, i.e. 26% of the domestic consumption, 1.15 Mt/year). It also details the main rice farming systems:

Rice farming systems	Aver. yield	Surface		Production		Main locations
	(t/ha)	ha	%	t	%	
Irrigated plains	1.5	74,912	9%	112,368	9%	Haute-Guinée, Gaoul & Koundara
Mangrove	2.5	133,177	16%	332,942	28%	Coastline
Lowland	2	83,236	10%	166,471	14%	Everywhere, mostly Guinée forestière
Rainfed	1.1	541,031	65%	595,134	49%	Everywhere
Total (paddy)	1.45	832,355	100%	1,206,915	100%	

Table 3 – Average yield, surface, production, and main locations per rice farming systems in 1008 (SNDR, 2009)

This table highlights the fact that most of the production (more than 3/4) is done in two vulnerable farming systems: mangrove rice (sea level rice, salinization, acidification, iron toxicity, etc.) and rainfed rice (erratic and/or reduced rainfalls, soil degradation, etc.)

The SNDR forecasts an increase of domestic need (expressed in t of white rice): from 1.20 Mt/year in 2013 (for 12 M inhabitants) to 1.43 Mt/year in 2018 (for 14 M inhabitants). Based on that, the SNDR sets a very ambitious goal by 2018: covering the domestic need and producing a surplus of 0.45 Mt/year (domestic production = 132% of domestic need), which imply an increase of the average rice yields of 1.43 t/year/ha in 2008 to 2.75 t/year/ha in 2018, i.e. nearly a doubling of the yield.

To achieve it, the SNDR sets four main strategic axes: (i) Creation of 160,000 ha of irrigated rice fields, with full water control, in Basse-Guinée (40% of existing lowland, in mangrove and inland areas) and Haute-Guinée (40% of the alluvial plains along the Niger and its tributaries), (ii) Rehabilitation of 20,000 ha of lowland, with diversification objective (rice cropping, vegetable gardening, fish farming), (iii) Promotion of rainfed rice through the wide dissemination of NERICA, and (iv) Improved access to agricultural inputs and equipment.

Climate change issues are not mentioned in this SNDR, yet climate change impacts are major threats to it achievement. Indeed, as we mentioned earlier:

⁸² Ministry of Agriculture and Livestock. 2009-2018 National Rice Development Strategy. GoG. May 2009. 27p

⁸³ Ministry of Agriculture. 2012-2016 National Agriculture Investment and Food Security Plan. GoG. September 2011. 104p

- The mangrove area is already subject to sea level rise, salinization, acidification, iron toxicity, etc. Creating hydro-agriculture facilities is not enough: rice breed have to be selected according to their resistance to salt and/or acidity and/or iron toxicity, the cropping calendar has to be revised according to the late appearance and early disappearance of rainfalls, etc.
- Rainfed rice is highly vulnerable to erratic and/or limited rainfalls. Using NERICA seed, known to be more drought-resistant, is not a silver bullet: these rice seed have the ability to produce a minimum, even in water stress conditions, but the yield might strongly decrease because of this water stress, which points out the need to have an integrate approach in terms of adaptation to climate change.

Practically, the use of NERICA seed should come along with other measures, to increase water harvest and limit evapotranspiration (e.g. agroforestry practices, seeding under crop cover, etc.), as well as to increase the efficiency of chemical fertilisers (e.g. measures to increase organic matter content: mulching, rotations with grain legumes, crop associations, etc.).

2012-2016 PNIASA

The PNIASA merges elements from the 2006-2015 NLPDA and the 2009-2018 SNDR, and also take into account regional and sub-regional guidance provided by the CAADP and the ECOWAP. The PNIASA has six main strategic programmes: (i) Sustainable development of the rice sector, (ii) Food crop diversification and increasing food security, (iii) Promotion of agriculture exportation, (iv) Promotion of sustainable NRM, (v) Strengthening of agriculture support services and farmers' organisations, and (vi) Coordination and implementation of the PNIASA.

Under the Programme 4 - Promotion of sustainable NRM, two sub-programmes are of relevance in terms of adaptation to climate change:

- 4.5 - Soil fertility improvement. Explanations are limited: it is only mentioned that the GoG has a "Plan for Soil Fertility Management" approved since 2001, but never implemented;
- 4.7 - Climate change. Various activities are planned: (i) Determination of the most appropriate soil moisture management techniques, (ii) Improvement of soil fertility: improved fallow, planting of legumes, (iii) Selection of drought-resistant breed and development of irrigated crops in areas North of the 10th parallel, (iv) Intensification of cereal production in Guinée forestière and Basse-Guinée, where climatic conditions are still favourable, (v) Use of agro-meteorological forecasting for planning agricultural operations and to better adapt to changing climatic conditions

This last sub-programme is interesting: contrarily to NLPDA and SNDR, it provides clear (even if limited) guidance in terms of adaptation of agriculture. However, as demonstrated during interviews with key stakeholders (see **Part 3.1** infra), these planned activities are not yet implemented, and even, not really known or understood by the stakeholders in charge of their implementation.

This analysis of the PNIASA is convergent with the one done in the USAID/Guinea ETOA: "*Similar to the other Strategies and Policies promulgated by the GoG (e.g., the DRSP noted above), it does not provide guidelines or assign responsibilities for actions needed [in terms of sustainable NRM] to get to the starting point, nor are the needed steps outlined for implementing the strategy presented*" (DENNISON S. et al., 2012).

DSRP3 2013-2015⁸⁴

Climate change is little mentioned across the 170 pages of the Poverty Reduction Strategy Document (*Document stratégique de réduction de la pauvreté* - DSRP3):

- "*Major challenges for the economic take-off and progress towards the MDGs relate to [...] (viii) the adaptation to /mitigation of climate change*": adaptation and mitigation are placed at the same level (while mitigation is far behind in terms of priority in many LDCs...) and climate change challenges are quoted in last position;
- "*It will be important, among other things: (i) to make strict application of the rules on restoration of degraded areas, (ii) to promote intensive agriculture and the use of renewable energy (gas, electricity, and photovoltaic), and (iii) to increase the involvement of women in decision-making regarding the protection of environment*". The two first measures proposed are implicitly referring to the reduction of deforestation and forest degradation: (i) = reforestation and revegetation on former mining sites, (ii) = limiting slash-and-burn farming and unsustainable firewood harvesting.

⁸⁴ Ministry of Economy and Finance. 2013-2015 Poverty Reduction Strategy Document. GoG. May 2013. 170p

Once again, this tends to corroborate the idea that there is a kind of confusion between causes and consequences of climate change in the mind of key Guinean stakeholders, and a belief that stopping deforestation in Guinea could bring back the global climate system to equilibrium... This point is further explained in **Part 3** infra;

- “*The foreseen adaptation programmes are under-financed and a small number of farmers adopt intensive agriculture practices (use of chemical fertilisers, improved seed, and mechanisation)*”. This sentence clearly demonstrates the mix being made between two very different concepts: CSA and input-intensive agriculture:
 - CSA aims at (i) increasing agriculture revenue (=producing as much, or even more, while stabilising or decreasing production costs), (ii) mitigating climate change (=minimising N₂O emissions from the use of chemical fertilisers, and minimising CO₂ emissions from agricultural engine, soils or forests degradation), and (iii) adapting practices to climate change (= using robust and resilient seed, water harvest techniques, soil fertility management techniques, etc.)
 - Input-intensive agriculture may lead to contrary results:
 - Agriculture revenue: using chemical fertilisers and mechanising is often not possible for farmers (lack of suppliers, high cost of inputs especially for chemical fertilisers in a context of rising oil price), and even not advisable if production costs have to be kept under control;
 - Mitigating climate change: the use of chemical fertiliser alone, without appropriate water and organic matter management, does not allow sustaining soil fertility in the long term and leads, sooner or later, to a shift back to slash-and-burn practices. Using chemical fertilisers and mechanising lead to increased N₂O and CO₂ emissions (NB: even if marginal compared to CO₂ emissions from soils and forests degradation);
 - Adapting to climate change: input-intensive farming techniques do not necessarily lead to sustainable NRM (i.e. soil fertility degradation in the absence of supply of organic matter) and are dependent on foreign exports, which is a problem in countries like Guinea, politically instable and having a degraded business climate.

Towards a national definition of CSA and CSA-ET?

As presented in **Part 3.2** supra, designing and implementing CSA imply to overcome three challenges: be “farming-system” specific, optimise the three pillars (mitigation, adaptation, and livelihood) taking into account inevitable trade-offs, and integrate agriculture / NRM outreach activities to guide farmers.

This leads to the idea that it would be more relevant to adapt the internationally “agreed” definition of CSA at “farming-system” level, rather than national level. “Farming-system” specific CSA strategies and the corresponding CSA-ET could be defined in four steps:

- Identification of farming system per agro-ecological areas: as presented earlier (see **Part 1.1** supra), FAO provides a classification of the main farming systems in Sub-Saharan Africa. Two of them cover the main part of Guinea: cereals and tubers (#8) in Northern Guinea, and tubers (#7) in Southern Guinea.

However, the definitions of these farming systems are too broad: it would be worth defining more specific farming systems for each agro-ecological region (savannah in Haute-Guinée, moist forest and savannah/moist forest mosaic in Guinée forestière, hilly savannah and rangeland in Moyenne-Guinée, and mangrove/savannah in Basse-Guinée).

Two or three most representative farming systems of each agro-ecological area could be identified, e.g. in Basse-Guinée: mangrove rice based farming system (with fishing and/or small ruminants rearing and/or salt production), rainfed rice based farming system (with dry-season gardening in lowland and/or small ruminants rearing and/or fruit tree production: cashew, banana, etc.)

- Vulnerability and resilience assessment of each specific farming system: using the most up-to-date climate projections (UNDP projections, IFPRI, projections, etc.) and based on current levels of vulnerability and assessment (after a field assessment), try to forecast the levels of vulnerability and resilience of each specific farming system;
- Design of appropriate CSA strategies and techniques: Based on the forecast of vulnerability and resilience, and knowing the CSA techniques available for farmers (e.g. simple enough, technically sound, cost-efficient, etc.), design a CSA strategy and the related CSA techniques;

- Design/implement CSA-ET: Once two-three specific farming-system CSA strategies are identified per agro-ecological area, the corresponding CSA-ET curricula can be designed/implemented.

To give concrete examples, here below are two CSA Strategies (and the corresponding techniques) that were identified in the Northern part of Ivory Coast, for two farming-systems: rainfed rice based farming system and yam based farming system (after passing through the two first steps: identification of farming systems with the National Agriculture Research Centre of Ivory Coast (*Centre national de la recherche agronomique* - CNRA), and forecasting of vulnerability / resilience based on climatic projections issued by the International Centre for Tropical Agronomy (CIAT) in Cali, Colombia)⁸⁵:

- Rainfed rice based farming system: The main features of the farming systems are as follows:
 - Traditional rainfed rice cropping: slash-and-burn on degraded savannah with reduced fallow (low fertility), use of local seed (often mixed, average cycle of 5 months), broadcast seeding, no fertilizer (organic or chemical), and one weeding. The average yield is around 0.8 t/ha/year;
 - CS rainfed rice cropping system: limited slash-and-burn with longer fallow, use of selected seeds (IDSA 6 or 10 or 78 or 85, NERICA 1 or 2 / pure / cycle of 3 months), dibbling (for better tillering and easier weeding) under N-fixing crop cover (pueraria), fertilizer (50 Kg/ha of NPK, in addition to the pueraria organic matter), and three weeding. The yield ranges from 2 to 3.5 t/ha/year, but we take the lower range in our example.

Valuing the labour force at 800 FCFA/man-day (1.5 US\$/man-day), the net margin are -10,300 FCFA/ha/year (-22 US\$/ha/year, which can be explained by the fact that farmers do not usually value their labour costs) for traditional rainfed rice cropping and 62,150 FCFA/ha/year (130 US\$/ha/year) for CS rainfed rice cropping. In terms of livelihood, the difference is substantial: around +150 US\$/ha/year and +1.2 t/ha/year (See net margin calculations in **Annex 4** infra).

In terms of adaptation, the CS rainfed rice cropping system has many advantages: (i) the use of crop cover allows for optimising the use of water and chemical fertiliser (strengthened clay-humus complex) by the plant, (ii) the use of short-cycle and drought-resistant rice seed allow for avoiding water stress in case of earlier end of rainfalls and/or reduced rainfalls during the whole cycle.

In terms of mitigation, the improvement of soil fertility leads to decrease slash-and-burn which in turn allow for avoiding GHG emissions from soils and forests.

- Yam based farming system: The main features of the farming systems are as follows:
 - Traditional yam cropping: slash-and-burn on degraded savannah with reduced fallow (low fertility flash), use of local breed (and degeneration due to reversed mass selection: large tubers are eaten and small ones replanted), no stake, no fertilizer (organic or chemical), and one weeding. The average yield is around 6.5 t/ha (including 20% of post-harvest losses because of inadequate harvest and storage practices);
 - CS yam cropping system: limited slash-and-burn with longer fallow, use of selected breed (from Nigeria or Ivory Coast, mass selection: some large tubers are planted, large and medium tubers are sold or eaten, small tubers are processed in yam chips), stakes, N-fixing crop cover (pueraria), fertilizer (290 Kg/ha of NPK, in addition to the pueraria organic matter), and three weeding. The yield ranges from 20 to 25 t/ha/year (including 10% of post-harvest losses: appropriate harvest techniques to avoid damaged tubers, storing in underground pits covered with leaves and earth rather than outdoors, regularly removing sprouts during storage, transforming damaged tubers into chips just after harvest)

Valuing the labour force at 800 FCFA/man-day (1.5 US\$/man-day), the net margin are -597,000 FCFA/ha/year (-1,250 US\$/ha/year, which can be explained by the fact that farmers do not usually value their labour costs) for traditional yam cropping and 1,564,000 FCFA/ha/year (3,270 US\$/ha/year) for CS yam cropping. In terms of livelihood, the difference is substantial: around +4,520 US\$/ha/year and +13.5 t/ha (See net margin calculations in **Annex 4** infra).

In terms of adaptation, the main advantage of the CS yam cropping system it to optimise the use of water and chemical fertiliser (strengthened clay-humus complex) by the plant, thanks to the crop cover. In terms of mitigation, the improvement of soil fertility leads to decrease slash-and-burn which in turn allow for avoiding GHG emissions from soils and forests

⁸⁵ SalvaTerra. Cost-Benefit Assessment of REDD+ Activities implemented for the main Food Crops and Cash Crops in Ivory Coast. European Forest Institute. January 2014. 139p

3. Field data collection and treatment for setting the baseline

3.1. GoG Institutions and Donors

In order to “determine the nature and effectiveness of current cross-sectoral cooperation and coordination among government, private sector, civil society and AET institutions, particularly on the development and dissemination of climate smart technologies for male and female farmers and entrepreneurs”, the key stakeholders among the GoG and among the donors were interviewed.

Below are the summaries of these interviews (ANPROCA, ANDASA, Ministries in charge of Environment, Livestock, and Fisheries, UNDP and AFD), where we highlighted the following aspects: (i) Perceived climate change impacts, (ii) Actions taken to address adaptation needs, (iii) Level of coordination with the AET and the IRAG, and (iv) Level of collaboration with national and international institutions involved in climate change. At the end of each interview is a short assessment.

→ ANPROCA

Person met: Mr. Aly CONDE, General Director of ANPROCA

Structure

The National Agency for Rural Promotion and Farm Advisory (*Agence nationale de la promotion rurale et du conseil agricole* - ANPROCA) is a public administrative body with legal personality which reports to the Ministry of Agriculture. It was created recently (March 2012) to replace the National Service for Rural Promotion and Agriculture Extension (*Service national de la promotion rurale et de la vulgarisation* - SNPRV), which was part of the Ministry of Agriculture. The ANPROCA is in charge of agriculture training and extension and comprises 763 field agents for the whole country.

Perceived impacts

According to the General Director, the main impacts of climate change are the scarcity and irregularity of rainfalls. The rainy season has reduced: nine to six months in Guinée forestière and six to three-four months in Haute-Guinée. It creates problem for the food crops (most of them are rainfed and hydro-agricultural facilities are poorly developed) and the livestock (lack of grazing land). It is further aggravated by the reduction of the fallow period in most places of Guinea.

Actions taken to address adaptation needs

According to the General Director, as early as 2000 the ANPROCA started disseminating the short-cycle rice seeds of the “New Rice for Africa” (NERICA) family, with the support of the Japanese International Cooperation Agency (JICA) and the West African Rice Development Association (WARDA, now known as AfricaRice).

Later on, in the late 90s, there were punctual collaborations with NGOs like ESSOR to promote the afforestation of degraded watersheds in the Fouta Djallon. More recently, in the frame of the second phase of the Emergency Project to Support Agricultural Productivity (*Projet d'urgence d'appui à la productivité agricole 2 – PUAPA2*), ANPROCA is expected to train farmers on irrigated rice and lowland rice cropping techniques, over the 4,600 ha of hydro-agricultural facilities to be renovated from 2012 to 2014.

This being said, the General Director acknowledges that there is no specific strategy within ANPROCA regarding the dissemination of CSA practices, and that the field agents are not trained, or even informed, about these emerging issues.

Level of collaboration with the AET and the IRAG

Many AET institutions' students are doing their internship within ANPROCA, especially ISAVF's students. Furthermore, ANPROCA is in charge of delivering courses on agriculture extension at ISAVF. According to the General Director, students' capacities are globally low, especially in terms of practical know-how.

IRAG is the “technology provider” of ANPROCA. For instance, IRAG produces the stock material, pre-basic seed and basic seed, and ANPROCA is in charge of the multiplication, in the Training and Technology Applications Centres (*Centres de formation et d'application des technologies*) of Bamban (near Kindia) and Yatiya (near Faranah).

With regard to the adaptation to climate change, IRAG produced various types of rice seeds resistant to iron toxicity and acidification (phenomenon aggravated by erratic rainfalls). IRAG also updates "basic technical packages". For instance, IRAG recently improved the rice nurseries management, thus reducing the needed seed from 120 kg/ha to 40 kg/ha.

Apart from the dissemination of short-cycle seeds, the General Director acknowledges that very few agriculture innovations transferred from IRAG to ANPROCA could be qualified as CSA practices.

The lack of agriculture innovation in the farm advisory system is also pointed out in a recent "Assessment of Farm Advisory Policies in Guinea"⁸⁶: *"One of the major issues raised by agriculture professionals is the mismatch between field advisors' skills graduated from agricultural training institutions and the needs of farmers. Purely "technicist" extension methods have changed little in a context where farmers are facing an increasingly complex reality [...] In this regard, State actors and farmers' organisations agreed on the need to reform the curricula of advisors [...] This led to the creation of a "Farm Advisory and Extension" Department at the ISAVF, whose first promotion was released in 2011"*.

Level of collaboration with national and international institutions involved in climate change issues

The General Director has no relation with the Ministry of Environment (and does not know the NAPA). He does not know the donors active in the field of climate change in Guinea. He does not know the IPCC, the Hub rural of Dakar and has only heard of CILSS/Agrhymet, because the Statistic Department of the Ministry of Agriculture collaborates with them; but he does not clearly figure out what are the areas of expertise of CILSS/Agrhymet and its relevance in terms of adaptation of agriculture to climate change.

Assessment: ANPROCA is expected to provide "tailor-made" farm advisory to the farmers, but mostly provides basic technical packages, as did the SNPRV before. The transformation of SNPRV, a Ministerial service, to ANPROCA, a public administrative body with legal personality, did not fundamentally improve its performance, often considered poor by the farmers themselves. The Research and Development Department of ANPROCA is poorly active and the updating of technical packages disseminated by ANPROCA depends on technology transfer from IRAG, which is not systematically organised. This explains why agriculture innovation are scarce in Guinea and why ANPROCA staff are not informed of and trained in CSA, and consequently, does not promote them to the farmers.

→ ANDASA

Person met: Mr. Mamady TRAORE, Senior Desk Officer at ANDASA

Structure

The National Agency for Agricultural Development and Food Security (*Agence nationale de développement agricole et de sécurité alimentaire* - ANDASA) is a public administrative body with legal personality which reports to the Head of State. It was created recently (March 2013, operational since January 2014 with public funding made available). The team is relatively small (10 people) and the mandates of this body overlap with the mandates of the Ministry of Agriculture. It was said that ANDASA was custom-designed for Mrs SULTAN, appointed as General Director of ANDASA in March 2013 after being Advisor to the Head of State for rural development.

The fact that ANDASA staff are now located in the Ministry of Agriculture since the very recent nomination of Mrs SULTAN as Minister of Agriculture tends to corroborate this analyse. Furthermore, Mrs Sultan is still considered as the General Director of ANDASA and, from informal discussions, it does not seem anybody else would replace her at this position in the near future. Therefore, the ANDASA would most probably be keep dormant.

Perceived impacts

According to the Mr. TRAORE, ANDASA is collaborating with the IFPRI on a pilot study aiming at detailing the impacts of climate change on food crops, and consequently food security and livelihood. The pilot study is underway in three countries (Ghana, Guinea, and India). It is coordinated by Mr. FOFANA from IFPRI Dakar and carried out by a team of Guinean consultants led by El Hadj Lamarana DIALLO, researcher at the Scientific Research Centre of Conakry Rogbané (*Centre de*

⁸⁶ GUIELLA NARH G. Assessment of Farm Advisory Policies in Guinea. Inter-réseaux. March 2013. 12p

recherche scientifique de Conakry-Rogbanè – CERESCOR), in close relation with El Hadj Seylou CAMARA, Advisor of the Minister of Environment (and lead author of the NAPA).

In Guinea, the focus is on rice, and to a lesser extent cassava and potatoes. Presently, the first phase (desk review) is over, the second phase (survey in 100 households to assess the impact of climate change on food security) is on-going and the third phase (assessment of future crop production, crossing soil and ecosystem maps with geo-localised climate change impacts – rainfall, temperature – under different scenarios) is expected to be completed by the end of 2014.

According to Mr. TRAORE, a specific focus is given to the mangrove rice production, which appears to be most at threat (sea level rise, rising saline water level, and flooding exacerbated by the destruction of the mangrove belt) and could pose a serious problem in terms of food security.

Level of collaboration with national and international institutions involved in climate change issues

At national level, if not for this IFPRI study for which some agents of the Ministry of Environment are engaged, there is almost no contact with this Ministry. At international level, apart from IFPRI, Mr. TRAORE has a limited knowledge of international institutions involved in climate change issues. He does not know the IPCC, or the Hub Rural in Dakar. He knows Guinea is now a member State of CILSS and that a Focal Point for the CILSS, Mr. Mamba KOUROUMA, has been appointed by the Ministry of Agriculture, but he does not have a clear idea of the mandates of the CILSS.

Assessment: ANDASA is a recently created institution, with very limited staff, and said to be custom-designed for her General Director. With the very recent appointment of this last as Minister of Agriculture, it will most probably be kept dormant. This being said, the on-going study on modelling future food crop production (rice in first place) according to climate change scenarios, carried out by ANDASA under the supervision of IFPRI Dakar, might be very interesting to raise awareness among Guinean decision-makers. The results are expected at the end of 2014 and it might be interesting for the AEMIP/GCC project to get in touch with El Hadj Lamarana DIALLO as soon as possible, to see how the results could be broadly communicated and help mobilising Guinean stakeholders on issues related to the adaptation of agriculture to climate change.

→ Ministry of Livestock

Persons met: Mr. Joseph Boniface SANGARE, Deputy National Director of the National Directorate of Livestock Production and Livestock Industries + Mr. Lansana Calla CAMARA, Head of the Natural Grazing Management Department + Mrs BALDE, Head of the Livestock Industries Department.

Structure

The Ministry of Livestock is represented at Regional level (eight Regions, four staff per Region), Prefectural level (33 Prefectures, six staff per Prefecture), Sub-Prefectural level (330 Sub-Prefectures, three to five staff per Sub-Prefecture). The field staff is reduced compared to the importance of the livestock sector, since the care are normally provided by private veterinary doctors: civil servants are only required in Sub-Prefectures where these private veterinary doctors are not present.

Perceived impacts

The Deputy National Director estimates that there is usually no shortage of fodder and even a surplus. He further assumes that the problem is the unevenly distribution of this fodder: most of it in Guinée Forestière, few in Haute Guinée and Moyenne Guinée. This being said, he also recognises that the Ministry does not have accurate estimate of grazing capacity, and does not control it: the major part of the cattle is bred extensively and transhumance from Moyenne-Guinée to neighbouring Regions is usually practice during the dry season (e.g. Peuhls herders coming massively from the Western part of Moyenne-Guinée to the coastal area after the rice harvest).

He also noticed that the transhumance has developed for the last 10 years, due to the lack of drinking water or grazing land because of erratic rainfalls: farmers/herders conflicts are more frequent (e.g. the deadly conflicts in Faranah in February this year). He believes it will be worst over time: the number of animals is increasing, the grazing land is reducing (slash-and-burn practices, mining industry, etc.), and the rainfalls are getting more and more erratic.

In terms of diseases, he does not estimate any increase in the near future due to climate change. This opinion is based on the following facts

- There are very few crossbreeds in Guinea: (i) very few trials of cattle crossbreeding: Montbéliarde / Holstein / Brune des Alpes with Ndama in the 80s (only one herd with fixed crossbreeds in Forécariah, property of Mrs Sultan, the new Minister of Agriculture), (ii) few trials of pig crossbreeding, mostly in Guinée forestière: Large White, Landrace, Korhogo (local breed from Northern Côte d'Ivoire) with the local breeds. There is almost no “exotic” crossbreeding of goats and sheep;
- The livestock is therefore well adapted to the local conditions (esp. the cattle, resistant to the trypanosomes), and a priori, more resilient to climate change than local x “exotic” crossbreeds;

As a follow-up to these answers, the Deputy National Director is questioned about the possible impact of climate change in the observed increase for the last years of (i) the Newcastle disease in the poultry sector and (ii) the sheep and goat plague.

Indeed, according to a Review of the Guinean Poultry Sector⁸⁷, less than 5% of the production is coming from industrial poultry houses (classified under sectors 1, 2, and 3) and rely on selected day-old chicks (mostly Isabrown, marginally Hissex, coming from two hatcheries: Kahéré - near Kindia, and SIGUCODA - near Koba) with a high level of biosecurity during the production. But 95% of the production comes from the villages (classified under sector 4): local breeding with very low level of biosecurity. This part of the production is massively subject to the Newcastle disease.

Apart from human-induced factors, a note on the Newcastle disease⁸⁸ suggests that one of the explanations for this expansion is that viruses of the Paramyxoviridae family are, at the same temperature, more stable in a dry atmosphere than in a humid atmosphere: it would explain that the Newcastle disease expands quickly because of shorter and heavier rainy seasons due to climate change.

As for the sheep and goat plague, an article entitled “An Expanded Disease: The Sheep and Goat Plague”⁸⁹ highlights the fact that Guinea has been for long one of the few West African countries to be exempted. But it is now developing strongly in the country. As this plague is also caused by viruses of the Paramyxoviridae family, which are more stable in a dry atmosphere (as already explained), it would explain that: (i) “Sahelian” breeding are more tolerant (and most of time healthy carrier) than “Guinean” breeding (especially for the goats, who are much more sensitive than sheep: African dwarf goats West Kirdi goats, etc.), and (ii) due to shorter and heavier rainy seasons, caused by climate change, the sheep and goat plague can expand quickly.

The Deputy National Director acknowledges he has no clear idea about these issues.

Actions taken to address adaptation needs

In the frame of the implementation of the Project of Rehabilitation of the Livestock Sector in Guinea (1986-1995, financed by the World Bank), all the staff of the Livestock services received testing and were reclassified (or even forced into retirement) according to their results. This explains why the Livestock services have often been considered of better quality than the Agriculture or Fisheries or Forestry services.

However, the Deputy National Director recognises that vocational training is very limited in all fields, and inexistent in the field of adaptation to climate change.

Level of collaboration with the AET and the IRAG

According to the Deputy National Director, the curricula of the AET are not adapted to the reality of the ground and not practical enough. Even the topics of the thesis are outdated.

As for IRAG, relations are very limited: (i) The Livestock Support and Demonstration Centres (*Centre d'appui et de démonstration de l'élevage* – CAE), located in Boké, Beyla, and Ditinn, were supposed to carry out research and development activities in the livestock sector (fodder selection, N'dama improvement programme, etc.), but they are dormant. Only few researchers of the IRAG centre of Barenj (Moyenne-Guinée) are working on livestock issues.

⁸⁷ SQUARE L. M. Review of the Guinean Poultry Sector. FAO. November 2010. 56p

⁸⁸ PICAULT J.-P. and GESTIN V. The Newcastle Disease. Zoopole of Ploufragan. Not dated. 8p

⁸⁹ LEFEVRE. P.-C. An Expanding Disease: The Sheep and Goat Plague. FAO. Not dated. 5p

Level of collaboration with national and international institutions involved in climate change issues

The Deputy National Director has no relation with the Ministry of Environment (and does not know the NAPA). He does not know who are the active donors in the field of climate change in Guinea. He does not know the IPCC, the Hub rural of Dakar and has only heard of CILSS/Agrhymet, because the Statistic Department of the Ministry of Livestock collaborates with them; but he does not clearly figure out what are the areas of expertise of CILSS/Agrhymet and its relevance in terms of adaptation of livestock to climate change.

Assessment: Among the four Ministries involved in rural development, the Ministry of Livestock is often considered as one of the best performing. However, the level of knowledge on climate change impacts and adaptation of livestock to climate change is very low, if not nil. For instance, at the higher level there is no clear estimate of the current fodder availability and forecast of the need/availability in the future, in a context of fast changing conditions. The issues related to genetic adaptation of breeding to the climate change and the possible consequences of climate change on the spread of diseases are not yet explored. In brief, the Ministry of Livestock is not aware of the possible impacts of climate change on the livestock sector and has not prepared adaptation measures.

→ Ministry of Environment – Services in charge of climate change

Persons met: Mr. Joseph SYLLA, Head of Division on Pollution Prevention / National Designated Authority on Adaptation to Climate Change / Focal Point of the UNFCCC + Mrs Moussa DOUMBOUYA, Assistant to the Head of Division

Structure

The staff of the Ministry of Environment is represented locally through the Forest services (see explanations below). At central level, the coordination of the climate change policies remains unclear. Indeed, below are the three persons/services involved:

- Dr. Faya TRAORE, who is recognised by many as a good expert in climate change issues, was formerly heading a Climate Change Cell, directly reporting to the Cabinet of the Minister of Environment. He has been transferred in the last years to a Project unit, called “Climate Change”, under the National Directorate for Environment;
- Mr. Mamadou SALIOU, Legal Advisor in the Cabinet of the Minister of Environment, has officially be appointed as Designated National Authority (DNA) to the Clean Development Mechanism (CDM);
- Mr. Joseph SYLLA, Head of Division on Pollution Prevention - although he has limited knowledge of climate change issues and the fact he does not speak English - was officially appointed as DNA on Adaptation to Climate Change and Focal Point of the UNFCCC (and therefore expected to speak on behalf of Guinea in international negotiations, which are most of time in English, apart from the plenary sessions).

Dysfunctions caused by unclear share of tasks/responsibilities could explain most of the delays in preparing climate policy documents, implementing them, informing and training key-stakeholders in the country:

- Second National Communication (2NC) to the UNFCCC in preparation for four years now. Mr SYLLA explains this delay by the shift made from UNDP (who coordinated the 1NC) to UNEP as implementing agency, with guidance coming from Nairobi (no representation of UNEP in Conakry). But the fact he replaced Dr. Faya TRAORE to coordinate the 2NC, without having the full technical capacity, might be one of the main reason for the delay;
- Delay in implementing the projects identified in the Guinean NAPA (see explanations infra);
- Preparation of the NAP not yet started. Mr SYLLA said he does not know how to proceed, from a technical point of view and a financial point of view. He is not aware of the technical guidelines produced by the LEG and does not know the procedures for requesting support to the multilateral funds. Additional information was gathered during an interview with El Hadj DIALLO, Senior Researcher at the CERESCOR and Head of the RACZ (see **Part 3.2** infra): according to El Hadj DIALLO, Guinea was invited to the “LEG regional training workshop on adaptation for Francophone LDCs” in March 2013. According to him, all the issues regarding adaptation to climate change (esp. implementation of the NAPA and search for support, preparation of the NAP) should be dealt with the Cabinet of the Ministry of Environment, in close link with the Prime Minister Office;

- Absence of move towards the REDD+⁹⁰ mechanism, while most neighbouring countries are already engaged in it (Ivory Coast, Liberia, Mali, Sierra Leone) or about to engage (Senegal);
- Lack of information sharing and awareness creation about climate change issues: this may be the most unfortunate weakness of the Ministry of Environment, since they are key-success factors for any climate policy in the country.

Progress in the implementation of the NAPA

Mr. SYLLA was unable to provide accurate information in this regard. He only mentioned the act that the Project entitled “Increased Resilience and Adaptation to Adverse Impacts of Climate Change in Guinea’s Vulnerable Coastal Zones (RACZ)⁹¹” was under implementation.

Additional information was gathered during an interview with El Hadj DIALLO (see **Part 3.2** infra), who said that upon the 25 projects identified in the NAPA, three are financed or yet to be financed:

- RACZ: With a budget of 8.6 MUS\$ mostly funded by the LDCF, it is implemented by the UNDP and has four main components: (i) Developing individual, institutional and systemic capacity to respond to climate change in coastal zone areas, (ii) Demonstration of climate risk reduction measures implemented in Boffa and Forécariah areas, (iii) Developing national capacity to design integrated climate change strategies and plans, (iv) Knowledge management, dissemination of lessons learned and replication of best practices. It covers the Project ideas #2, 3, 5, 6 and 8 of the NAPA;
- Strengthening Resilience of Farming Communities' Livelihoods against Climate Changes in the Guinean Prefectures of Gaoual, Koundara and Mali⁹² : with a budget of 54 MUS\$ funded by the LDCF and the GEF, the project should be launched in 2014 and be implemented by UNDP. The Project Identification Form (PIF) is not yet available online, but – according to El Hadj DIALLO - the project should focus on the promotion of agroforestry. It is worth noting the PIF was approved in December 2011, but finally endorsed by the Chief Executive Officer (CEO) of the GEF nearly two years later, in July 2013;
- Ecosystem-Based Adaptation Targeting Vulnerable Communities of the Upper Guinea Region⁹³: with a total budget of 35.8 MUS\$ funded by the LDCF and the GEF, the project should be launched in 2014 and be implemented by UNDP. The PIF is not yet available online, but an unofficial PIF (NB: with track changes, while the PIF is normally approved since May 2013) was kindly sent by Mr. DAN BARIA from the UNDP (see interview in this **Part 3.1** infra).

According to this draft PIF, the project goal is to promote ecosystem-based adaptation through three components: (i) Strengthening resilience of vulnerable groups through community based management of climate change adaptation for natural resources in protected areas, (ii) Capacity building for integration of climate change adaptation into national/regional/local management plans and policies, and (iii) Information system to guide climate adaptive management of key natural resources (water, wetlands, savannah, forest). The process was much faster than for the second project above: the PIF was approved in May 2013 and endorsed by the GEF CEO in July 2013.

Mr. SYLLA said he requested support from the following funds, but without success:

- Adaptation Fund: CERESCOR was supposed to be selected as a national operating entity with direct access to the Fund, but due to its lack of reliability [no detailed explanation given], he requested the Board of the Fund to consider the selection of the Strategy and Development Office of the National Directorate for Environment. He seems confident about the feasibility of such selection, based on the fact it was already done in Chile...But knowing the poor level of performance of the public administration in Guinea, it seems rather unrealistic, which was further corroborated by El Hadj DIALLO, who also mentioned that the Minister of Environment herself, as former GEF Focal Point for 11 years, do not believe it can succeed;
- LCDF: He said he introduced an official request, but he is not confident it will pass.

⁹⁰ Reduction of GHG Emissions due to Deforestation and forest Degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stock

⁹¹ GEF. Project Identification Form - Increased Resilience and Adaptation to Adverse Impacts of Climate Change in Guinea’s Vulnerable Coastal Zones. GEF. June 2008. 11p

⁹² PIF not yet available online, but summary available at http://www.thegef.org/gef/project_detail?projID=4692

⁹³ GEF.Draft PIF - Ecosystem-Based Adaptation Targeting Vulnerable Communities of the Upper Guinea Region. GEF. February 2012. 31p

Apart from UNDP, GEF, and these two Funds, he did not request assistance from other donors.

Assessment: Tasks and responsibilities with regard to climate change are not clear among the services of the Ministry of Environment, which would explain most of the delay in designing and implementing climate change Strategies and Policies, i.e. 2NC, NAPA, NAP, REDD+ mechanism. Only one NAPA project is under implementation in the mangrove area of Basse-Guinée, while two projects are yet to be launched: one focusing on agroforestry in the Prefectures of Gaoual, Koundara and Mali (Moyenne-Guinée), another one focusing on ecosystem-based adaptation in Haute-Guinée. The level of understanding of key technical issues related to the adaptation to climate change, such as the development of CSA, is low.

→ Ministry of Environment – Services in charge of forestry

Persons met: Mr. Alkhaky BANGOURA, Head of Division of Forest Management + Mr. Ousmane TRAORE, Head of Division of Forest Economics + Mr. Alsény CAMARA, Head of Service of the Botanical Garden of Conakry

Structure

The persons met depend on the National Directorate for Forest and Fauna. The two other Directorates dealing with forestry are (i) the National Directorate for Water and Forest (which includes the Service of Forest Inventory) and (ii) the National Directorate for Community and Private Forests. The Forest services are present at local level, generally under the responsibility of the Regional Director for Agriculture (NB: even if the four Ministries active in the rural sector have been recently separated, the local staff still refer to a single person, formerly called Regional Inspector in charge of Agriculture, Water, Livestock, and Forestry and now called Regional Director for Agriculture).

Perceived impacts

They make a link between deforestation (slash-and-burn agriculture, firewood/charcoal extraction, baking of bricks, mining, overgrazing, bush fire, etc.) and climate change. There are three problems: (i) as many other persons met, they are not conscious of the universal nature and the irreversibility (in the short- to medium term at least) of climate change, (ii) reforestation is seen as the adequate solution to address the issue and bring the system back to equilibrium in the short-term, (iii) they are not conscious of the aggravating impact of climate change on degraded dry forests (most of the savannah area) and even fewer on degraded moist forest (Guinée forestière) or mangrove forest (Basse-Guinée).

It is worth noting that, as outlined earlier (see **Part 1.1** supra), the rate of deforestation is high in Guinea (0.5% per year) and the number of forest fires is the highest from all the neighbouring countries (25 fires/100 km²/year). According to the USAID/Guinea ETOA, “*While current data is limited, estimates are of 7,655 km² of forest remaining or about 4.1% of the original closed canopy cover (SAYER et al. 1992). Most of the current forest cover that remains is secondary forest as a result of anthropogenic changes to the landscape*” (DENNISON et al. 2012)

Actions taken to address adaptation needs

In terms of control of firewood/charcoal extraction, they feel powerless, the only solutions according to them being (i) to subsidise butane gas...Which they see impossible in the short term, (ii) to afforest/reforest massively, which they also see impossible because of the bush fires and free grazing animals. None of them mentioned the possibility to increase energy efficiency (during the production of charcoal, using improved kilns, or during cooking/fish-smoking, promoting improved cookstoves/fish-smokers), or to promote agroforestry.

The extent of Guinean forest itself is not known, since there is no national forest inventory. To their best knowledge, the only data available are:

- In terms of forest maps: Multithematic maps produced in the 50s by the National Geographic Institute of France (*Institut géographique national* – IGN), forest maps produced in 1978-1979 by the Japanese International Cooperation Agency (JICA), bush fires maps produced for the last decades by Agrhymet Niamey. In the frame of the Programme for Natural Resources Integrated Management (*Programme d'appui à la gestion intégrée des ressources naturelles* – AGIR, funded by the 8th European Development Fund - EDF), at least 25 persons from the Forest services had been trained in 1993 in forest inventory. There were three active units within the Service of Forest

Inventory: GIS, image treatment, and photo-interpretation. Since 2003, there is no more equipment: table scan, plotter, software, computer, etc.

- In terms of dendrometric data: A field inventory has been carried out in Basse-Guinée in the early 80s, with FAO funding. The forest map was later updated in 1986-1988 by experts from the Technical Centre for Tropical Forestry (*Centre technique forestier tropical* - CTFT, which later became CIRAD-Forêt). But nobody can locate the report of this study. Another large scale field inventory was carried out in 1992, in the surroundings of Gaoual and Koundara, with funding from the Project of protection of the Gambia River. The report is not available neither, but they remember there were a lot of "beautiful trees" ("*Acajou du Sénégal*", "*Lengé*", "*Iroko*", etc.) whereas these area is now considered as one of the most degraded in Guinea!

In the early 90s, with the influence of AGIR, there had been a proliferation of community-forest associations (e.g. up to 111 in Guékédou!), to the point where there was talk of a national Federation. But, after 2000, most of these groups disappeared. The main reasons for this demobilisation were the bad governance within these associations and the bad examples given by their leaders. For instance, many Prefects and Sub-Prefects were thus illegally using chainsaws, to cut firewood and produce charcoal. Successes were few, e.g. around Kissidougou, Labe, Mamou.

AGIR also promoted the creation of charcoal producers' associations: such associations were created in Kankan, Kissidougou, Labe, and Faranah. A Swiss NGO, ATEF, even trained them to the use of the Casamance kiln in 1997/98.

Large scale afforestation/reforestation programme have been few, apart from the Master Plan for the mangrove (1992-1998), in which were promoted plantations of Eucalyptus, Acacia Mangium, Acacia auriculiformis or holosericea, Epil Epil, etc. Episodic afforestation/reforestation initiatives also used other exotic species (in particular *Tectona Grandis* "Teck", *Gmelina Arborea*) or indigenous species (*Terminalia Ivorensis* "*Framiré*", *Terminalia Superba* "*Fraké*" or "*Limba*", *Khaya Senegalensis* "*Cailcédra*" or "*Acajou du Sénégal*", *Aspilia Africana* "*Lengé*"). The cost of afforestation is around 1,000 US\$/ha (ground preparation + seedling + labour for planting and maintenance), but can reduce by cropping groundnuts or cassava in the inter-row ("Tonja" system successfully developed in Burma).

In terms of forest management, little has been done, especially in Guinée forestière. In 1988, a German consultancy firm (Atlanta) carried out a full inventory of the Forest resource in Guinée forestière. Following that, in 1990, a French sawyer (Mr. ALBERT) established a sawmill in Nianpaga, 7 km from N'Zérékoré, in order to harvest the forests adjacent to the Diécké classified forest. The sawmill had a capacity of 50,000 m³/year (sawnwood and plywood) and GTZ supported the establishment of community-based management plans to feed the sawmill.

But, the initiative did not succeed and, before the 2000s, there were a dozen loggers in Guinée forestière (six only for the Sub- Prefecture of Lola), extracting wood without management plans. After that, in 2002, Forêt forte, a timber industry owned by relatives of former President Lansana CONTE and Taiwanese investors, set up in N'Zérékoré⁹⁴.

They obtained annual cutting licenses for the 40,000 ha of the Zياما and Diécké classified forests, plus approximately 10,000 ha out of these two classified forests. Forêt Forte then created a second sawmill, 17 km from the first. The activity of Forêt forte was stopped from December 2010 to August 2013, based on a Decree from the Prime Minister deploring the lack of sustainable forest management plan. A Decree from the Minister of Environment allowed them to pursue their activity, even though there is yet no sustainable forest management plan to guide it.

Level of collaboration with the AET and the IRAG

To their best knowledge, there is no collaboration with the AET and the IRAG.

Level of collaboration with national and international institutions involved in climate change issues

To their best knowledge, there is no collaboration with international institutions involved in climate change issues. The collaboration with the National Directorate for Environment seems to be limited to exchange of basic information. For instance, none of the person met is well informed of the REDD+ mechanism, although this is being discussed for more than eight years and many neighbouring countries (Sierra-Leone, Liberia, Ivory Coast, and Mali) are already engaged in it.

⁹⁴ <http://www.foretforte.com.tw>

Assessment: The Guinean forests are under considerable threats: slash-and-burn agriculture, firewood/charcoal extraction, baking of bricks, mining, overgrazing, bush fire, etc. While current data is limited, it is estimated that only 4.1% of the original closed canopy cover remains. The extent of Guinean forest is not known, in the absence of national forest inventory (even an old one). Impacts of climate change will further aggravate the problem, especially in savannah area, but the climate change phenomenon is not well understood and the universal nature and irreversibility of climate change are not known. Adaptation/mitigation measures are scarce and old now: few trials of community-based forest management, episodic afforestation/reforestation initiatives (the largest one in mangrove area in the 90s), few training for producing improved charcoal (Casamance kiln)...Sustainable management is not developed, even in Guinée forestière where mobile and industrial sawmills are active.

→ Ministry of Fisheries

Persons met: Mr. Fodé SANKHON, Head of the Strategy and Development Office (*Bureau de la stratégie et du développement* – BSD) + Mr. Sékou TOURE, Technical Advisor to the Minister.

Structure

At national level, the Ministry of Fisheries has three main Directorates, respectively in charge of aquaculture and inland fisheries, marine fisheries, and fish farming (recently created). In addition to that, there is a Strategy and Development Office, in charge of the overall coordination, and various observatories and technical services.

The Ministry has eight regional Directorates and a hundred of Prefectural Directorates, but not in all the Prefectures. When there are some staffs at Prefecture level, they are three to four at maximum, and under the responsibility of the Regional Director for Agriculture. Presently, the Ministry of Fisheries gathers 1,360 senior civil servant, but 800 of them were hired in 2007 and do not always have the required academic background and capacities to fulfil their tasks.

Perceived impacts

According to them, the climate change is due a conjunction of different factors: (i) industrial pollution on the seashore (e.g. discards into the sea from SOBRAGUI, the national brewery), (ii) deforestation due to slash-and-burn cropping, baking of bricks, fish smoking, bush fire, etc.). The deforestation of the mangrove belt would explain the sea level rise. Reforesting the mangrove would bring the ecosystem back to equilibrium, including the reconstitution of the fish stocks in the coastal area.

According to them, the temporary and permanent ponds are reducing mainly because of erosion and accumulation of sediments (due to unsustainable slash-and-burn cropping).

In conclusion, the causes and consequences of climate change are not clearly distinguished, and further mixed with other aggravating factors not directly linked to climate change (such as soil erosion). The most worrying is the fact that the universal nature and the irreversibility (in the short- to medium term at least) of climate change are not known and that reforestation is seen as the adequate solution to address the issue and bring the system back to equilibrium in the short-term. In that context, the need for long-term adaptation is not identified.

Actions taken to address adaptation needs

They declared that, in the frame of the second phase of the Project for Integrated Management of Natural Resources (PEGIR2, launched in 2013), the National Directorate for Inland Fisheries and Aquaculture has rehabilitated 12 permanent and temporary pools (near Kouroussa, Faranah, and Coyah): removal of sand, building of dams, reforestation of the edges, restocking with tilapia.

The sustainability of such measures are questionable, since it does not address the root causes of the problem (decreasing and/or erratic rainfall due to climate change), but an aggravating factor (erosion). There is not though given to the selection of the species of freshwater fish and their robustness to an increase of water turbidity and/or eutrophication, etc. due to climate change. Tilapia is the only fish species promoted: the Ministry of Fisheries relies on two centres for the production of fingerlings: Gouécké/Macenta for the production of local tilapia, Tolo/Mamou for the production of “Ivorian” tilapia.

The Fish Farming Project in Guinée forestière, carried out since 1999 by the Association for Fish Farming and Rural Development in Africa (*Association pisciculture et développement rural en Afrique* – APDRA), may be the most successful initiative in this sector in Guinea. It does not aim at developing more resilient fish farming system, but by diversifying the source of incomes of rural populations mostly dependant on rainfed agriculture, it participates to their adaptation to climate change.

In terms of marine fisheries, the Ministry did not assess the impacts of climate change on fish stocks and marine ecosystem as a whole. Apart from a National Director and the Head of the BSD who attended a workshop on “awareness-raising about climate change” organised in August 2011 by the Ministry of Environment, the agents are not trained, or even informed, about this emerging issue.

Level of collaboration with the AET and the IRAG

To their best knowledge, there is no collaboration with the AET and the IRAG.

Level of collaboration with national and international institutions involved in climate change issues

To their best knowledge, there is no collaboration on these issues with other institutions. They have never heard of NAPA, CILSS, Hub rural, and IPCC.

Assessment: The climate change phenomenon itself is not understood, with a mix between causes and consequences made by the two interviewees, high level civil servants from the Ministry of Fisheries. As a result of this mixing, the universal nature and the irreversibility (in the short- to medium term at least) of climate change are not known and reforestation is seen as the adequate solution to address the issue and bring the system back to equilibrium in the short-term. In that context, the need for long-term adaptation is not identified. On-going adaptation measures in inland fishery are very few, expecting the promotion (at small scale) of fish farming in Guinée forestière, which could contribute to food and revenue diversification. Examples of on-going adaptation measures in marine fishery were not given, which would let us tend to believe that they do not exist.

AFD

Person met: Mrs. Anya BELLALI, desk officer in charge of the rural sector (agriculture, livestock, fisheries, forestry, and environment).

AFD activities in the field of environment and climate change

AFD has been active for long in rural development: agriculture (support to the main cash crops: coffee in Guinée forestière, cotton in Haute-Guinée, potato-onion in Moyenne-Guinée, rice-salt in Basse-Guinée, etc.), livestock (support to the veterinary services, to the CONEG, etc.), fisheries (support to small-scale fish farming in Guinée forestière), and environment (support to the mangrove observatory, support to afforestation in Moyenne-Guinée through the NGO ESSOR, etc.).

After a stop of their activities during the troubles, prior to the election of the present Head of State, AFD resumed its activities, with two main projects in the agriculture sector:

- Rice Sector Development Project in Basse-Guinée: Support to the mangrove rice production in Basse-Guinée, through the Federation of Farmers' Organisations of Basse-Guinée (*Fédération des organisations professionnelles de Basse-Guinée* - FOP-BG): creation of hydro-agriculture facilities, support to rice farmers' and rice processors' organisations, support to IRAG for the development of salt-resistant seed, support to the collective branding of mangrove rice, etc.
- Fish Farming Development Project in Guinée forestière: Support to small-scale integrated fish farming / rice cropping in Guinée forestière (with trials to integrate pig farming into this system).

One can consider these two projects are participating to adaptation to climate change: directly in the case of mangrove rice production in hydro-agriculture facilities (more adapted to sea level rise, erratic rainfall and increased salinity), indirectly in the case of fish farming production (alternative IGA to rainfed agriculture).

Late 2012, Guinea achieved the completion point of the Highly Indebted Poor Country (HIPC) Initiative. A Debt Reduction-Development Contract (*Contrat de désendettement et de développement* – C2D) was then signed in July 2013 between the Guinean and French Governments. Four sectors of cooperation were identified, including agriculture with a budget of 15 M€ for four years. A first mission of identification was carried out in July 2013, and a second one in February 2014.

As it stands, AFD would be financing a project of promotion of sustainable forest management in three of the seven remaining classified forest of Guinée forestière, with a special focus on the classified forest of Ziama. The aim of this project is to promote the use of sustainable management plans among artisanal and industrial sawmillers. It is therefore indirectly linked to adaptation to climate change.

Development partner activities in the field of environment and climate change

AFD is presently appointed as the lead development partner in the rural development sector and is responsible for coordinating development partner activities with the Government priorities. In addition to AFD, the main development partners active in the sector are: African Development Bank (AfDB), World Bank, Islamic Development Bank (IsDB), International Fund for Agriculture Development (IFAD), UNDP, and USAID.

According to Mrs BELLALI, there are very few projects in the environment sector, and no project in the field of adaptation to climate change, apart from the ones funded by the GEF and the UNDP. According to her, the EU and the AfDB were supposed to start supporting the collection and dissemination of environmental statistics in 2013 (which could be useful for preparing adaptation activities), but this has not yet started.

Assessment: AFD has been supporting the Guinean rural development for long and is now coordinating development partner activities with the Government priorities in the rural development sector. Among the active development partners in this sector (AfDB, EU, WB, IsDB, IFAD, UNDP, and USAID), few are currently supporting projects in the environment sector. In the field of adaptation to climate change, there are only three NAPA projects supported by the GEF and the UNDP (one on-going: RAZC mangrove area of Basse-Guinée, and two about to start: “agroforestry” project in Moyenne-Guinée, “ecosystem-based adaptation” project in Haute-Guinée), plus the AEMIP/GCC Integration Pilot project.

UNDP

Person met: Mr. Soumaïla DAN BARIA, UN volunteer, focal point for the environment sector at UNDP (replacement of Mr. SYLLA, retired in February 2014).

Activities in the field of environment and climate change

UNDP, together with the LDCF/GEF (NB: GEF Focal Point in Guinea: Mr. TOURE, based at the Ministry of Environment), co-financed the elaboration of the NAPA in 2007 and was also the implementing agency for this project. In 2010, still with the LDCF/GEF, UNDP supported the first phase of the RAZC project (see in this **Part 3.1** supra). UNDP and LDCF/GEF might support a second phase (to start in 2015. Yet to be confirmed). The terms of reference for the mid-term review of RAZC were given by Mr. DAN BARIA.

UNDP is also interested in financing the two other NAPA projects already presented (see in this **Part 3.1** supra):

- Ecosystem-based adaptation in the Prefectures of Mandiana, Kouroussa and Kissidougou. The project identification was done in February 2012 and the feasibility study was carried out few months ago by a Namibian expert, Mr. ZEIDER. This project will be supervised by the Focal point on Desertification, Mr. DIAWARA, from the Ministry of environment. The draft PIF was given by Mr. DAN BARIA: he could not localise the approved PIF and this one is not available online;
- Strengthening the resilience of agroforestry ecosystems and the rural livelihood in the Sub-Prefectures of Mali, Koundara, and Gaoul. Mr. DAN BARIA was not able to provide the draft of approved PIF of this project, and the approved PIF is not available online.

However, he gave the Final Project Report of a project entitled “Institutional Capacity-Building to Combat Desertification and Land Degradation in Guinea”, saying the “agroforestry” project would be quite similar. The “desertification” project had a budget of 1.06 MUS\$ and it closed in November 2012. It aimed at strengthening institutional and operational capacities to combat desertification and land degradation in Guinea, with pilot activities (mainly afforestation) in the Prefectures of Macenta and Kissidougou (Guinée forestière) and Kankan and Dabola (Haute-Guinée).

Mr. DAN BARIA arrived in Guinea in 2011 and does not know how the selection of these three projects, out of all the project ideas identified in the NAPA, was done. More generally, may be because Mr. SYLLA retired recently and he took over recently, he does not seem to be very informed about the details of the on-going or foreseen projects in the field of climate change (e.g. the fact not to have any document related to the foreseen “agroforestry” project). He does not seem very proactive neither.

According to El Hadj DIALLO (see in **Part 3.2** infra), the fact that the Environment Programme of the UNDP Guinea has been integrated into the broader “Green Growth and Sustainable Development Programme” in 2012 seems to have “diluted” the attention given to climate change.

Mr. DAN BARIA does not know about the concept of NAP, he has never heard of the IPCC or the Hub Rural, and only knows that CILSS is dealing with meteorological issues, but does not know about their activities in the field of climate change.

Assessment: UNDP, as implementing agency of the LDCF/GEF, co-financed together with the LDCF/GEF, the elaboration of the Guinean NAPA, as well as one its identified project, the RAZC. UNDP, still with the LDCF/GEF, will support two other NAPA projects (to be launched in 2014): “Agroforestry” project in Moyenne-Guinée and “Ecosystem-based adaptation” project in Haute-Guinée. It might also support a second phase of the RAZC. UNDP/Guinea’s Environment Programme has been integrated into the Green Growth and Sustainable Development Programme in 2012 and its climate change specialist has retired recently, two changes that might explain the relative “loss of interest” from UNDP/Guinea with regard to adaptation to climate change.

3.2. AET Institutions (Faculty and Students) and Research Centres

As explained earlier (see **Part 1.3** supra), data were collected by two means: semi-structured bilateral interviews and individual questionnaires. In what follows, we will present the synthesis of:

- Bilateral interviews with the National Directorates of Vocational/Technical Training and On-the-job/Short-term Training, which are supervising the ENAE, as well as the headquarters of Research Centres – National Directorate for Meteorology, Scientific Research Centre of Conakry Rogbané, and IRAG - that could support the design of AET curricula related to climate change and CSA;
- Individual questionnaires with AET Faculty and Students, as well as IRAG Researchers.

→ National Directorates of (i) Vocational/Technical Training, (ii) On-the-job/Short-term Training

Persons met: Mrs. DIANE, National Director of Vocational and Technical Training + Mr. DIABY, Deputy National Director + Mr. DIALLO, Head of Division of Vocational Training + Mr. BAH, Deputy National Director of On-the-job and Short-term Training (and former Director of the ENAE of Tolo)

Structure

The National Directorate of Vocational and Technical Training has the responsibility over the ENAE and the ENATEF, while the ISAVF is under the responsibility of the Ministry of Higher Education. In each ENAE and ENATEF, there is a board (*Conseil d'établissement*) composed of the Regional Inspector in charge of Vocational and Technical Training (Chair of the Board), a representative of the Parents' Association, a representative of the Students' Association, a representative of the local Farmers' Organisations, the Director.

At national level, as explained in **Part 2.2** supra, the National Directorate of Vocational and Technical Training recently supported the creation of a Network of Stakeholders involved in Agricultural and Rural Training in Guinea (*Réseau des acteurs des formations agricoles et rurales de Guinée – RAFARGUI*). It gathers the National Directorate of Vocational and Technical Training, the National Directorate of On-the-job and Short-term Training, the ANPROCA, the National Directorate of Livestock, the National Directorate of Inland Fisheries and Aquaculture, the CNOP-G, the National Confederation of Breeders (*Confédération nationale des éleveurs de Guinée – CONEG*), the National Confederation of Fishermen (*Confédération nationale des pêcheurs de Guinée - CONAPEG*), the IRAG, the National Chamber of Agriculture, the Training Centre in Agricultural Machinery (*Centre de perfectionnement en machinisme agricole - CEPERMAG*), and the National Institute for Rural Development Support (*Institut national pour l'appui au développement rural - INADER*, a Guinean NGO). It is chaired by Mr. Moussa Para DIALLO, President of the CNOP-G.

As explained in **Part 2.2**, the umbrella of RAFARGUI (*Réseau FAR*) and RAFARGUI itself did not develop specific thought relating to the integration of CSA into AET curricula. However, since RAFARGUI seems to gather most of the AET Stakeholders the AEMIP/GCC Integration Pilot intended to consult, through the creation of an ad hoc group, it might be useful for the AEMIP to liaise with the RAFARGUI and to see how best the CSA issues could be dealt with by the RAFARGUI.

Perceived impacts and actions taken to address adaptation needs

The climate change phenomenon itself is not understood by any of the persons met. They gave contradictory explanations in this regard, mixing causes and consequences (e.g. warming due to the

decrease of rainfall, warming due to increased solar heating caused by decreased shade effect, itself due to deforestation, degradation of the ozone layer, etc.).

Once again, the universal nature and the irreversibility (in the short- to medium term at least) of climate change are not known and reforestation is seen as the adequate solution to address the issue and bring the system back to equilibrium in the short-term. In that context, the need for including adaptation to climate change into the curricula of the AET is not identified.

Level of collaboration with the IRAG and the ANPROCA

The Deputy National Director of On-the-job and Short-term Training mentions the existence of sporadic contacts at local level with IRAG (e.g. multiplication of maize and rice seed by the ENAE Tolo, after production of basic seed by the IRAG Tolo) or with ANPROCA (e.g. support to the ENAE Tolo in 2013 by the ANPROCA/PUAPA2: fertilisers, seed, veterinary products, etc.).

This being said, all the persons met acknowledge that these collaborations between the ENAE/ENATEF, IRAG, and ANPROCA are informal: there is no guidance given to the ENAE/ENATEF staff to share the information and organise practical field training with ANPROCA and IRAG. ANPROCA and IRAG are also not part of the Board of the ENAE/ENATEF.

As a result, there is a great missed opportunity for practical collaboration (e.g. involving students in the design and follow-up of experimental or on-farm trials, mobilising researchers for certain specific courses, etc.). This is even more difficult to understand than the ENAE and the IRAG centres are close to each other: same compound for ENAE and IRAG in Koba, Bordo/Kankan, Tolo/Mamou, a few km drive from ENAE Macenta and IRAG Sérédou.

All the persons met are of the opinion that, even if the academic level and practical know-how of the ENAE students is low, it is still better than those of the University students. They affirmed they made their best to improve the ratio of field training vs classroom training up to 60%. Questioned about the reality of this figure, they however recognise that it might be much lower.

Level of collaboration with national and international institutions involved in climate change issues

There is no collaboration with the Ministry of Environment, the CERESCOR, and the National Directorate of Meteorology and they have never heard of NAPA, CILSS, Hub rural, and IPCC.

Assessment: As for the Ministries in charge of rural development (Environment, Agriculture, Livestock and Fisheries), the climate change phenomenon itself is not understood, with a mix between causes and consequences. As a result of this mixing, the universal nature and the irreversibility (in the short- to medium term at least) of climate change are not known and reforestation is seen as the adequate solution to address the issue and bring the system back to equilibrium in the short-term. In that context, the need for long-term adaptation is not identified. Collaborations between the ENAE-ENATEF, IRAG, and ANPROCA are informal: there is no guidance given to the ENAE-ENATEF staff to share the information and organise practical field training with ANPROCA and IRAG. There is a great missed opportunity, all the more difficult to understand that ENAE and IRAG antennas are close to each other. The interviewees recognise the low academic level and the lack of practical know-how of AET Students. The recent creation of the RAFARGUI could be an efficient channel to inform/train the civil servants of these two National Directorates, together with the other RAFARGUI members, in order (i) to define with them ways and means to introduce CSA into the AET curricula, (ii) to liaise RAFARGUI members with international/sub-regional institutions active in CSA-ET (see **Part 2.3** supra)

→ CERESCOR

Person met: El Hadj Lamarana DIALLO, Senior researcher and National Coordinator of the RAZC project (see **Part 3.1** supra).

Structure

The Scientific Research Centre of Conakry Rogbané (*Centre de recherche scientifique de Conakry-Rogbané* – CERESCOR)⁹⁵ is a public scientific body with legal personality which reports to the Ministry of Science. Created in 1982 with the support from the Soviet Union, it gathers a hundred of researchers in five Departments: oceanography, hydrobiology, energy, materials, and data management (see for further details).

⁹⁵ <http://www.estis.net/sites/cerescor/>

Involvement in climate change

El Hadj DIALLO is part of the Energy Department, reason why he was involved in the early 2000 in the preparation of the First National Communication (1NC) to the UNFCCC, to support the elaboration of the GHG inventory (the energy sector being a key one in the inventory). In 2001, Dr Faya TRAORE, officially appointed as 1NC Coordinator, got sick and El Hadj DIALLO replaced him.

In 2006, El Hadj DIALLO was appointed as NAPA coordinator. In 2010, he was again called to support the elaboration of the 2NC. Since 2010, he is the team leader of the RAZC project. Last but not the least, he is the team leader of the IFPRI study - modelling of climate impacts on the food crops production. El Hadj DIALLO is the only staff of the CERESCOR to be involved in climate change, but he is very knowledgeable about it, may be the most informed among all the persons interviewed. He recognises that there are very limited, if not any, collaborations on climate change issues between CERESCOR, IRAG, National Directorate of Meteorology, and the AET institutions.

Unfortunately, his attachment to the CERESCOR, a Research Centre under the supervision of the GoG, does not allow him to get fully involved in the design and implementation of the climate change Policies. When his support is needed, he is under a consultant contract and has to report back to Mr. SYLLA, the UNFCCC Focal Point at the Ministry of Environment, who ultimately makes the decisions.

Assessment: The CERESCOR itself is not very active in the field of climate change, but one of his Senior Researcher, El Hadj DIALLO, is involved in the preparation of the 1NC and the 2NC, NAPA Coordinator, Head of the RAZC project, and he is the Team leader of the IFPRI study - modelling of climate impacts on the food crops production. According to him, there are very limited, if not any, collaborations on climate change issues between CERESCOR, IRAG, National Directorate of Meteorology, and the AET institutions. It would be very useful for the AEMIP/GCC Integration Pilot to discuss with him, in order to get its feedback/thoughts about the NAPA, the RAZC, the design of CSA pilot activities, etc.

→ National Directorate for Meteorology

Persons met: Dr. Mamadou Lamarana BAH, National Director + Dr. Yaya BANGOURA, Deputy National Director + Mr. Namory DIAKITE, Head of the Division for Applied Meteorology + Mr. Alpha Boubakar BARRY, Head of the Division for Data Production and Management + Mr. Mamady TOUNKARA, Head of the Division for Research and Study

Structure

Considering the fact that the information given on the structure were quite vague and the persons met seemed reluctant to go into details, and cross-checking this judgment with information given by third parties (from IRAG and the Ministry of Agriculture), it seems that the decentralised services of the National Directorate for Meteorology do not function. The headquarter itself appears dormant: there are few people, very few computers, and some rooms seem empty.

Perceived impacts

At the contrary to all the persons met before, they have a good knowledge of the climate change phenomenon, from its causes to its impacts. It is worth to note that Dr. BANGOURA is the IPCC Focal Point for Guinea.

In terms of long-term climatic prediction: Mr. TOUNKARA is involved in the preparation of country-specific climatic scenario (see below). In terms of short-term climatic predictions (esp. rainfalls): the Directorate follows the joint African Centre of Meteorological Applications for Development (ACMAD) / Agrhymet Programme entitled "Seasonal Climate Prediction for the Gulf of Guinea (PRESAGG-01)"⁹⁶

Historical data

The Directorate has some very old paper-based data, back to 1897 for the oldest ones...But this old data get deteriorated and have never been compiled or treated. The 1961-1990 data were used to establish the seasonal standards and the 2001-2010 were used to report ten-year averages to the World Meteorological Organisation (WMO).

The two data series were treated by ecological region, averaging data collected in various weather stations: Conakry, Kindia, and Boffa for Basse-Guinée; Mamou, Labé, and Koundara for Moyenne-

⁹⁶ <http://www.acmad.net/new>

Guinée; Faranah, Kankan, and Siguiré for Haute-Guinée; Kissidougou, Macenta, and N'Zérékoré for Guinée forestière.

For the 1961-1990 data series, the data treatment was done with the ClimCom software, installed in 1992 through a support of the USAID and the WMO. This software is outdated for 10 years (it was running with Windows 95). They tried ClimData and ClimSoft (promoted by the British Met Office and the ACMAD) in 2009, but were not able to install them (ClimData is only use now in Niger and Senegal, while ClimSoft is in use in most of the West African countries). Therefore, the 2001-2010 data series was treated with Excel.

They said they did not compared averages of these two data series in details, but according to Mr. TOUNKARA, the temperature increased by 0.65°C and the rainfall decreased by 300 mm/yr, between the two periods, which seem in line with the findings of the UNDP Climate Change Country Profile for Guinea (Mc SWEENEY et al., 2012).

Country-specific climatic projections

Mr. TOUNKARA follows two research programmes related to this issue:

- Projections “ENSEMBLE”. The Adaptation to Climate Change in West Africa by Improving Climate Information (ACCIC)⁹⁷ project is funded by the Danish International Development Agency (DANIDA) and implemented by the Danish Meteorological Institute (DMI) and Agrhymet. It aims at supporting adaptation strategies to climate change in West Africa through the provision of scientific data. It includes all West African countries with specific actions in Burkina Faso, Mali and Niger.

As part of its activities, the downscaling of global climatic scenarios (by 2100) is foreseen. A workshop for the West African meteorological services will take place in March/April this year and Mr. TOUNKARA hopes to bring back country-specific scenarios (extraction promised by Agrhymet, with support from British Met Office);

- Programme “Coordinated Regional climate Downscaling Experiment” (CORDEX)⁹⁸. It provides global coordination of regional climate downscaling for improved regional climate change adaptation and impact assessment. Indeed, regional climate downscaling techniques are being increasingly used to provide higher-resolution climate information than is available directly from contemporary global climate models. It is therefore important that these techniques, and the results they produce, be applied appropriately. Presently, there is no country-specific climatic projection.

Collaborations with IRAG and other institutions

According to the General Director, IRAG and CERESCOR come to the Directorate “only when they are in need”. The last notable collaboration with IRAG was in 1982, when IRAG and the Directorate worked together to establish some “agro-meteorological” stations with the support of the WMO. In addition to the parameters normally captured in the “synoptic” stations (air pressure, wind, temperature, rainfall) managed by the Directorate, these “agro-meteorological” stations managed by IRAG were able to capture soil temperature, evapotranspiration and air humidity (thanks to an evaporation pan), to record phenological observations, etc. The five antennas of IRAG were equipped, but these agro-meteorological stations are out of duty for the last ten years...

The General Director complains about the fact that IRAG has set up an automated weather station at IRAG Kankan in 2013, with support from AfricaRice, without involving the Directorate and without sharing the captured data (they are sent directly to AfricaRice headquarters in Benin). He also believes another automatic station was set up at IRAG Foulaya, but he is not sure of that.

The General Directorate further complains about the recent set up of a weather station at ISAVF Faranah by two researchers of Purdue University, in the frame of the AEMIP/GCC Integration Pilot, deploring once again the lack of involvement of the Directorate.

It is worth noting that we spent two hours discussing about the lack of information sharing, and that the persons met did not indicate their recent Public-Private Partnership (PPP) with the private US-based company Earth Networks and the Guinean-based company CellCom Guinée, for setting up an “advanced forecasting and severe weather warning system in Guinea”. This PPP was identified after the field mission, by browsing in search of information about the National Directorate of Meteorology!

⁹⁷ <http://www.agrhymet.ne/projetcours.htm>

⁹⁸ <http://wcrp-cordex.ipsl.jussieu.fr/>

The system⁹⁹ has two components: (i) an early warning system enabling real-time weather observations and forecasts, (ii) a dangerous thunderstorm alerts and radar-like visibility to precipitation, which can be used to assess the possibility of floods and drought. On the ground, twelve lightning sensors and weather stations, interconnected via the internet, were set up. Which remains unclear from this PPP is: who will compile and treat the raw data, and broadcast the treated data?

Another surprise, back to France, was to receive an email from one of the person met, inviting to visit a website describing the activities of Gui-MétéoClimat¹⁰⁰, a consultancy firm specialised in climatology, hydrology, and environment, and presented as a provider of tailor-made climatic scenarios!

Assessment: The staff is knowledgeable about climate change, which is rare among the key stakeholders interviewed. They have very valuable meteorological data, back to 1897 for the oldest ones which are paper-based. But this old data get deteriorated and have never been compiled or treated. 1961-1990 data were compiled and treated with ClimCom, which is outdated for more than 10 years. 2001-2010 data were compiled and treated with Excel. To have complete and coherent historical data series, there is an urgent need to collect and compile all these data in a single software. In terms of climate projection, they are following the ENSEMBLE and CORDEX Programmes, but were not able yet to produce country-specific scenario. In terms of data collection, it seems that most of the “agro-meteorological” stations are out of duty and that only basic meteorological data are recorded with “synoptic” stations. The Directorate seems in poor condition (lack of logistical mean, local services inoperative, etc.), does not collaborate much with IRAG and CERESCOR, and does not share information adequately (e.g. recent PPP with Earth Network). This being said, having reliable and country-specific meteorological data series is necessary to calibrate country-specific climate projections: working with the National Directorate of Meteorology may be a challenge, but this Directorate has to be involved in the implementation of the AEMIP/GCC Integration Project.

IRAG headquarter

Person met: Dr. Famoï BEAVOGUI, General Director of IRAG

Structure

The Institute for Agricultural Research in Guinea (*Institut national de la recherche agronomique de Guinée – IRAG*)¹⁰¹ is a public scientific body with legal personality which reports to the Ministry of Agriculture and the Ministry of Livestock. Created in 1989 (to replace the former agriculture research system inherited from the French colonisation), it comprises six centres: Koba, Kilissi, Foulaya, Bareng, Sérédou, and Kankan.

Perceived impacts

To the best knowledge of the General Director, a vulnerability assessment of the Guinean agriculture to climate change has never been done [NB: He does not know about the UNDP Climate Change Country Profile for Guinea (Mc SWEENEY et al., 2012)]. However, he said there are some useful country-specific data to understand the major impacts of climate change in agriculture. For instance:

- In Haute-Guinée, the average annual rainfall from 1945 to 1970 was around 1,700 mm/yr. It decreased by 200 mm/yr from 1971 to 1985, and decreased again by 100 mm/yr from 1985 to 1996. Nearly the same trend (but different levels) can be observed in Basse-Guinée;
- In Haute-Guinée, the fonio has developed strongly in the last decades and now replace the rice in areas with degraded soils and erratic rainfalls;
- In Basse-Guinée, the mangrove rice fields are subject to various problems caused by climate change (rise of the sea level, seawater intrusion, iron toxicity, etc.).

However, according to the General Director, Guinea is in a better position than most Saharo-Sahelian countries.

Actions taken to address adaptation needs

According to the General Director, IRAG was dormant for the last decades. But, the Head of State recently decided to allocate a substantial part of the 2013 national budget to IRAG and to nominate a

⁹⁹ <http://earthnetworks.com/Products/EarlyWarningSystem/EarlyWarningSystemDemonstrationProject.aspx>

¹⁰⁰ www.gmclimat.com

¹⁰¹ <http://www.irag-guinee.org>

new General Director. With that, IRAG has revitalised and is preparing its 2015-2022 Strategic Plan. In this Plan, more than 15 Research Programmes are foreseen. Each has a national coverage, but is driven by one of the six research centres. Within the 15 Programmes, three may focus on NRM:

- Promotion of agroforestry and protection of forest biodiversity (driven by IRAG Sérédou),
- Identification of Guinean fauna and flora species and collection of samples (driven by IRAG Foulaya, with support from the National Museum of Life Science of Paris and the Queens Garden in London). The Programme already started and more than 10,000 samples are yet collected;
- Soil fertility management and cereal production (driven by IRAG Koba).

A specific Programme on adaptation of agriculture to climate change is under discussion, but no decision has been taken yet. For now, the most notable research activities in the field of climate change are (i) Various research programmes to shorten the rice cycle (some of them engaged for many years), (ii) Participation of two IRAG staff (Mr. Sékou BEAVOGUI - MSc in biostatistics, IRAG Conakry - and Mr. Mamady KOUROUMA - MSc in agronomy, IRAG Conakry in the IFPRI study on "Impacts of climate change on food security" led by El Hadj DIALLO from CERESCOR, (iii) Recent installation of an agro-meteorological station at IRAG Kankan.

It is worth noting that the research activities in the field of fisheries and livestock are reduced: occasional cooperation with the National Centre of Fishery Sciences of Boussoura (*Centre national des sciences halieutiques de Boussoura* – CNSHB) and six researchers specialised in animal health and zootechnics at IRAG Bareng. Research activities in terms of adaptation to fisheries and livestock to climate change are nil.

According to the General Director, among the nearly 150 researchers (out of 200 staff, researchers and support staff: GD = 40, Foulaya = 48, Sérédou = 31, Bordo = 29, Bareng = 20, Kilissi = 18, Koba = 10), eight researchers (i.e. 5%) are aware of climate change and have carried out research directly and indirectly related to this issue. In addition to the two engaged in the IFPRI study, these are:

- The General Director himself (Dr. in general agronomy), Dr. N'Famara CISSE (Dr. in plant protection, IRAG Bordo) and Dr. Makan Kourouma (Dr. in plant protection, IRAG Bordo) have carried out research on crop associations and sowing under plant cover in Haute-Guinée. The objectives were: (i) to mitigate climate change by enhancing soil fertility and providing alternative to slash-and-burn, (ii) to adapt to climate change by designing more resilient cropping systems;
- Mr. Moussa DIABATE (MSc Forestry, IRAG Sérédou) is the head of Programme on Agroforestry;
- Mr. Amadou DIALLO (MSc Agroforestry and GIS, IRAG Foulaya) is the head of Programme on Biodiversity;
- Mr. BEAVOGUI (post-doc) is based at Agrhymet Nyamey [no identification of his topic of research].

Level of collaboration with the AET, the CNOP-G and the ANPROCA

According to the General Director, CNOP-G and ANPROCA do not request the services of IRAG. As for the AET, he deplors the low academic and technical level of the graduated students, especially from the ENAE: "*They cannot be considered as farmers or farm technicians, since they miss of basic technical know-how: to do basic phenological observations, to drive a tractor, to repair a plough, etc.*"

IRAG does not employ them (17% of IRAG researchers are holding a PhD, the remaining part are engineers), is not part of the Boards of the ENAE, and does not generally intervene in the classroom and field courses. According to the General Director, the best these graduated students can do is to establish themselves as farmers. Large scale farmers will not engage them and they cannot create large farming enterprises by themselves.

Level of collaboration with national and international institutions involved in climate change issues

IRAG collaborates with many international research centres, without specific focus on climate change issues:

- WECARD (see **Part 2.2** supra): As member of the WECARD, IRAG shares information, but is not part of transnational research programme. NB: As noted earlier, the 2007-2016 Strategic Plan of WECARD does not identify climate change as a major threat for Sub-Saharan agriculture;
- CILSS (see **Part 2.2** supra): Guinea joined the CILSS recently and the collaboration between them is not yet organised. The contacts are filtered by Mr. Mamba KOUROUMA, the CILSS Focal Point

for Guinea, based at the Ministry of Agriculture. The only on-going collaboration is the placement of Mr. BEAVOGUI, IRAG researcher, as post-doc in Agrhyment Niamey;

- International Centre for Agricultural Research for Development (*Centre international de la recherche agronomique pour le développement* – CIRAD) and Research Institute for Development (*Institut de recherche pour le développement* – IRD), the two main French research centres active in tropical countries, are historical partners of IRAG. Both research centres have developed various research programmes on adaptation to climate change, but the cooperation between CIRAD/IRD and IRAG does not (yet) cover these programmes. It may change in the near future if IRAG decides to create a dedicated research programme on adaptation to climate change;

Finally, among the research centres, AfricaRice might be the only one with whom IRAG collaborates on adaptation to climate change. Indeed, since 2012, they carry out a joint research on the improvement of NERICA breed, taking into account crop yield, yield after shelling, organoleptic quality, duration of the cycle, plasticity (i.e. ability to be cropped in various conditions: lowland, irrigated plains, rainfed areas, etc.), resistance to iron toxicity or salinity, etc. Adaptation to climate change of rice seed is therefore explicitly addressed: shortening of the cycle, improving the plasticity and the resistance to pests/diseases which impacts are aggravated by climate change.

At national level, collaborations are limited, if not nil, with the Ministry of Environment. It is also limited with the National Directorate of Meteorology, which is a pity since IRAG really need regular and precise meteorological data. Confronted to the lack of dynamism of this Directorate, IRAG wants to rehabilitate its own agro-meteorological stations: the stations at IRAG Bareng and Sérédou are still there, but need to be revised; a new station was set up at IRAG Bordo recently; new stations have to be set up at IRAG Koba, Kilissi, and Foulaya.

Assessment: After decades of degradation, the IRAG was recently revamped, with a substantial budget allocation taken directly from the national budget, and the appointment of a young and dynamic General Director. The involvement of IRAG in climate change is limited: less than 5% of its 150 Researchers may be knowledgeable about climate change issues. The research carried out in that field are focused on the cropping system (e.g. designing new crop association/rotation farming system with sowing under crop cover, shortening of the rice breed cycle, identification of drought-resistant and/or salt-resistant rice breed, etc.). IRAG is poorly active in the livestock and fisheries sector in general, and is completely inactive in adaptation to climate change in these two sectors. IRAG is preparing its 2013-2017 Strategic Plan, where three Programmes (upon 15) may focus on NRM: agroforestry, fauna/flora biodiversity, soil fertility management. A specific Programme on adaptation of agriculture to climate change may be drawn, but it is not yet confirmed. IRAG does have very limited collaborations with national institutions (AET institutions, CNOP-G, ANPROCA, National Directorate of Meteorology, ministry of Environment). IRAG is collaborating with various sub-regional or international institutions (WECARD, CILSS, CIRAD, IRD, AfricaRice, etc.), but adaptation to climate change is not specifically dealt with in the frame of these collaborations. It would be of great interest for the AEMIP/GCC Integration Pilot to discuss with the IRAG, in particular to encourage them to insert a specific Programme on CSA in their new Strategic Plan and involve them in the development of CSA pilot activities, together with AET institutions and agriculture professionals.

AET Faculty

Here below are the analyses of 28 questionnaires administered as follows: 5 for ENAE Koba, 5 for ENAE Tolo, 3 for ENAE Macenta, 6 for ENAE Bordo, 5 for ENATEF, and 5 for ISVAF. Faculty are engaged in different areas: crop production, botany, vegetable production, soil science, forestry, zootechnics, rural infrastructure, management, etc. They are all males: the team did not reach to interview female faculty, although clear requests were made in that sense to all the AET institutions' Directors prior to the interviews.

12 Faculty declare their Students would work in the private sector (as farmer or employee in a farm), in the associative sector (farmers' organisation) or for the State. 11 declare they would work mainly in the private sector. 3 declare they would mainly work for NGOs. 2 declare they would mainly work for farmers' organisations.

NB: An interviewee can give several responses for one question: numbers below are not cumulative.

Basic knowledge (“revealing questions” not linked to Winrock sub-questions)

As explained in **Part 1.3** supra, 6 questions were asked at the beginning of the interview to assess the basic knowledge of the interviewees with regard to the topics of the questionnaire, in order to allow the interviewer to triangulate the answers to the following questions (i.e. to avoid taking answers as face value if they are apparently contradictory with the revealed level of knowledge of the interviewee):

- **Climate change:** 6 do not have explanation for the phenomena and 12 explain it by other factors than increasing GHG emissions (e.g. deforestation reduces the shade, increases the sunlight, and accelerates water evaporation...all factors that lead to increasing temperature; oxygen is reduced because of industrial pollution, reason why humans are suffocating and temperature is increasing; silting of rivers reduces water flow and makes the temperature to increase, etc.). Finally, only 1/3 (10 upon 28) explain it by the increasing GHG emissions.

However, it is important to note that the fact an interviewee mentions “increasing GHG emissions” does not mean he understands the phenomenon. Indeed, upon the 10 that mention it, 3 are unable to mention the 3 main GHG in the agriculture sector (CO₂, CH₄, and N₂O). Therefore, it can be derived that only 7 have a clear understanding of the phenomenon.

Furthermore, it is even possible that upon the 7 who mention increased GHG emissions and give the 3 main GHG in the agriculture sector, some do not understand the phenomenon. This is corroborated by the fact that upon the 12 who have their own explanations of the climate change phenomena, 5 are able to mention some GHG: 3 mention CO₂, CH₄ and N₂O, 1 mentions CO₂ and CH₄, and 1 mentions CO₂!

Only 3 know the +2°C target discussed since the Climate conference of Bali (2007). Upon the three who mention the +2°C, one does not explain the climate change phenomenon, nor mentions GHG.

- **Other natural resources:** 1 knows the Nagoya objective to increase the surface of Protected Area up to 17%. 4 know the 3 Rio Conventions (and 1 mentions at least the UNFCCC). 4 know about the Great Green Wall.

Assessment: 75% of AET Faculty interviewed have a low level of knowledge of the climate change phenomenon, linking it mainly to local deforestation and thus not having the idea it is irreversible in the short- to medium term and there is an imperious need to adapt to it. They also have a poor knowledge of the level of progress of international talks/actions on NRM (climate change, biodiversity, and desertification).

Information (questions 8 to 13, linked to to Winrock sub-questions 1.5 and 1.6)

- **Climate change:** 10 say they do not receive information, 10 say they receive it rarely (less than once a month), and 8 say they receive it frequently (more than once a month).
 - Upon the 10 that say they rarely receive information, 5 mention radio, 2 mention TV, 2 mention Internet. Only 2 upon the 5 receiving information from the radio can recall it (negative impact of deforestation on climate). All the others (receiving information from the radio, or the TV, or Internet) are unable to recall it (apart from one who says he saw a TV programme about the effect of climate change: boiling sea water killing fishes...?). 1 mentions a RAZC workshop (but also says it was more about budgeting than discussing technical topics), 1 mentions an AEMIP workshop (and recalls 2 things: better to mitigate than adapt, need to get shorter-cycle seed), 1 mentions a review called “CGER-SNRA” (and does not recall the key message about climate change. Indeed, this review is about fisheries and has little to do with climate change).
 - Upon the 8 that say they frequently receive information, 6 mention the radio (and most of them recall the main message: negative impact of deforestation on climate), 5 mention Internet (but are unable to recall the information), 3 mention reviews/newspaper (but are unable to recall their names or the key information gathered), 2 mentioned an AEMIP/Winrock workshop (but are unable to recall the information), and 1 mentions a RAZC workshop (idem).
- **Biodiversity:** 9 say they do not receive information, 13 say they receive it rarely (less than once a month), and 6 say they receive it frequently (more than once a month).
 - Upon the 13 that say they rarely receive information, 4 mention radio, 3 mention signs on the road (“protect the chimpanzee”), 3 mention TV, and 1 mentions Internet. None of them (apart from those mentioning the signs on the road) can recall the key messages. 1 mentions an IRAG workshop (in 2005! He cannot recall the topic, but believes it was on biodiversity), 1 mentions

an AGIR document (received in 2003/2004! About fauna inventory), 1 mentions a review called "CGER-SNRA" (and do not recall its content), 1 mentions a Winrock/Steward workshop (and do not recall the information).

- Upon the 6 that say they frequently receive information, 2 mention their MSc course, 2 mention the radio, 2 mention Internet, 2 mention TV, 1 mentions NGOs (without precision), 1 mentions the Forest services, 1 mentions the Jehovah's witness (sic), 1 mentions a Steward workshop (about carbon credit). Apart from this last, none was able to recall the key messages.
- **Soil management:** 7 say they do not receive information, 15 say they receive it rarely (less than once a month), and 6 say they receive it frequently (more than once a month).
 - Upon the 15 that say they rarely receive information, 7 mention reviews/newspaper (including: Grande forêt, Agrovision, CERG/SNRA, and Spore/ACP), 7 mention radio, 3 mention internet, and 1 mentions TV. In any case they are able to recall the key messages. Apart from that, 2 mention specific documents, old in both cases: Sasakawa 2000 document on soil protection with vetiver (received between 1996 and 2004), book on soil degradation (dated 1989). 2 others also mention workshops: ISAVF/Univ. of Kankan (he does not recall the date, nor the topic), Steward (about carbon credit, in 2013).
 - Upon the 6 that say they frequently receive information, 5 mention reviews/newspapers, 3 mention TV, 1 mentions internet, and 1 mention the Andolex project (?). Only 1 gives more details and mentions the weekly brief on environment broadcasted by TV5 Monde.

Assessment: Only 25% of the Faculty interviewed say they have a frequent access (more than once a month) to information on climate change, biodiversity, and soil management. They access it mostly through the radio or Internet. Few of them mention TV or workshops or NGOs/projects. Reviews/newspapers seem even more marginal. The information received appears of poor quality: most of time they are not able to recall the key messages. When they recall it, the key message is about the negative impact of deforestation on climate.

Training of Faculty (questions 14 to 22, linked to Winrock sub-questions 1.3 and 1.4)

- **Climate change:** 6 say they received training:
 - 5 short term training: 4 with Protection forest/Winrock in June 2012 about the fight against deforestation, 1 with ISAVF in February 2014 about forest fires;
 - 1 diploma: MSc ISAVF/Univ. of Ouagadougou about the basic concepts of climate change.
- **Biodiversity:** 4 say they received short-term training: (i) 8 days on fauna inventory in the Protected areas of Bobé, Tougué, and Koundara in 2004 or 2008, with support from the AGIR project, (ii) Regular exchanges among ENATEF faculty on protection of classified forests, between 2001 and 2004, (iii) Training with ISAVF in 2013 about forest protection (he does not recall the number of days), (iv) Internship in the USA (without mention of the topic and the date).
- **Soil management:** 4 say they received short-term training: (i) 2 days on agriculture soil management in 2001 with GTZ, (ii) soil management with IRAG (he does not recall the number of days and the date), (iii) 32 days on degraded soils and GIS in 2003 or 2004, with support from the AGIR project, (iv) Internship in the USA (without mention of the topic and the date).

Assessment: Very few Faculty interviewed have recently received training on climate change, biodiversity or soil management, most probably less than 10% if we consider the training received in the last 5 years. When it is the case, it is generally short-term training provided by projects or donors.

Courses to Students (questions 23 to 28, linked to Winrock sub-questions 1.1 and 1.2)

- **Climate change:** 15 say they never talk about this topic, 11 say they talk about it superficially, and 2 say they give thorough explanations:
 - Superficial explanations: 6 say they highlight the need to protect the environment during their courses, 3 say they focus on specific issues but have no course as such (mulching of vegetables, pest dissemination and climate change, impact of hedgerows on water harvesting), 3 say they have a specific course (fodder preparation = 1 hour during the year, basic concepts of climate change = 1h30 during the year, fight against deforestation = 20 min per session (sic));
 - Thorough explanations: one says he delivers 2 hours a week on the basic concepts about climate change, another says he delivers 4 hours a week on climate change (without precision).

After checking, it appears that the 2 persons do not understand the climate change phenomena (explanation: deforestation increases sunlight and decreases the rainfalls, reason why the temperature increases). It appears difficult to believe they could deliver climate change course.

- **Biodiversity:** 17 say they never talk about this topic, 8 say they talk about it superficially, and 3 say they give thorough explanations:
 - Superficial explanations: 4 say they highlight the need to protect the environment during their courses, 4 they have a specific course (i) most common pharmaceutical plants and most common wild animals = 4 hours during the year, (ii) most common precious tree species = 2h per week during 3 months of dendrometric course, (iii) importance of soil micro-organisms = 4 hours per week during 2 months of course on cash crops, (iv) most common fruit tree species = 4 hours per year of course on fruit tree cropping)
 - Thorough explanations: one says he delivers 2 hours a week during one month, 2 say they deliver 2 hours a week during the whole year. As none of them give details about the content of these course, cross-checking is difficult...However, if the courses were effectively delivered, one could expect the Faculty to give more details about the courses.
- **Soil management:** 16 say they never talk about this topic, 8 say they talk about it superficially, and 4 say they give thorough explanations:
 - Superficial explanations: 6 say they highlight the need to protect the soils during their courses, 1 says he focus on a specific issue (mulching) but have no course as such, 1 says he has a specific course: cover crop to avoid soil leaching in sloppy areas = 2 hours during the year
 - Thorough explanations: (i) 15 hours during the year on soil erosion, (ii) 36 hours a year during the course on fruit tree cropping, (iii) 2 hours per week during one month, (iv) 2 hours per week during 1 year. For the 2 last responses, there is no detail about the content of these course, cross-checking is difficult...However, if the courses were effectively delivered, one could expect the Faculty to give more details about the courses.

Assessment: Around 10% of the Faculty interviewed say they give thorough explanations to their Students about climate change, biodiversity, and soil management. Most of the Faculty are unable to present the content of these explanations, which lead to assume they are vague. 60% say they never talk about these environmental issues. The rest say they touch upon it occasionally, delivering general messages, i.e. environmental education rather than practical know-how the Students may use latter.

AET Students

Here below are the analyses of 59 questionnaires administered as follow: 8 for ENAE Koba, 10 for ENAE Tolo, 10 for ENAE Macenta, 10 for ENAE Bordo, 10 for ENATEF, and 11 for ISVAF. They are 15 female students (around ¼), which appears quite good if we assume the rates of females are the same between ENAE/ENATEF and ISVAF and if we consider they are only 15% at ISAVF (239 female students for 1,560 students in total, according to the ISVAF Institutional Assessment - AEMIP, 2013).

In terms of specialisation, here below is the breakdown, using the following acronyms: Y = year at school, AT = Technical Assistant (*Assistant technique* – no Bachelor Degree needed to enter; graduated after 2 years), CT = Technical Controller (*Contrôleur technique* - Bachelor Degree needed to enter; graduated after 3 years)

	Total	Y1	Y2	Y3	Graduated
ENAE - no yet specialised	6	6			
ENAE AT - Agriculture	15		2	7	6
ENAE AT - Livestock	8		2	5	1
ENAE AT - Water and Forestry	10		4	6	
ENAE CT - Agriculture	3		1		2
ENAE CT - Livestock	6		2		4
ENAE CT - Water and Forestry	0				
ISAVF*	11		2	9	
Total	59	6	13	27	13

Table 4 - Breakdown of students intervieweed by specialisation and shool (GCCC baseline study, 2014)

* 4 in rural economics, 3 in animal production, 2 in soil science, 1 in extension & 1 in rural engineering

It is difficult to assess the representativeness of this sampling, in the absence of consolidated data at national level with regard to the number of students in the AET institutions, disaggregated by specialisation and school. However, having this national data would have been of little use, since we could not select our sampling in each AET institution: indeed, students were on vacation and it proved difficult to gather them for the interviews. At least, it can be observed that almost all the schools and specialisations are represented (apart from ENAE CT – Water and Forestry).

Most than ½ of the students (33) declare they would like to work for the private sector: 16 as independent farmer, 11 as farm employee, and 6 in farmers' organisations. A bit more than 1/3 (22) declare they would like to work: for 8 of them in a public service, for 7 of them either in a public service or the private sector, and for 7 of them in an NGO/project. 4 of them do not have a precise idea.

NB: An interviewee can give several responses for one question: numbers below are not cumulative.

Basic knowledge (“revealing questions” not linked to Winrock sub-questions)

- Climate change: ½ (29) do not have explanation for the phenomena, 16 explain it by other factors than increasing GHG emissions (in most cases: deforestation reduces the shade, increases the sunlight, accelerates water evaporation, and leads the rainfalls to decrease ...all factors that lead to increasing temperature), less than ¼ (12) explain it by the increasing GHG emissions. 1 did not understand the question (although the Director himself came to give a hand during the interview) and 1 said there was no change and the period of the rainy season was increasing.

As for the Faculty questionnaires, it is important to note that an interviewee mentioning “increasing GHG emissions” may not necessarily understand the phenomenon. Indeed, upon the 12 that mention it, 3 are unable to mention the 3 main GHG in the agriculture sector (CO₂, CH₄, and N₂O), 2 mention only CH₄ and CO₂, and 2 mention only CO₂. Therefore, it seems that only 9 have a clear understanding of the phenomenon.

Furthermore, it is possible that upon these 9, some do not have a clear idea of the phenomenon. This is corroborated by the fact that upon the 16 who have their own explanations of the climate change phenomena, 3 are able to mention CO₂!

Only 3 know the +2°C target discussed since the Climate conference of Bali (2007). Upon the 3 who mention the +2°C, 1 does not explain the climate change phenomenon, nor mentions GHG.

- Other natural resources: 1 knows the Nagoya objective to increase the surface of Protected Area up to 17%. 1 knows the 3 Rio Conventions. 1 knows about the Great Green Wall. At the ENAE of Koba, after observing lack of clarities in the answers, the question about biodiversity was further investigated and led to realise that none of the 8 students could define the term of “biodiversity” and that upon the 8, after giving explanations, 3 declared the local biodiversity is increasing.

Assessment: 85% of the AET Students interviewed have a low level of knowledge of the climate change phenomenon, linking it mainly to local deforestation and thus not having the idea it is irreversible in the short- to medium term and there is an imperious need to adapt to it. They also have a poor knowledge of the level of progress of international talks/actions on NRM (climate change, biodiversity, and desertification).

Information (questions 8 to 13, linked to to Winrock sub-questions 1.5 and 1.6)

- Climate change: More than ½ (32) say they do not receive information, 1/3 (19) say they receive it rarely (less than once a month), and 8 say they receive it frequently (more than once a month).
 - Upon the 19 that say they rarely receive information, the vast majority (14) mention the training course (without recalling clearly the key messages, apart for 2 who recall the link between climate change and adaptation of tree species), 4 mention the radio (recalling in one case the link between forest fire and climate. Another recalls the Fukushima disaster and links it with climate change!), and 1 mentions an internship done at the Prefectural Direction of Agriculture (not recalling specific messages).
 - Upon the 8 that say they frequently receive information, 4 mention the training course (2 do not even recall the topic of the training course. None recalls the main messages), 3 mention the radio (without recalling the main messages), 3 mention reviews/newspaper (idem), and 1 mentions the Internet (idem), 1 mentions ANPROCA (idem), and 1 the Forest services (idem).
- Biodiversity: More than ½ (33) say they do not receive information, 19 say they receive it rarely (less than once a month), and 7 say they receive it frequently (more than once a month).

- Upon the 19 that say they rarely receive information, the vast majority (16) mention the training course (4 do not even recall the topic of the training course), 3 mention radio, 1 mentions reviews/newspaper, 1 mentions the forest services. None of them recall the main messages, apart from one recalling a radio programme about the decrease of monkeys and antelopes.
- Upon the 7 that say they frequently receive information, 4 mention the training course (3 do not even recall the topic of the training course. None recalls the main messages), 1 mentions the radio (without recalling the main messages), 1 mentions reviews/newspaper (idem), 1 mentions Rio Tinto (idem), 1 mentions an NGO called CODEL SUS (and recall an excursion in the Mont Nimba and explanations about endangered species), 1 mentions an internship at IRAG (without recalling the main messages), and 1 mentions the Forest services (idem).
- Soil management: around ½ (27) say they do not receive information, 19 say they receive it rarely (less than once a month), and 13 say they receive it frequently (more than once a month).
 - Upon the 19 that say they rarely receive information, the vast majority (18) mention the training course (5 do not even recall the topic of the training course), 3 mention radio, 2 mention reviews/newspaper, 1 mentions NGO (without specifying which one). None of them recall the main messages, apart from one recalling a training course on soil defence and restoration.
 - Upon the 13 that say they frequently receive information, 8 mention the training course (5 do not even recall the topic of the training course. None recalls the main messages), 2 mentions the Forest services (without recalling the main messages), 2 mention reviews/newspaper (idem), 1 mention an NGO called AJSH (idem), 1 mentions an internship at the Rice Federation (FuProRIZ - without recalling the main messages), 1 mentions the internet (idem), and 1 mentions the TV (idem).

Assessment: Only 15% of the Students interviewed say they have a frequent access (more than once a month) to information on climate change, biodiversity, and soil management, and a bit more than 30% say they rarely receive information (less than once a month). 75% of the Students receiving information, frequently or rarely, mention training course as the source of information. Other sources of information are marginal, apart from the radio (mentioned by 10% of the Students receiving information). Internet, reviews/newspapers, TV, workshops, NGOS/projects are nearly never mentioned. The information received appears of poor quality: most of time they are not able to recall the key messages.

Training of students (questions 14 to 22, linked to Winrock sub-questions 1.3 and 1.4)

- Climate change: A vast majority (48 or 4/5) say they did not receive training and 11 say they addressed climate change during at least 1 training course: 4 during ecology course, 4 during general agronomy course, 2 during forestry course, 1 during soil science course, and 1 during botany course. Only 3 of them are able to recall key messages: 2 mention the impact of deforestation on climate change, and 1 mentions the need to adapt tree species to climate change.
- Biodiversity: A vast majority (46 or ¾) say they did not receive training and 13 say they addressed biodiversity during at least 1 training course: 5 during ecology course, 3 during animal science course, 2 during agronomy course, 2 during forestry course, 1 during game (*cynégétique*) course, and 1 during soil science course. Only 2 of them are able to recall key messages (in animal science course): importance of biodiversity and cross-breeding in animal selection.
- Soil management: A vast majority (44 or ¾) say they did not receive training and 15 say they addressed soil management during at least 1 training course: 5 during soil science course, 3 during forestry course, 3 during agronomy course, 1 during micro-biology course, 1 during ecology course, and 1 during botany course. 11 of them are able to recall key messages: importance of defence and restoration of soils to avoid erosion and loss of fertility, need to avoid forest fires, use of legumes to enrich the soil.

Assessment: Only 20% of the AET Students interviewed say they receive training about climate change, biodiversity or soil management during training. When it is the case, it is always done at school, and generally included into broader training course (agronomy, animal science, forestry, etc.) as there is no specific training course on NRM. Most of the students having addressed climate and biodiversity do not recall the main messages. The situation is different for soil management: 11 upon 15 of those having addressed soil management during training course can recall key messages.

IRAG Researchers

Here below are the analyses of 16 questionnaires administered as follow: 5 for IRAG Koba, 5 for IRAG Kilissi, 1 for IRAG Bareng, 2 for IRAG Sérédou, and 3 for IRAG Bordo. Some researchers are engaged in specific Programmes: maize (2), rice (2), grain legumes (2), and root and tuber (1). The others have transversal responsibilities: scientific coordinator, responsible for research infrastructures, supervision, etc. 3 of the interviewees are Directors (IRAG Centres of Koba, Kilissi, and Sérédou).

All of them are males: there is almost no female researcher within IRAG. The sample size is smaller than expected (16 interviews done vs 25 planned), but still significant, as it represent around 10% of the total number of researchers at IRAG (see earlier in this [Part 3.2](#) supra).

NB: An interviewee can give several responses for one question: numbers below are not cumulative.

Basic knowledge (“revealing questions” not linked to Winrock sub-questions)

- Climate change: 4 explain it by the increasing GHG emissions, 8 explain it by other factors than increasing GHG emissions (most of time: deforestation reduces the shade, increases the sunlight, and accelerates water evaporation...all factors that lead to increasing temperature), 2 explain it by the destruction of the ozone layer by GHG, 3 have exotic explanations: the increase of CO₂ leads the O₂ to decrease, reason why we are suffocating ; the GHG stop the air exchanges, leading to an increase of temperature; the lack of infrastructure to protect the coastline explains the sea level rise...1 mentions the CO₂, but is unable to explain its link with climate change.

However, it is important to note mentioning “increasing GHG emissions” does not mean he interviewee understands the phenomenon. Indeed, upon the 4 that mention it, 1 is unable to mention the 3 main GHG in the agriculture sector (CO₂, CH₄, and N₂O). Therefore, it seems that only 3 have a clear understanding of the phenomenon.

And the opposite is also true: upon the 12 that did not explain climate change by the increasing GHG emissions, 3 are able to mention the 3 main GHG, 2 are able to mention CO₂ and CH₄, and 3 are able to mention CO₂.

Only 1 knows the +2°C target discussed since the Climate conference of Bali (2007).

- Other natural resources: 1 knows the Nagoya objective to increase the surface of Protected Area up to 17%. 1 knows the 3 Rio Conventions. 6 know about the Great Green Wall.

Assessment: More than 80% of the IRAG Researchers interviewed have a low level of knowledge of the climate change phenomenon, linking it mainly to local deforestation and thus not having the idea it is irreversible in the short- to medium term and there is an imperious need to adapt to it. They also have a poor knowledge of the level of progress of international talks/actions on NRM (climate change, biodiversity, and desertification). This is all the more striking that their research programmes are highly dependent on these global changes and they should be the best informed about it in Guinea.

Information (questions 8 to 13, linked to to Winrock sub-questions 1.5 and 1.6)

- Climate change: 3 say they do not receive information, 10 say they receive it rarely (less than once a month), and 2 say they receive it frequently (more than once a month).
 - Upon the 10 that say they rarely receive information, 5 mention the CTA/Spore newspaper (see [Part 2.2](#) supra), 5 mention the radio (local or RFI, recalling vague messages, such as the link between deforestation and climate change), 6 mention Internet (only 2 recalling looking for precise information on the WECARD, CILSS and AfricaRice website. See [Part 2.2](#) supra), 2 mention the TV (local or TV5 Monde, recalling vague messages, such as the link between deforestation and climate change).
 - Upon the 2 that say they frequently receive information, the 2 mention Internet (but are unable to recall the information) and reviews/newspaper (1 recall CTA/spore, the other is unable to recall the names of the reviews/newspaper and the key information gathered).
- Biodiversity: 4 say they do not receive information, 9 say they receive it rarely (less than once a month), and 3 say they receive it frequently (more than once a month).
 - Upon the 9 that say they rarely receive information, 6 mention reviews/newspapers (5 mention CTA/Spore and 1 mention Tropicultura and the Cameroon’s University Press), 4 mention Internet (with only one specifying the websites: WECARD and AfricaRice and the purpose of visiting them: gathering information on rice biodiversity), 1 mentions the radio.

- Upon the 3 that say they frequently receive information, 2 mention reviews/newspapers (1 mentions CTA/Spore), 1 mention the internet, and 1 mention the Forest centre (no more in operation for years...)
- Soil management: 2 say they do not receive information, 10 say they receive it rarely (less than once a month), and 4 say they receive it frequently (more than once a month).
 - Upon the 10 that say they rarely receive information, 4 mention Spore/ACP, 4 mention internet, 2 mention books (1 on soil degradation published in 1985 and one on soil acidification of more than 20 years), 2 mention projects (Riz-BG and FeProRiz), 1 mentions international conference (organised annually since 2008 on bean cropping and soil fertility).
 - Upon the 4 that say they frequently receive information, all mention reviews/newspapers (1 CTA/Spore, 1 a FAO newspaper (?), the 2 others without precision), 2 mention internet, and 1 mentions the Forest centre (no more in operation for years...)

Assessment: Only 20% of the Researchers interviewed say they have a frequent access (more than once a month) to information on climate change, biodiversity, and soil management, and a bit more than 60% say they rarely receive information (less than once a month). 30% of the Researchers receiving information, frequently or rarely, mention Internet and the CTA/Spore bimonthly review. Other sources of information are marginal, apart from the radio (mentioned by 10% of the researchers receiving information). Books, reviews/newspapers (apart from the CTA/Spore), TV, conferences/workshops, NGOS/projects are nearly never mentioned.

Training of Researchers (questions 14 to 22, linked to Winrock sub-questions 1.3 and 1.4)

- Climate change: 7 say they received training:
 - 4 short term training: 2 with CERESCOR/RAZC (see **Part 2.4** supra) in 2013 (2 to 4 days) about adaptation to climate change (overview), 2 with CERAAS Senegal (See **Part 2.2** supra) respectively in 1990 and 2001 (some months) about adaptation of crops to drought;
 - 3 diploma: 2 MSc in Tropical Agronomy (1999-2002) with the National Centre for Research and Studies in Hot Regions (*Centre national d'étude et de recherche agronomique pour les régions chaudes* – CNEARC) in Montpellier – France, with financial support from the CIRAD; 1 MSc in Biotechnology and Animal Science (2012-2013) with support from the Agriculture fund of the African and Malagasy Council for Higher Studies (*Conseil africain et malgache pour l'enseignement supérieur* – CAMES) and the WECARD. Within these 3 MSc, basic concepts of climate change were addressed.
- Biodiversity: 5 say they received training:
 - 3 short-term training: (i) 2 days on rice seed classification with AfricaRice in 2011, (ii) 3 days on seed biodiversity and photoperiodism with IRAG HQ in 2013, (iii) Some weeks at the National Agriculture Research Centre of Senegal (Bambey) in 1989 and 1995 + some weeks at the International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT – India) in 1992. All these short-term training addressed biodiversity of grain legumes);
 - 2 diploma: the same MSc in Tropical Agronomy already described. Basic concepts of biodiversity were addressed.
- Soil management: 5 say they received training:
 - 3 short-term training: (i) 2 days on cover crops and watershed protection with ICRAF in 1991, (ii) few days on compost with the West African Productivity Project (WAAP) in 2012 + few days on conservation agriculture (association of soya, cowpea, and mucuna) with the Guinean NGO OGDC in 2011-2013, (iii) Some weeks at the CIRAD of Montpellier - France in the early 2000s on zero tillage, use of grain legumes for soil enrichment, and use of the agro-climatic risk modelling software SARA;
 - 2 diploma: the same MSc in Tropical Agronomy already described. Basic concepts of soil management were addressed.

Assessment: Very few Researchers interviewed have recently received training on climate change, biodiversity or soil management, most probably less than 10% if we consider the training received in the last 5 years. When it is the case, it is generally short-term training provided by projects or donors.

Research (questions 23 to 28, linked to Winrock sub-questions 1.1 and 1.2)

- **Climate change:** 7 say they never address this topic in their research, 5 say they address it superficially, and 4 say they address it thoroughly:
 - Superficial research: (i) Impact of seeds photoperiodism on resilience to erratic rainfall, (ii) Creation of extra-short cycle rice seed, (iii) Assessment of water stress resistance of different crops, (iv) Selection of short-cycle bean seeds, more adapted to drought, (v) Trials-of short-cycle seeds more adapted to drought or flooding.
 - Thorough research: (i) Adaptation of yam breed to new soil/climate conditions, (ii) Comparative trials in mangrove areas of 6 rice breed (5 improved seeds and 1 local seed) with broadcast sowing vs drilling to shorten the cycle and avoid saline water increase, (iii) Resilience to climate change (without precision), (iv) Trials of short-cycle seeds more adapted to drought or flooding.
- **Biodiversity:** 10 say they never address this topic in their research and 6 say they address it thoroughly: (i) 2013-2015 work programme on classification of 80 rice seeds in Guinée forestière and Basse-Guinée for AfricaRica, (ii) Identification and conservation of 108 mangrove rice seeds, (iii) Creation of a seed bank (397 maize seeds in Guinea) and transfer to the Svalbard island in Norway for conservation in the global seed bank, (iv) Analysis from 2013 to 2015 of the genetic erosion of rice, maize, and groundnut, (v) Integrated management of oil palm plantations, native forests and water, (vi) Identification of conservation of yam breeds.
- **Soil management:** 10 say they never address this topic in their research, 1 says he addresses it superficially, and 5 say they address it thoroughly:
 - Superficial research: rational application of chemical fertilisers
 - Thorough research: (i) Trial (2005) of diverse crop cover (Mucuna, Elusine, Crotalaria retusa, Bracharia cochinchina, Calapogonyum, Stylosantes, etc.), (ii) Application of organic manure on yam plantations (early 2000), (iii) Development between 1998 and 2003 of rice seeds resistant to iron toxicity (leading to the development of the famous CK73, the best of his type worldwide), (iv) Trials since 2012 (with support from the WAPP and the International Fertilizer Development Centre – IFDC) of different associations of chemical and organic fertilisers, (v) Rational application of chemical and organic fertilizers to the bean.

Assessment: Around 60% of the Researchers interviewed say they do not address climate change, biodiversity, or soil management in their research. The others mention the following topics of research: (i) in relation to climate change and biodiversity: mostly about seed selection (photoperiodism, length of the cycle, drought-resistance, salt-resistance, etc.) and seed classification, (ii) in relation to soil management: trials of different fertilisers (organic: manure or crop cover, chemical, mix of the 2), iron-toxicity resistance of seed (therefore indirectly related to soil management). In short, most of the research programmes related to NRM are focused on genetic selection/improvement of food crops.

AET institutions/IRAG and CSA activities (qu. 29 to 33, linked to Winrock sub-qu. 2.1 and 2.2)

Here below are the trials (on farm or in a research station) or the transfer (no trial, but implementation of specific practices yet tested elsewhere) on adaptation of agriculture to climate change on which the interviewees say they participated:

→ AET faculty:

Description of the trial	Type of trial	Dissemination	Visitors
Production of 20,000 seedlings of Gmelina et Acacia to restaure degraded soils	Farmer trial	No	10 nursery gardeners
Trial of more drought-resistant seed	Farmer trial	ANPROCA	>1000
Biological and physical protection against soil erosion	Farmer trial	CNOP-G + Federation	<100
Anti-erosion practices (no detail given)	Farmer trial	CNOP-G + Federation	<100
Use of termite mounds to enrich the soils	Farmer trial	ANPROCA	<100
Use of sweet potato as cover crop to avoid soil leaching	Testing station	No	Few Students
Shortening of period in rice nursery (18-21 days vs of 30) and fast planting (May-June vs July)	Testing station	No	Few Students
Enrichment of grazing land with selected fodder species	Testing station	Rural radio	1000>x>100
Mulching of vegetable gardens and improved crop rotation	Testing station	Federation	<100
Trial of maize/bean association, together with compost	Testing station	SNPRV (ANPROCA now)	>1000
Identification of more resistant seed to climate change (no detail given)	Testing station	ANPROCA	>1000
Zero tillage and use of organic manure	Testing station	ANPROCA	>1000
Reforestation of degraded soils	Testing station	ANPROCA + Federation	<100
Comparative trial of aboveground conservation (silo) of fonio straw vs groundnut hay	Transfer	No	25 Students
Preparation of 2 buried maize silos (2 m x 1 m) to increase grain conservation	Transfer	No	38 Students
Reforestation of catchment areas	Transfer	No	<100

Figure 28 - Trials/transfer on adaptation of agriculture to CC carried out by AET Faculty (Baseline study, 2014)

**Agriculture Education and market Improvement Programme (AEMIP)
Baseline study for the AEMIP Global Climate Change Integration Pilot**

→ AET students:

Description of the trial	Type of trial	Dissemination	Visitors
Trial of different maize seeds	Testing station	No	Do not know
Trial of different crop associations	Testing station	No	Do not know
Integration rice cropping and fish farming	Testing station	CNOP-G +Federation)	Do not know
Improved fallow	Testing station	No	Do not know
Trial of different itineraries for rubber and palm oil plantations	Testing station	IRAG Sérédou	Do not know
Conservation (silo) of groundnut hay	Transfer	No	25 students
Conservation (silo) of rice straw	Transfer	No	20 students
Conservation (silo) of rice straw	Transfer	No	18 students
conservation (silo) of gramineous hay	Transfer	No	18 students
Use of organic manure on coffee plantation	Transfer	No	<100
Reforestation with Gmelina	Transfer	No	Few students
Early planting of rice taken from the nursery	Transfer	Rice farmers'group	<100
Use of compost on vegetable gardens	Transfer	No	1000>x>100

Figure 29 - Trials/transfer on adaptation of agriculture to CC carried out by AET Students (Baseline study, 2014)

→ IRAG Researchers:

Description of the trial	Type of trial	Dissemination	Visitors
Association of cowpea and rice in sloppy areas (to reduce erosion and increase N-fixation)	Farmer trial	ANPROCA	>1000
Identification of breeds of yam and cassava less demanding in term of soil fertility	Farmer trial	ANPROCA + Federation	1000>x>100
Multi-sites participatory trials to identify rice seeds (mangrove, irrigated, and lowland areas)	Farmer trial	ANPROCA	60
Trials of different association of chemical and organic fertilisers to maintain soil fertility	Farmer trial	ANPROCA	Bit more than 100
Participative selection of rice seeds, with resistance to drought, salinity, flooding (high stem)	Farmer trial	ANPROCA	Around 270
Comparative trial of 2 high protein maize grains	Farmer trial	ANPROCA	15-20
Comparative trials of 6 rice breed: broadcast sowing vs drilling (to shorten the production cycle)	Farmer trial	ANPROCA	Around 400
Shortening of bean production cycle (to avoid heavy rains in October and fungal diseases)	Testing station	"open house"	100 to 200
Improvement of a local maize seed to reduce its stem (to reduce lodging) and increase it yield	Testing station	No	No
Comparative trials of different chemical fertilisers inputs (urea and NPK)	Testing station	"open house"	Around 50

Figure 30 - Trials/transfer on adaptation of agriculture to CC carried out by IRAG Researchers (Baseline study, 2014)

The analysis of these 39 trials or transfers identified is as follows:

- **Topic:** They can be classified into 6 main topics (in case of overlap, the major one was retained):
 - 9 are about seed: resistance to drought (for rice and bean), to salinity (for mangrove rice), plasticity to adapt to poor fertile soils (for yam and cassava), adaptation to flooding (for rice: selection of high stem rice), adaptation to storms/lodging (for maize: selection of short stem maize), shortening of the cycle (for rice and bean), protein rich maize;
 - 8 are about soil fertility: use of compost, or manure, or mulching, or termite mounds, or mix of chemical and organic fertiliser;
 - 6 are about fodder: mostly about fodder/groundnut hay/rice straw conservation (5), but also enrichment of natural grazing land (1);
 - 6 are about soil erosion: use of cover crop, like cowpea/rice association in sloppy area or sweet potato in vegetable gardens, zero tillage, physical barriers to soil erosion;
 - 6 are about cropping system: shortening of the rice nursery period and early planting (to shorten the cycle and avoid water stress), broadcast sowing instead of dibbling (idem), rice cropping and fish farming association (diversification of revenue), maize and bean association (to increase N-fixation), improved rubber and palm oil farming system (agroforestry);
 - 4 are about reforestation: on degraded soils or catchment area, using fast growing species (esp. Gmelina)
- **Type of trial:** The objective was to identify 3 types of technology development/transfer, the basic one being "transfer" (to implement a technology already successfully implemented elsewhere), a bit more elaborated one being the trial in station (to design a technology in a controlled environment, without involving farmers), the most elaborated one (and the most complex, but also most interesting in terms of local ownership) being the farmer trial (to design a technology in a partially controlled environment, the farmers managing the plot trials). It seems the differences between these 3 types were not understood by AET Faculty and Students, leading to poorly significant responses. In total, 11 transfer, 16 trials in station and 12 farmer trial were mentioned, but most of the trial in station seem to be simple transfer, and most of farmer trial seem to be trials in station.
- **Dissemination and visitors:** 40% of the transfer or trials are not subject to dissemination. When dissemination is carried out, it is most of time with the support of ANPROCA (mentioned 13 times

upon 22), more rarely through the farmers' organisations (CNOP-G or Federation: 9 upon 22), or through the IRAG ("open house": 3 upon 22), or very rarely through the radio (1 upon 22). The answers given to the question about the number of visitors does not appear significant, most of the interviewee finding it difficult to answer such question.

3.3. Civil Society: Farmers' Organisations, Agribusiness Firms, Local Radio

CNOP-G

Persons met: Mr. Ibrahima BAH, National Coordinator of the CNOP-G + Mr. Kourayohe DIALLO, Advisor to the President of the CNOP-G + Mr. Abdulla 2 BAH, Training Officer at the CNOP-G

Structure

The National Confederation of Farmers' Organisations of Guinea (*Confédération nationale des organisations professionnelles de Guinée* – CNOP-G) gathers nine Federations, 46 Unions, 18,000 Farmers' Groups (approximately 480,000 members) spread over the entire territory of Guinea. It was created in 2004 by the four main regional Federations of farmers at that time, acting in the following sectors: cotton in Haute-Guinée, coffee in Guinée forestière, rice and salt in Basse-Guinée, and potato and onion in Moyenne-Guinée. From all the Federations included in the CNOP-G, the most developed and organised is – by far – the Federation of Fouta Djallon Farmers (*Fédération des paysans du Fouta Djallon* – FPFJ). This explains why most of the discussion was focused on the activities of the FPFJ.

Perceived impacts

According to the Advisor, the key impact is the lack of water: "*Guinea has always been referred to as the "water tower" of West Africa...But the water tower is drilled!*" The Guinean agriculture, mostly rainfed, already suffers from water shortage and will suffer more and more. Knowing that 14 rivers (Niger, Senegal, Mano, etc.) start in the Fouta Djallon, if water gets scarce in Guinea, the situation might be even worse for neighbouring countries.

For instance, at the FPFJ, farmers are encouraged for the last three years to crop potato in the lowland, because water is too scarce in the highland of Fouta Djallon. Another example of the impact of water scarcity: the Koundara Union of FPFJ lost 9,000 ha of rice this year (upon 12,000 ha in total) due to the early end of the rains late 2013. At the FPFJ, the impacts of climate change are clearly felt, because water availability is a key factor of success for capital intensive cropping systems (e.g. production costs = 30 MFG/ha/yr – 4,000 US\$/ha/yr – for potato).

After the lack of water, other impacts are the disruption of water, temperature, and phenological cycles. For instance, one does not know what type of seed to be used: short-cycle, medium cycle, long-cycle, the fruiting period changes which sometimes leads to poor level of production (e.g. fluctuant mango production for the last years), etc. The IRAG and the National Directorate of Meteorology do not have the capacities and the equipment needed to put in place and run an early weather warning system.

Impacts of climate change and the related adaptations measures will be treated in the next strategic plan of the FPFJ. Before that, we were focused on improving input supply, cropping practices, mechanisation, marketing, etc. The new challenge in front of us is the adaptation to climate change.

Actions taken to address adaptation needs

At the FPFJ level, three adaptation measures have been promoted: (i) Build hill dams in the central plateau of the Fouta Djallon (e.g. 12 of them already build in the Sub-Prefecture of Mali. In total, between 10 to 20 km³ of water storage capacity), (ii) Promote the use of compost: 3,000 are put in place every year and each farmer is expected to have at least 40 kg of compost for each kg of potato seed (if not, the FPFJ does not supply the seed), (iii) Diversify the activities, in addition to the vegetable gardening: fish farming, small ruminants rearing, etc. In addition to that, collaboration is discussed with the CIRAD in order to do the water balance (availability/need/gap, month by month) of the Sub-Prefectures where the FPFJ operates.

At the CNOP-G level, there is not much done in the field of adaptation to climate change. The most notable efforts are made by the FPFJ (as presented earlier) and the FOP-BG, which aims at expanding hydro-agriculture facilities, in order to better manage the fresh water and control the soil salinity.

Level of collaboration with the AET and the IRAG

According to the National Coordinator, the collaborations with the AET and the IRAG are very limited. When they occur, it is at local level and limited in time. The only encouraging sign is the recent invitation sent by ISAVF to the CNOP-G to join the Board of the ISAVF (nine members, from which five are from the agriculture private sector).

The AET's students are often hired as trainee and the AET's graduate students are sometimes hired as field agents by the farmers' organisations. In general, they lack of practical know-how and they sometimes even fear going to the field with the farmers. Their entrepreneurship courses are theoretical and not adapted to the reality of familial farming in Guinea. For the National Coordinator, the students are not the ones to be blamed, rather the faculty that do not go out of the schools and lack of consideration for the farmers.

The most urgent needs for the CNOP-G in terms of adaptation to climate change are: (i) to put in place an early weather warning system at national scale, (ii) to launch local studies on water balance, to assess the availability/need/gap, month by month during the year.

Level of collaboration with national and international institutions involved in climate change issues

The level of collaboration is low with the Ministries, and the Government as a whole. For instance, the CNOP-G members classified their needs during the last General Assembly: 1/ Fences and delineation of grazing corridors, 2/ Equipment (tiller, plow, harrow, daba, etc.), 3/ Irrigation facilities and equipment (wells, dams, motor pump, etc.), 4/ Chemical fertilisers, 5/ Pesticides and weedicides.

The Government recently released its draft budget bill for 2014: 600 GFG – 80 MUS\$ - are planned for agriculture, but mostly allocated to input supply (chemical fertilisers, pesticides, weedicides, etc.) which were not ranked as first priorities by the CNOP-G. In addition, all the resources are targeted to the Ministry of Agriculture and its agencies (IRAG, ANPROCA) and nothing for the CNOP-G.

The CNOP-G was not involved in the preparation of the PANA and does not know this document.

At international level, the main source of information of the CNOP-G is the Network of Peasant and Producers' Organisations in West Africa (*Réseau des organisations paysannes et de producteurs de l'Afrique de l'Ouest* – ROPPA), but the ROPPA does not deal with climate change issues, rather with agriculture policies, international trade, etc.

Assessment: CNOP-G gathers nine Federations, 46 Unions, and 18,000 Farmers' Groups (approximately 480,000 members) spread over the entire territory of Guinea. They feel climate change impacts, especially the lack of water ("*the water tower is drilled!*"), but the CNOP-G and most of its member Federations do not address this issue in their Strategic Plans. However, the strongest Guinean Federation, FPF, is active in that field and has started implementing adaptation measures, such as (i) building hill dams in the central plateau of the Fouta Djallon, (ii) promoting the use of compost, (iii) diversifying activities (fish farming, small ruminants holding, etc.). FPF also intends to carry out a water balance of its Sub-Prefectures (with support from CIRAD) and to include climate change into its next strategic plan. CNOP-G does not expect support from IRAG, the National Directorate of Meteorology, or the AET institutions to design adaptation measures, as they estimate they do not have the needed capacities. The CNOP-G does not feel heard by the Government and estimates that the massive distribution of improved seeds and chemical fertilisers does not respond to farmers' needs. In terms of adaptation, their two main priorities are (i) to put in place an early weather warning system at national scale, (ii) to launch local studies on water balance, to assess the water availability/need/gap, month by month.

→ CONEG

Person met: El Hadj Bachir DIALLO, President of the National Association of Poultry Farmers of Guinea (*Association nationale des aviculteurs de Guinée* - ANAVIG) and board member of the National Confederation of Animal Farmers of Guinea (*Confédération nationale des éleveurs de Guinée* – CONEG), in charge of poultry farming.

Structure

The CONEG officially gathers animal farmers from the following sectors: cattle breeding, small ruminants rearing, poultry farming, pig farming, dairy farming, and bee-keeping. It was created in 1998, at the Conference of Labé, and immediately supported by an EU-funded programme called Programme of Support to Animal Farming (*Programme d'appui à l'élevage* – PAE, 1998-2003).

Soon after its creation, CONEG encountered many problems: interference of the public service in its management (2000), then obligation to create Unions in all Prefectures, like a ministerial structure (2001), and finally explosion due to misappropriation of the resources by some leaders (2005).

In 2006, elections were organised, the former board of CONEG was replaced, and the Programme of Support to the Livestock Sector (*Programme d'appui au secteur de l'élevage* – PASEL, 2006-2009) was launched. CONEG was revitalised and a new EU-funded programme, called Programme of Capacity-Building of the CONEG (*Programme de renforcement des capacités de la CONEG* – 2009-2011) was launched after the PASEL. But once again, misappropriation of resources and conflicts between members, led the CONEG to dormancy.

Nowadays, the CONEG is still dormant, and it is likely to stay dormant in the near future: (i) Its President, Mme SULTAN, has been recently appointed as Minister of Agriculture, (ii) The board members do not meet anymore since the end of the last EU-funded programme. In that context, it was considered useful to meet the President of one of the few Federations active in the livestock sector. Indeed, the ANAVIG was created in 1996 by 12 poultry farmers' groups and now gathers more than 200 groups. Consequently, the interview is focused on poultry farming.

Perceived impacts

According to the President, the months of March, April and May for the last years were very hot compared to historical averages. The President believes this warming is due to the high rate of deforestation in the country. The impacts on poultry farming are various: (i) Feed consumption decreased by 10-20% and decrease of the rate-of-lay accordingly, (ii) Increased panting and increased acidosis (NB: chickens do not sweat), (iii) Increased rate of attack (heat => nutritional deficiency => search for salt contained in the blood), (iv) Increased mortality (asphyxiation).

Actions taken to address adaptation needs

According to the President, most of members of the ANAVIG have done the following: (i) Decreasing the density in the henhouse (from 7-8 chickens/m² to 5), (ii) Increasing the number of watering spots, (iii) Covering the water tanks at the rooftop of the henhouse, in order to cool the water, (iv) Replacing the brick wall by wire grid, (v) Introducing vitamins in the daily ration during the hottest months.

Level of collaboration with the AET institutions and the IRAG

All the listed adaptation practices have been identified by the ANAVIG members through the internet, technical reviews, and exchanges of ideas with the National Association of Poultry Farmers of Ivory Coast (*Association nationale des aviculteurs de Côte d'Ivoire* – ANAVICI). Collaborations on technical issues with AET institutions and IRAG are nil.

The only link the ANAVIG members have with the AET institutions is the hosting of students for training. According to the President, most of the ANAVIG members are disappointed with the students, because their academic level and their technical know-how are very low. If they hire some of them (like the President does on his farm near Kindia), they have to educate and train them from A to Z.

Level of collaboration with national and international institutions involved in climate change issues

According to the President, as far as he knows, there is no collaboration with national and international institutions involved in climate change issues.

Assessment: CONEG officially gathers animal farmers from the following sectors: cattle breeding, small ruminants rearing, poultry farming, pig farming, dairy farming, and bee-keeping. Since its creation in 1998, CONEG experienced many problems. After the last one in 2011 (misappropriation of resources), CONEG entered in dormancy and it is likely to stay as it is: (i) Its President, Mme SULTAN, has been recently appointed as Minister of Agriculture, (ii) The board members do not meet anymore. ANAVIG, National Association of Poultry Farmers, is one of the few CONEG members still active. Created in 1996, it gathers more than 200 poultry farmers' groups. They feel the impacts of climate change: decrease of feed consumption and rate-of-lay, increase of panting, acidosis, attacks, mortality, etc. Using internet and exchanging with their Ivorian colleagues, they have already started implementing adaptation measures: decreasing the density in the henhouse, increasing the number of watering spots, covering the water tanks, replacing the brick wall by wire grid, introducing vitamins during hot season, etc. Collaborations on technical issues with AET institutions and IRAG are nil, and AET Students are poorly considered (very low academic level and technical know-how).

Farmers' organisations at grassroots level

Here below are the analyses of 33 questionnaires administered to 9 female and 24 male (i.e. around ¼ of females while they account for more than ½ of the labour force in the agriculture sector...we tried our best to interview as much female farmers as possible, which is a challenge nowadays in Guinea. See **Part 1.3** supra).

Around 2/3 (20) are simple members and 1/3 (13) are board members, which mean board members are overrepresented. They should be less than 5% of the sampling to give a faithful representation of the farmers' organisation... But since the interviews were booked with the support of the board members and since they like to be present when a field mission comes to the village, it was difficult for us to gather more simple members than board members.

The 33 interviewees are part of 26 farmers' groups, distributed as follows: 4 in yam/sesame (near Kankan), 4 in banana (near Macenta), 4 in palm oil/rubber (near N'Zérékoré), 3 in potato/onion/tomato (near Pita), 3 in honey (bee keeping) (near Labé), and 8 in rice – 1 in salt/mangrove rice (near Koba), 3 in irrigated rice (near Kindia), 3 in rainfed rice (near Kissidougou), and 1 in lowland rice (near Kérouané). With that sampling, we have a good overview of different food crops (tuber, cereals, vegetables) and cash crop (palm oil, rubber), in different agro-ecological contexts.

The fact that the rice farmers' group are many reflects the fact this is the major food crop in Guinea. The absence of livestock farmers' groups or fishermen' groups of forest/NRM groups is due to the fact that most of these groups are in dormancy and it was not assumed relevant to incorporate them in our sampling (see explanations in **Part 1.3** supra).

NB: An interviewee can give several responses for one question: numbers below are not cumulative.

Level of awareness of and knowledge about environmental issues ("revealing questions" not linked to Winrock sub-questions)

- **Climate change:** All of them say they observe climate changes: around ½ (15) say there is less water, 13 say the weather is warmer and/or sunnier, 11 say the rainfall period has changed (latter arrival and/or earlier stop and/or heavy rains), 3 say the seasons have changed (for more than 30 years for 2 persons, 15 years for the other). Some specific observations are also mentioned: wilting of the plants (2), colder days (1), attack of mealy bug (1), and death of domestic animals (1). All of them have an explanation about these changes:
 - ½ (15) say it is caused by deforestation (harvesting of firewood, charcoal production, slash-and-burn, bushfire, etc.), explaining the same reasoning than many faculty, students and researchers (see **Part 3.2** supra): forests "attract" the rains => deforestation leads to decreasing rains => rains do not cool anymore the atmosphere and temperature increases.

This reasoning is partially correct, since the evapotranspiration of forest favours the rains locally, which in turn has a cooling effect on the temperature. However, this phenomenon (local climate change due to deforestation) is different from global climate change and its effects may be felt only in forest-rich areas getting deforested...In the savannah woodland, which cover most of the country, climate changes may be more correlated to global climate change.

- 12 mention the "climate change" or the "greenhouse effect", but during exchanges, it appears that most of them use these terms to qualify their deforestation/decreased rainfall/increased temperature explanations.
- Others have difficulty to order causes and consequences and mention: "overloaded/suffocating" atmosphere (5), sunshine/heat (5), reduced rainfalls (3). 1 mentions the silting of rivers by sand.

Faced to these changes, 12 say they did not change their farming practices, 4 giving reasons for that: no control over the climate changes / no clue about how to adapt (2), ancestral practices cannot be changed, round of observation: when climate changes are better understood, it is possible to adapt (1). 21 say they changed their practices and mention a large array of adaptation measures:

- 1/3 (11) say they shift their farming cycle to adapt to the rainy season, without specifying how (earlier/latter harrowing and/or planting and/or harvesting, etc.). One say he harrows and plants earlier, one says the contrary. 3 say they now use barrage and pump. 2 say they migrated from the plains to the lowlands. 3 say they use shorter cycle seeds. Some answers appear only once: increased use of herbicides (no explanation given in terms of link between climate change impacts and this measure), increased use of chemical fertilisers (idem), increased volume of

seeds (because of sowing problems when rains come late), introduction of onion (more adapted to drought than many vegetables), and late displacement of hives

- **Biodiversity:** All of them, except 1 (“fishes and crabs cannot lack”), say they observe a degradation of biodiversity: forests for 1/3 (13), fauna and flora for 5, big animals/bushmeat (antelopes, warthog, monkeys) for 5, local rice seeds (Konian, Silly, Dissi, Siné-Masifi, etc.) for 3, bees and bee-forage plants for 2, small birds for 2, rats for 1. All of them, except 1, say it has negative impact on their farming activities.
- **Soils:** All of them expect 1 say they observe a degradation of soils: loss of fertility for nearly 2/3 (19), erosion for 8, loss of organic matter and sandy texture for 3, soil compaction for 2, iron toxicity for 2, salinity for 1. All of them, except 1, say it has negative impact on their farming activities and they 4 say they need to use fertilisers to produce.

Assessment: All the farmers interviewed observe the climate changes, especially erratic/reduced rainfall and increasing heat, and most of them explain it – as do most of the AET Faculty and Students, and IRAG researchers – by deforestation (that would locally reduce the rain and increase the temperature). 33% say they do not change their farming practices, some explaining they are ancestral or that they do not know how to adapt. 66% say they have changed their farming practices, mainly by shifting the farming cycle to adapt to the rainy season. Nearly all the farmers say they observe a loss of biodiversity (mostly loss of forest, for 50% of them) and a degradation of the soils (mostly loss of fertility, for 66% of them).

Information (questions 8 to 19, linked to to Winrock sub-questions 2.2 and 2.4)

- **Climate change:** 1/3 (12) say they do not receive information, ½ (16) say they receive it rarely (less than once a month), and 5 say they receive it frequently (more than once a month). Upon the 21 receiving information, most of them receive it through the radio (11), or ANPROCA (10). Some also receive it through their Federation (7), NGOs/projects (6, some mention PACNOP/UE or NGO OIC), Forest services (4). Internet and TV are never mentioned.

The key messages they recall are the following: avoiding bush fires (12), avoiding slash-and-burn on the catchment area (9). 4 mention environmental education but cannot recall precise messages. 2 mention reforestation (in conjunction with the protection of catchment area). Interestingly, a rice farmer in Kissidougou mentions a video training on the projections of rainfall and adaptation of crop cycles to climate change. 1 mentions training on GHG / climate change, but cannot explain it further.

Questioned about the usefulness of the information received for improving their level of production, ½ (10) say they do not see any change, 7 say it improves a bit, and 4 say it improves strongly. Those who do not see a change, or a small one, explain that they do not have alternative (no other plots to crop, no access to fertilisers, no hydro-agricultural facilities in the lowland to migrate from the sloppy areas, etc.) or that the implementation of the measures promoted are not successful since they do not address the real issues.

- **Biodiversity:** ½ (17) say they do not receive information, 1/3 (9) say they receive it rarely (less than once a month), and 6 say they receive it frequently (more than once a month). Upon the 15 receiving information, most of them receive it through the Forest services (7) or their Federation (5) or the radio (4). Some also receive it through ANPROCA (3), NGOs/projects (3, including one who mentions the Peace Corps). Internet and TV are never mentioned.

The key messages they recall are the following: protecting the forests: avoiding bush fires, cattle wandering, slash-and-burn, cut of palm tree to produce wine, use of fire to collect honey, reforestation, etc. (6), using improved farming techniques (4), protecting micro-organisms (2), and protecting big animals (1).

Questioned about the usefulness of the information received for improving their level of production, 6 say they do not see any change, 6 say it improves a bit, and 3 say it improves strongly. As for information received on climate change, those who do not see a change, or a small one, explain that they do not have alternative or the implementation of measures promoted is not successful.

- **Soils:** 14 say they do not receive information, 15 say they receive it rarely (less than once a month), and 4 say they receive it frequently (more than once a month). Upon the 19 receiving information, most of them receive it through the Forest services (11), Radio (10), their Federation (9), ANPROCA (7), and more rarely through NGOs/projects (3). Internet and TV are never mentioned.

The main message they recall is to avoid deforestation (avoiding bush fires, cattle wandering, slash-and-burn, etc.) and to reforest. 2 mention environmental education (without being more precise). Some responses appear once: using rice seed resistant to iron toxicity, producing and using compost, and using improved rice parboiling equipment and improved cookstove (to reduce firewood consumption).

Questioned about the usefulness of the information received for improving their level of production, 12 say they do not see any change, 5 say it improves a bit, and 2 say it improves strongly. Those who do not see a change, or a small one, explain that the advices are too vague/not operational, that they do not have alternative to slash and burn, or they do not have the means to implement the measures (e.g. this is the case with the improved rice parboiling equipment and improved cookstove: women say they are often invited to purchase these equipment, but they are rare and too costly).

Assessment: Farmers' groups (at grassroot level) have a poor access to information/advices on environmental issues (climate change, biodiversity, soil): 50% of them do not have such information and 33% receive it rarely (less than once a month). The main sources of information are the radio, ANPROCA, Forest services, and their Federation. Review/newspaper, Internet, and TV are never mentioned. The main key message relates to the protection of forest (avoiding slash-and-burn and bushfires, reforesting) and there are very few specific messages related to adaptation to climate change, protection of biodiversity, and sustainable soil management. The usefulness of the information received is generally considered poor, with little or no improvement in terms of production: farmers say do not have alternative to slash-and-burn (no other plots to crop, no access to fertilisers, no hydro-agricultural facilities to migrate from the sloppy areas, etc.) or no means to implement the measures or that the advices are too vague/not operational or do not address the real issues.

Farmers' organisations at umbrella level

Here below are the analyses of 14 questionnaires administered to 3 female and 11 male (i.e. around 1/5 of females... See explanations about this sampling biases in the previous analysis supra). Only 1 is a simple member: interviews were requested with the board members only, to have a good overview of the Federation of Unions' activities. The 14 interviewees are part of 10 organisations:

- Federation of Unions of Yam and Sesame Farmers' Cooperatives (*Fédération des unions de cooperatives de producteurs d'igame et de sésame* – FUCPIS): yam/sesame (near Kankan);
- Banana Farmers' Union of Macenta (Union des producteurs de banane de Macenta – UPBM): banana (near Macenta);
- Regional Federation of Rubber and Oil Palm Farmers' (*Fédération régionale des producteurs de palmier à huile et hévéa* – FEREPHAH): palm oil/rubber (near N'Zérékoré);
- Federation of Fouta Djallon Farmers (*Fédération des producteurs du Fouta-Djallon* – FPDF): potato/onion/tomato (near Pita);
- Federation of Bee-keepers of Guinea (*Fédération des Apiculteurs de Guinée* – FAPI): honey (bee keeping) (near Labé);
- Federation of Farmers' Organisations of Basse-Guinée (*Fédération des organisations paysannes de Basse-Guinée* – FOP-BG) and 1 of its Union: salt/mangrove rice/irrigated rice (near Koba);
- Rice Farmers' Federation of Guinée forestière (*Fédération des producteurs de riz de Guinée forestière* – FeProRiz): rainfed rice (near Kissidougou);
- Federation of Rice Farmers' Unions of Haute-Guinée (*Fédération des producteurs de riz de Haute-Guinée* – FuProRiz) and 1 of its Union: lowland rice (near Kérouané)

NB: An interviewee can give several responses for one question: numbers below are not cumulative.

Level of awareness of and knowledge about environmental issues (“revealing questions” not linked to Winrock sub-questions)

- Climate change: All of them say they observe climate changes: less/erratic rainfalls (10), warmer and/or sunnier weather (6), shifting seasons (3), delayed flowering (1), sea level rise (1). All of them have an explanation about these changes and the main explanation (for 13 of them) is deforestation, explaining the same reasoning than many AET Faculty and Students and IRAG

Researchers (see **Part 3.2** supra): forests “attract” the rains => deforestation leads to decreasing rains => rains do not cool the atmosphere and temperature increases. Only 1 mentions the greenhouse effect.

Faced to these changes, almost ¾ say they did not change their farming practices, 2 giving reasons for that: no control over the climate changes and no clue about how to adapt. 5 say they changed their practices and mention some adaptation measures: later harvest of honey, creation of bunds in the mangrove area against seawater infiltration, use of pumps, shifting of the farming calendar, and change of associations/rotations.

- **Biodiversity:** All of them say they observe a general degradation of fauna and flora biodiversity, some mentioning specific species, i.e. buffalos, grasscutters, bees, crabs, crayfish, chimpanzee, Caïcedrat (*Acajou du Sénégal*). All of them say the loss of biodiversity has negative impact on their production, explaining it by the fact that the loss of forests and vegetation leads to a decrease in rainfalls.
- **Soils:** All of them say they observe a degradation of soils: loss of fertility (8), erosion (3), soil compaction (2), and salinity (1). All of them say it has negative impact on their farming activities.

Assessment: All these farmers observe the climate changes, especially erratic/reduced rainfall and increasing heat, and most of them explain it – as do most of the AET Faculty and Students and IRAG Researchers – by deforestation (that would locally reduce the rain and increase the temperature). 66% say they do not change their farming practices, some explaining they do not know how to adapt. 33% say they have changed their farming practices, through different measures. Nearly all the farmers say they observe a loss of biodiversity and soil degradation (mostly loss of fertility, for 66% of them).

Information (questions 8 to 19, linked to to Winrock sub-questions 2.2 and 2.4)

- **Climate change:** 4 say they do not receive information, ½ (7) say they receive it rarely (less than once a month), and 3 say they receive it frequently (more than once a month). Upon the 10 receiving information, most of them receive it through the radio (6), or ANPROCA (6). Some also receive it through their Federation, thanks to the technical staff (3), NGOs/projects (FOP-BG mentions 3 local NGOs: APEK, TRIAS, and RGTADI).

To be highlighted: IRAG is mentioned for the first time in the questionnaires, as a provider of information on NRM to the UPBM. Internet and TV are never mentioned.

The main message most of them (9) recall is about avoiding bush fires and slash-and-burn, especially on the catchment area. FOP-BG is the only one to be specific and to mention the advices received from the local NGOs, in order to create lowland rice plots, to get equipped with water pump, and to use selected seeds (CK30, Kaolak) with higher resistance to iron toxicity (which aggravates when water is not flowing in the lowland plots).

Questioned about the usefulness of the information received for improving their level of production, 6 (upon the 10 that say they receive information/advices) say they do not see any change, 2 say it improves a bit, and 2 say it improves strongly. Those who do not see a change, or a small one, explain that implementation of the measures promoted are not successful since they do not address the real issues.

- **Biodiversity:** More than ½ (8) say they do not receive information, 4 say they receive it rarely (less than once a month), and 2 say they receive it frequently (more than once a month). For those receiving information, it goes through the ANPROCA (4) or their Federation (3). Some also receive it through the Forest services (1), NGOs/projects (1). Internet and TV are never mentioned.

The main message they recall is about protecting the forests (avoiding bush fires, slash-and-burn, etc.). 2 also mention general information on environmental education, 1 mentions the protection of wild animals and the need to stop trading bushmeat. FOP-BG mentions collaboration with IRAG to identify and conserve 42 local rice seeds.

Questioned about the usefulness of the information received for improving their level of production, 3 say they do not see any change, 2 say it improves a bit, and 1 say it improves strongly. Those who do not see a change, or a small one, explain that they do not have alternative or that the implementation of the measures promoted are not successful.

- **Soils:** 5 say they do not receive information, 6 say they receive it rarely (less than once a month), and 3 say they receive it frequently (more than once a month). Upon the 9 receiving information,

most of them receive it through the radio (6), ANPROCA (5), Forest services (4), their Federation (3). FOP-BG and its Union also receive it through the NGOs/projects: PDRiz-GM, APEK, and TRIAS. Internet and TV are never mentioned.

The main message most of them (7) recall is about protecting the forests (avoiding bush fires, slash-and-burn, etc.). FOP-BG and its Union also mention specific advices related to bundling of lowland plots (to avoid seawater infiltration), methods to wash the salt from the soils at the start of the rainy season, use of compost. FERREPAH also mentions advices to settle rubber plantations in degraded forests (double advantage: income generation and restoration of degraded forests).

Questioned about the usefulness of the information received for improving their level of production, 4 say they do not see any change, 3 say it improves a bit, and 2 say it improves strongly (FERREPAH and FOP-BG). Those who do not see a change, or a small one, explain that they do not have alternative or that the implementation of the measures promoted are not successful.

Assessment: Farmers' groups (at umbrella level) have a poor access to information/advices on environmental issues (climate change, biodiversity, soil): 40% of them do not have such information and 40% receive it rarely (less than once a month). The main sources of information are the radio, ANPROCA, and the Forest services. Review/newspaper, Internet, and TV are never mentioned. IRAG is very rarely mentioned. The main key message relates to the protection of forest (avoiding slash-and-burn and bushfires, reforestation) and there are very few specific messages related to adaptation to climate change, protection of biodiversity, and sustainable soil management. The usefulness of the information received is generally considered poor, with little or no improvement in terms of production: farmers say do not have alternative to slash-and-burn (no other plots to crop, no access to fertilisers, no hydro-agricultural facilities to migrate from the sloppy areas, etc.) or no means to implement the measures or that the advices are too vague/not operational or do not address the real issues.

Farmers and CSA trials (questions 20 to 23, linked to Winrock sub-question 2.1)

39 trials/transfers were identified with AET Faculty and Students and IRAG Researchers. During the interviews carried out with 36 Farmers' organisations (10 at umbrella level and 26 at grassroot level), only 11 trials in terms of adaptation of agriculture to climate change were identified. Even if it does not mean that the persons interviewed do not implement other adaptation measures (because they did not think to mention them: as we explained earlier, see **Part 2.2**, most of the CSA practices can be qualified as already existing "good agricultural practices"), it is however worth to note that there are few adaptation measure mentioned, compared to the number of organisations interviewed.

Another point to highlight is the fact that most of the trial listed below can be assimilated to a CSA practice (changing one component of the farming system, e.g. shift from local rice seed of 4-5 month cycle to selected rice seed of 3-month cycle), but not to a CSA Strategy (rethinking the whole farming system). Maybe the two last trials on the list below could be considered as CSA Strategy, since they try to address various adaptation needs.

Description of the trial	Farmers' opinion	Visitors
Comparative trial of modern (Kenyan) vs traditional hives	Strong improvement. Less forest fires, better yields	<100
Creation of lowland rice plots	Strong improvement. No more water stress	>1000
Trial of short-cycle rice seeds	Good seeds, but birds damaged part of the harvest	<100
Trial of early varieties of yam	Interesting varieties, but high costs	10 villages
Training for producing/using compost	Valuable technique: increased fertility and yield, decreased costs	Less than 30 farmers
Planting of palm oil tree and raphia tree in degraded forest	Good: income generation and restoration of the forest	>1000
Reforestation of degraded land with Acacia mangium	Interesting, but bush fires remain an issue	All the village
Participatory selection after comparative trial of 21 rice seed (improved and local one)	Bad : Souakoko (from forest area) failed in Mangrove area (salinity)	Less than 30 farmers
Reforestation of degraded catchment area	Interesting, but improvement is slow after planting	<100
Rice farming with salt-resistant seeds, dibbling, improved water management	Excellent: shift from 0,6 t/ha (tradi) to 2 t/an (mean) / 3,5 t/ha (max)	Scale of the FOP-BG
Fine-tuning of the vegetable gardening cycle to adapt to shifting season	Optimum possible: three harvests a year	Scale of the FPDF

Figure 31 - Trials on adaptation of agriculture to CC carried out by Farmers' organisations (Baseline study, 2014)

Agribusiness firms

As explained earlier (see **Part 1.3** supra), they are very few agribusiness firms in Guinea, due to the poor climate business. We were able to interview 8 peoples belonging to 6 companies: Farm El Hadj BERETE (poultry farming) in Kankan, Guinea Cotton Company (*Compagnie guinéenne du coton - CGC*) in Kankan, Guinea Palm Oil and Rubber Company (*Société guinéenne de palmier à huile et d'hévéa - SOGUIPAH*) in Yomou, Guinea Brewery Company (*Société de brasserie guinéenne -*

SOBRAGUI. They crop and purchase maize) in Kissidougou, Daboya Fruit Company (*Compagnie fruitière de Daboya*), Farm Boubacar CAMARA (poultry farming) in Mamou.

It has to be noted that 2 of these agribusiness firms, CGC and SOGUIPA, are partially owned by the GoG, SOGUIPAH also being the biggest employer in Guinea, with 3,500 employees. It also has to be noted that most of the interviewees were high level administrators: Director of the Production and his Deputy for CGC, Director of the Production and his Deputy for SOGUIPAH, General Director for SOBRAGUI, and General Director for the Daboya Fruit Company.

In what follows, we will not give quantitative analysis (small sampling), but highlight the key findings:

- Level of awareness of and basic knowledge about environmental issues: For SOBRAGUI and Farm B. CAMARA, there is no climate change. For the others, the climate change is explained by deforestation (and the reduction of rainfalls, etc.). In addition to that, the General Director of the Daboya Fruit Company explains that there CO₂ emissions are depleting the ozone layer. All of them, apart from the Daboya Fruit Company, consider that the level of biodiversity and the soil fertility have decreased;
- Adaptation measures implemented: only for CGC (late harrowing and late sowing) and the two poultry farmers (arrival of one-day chick in the rainy season, reduction of the chicken density in the henhouses). SOBRAGUI, SOGUIPAH, and the Daboya Fruit Company did not change anything. In the case of the Daboya Fruit Company, this is striking, since the General Director also says that the mango harvesting period has reduced (from mid-March/mid-July to mid-April/mid-June) due to late flowering (lack of cold) and the early arrival of anthracnose and fruit fly (heavy rain). This also explained the drop in quality export mango at the end of the season, from 90% in previous years to 40% nowadays. He does not envisage to place fruit fly traps, nor to implement sanitary harvest.
- Access to information/advice on climate change and NRM: 5 out of 8 say they never access information about these issues. The others (Director of the Production for SOGUIPAH, Deputy Director of the Production for CGC and General Director for SOBRAGUI) say they have information from Internet, TV and reviews/newspapers. It has to be noticed that the General Director of SOBRAGUI says there is no climate change, so the information he gets is of poor quality.

Assessment: Surprisingly, the level of awareness and information about environmental issues is worst for the high level representatives from agribusiness firms (even large ones like SOBRAGUI, CGC or SOGUIPAH) than for farmers' groups representatives. A majority of them say they do not adapt to climate change, they never have information on climate change / NRM, and the General Director of SOBRAGUI even considers there is no climate change. These results are alarming.

Rural radio

As the rural radios were often mentioned as local provider of information on climate change and NRM, far ahead of other sources of information (Internet, TV, NGOs/projects, reviews/newspapers, etc.), it was considered relevant to assess their level of awareness and knowledge about environmental issues. 6 Station Director or Programme Director were interviewed in Mamou, Kissidougou, N'Zérékoré, Guéckédou, Faranah, and Kankan. The results are not analysed quantitatively (the sampling is too small), but here below we just highlight the key findings:

- Level of awareness of and basic knowledge about environmental issues: None of them understand the climate change phenomenon and none of them have basic knowledge of the level of progress of international talks/actions on NRM;
- Access to information/training on climate change and NRM: apart from the Station Director of Mamou, who received a 2-week training in 2011 at the ENATEF on the protection of forests, none of them is able to recall information received on climate change and NRM (even if they mention various media) and none of them recently attended training on climate change and NRM.
- Diffusion of information on climate change and NRM: All of them, apart from the Programme Director of N'Zérékoré, say they address environmental issues during their radio programme, but the messages are reduced to avoiding slash-and-burn and bushfires.

Assessment: Rural radio is often mentioned as a key source of information on climate change and NRM. But, the interviewees do not understand the climate change phenomenon, lack of knowledge about international talks/actions on NRM, and do not seem to have information/training on climate change/NRM. Therefore, their key messages are focused on limiting slash-and-burn and bushfires.

4. Conclusions about the baseline (task 6) and recommendations

4.1. Conclusions about the baseline (task 6)

According to the methodology presented earlier (see [Part 1.3](#) supra), the six tasks of the terms of the reference are addressed as follow in this report:

- Task 1 “Model/benchmark”: addressed in [Parts 2.1, 2.2, and 2.3](#) supra;
- Task 2 “Definition”: addressed in [Part 2.4](#) supra;
- Task 3 “Policies”: addressed in [Part 2.4](#) supra;
- Task 4 “Data”: addressed in [Parts 3.1, 3.2, and 3.3](#) supra;
- Task 5 “Informants”: addressed in [Parts 3.1, 3.2, and 3.3](#) supra;

In this [Part 4.1](#), we will therefore address the last task by responding to the 12 Winrock research sub-questions and the two USAID research questions already presented in [Part 1.3](#), before to fill in the indicators relating specifically to GCC Integration Pilot and integrated into the AEMIP Revised Result Framework.

Winrock research sub-questions Q1.1 to Q1.7 and USAID research question Q1

Q1.1: To what extent can AET faculty articulate an academic-level understanding of climate change adaptation, biodiversity or NRM topics?

→ Currently, the level of information of AET Faculty on climate change adaptation, biodiversity, or NRM topics is very low. As detailed in [Part 3.2](#) supra and as summarised here, 75% of AET Faculty interviewed have a low level of knowledge of the climate change phenomenon, linking it mainly to local deforestation: deforestation → less rainfalls → more heat.

This ad hoc explanation is the common one across all stakeholders interviewed during the baseline study. It does not generally involve GHG emissions, but when GHG emissions are mentioned, their role is either not understood, or invoked to explain other consequences (e.g. the increase in CO2 leads to a decrease in O2, CO2 destroys the ozone layer, etc.)

Most of the stakeholders interviewed, including the AET Faculty, thus have no idea of the irreversibility in the short to medium term of climate change, and do not feel the imperious need to adapt to it, because most of them believe local reforestation could bring back the system to equilibrium.

AET Faculty also have a poor knowledge of the level of progress of international talks/actions on NRM (climate change, biodiversity, and desertification).

Q1.2: What is the current scope, depth and effectiveness of climate change adaptation, biodiversity and NRM certificate/degree-granting programs, coursework, short-term training, and research in AET institutions in Guinea?

→ Currently, there is no training module on climate change adaptation, biodiversity, or NRM topics in any of the AET institutions. Environmental issues are sometimes touched upon, during technical training (e.g. soil biodiversity during soil science courses) but are not dealt with specifically, and AET Students do not generally recall key messages about it, apart from the fact that slash-and-burn and bushfires should be avoided, especially on water catchment area.

But this last message is well known by all the stakeholders we interviewed, even farmers' groups: it cannot be considered as an added-value of the AET curricula. The only environmental issue which seems to be addressed at minima in the AET curricula is the soil management, as 11 upon 59 AET Students interviewed can recall key messages about this issue.

These conclusions are corroborated by the following analysis, on the basis of the questionnaires administered to AET Faculty and Students (see detailed data and explanations in [Part 3.2](#) supra):

- **Faculty:** Around 10% of the Faculty interviewed say they give thorough explanations to their Students about climate change, biodiversity, and soil management. But, most of them are unable to present the content of these explanations, which lead to assume they are vague. 60% say they never talk about these environmental issues. The rest say they touch upon it occasionally,

delivering general messages, i.e. environmental education rather than practical know-how the Students may use latter;

- **Students:** Only 20% of the AET Students interviewed say they receive explanation about climate change, biodiversity or soil management during training. When it is the case, it is always done at school, and generally included into broader training course (agronomy, animal science, forestry, etc.) as there is no specific training course on NRM. Most of the students having addressed climate and biodiversity do not recall the main messages. The situation is different for soil management: 11 upon 15 of those having addressed soil management during training course can recall key messages.

Q1.3: What is the current scope and depth of faculty credentials (degrees, certificates, short-term training, and published research) in climate change adaptation, biodiversity and NRM topics?

→ As detailed in **Part 3.2** supra and as summarised here, during the baseline study, upon the 28 AET Faculty interviewed, none of them was holding a specific degree or certificate in of having published on climate change adaptation, biodiversity, and NRM topics. Very few of them have recently received short-term training on climate change, biodiversity or soil management, most probably less than 10% if we consider the training received in the last 5 years.

Q1.4: To what extent do AET students and faculty have access to external coursework, short-term training, research funding and practicums on climate change adaptation, biodiversity and NRM topics? Who are the external providers? And to what extent are they utilizing this access?

→ As detailed in **Part 3.2** supra and as summarised here:

- **Faculty:** Upon the 28 interviewees, five say they received short-term training in climate change (four with Protection forest/Winrock in June 2012 about the fight against deforestation, one with ISAVF in February 2014 about forest fires), four say they received short-term training in biodiversity (eight days on fauna inventory in the Protected areas of Bobé, Tougué, and Koundara in 2004 or 2008, with support from the AGIR project ; Regular exchanges among ENATEF faculty on protection of classified forests, between 2001 and 2004 ; Training with ISAVF in 2013 about forest protection - he does not recall the number of days ; Internship in the USA - without mention of the topic and the date), four say they received short-term training in soil management: (two days on agriculture soil management in 2001 with GTZ ; soil management with IRAG - he does not recall the number of days and the date ; 32 days on degraded soils and GIS in 2003 or 2004, with support from the AGIR project ; Internship in the USA - without mention of the topic and the date).
- **Students:** Upon the 59 interviewees, none of them say she/he received short-term training on environmental issues from external providers.

In conclusion, there are very few external providers of training on environmental issues.

Q1.5: To what extent do AET students and faculty have access to information services/knowledge bases related to climate change adaptation, biodiversity and NRM (national, regional and international databases, papers, conferences, journals)? And to what extent are they utilizing this access? What are the information services/knowledge bases they are most commonly accessing?

→ As detailed in **Part 3.2** supra and as summarised here:

- **Faculty:** Only 25% of the interviewees say they have a frequent access (more than once a month) to information on climate change, biodiversity, and soil management. They access it mostly through the radio or Internet. Few of them mention TV or workshops or NGOS/projects. Reviews/newspapers seem even more marginal. The information received appears of poor quality: most of time they are not able to recall the key messages. When they recall it, the key message is about the negative impact of deforestation on climate.
- **Students:** Only 15% of the interviewees say they have a frequent access (more than once a month) to information on climate change, biodiversity, and soil management, and a bit more than 30% say they rarely receive information (less than once a month). 75% of the Students receiving information, frequently or rarely, mention training course as the source of information. Other sources of information are marginal, apart from the radio (mentioned by 10% of the Students receiving information). Internet, reviews/newspapers, TV, workshops, NGOS/projects are nearly

never mentioned. The information received appears of poor quality: most of time they are not able to recall the key messages.

This is corroborated by the fact that 85% of the Students interviewed have a low level of knowledge of the climate change phenomenon, linking it mainly to local deforestation and thus not having the idea it is irreversible in the short to medium term and there is an imperious need to adapt to it. They also have a poor knowledge of the level of progress of international talks/actions on NRM (climate change, biodiversity, and desertification)

Q1.6: To what extent are AET students and faculty participating in national, regional and international dialogues, networks and platforms for CSA, biodiversity, and NRM?

→ As presented in **Part 3.2** supra, during the interviews with AET Faculty and Students, such international dialogues, networks, and platforms for CSA, biodiversity, and NRM were never mentioned. But, as presented in **Part 2.2**, such international dialogue and networks are many in the Sub-Regions (e.g. Rural Hub, Inter-Réseaux, CILSS/Agrhymet, etc.)

Q1.7: What efforts have been made by the Ministry of Higher Education's to integrate climate change adaptation into AET in Guinea? What additional efforts are necessary?

→ It was not possible to meet with representatives of the Ministry of Higher Education (supervising ISAVF) during the field mission, but the representatives of the National Directorates of (i) Vocational/Technical Training, (ii) On-the-job/Short-term Training (supervising the ENAEs and the ENATEF) were met. None of the persons met, including one National Director and two Deputy National Director, understands the climate change phenomenon. They gave contradictory explanations in this regard, mixing causes and consequences (e.g. warming due to the decrease of rainfall, warming due to increased solar heating caused by decreased shade effect, itself due to deforestation, degradation of the ozone layer, etc.).

Once again, the universal nature and the irreversibility (in the short-to medium term at least) of climate change are not known and reforestation is seen as the adequate solution to address the issue and bring the system back to equilibrium in the short-term. In that context, the need for including adaptation to climate change into the curricula of the AET is not identified and no real effort has been made to integrate it into AET in Guinea.

Q1: To what extent has AEMIP institutionalized gender-responsive climate change into the course/research curriculum? (Based on baseline, mid-term, and post-survey results measuring stakeholder knowledge and perceptions of climate change as a component of the curriculum. Based as well on a measurement of the knowledge-base that has been established [databases, papers, conferences, etc.] over the same time period).

→ The baseline is easily drawn: climate change is generally not understood by the representatives of the National Directorates of (i) Vocational/Technical Training, (ii) On-the-job/Short-term Training, the AET Faculty and Students, and climate change is not present in the course/research curriculum.

The vague messages about the necessary protection of forest against slash-and-burn and bushfires are not logically linked to the broader global climate change, and as such may be even counter-productive, as many Faculty and Students believe the climate system could come back to equilibrium if local deforestation decreases and reforestation increases. Therefore, the importance of adaptation to climate change is not well perceived.

Winrock research sub-questions Q2.1 to Q2.5 and USAID research question Q2

Q2.1: To what extent are AET institutions developing CSA technologies for male and female farmers and entrepreneurs? To what extent are they developing these by conducting applied research field activities? What are the mechanisms and platforms (other than applied research field activities) used to disseminate CSA technologies to male and female farmers and entrepreneurs? How effective are these mechanisms and platforms?

→ As presented in **Part 3.2** supra, 28 AET Faculty and 59 AET Students were interviewed during the field mission. One of the objective of the questionnaires was to identify three types of CSA technology development/transfer, the basic one being "transfer" (to implement a technology already successfully implemented elsewhere), a bit more elaborated one being the trial in station (to design a technology in a controlled environment, without involving farmers), the most elaborated one (and the most complex,

but also most interesting in terms of local ownership) being the farmer trial (to design a technology in a partially controlled environment, the farmers managing the plot trials).

During these interviews, 39 trials or transfers of CSA technologies were identified as follows:

- 9 are about seed: resistance to drought (for rice and bean), to salinity (for mangrove rice), plasticity to adapt to poor fertile soils (for yam and cassava), adaptation to flooding (for rice: selection of high stem rice), adaptation to storms/lodging (for maize: selection of short stem maize), shortening of the cycle (for rice and bean), protein rich maize;
- 8 are about soil fertility: use of compost, or manure, or mulching, or termite mounds, or mix of chemical and organic fertiliser;
- 6 are about fodder: mostly about fodder/groundnut hay/rice straw conservation (5), but also enrichment of natural grazing land (1);
- 6 are about soil erosion: use of cover crop, like cowpea/rice association in sloppy area or sweet potato in vegetable gardens, zero tillage, physical barriers to soil erosion;
- 6 are about cropping system: shortening of the rice nursery period and early planting (to shorten the cycle and avoid water stress), broadcast sowing instead of dibbling (idem), rice cropping and fish farming association (diversification of revenue), maize and bean association (to increase N-fixation), improved rubber and palm oil farming system (agroforestry);
- 4 are about reforestation: on degraded soils or catchment area, using fast growing species (esp. Gmelina)

As explained earlier, see **Part 2.2**, most of the trial listed above can be assimilated to a CSA practice (changing one component of the farming system, e.g. shift from local rice seed of 4-5 month cycle to selected rice seed of 3-month cycle), but not to a CSA Strategy (rethinking the whole farming system).

With regard to their classification, transfer/trial in station/farmer trial, it seems the differences between these types were not understood by most AET Faculty and Students, leading to poorly significant responses. In total, 11 transfer, 16 trials in station, and 12 farmer trial were mentioned, but most of the trials in station seem to be simple transfers, and most of farmer trials seem to be trials in station.

40% of the transfer or trials are not subject to dissemination. When dissemination is carried out, it is most of time with the support of ANPROCA (mentioned 13 times upon 22), more rarely through the farmers' organisations (CNOP-G or Federation: 9 upon 22), or through the IRAG ("open house": 3 upon 22), or very rarely through the radio (1 upon 22). Dissemination is always very local, because it relies mainly on field visit and most of the farmers are coming by foot or bikes or motorbikes.

In conclusion, there are already CSA technologies being tested and disseminated on the ground, but:

- Most of them are transfer or trial in station, and farm trials (the most elaborated ones, but the most successful in terms of ownership) remain rare,
- Most of them are not integrated in a CSA Strategy, which lead to partially addressing the adaptation needs (e.g. not very useful to test/disseminate drought-resistant rice seed without improving soil organic matter content, in order to optimise water retention and access for the plant);
- Dissemination is not systematic, very local, and mainly made via ANPROCA and Farmers' Organisation, i.e. mainly word of mouth. Therefore, interesting CSA technologies designed in one area (e.g. fish farming/ rice cropping integration near N'Zérékoéré ; use of organic manure and stony lines for potato cropping in Fouta Djallon) are generally not know outside of the said area.

Q2.2: To what extent are surveyed community-level institutions engaged in climate adaptation activities (such as developing and executing an adaptation management plan, forestry plan, land use plan, practicing conservation agriculture, etc.). How are these activities reinforcing technology uptake? To what extent have these activities resulted in increased number of hectares under improved management, and increased yields?

→ As presented in **Part 3.3** supra, 36 Farmers' organisations (10 at umbrella level and 26 at grassroot level) were interviewed during the field mission. Only 11 trials in terms of adaptation of agriculture to climate change were identified. Even if it does not mean that the persons interviewed do not implement other adaptation measures (because they did not think to mention them: as we explained earlier, see **Part 2.2**, most of the CSA practices can be qualified as already existing "good agricultural

practices”), it is however worth to note that there are few adaptation measure mentioned, compared to the number of organisations interviewed.

Another point to highlight is the fact that most of the trial listed below can be assimilated to a CSA practice (changing one component of the farming system, e.g. shift from local rice seed of 4-5 month cycle to selected rice seed of 3-month cycle), but not to a CSA Strategy (rethinking the whole farming system). Maybe the two last trials on the list below could be considered as CSA Strategy, since they try to address various adaptation needs.

Description of the trial	Farmers' opinion	Visitors
Comparative trial of modern (Kenyan) vs traditional hives	Strong improvement. Less forest fires, better yields	<100
Creation of lowland rice plots	Strong improvement. No more water stress	>1000
Trial of short-cycle rice seeds	Good seeds, but birds damaged part of the harvest	<100
Trial of early varieties of yam	Interesting varieties, but high costs	10 villages
Training for producing/using compost	Valuable technique: increased fertility and yield, decreased costs	Less than 30 farmers
Planting of palm oil tree and raphia tree in degraded forest	Good: income generation and restoration of the forest	>1000
Reforestation of degraded land with Acacia mangium	Interesting, but bush fires remain an issue	All the village
Participatory selection after comparative trial of 21 rice seed (improved and local one)	Bad : Souakoko (from forest area) failed in Mangrove area (salinity)	Less than 30 farmers
Reforestation of degraded catchment area	Interesting, but improvement is slow after planting	<100
Rice farming with salt-resistant seeds, dibbling, improved water management	Excellent: shift from 0,6 t/ha (tradi) to 2 t/ha (mean) / 3,5 t/ha (max)	Scale of the FOP-BG
Fine-tuning of the vegetable gardening cycle to adapt to shifting season	Optimum possible: three harvests a year	Scale of the FPF

Q2.3: What are the current mechanisms and platforms to coordinate with AET institutions to advance national gender-responsive climate change policies and protocols, and develop and disseminate climate smart technologies - among the public sector (ministries, government research institutions, and public extension systems), private sector (input suppliers, business development services, processors, wholesalers and retailers), and civil society sector (cooperatives, producer groups, forest and water user groups, non-governmental organizations [NGOs] and community-based organizations [CBOs])? How effective are these mechanisms and platforms?

→, AET institutions are poorly coordinated with:

- National AET Stakeholders: CNOP-G, CONEG, IRAG, CERESCOR, National Directorate of Meteorology, and ANPROCA, as presented in **Parts 3.1 and 3.2** supra. In particular, there is a great missed opportunity of collaboration between ENAE-ENATEF and IRAG, all the more difficult to understand that ENAE and IRAG antennas are close to each other. The recent creation of the RAFARGUI could be an efficient channel to inform/train the AET stakeholders about adaptation of agriculture to climate change, and (i) define with them ways and means to introduce CSA into the AET curricula, and (ii) liaise them with international/sub-regional institutions active in CSA-ET.
- International AET and CSA-ET institutions: If not *Réseau FAR*, Guinean AET Institutions are not linked with other AET institutions, while they are many.

Q2.4: What are the current mechanisms and platforms for civil society (such as cooperatives, producer groups, forest and water user groups, non-governmental organizations [NGOs] and community-based organizations [CBOs]) to coordinate with government and AET institutions to advance national climate change policies and protocols, and develop and disseminate climate smart technologies? How effective are these mechanisms and platforms?

→ As presented in **Part 3.3** supra, all the Farmers' organisation interviewed observe the climate changes, especially erratic/reduced rainfall and increasing heat, and most of them explain it by deforestation (that would locally reduce the rain and increase the temperature). 33% and 66%, at grassroot level and umbrella level respectively, say they do not change their farming practices, some explaining they are ancestral or that they do not know how to adapt. Others say they have changed their farming practices, mainly by shifting the farming cycle to adapt to the rainy season. Nearly all the farmers say they observe a loss of biodiversity (mostly loss of forest, for 50% of them) and soil degradation (mostly loss of fertility, for 66% of them).

They have a poor access to information/advice on environmental issues: 50% and 40% of them, at grassroot level and umbrella level respectively, say they do not have such information and 33% and 40% of them, at grassroot level and umbrella level respectively, receive it rarely, mostly through the radio, ANPROCA, Forest services, and their Federation. Review/newspaper, Internet, and TV are never mentioned. The main key message relates to the protection of forest (avoiding slash-and-burn and bushfires, reforestation) and there are very few specific messages. These information are generally considered unhelpful, with little or no improvement in terms of production: farmers say do not have alternative to slash-and-burn or no means to implement the advice or that the advice are too vague or do not address the real issues.

Farmers' organisations (as a whole, from grassroot level to CNOP-G and CONEG) are poorly coordinated with the GoG and AET institutions. Even beyond, from the interview carried out with the CNOP-G, it seems they do not share the vision of the GoG (massively promoting improved seeds, chemicals fertilisers, and pesticides, while the CNOP-G needs were different) and they do not trust the AET institutions and IRAG to support them in designing and implementing CSA (lack of capacities).

In short, there is no mechanism or platform for civil society to coordinate with GoG and AET Institutions on CSA, and even worse, there is a lack of mutual trust to advance CSA development.

Q2.5: What are the current mechanisms and platforms for the agribusiness private sector (input suppliers, business development services, processors, wholesalers and retailers) to coordinate with government and AET institutions to advance national climate change policies and protocols, and develop and disseminate climate smart technologies? How effective are these mechanisms and platforms?

→ As explained earlier (see **Parts 1.3 and 3.3** supra), they are very few agribusiness firms in Guinea, due to the poor climate business. We were able to interview 8 peoples belonging to 6 companies, including major ones like the Guinea Cotton Company (*Compagnie guinéenne du coton - CGC*) in Kankan, the Guinea Palm Oil and Rubber Company (*Société guinéenne de palmier à huile et d'hévéa – SOGUIPAH*) in Yomou, and the Guinea Brewery Company (*Société de brasserie guinéenne – SOBRAGUI*. They crop and purchase maize) in Kissidougou.

Surprisingly, the level of awareness and information about environmental issues is worst for the high level representatives from agribusiness firms (even large ones like SOBRAGUI, CGC or SOGUIPAH) than for farmers' groups representatives. A majority of them say they do not adapt to climate change, they never have information on climate change / NRM, and the General Director of SOBRAGUI even considers there is no climate change. These results are alarming.

Currently, there is no mechanism or platform for the agribusiness private sector to coordinate with government and AET institutions to advance national climate change policies and protocols, and develop and disseminate climate smart technologies.

Q2: To what extent has the new curriculum and research supported by AEMIP led to improved technical extension work and agricultural practices of male and female farmers as they relate to addressing new conditions brought upon through climate change? (Based on the number of applied research field activities conducted, adoption of technology, number of hectares under improved management, and yields. Based also on complementary qualitative indicators, such as survey of farmers participating in projects using new techniques)

→ The baseline is easily drawn: design and implementation of CSA technologies is very limited and design and implementation of CSA Strategies is even more limited. AET Stakeholders (Farmer's organisation, GoG Ministries in charge of agriculture and environment, AET institutions, IRAG, ANPROCA for the main ones) have a low level of collaboration.

Indicators relating to GCC Integration Pilot into the AEMIP Revised Result Framework

According to the AEMIP Results Framework (see **Annex 5** infra), most of the indicators (applied to either Activities or Outcomes or Intermediate Results) are sourced from the "Feed the Future Handbook" (and numbered as follows: 4.5.2-5, 4.5.2-6, 4.5.2-7, 4.5.2-12, 4.5.2-32, and 4.5.2-34), and only one indicator is sourced from the "GCC Handbook" (and numbered 4.8.2-26). Among these indicators, three can be directly linked to the GCC Integration Pilot:

- 4.5.2-32: Number of stakeholders using climate change information in their decision making as a result of USG assistance
- 4.8.2–26: Number of stakeholders who have enhanced to adapt / ability to respond to the impacts of climate change through the USG
- 4.5.2-34: Number of stakeholders implementing risk-reducing practices/actions to improve resilience to climate change as a result of USG assistance

As the activities of the AEMIP/GCC Integration Pilot are not yet launched, and thus USG Assistance has not yet been delivered, the three indicators are set to 0 in the baseline.

4.2. Recommendations

In order not to disperse efforts and to allow for a quick start of the GCCC Integration Pilot part of the AEMIP, here below are six main recommendations for actions to be implemented in the short term by the AEMIP project unit, and ordered by priority:

1. Request a meeting with the Minister of Environment and the high level civil servants in charge of climate change issues, in order to get clarity about tasks/responsibilities

As highlighted in **Part 3.1** supra, climate change issues are dealt with three different services/persons, causing dysfunctions and delay. As the Ministry of Environment is supposed to coordinate all domestic policies and measures related to climate change, including the present AEMIP/GCCC Integration Pilot, it is necessary to have a clear understanding of who is doing what, and – in case the dysfunctions identified in the baseline study are confirmed during the meeting – try to coordinate with other donors active in the field of climate change (UNDP, GEF, AFD, etc.) in order to have a concerted outreach and get more clarity from the Ministry and, eventually, facilitate a reorganisation of the services.

This is crucial for the successful deployment of the project: the delay in preparing the 1CN and 2CN, in implementing the NAPA's project, etc. are there to prove that a good mainstreaming of climate change policies within the Ministry of Environment first is needed, before to launch any inter-sectoral initiative about CSA. Preliminary discussions with El Hadj DIALLO (CERESCOR), who is apparently the most knowledgeable about climate change policies in Guinea, would be useful.

2. Facilitate a meeting with an enlarged group of stakeholders that are or that should be active in facilitating the adaptation of agriculture to climate change

As highlighted in **Parts 3.1, 3.2 and 3.3.** supra, dialogue among the stakeholders having to play a role in adaptation of agriculture is deficient. Most of them do not have a clear understanding of the climate change phenomenon, are not aware of the need to urgently prepare the adaptation of agriculture to climate change, and consequently do not have ideas of how it could be done practically.

The representatives to be invited could be from the following institutions: four Ministries in charge of rural development (Environment/Forests, Agriculture, Livestock, and Fisheries), Ministry in charge of Vocational Training, Ministry in charge of Higher Education, ANDASA, ANPROCA, IRAG, ND of Meteorology, CERESCOR, CNOP-G, CONEG (or one member Federation like ANAVIG).

In order to quickly raise awareness among the stakeholders, such a meeting could be based on the following presentations: (i) Upgrading about the climate change phenomenon, insisting on its irreversibility and global nature (see figure below), (ii) Main findings of the 2013 IPCC Report, with focus on West Africa (temperature, rainfall, sea level rise by 2050), (iii) Refined climatic projections for Guinea (UNDP, ENSEMBLE, CORDEX. To be determined depending on availability), (iv) Key findings from the IFPRI modelling on climate change impact on crop production, (v) Overview of the current (deficient) mainstreaming of climate change into national policies (see **Part 2.4** supra).

A key outcome of the meeting would be to make very clear to all that the climate change phenomenon is not only linked to local deforestation, but also global GHG emissions, and that there is a urgent need to adapt, since the climate system will not return back to equilibrium in the short term, whatever we do:

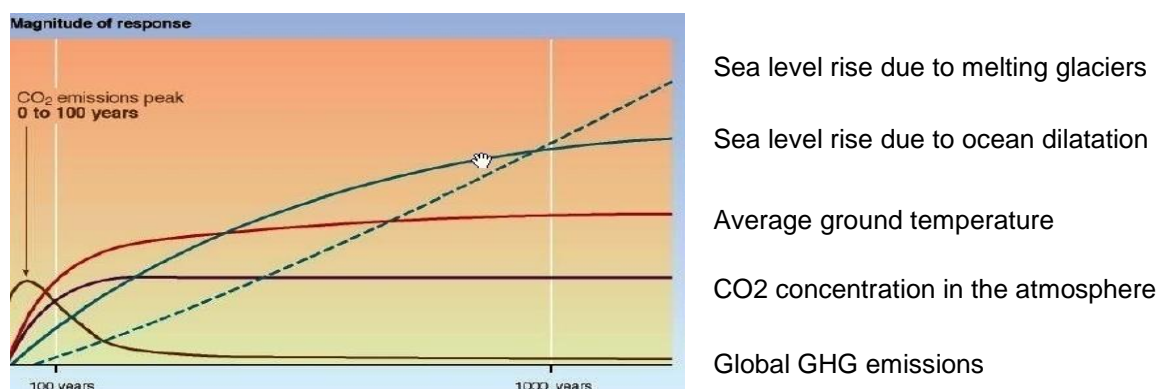


Figure 32 - Inertia of the climate system (IPCC, 2001)

“There will be no return to prior conditions over the course of individual lifetimes [...] even if we reach a peak of GHG emissions in the coming decades, climate change will continue for hundreds of years, because of the “lifetime” of the GHG in the atmosphere” (IPCC, 2013)

3. Facilitate a meeting of the RAFARGUI members to update all of them about adaptation of agriculture to climate change and start a common reflexion about CSA and CSA-ET

As presented earlier (see **Parts 2.2 and 3.2** supra), the RAFARGUI gathers all the Guinean AET stakeholders. Climate change is not yet on the agenda of the *Réseau FAR*, its overarching network, neither on RAFARGUI's Agenda, but it could be proposed to facilitate a meeting about CSA/CSA-ET.

Such a meeting could be based on the same brief presentations than presented just above, followed with exchanges on views on how to progress the debate efficiently and practically (i.e. how to design CSA strategies adapted to local conditions and integrate ad hoc CSA-ET into the curricula of the AET institutions). At this stage, the four-step work plan presented earlier (see **Part 2.4** supra) could be proposed to the RAFARGUI: (i) Identify the main farming system per agro-ecological regions, (ii) Assess the vulnerability and resilience of each specific farming system, (iii) Design appropriate CSA strategies and techniques, and (iv) Design and implement CSA-ET.

4. Launch a restricted working group to implement the four-step work plan aiming at identifying the main farming systems and designing/implementing ad hoc CSA/CSA-ET

IRAG would be the most adequate institution to lead such a work from a scientific and technical point of view, having the necessary human resources. Proposing such a leading role to the CNOP-G could also be a good opportunity to underscore the strategic importance of including an ad hoc Programme on adaptation to climate change in their Strategic Plan.

The restricted working group could also include the DN Meteorology, ANPROCA, ISAVF, and CNOP-G. If pilot sites are selected for implementing CSA activities, dedicated support could be provided to the DN Meteorology in order to rehabilitate agro-meteorological stations nearby and be involved in the monitoring and evaluation.

The first CSA strategies to be produced could address the rice sector, as it is – by far - the main food crop in Guinea, and be focused on the following vulnerable farming system: recession rice in the Niger valley and its tributaries (Haute-Guinée), lowland rice (without bundling / water control) in Guinée forestière, mangrove rice (without bundling / water control) in Basse-Guinée, and rainfed rice in the hillsides of Fouta Djallon (Moyenne Guinée).

It could help the AET Stakeholders to practically understand the process and, later, start working on other farming systems.

5. Liaise the AET Stakeholders (through RAFARGUI if possible) to the international and sub-regional institutions active in AET and CSA-ET

All the relevant institutions in that regard were identified and presented in **Part 2.2** supra. The following actions could be carried out:

- Ask for the curricula on adaptation of agriculture to climate change to CILSS and WASCAL;
- Ask for specific documents (listed in **Part 2.2** : brochures, reports, newsletters, etc.) to the other institutions;

6. Train AET Faculty to the basics of climate change: phenomenon, projections, and actions

In order to quickly upgrade their knowledge, and avoid further dissemination of counter-productive explanations (e.g. climate change = local deforestation / back to normal = reforestation), a simple training course focused on three presentations could be organised in all the AET institutions, for all the Faculty: (i) Phenomenon (greenhouse effect, the GHG in general, the GHG from agriculture and land use, etc.), (ii) Projections (by 2050: globally, in West Africa, and in Guinea, impacts on agriculture and livelihood, etc.), (iii) Actions (mitigation in the rural sector, adaptation in the rural sector, concept of CSA, etc.)

Annex 1 – Key human and economic factors for Guinea and neighbouring countries

Year	Source		Gambia	Guinea	B. Guinea	Liberia	Mali	Senegal	S. Leone
POPULATION									
2011**	WB database	Population (1,000 inhab)	1 776	10 222	1 547	4 129	15 840	12 768	5 997
2011	WB database	Growth rate (%/yr)	2,7	2,4	2,1	3,3	3,0	2,6	2,2
2011**	WB database	Population density (inhab/km ²)	173	41	54	41	13	65	82
2011**	WB database	Rural population (% of total)	43	65	56	52	65	57	61
LAND USE									
2011	FAOSTAT	Cropland (% of total)	45	14	20	7	6	20	17
2011	FAOSTAT	Grassland (% of total)	16	44	38	21	28	29	31
2011	FAOSTAT	Forest land (% of total)	48	26	72	45	10	44	38
2011	FAOSTAT	Other, e.g. bareland (% of total)	-	16	-	28	56	7	14
1990	GLASOD	Land degradation (0=nil, 4=very strong)	1,3	1,0	1,3	0,6	1,1	1,5	1,0
LDC's CRITERIA									
2011	WB database	Gross national income per capita (current US\$)	500	430	600	330	610	1 070	340
2008	UN	Human capital index	50	42	37	41	39	46	27
2008	UN	Economic vulnerability index	64	26	55	54	39	35	43
AGRICULTURE									
2011**	WB database	Share of agriculture in GDP (%)	19	22	57	53	37	15	44
1990*-2011**	WB database	Change of this share from 1990 to 2011 (%)	-	-2	-4	-1	-9	-5	-3
Most recent (1976-2012)	WB database	Employment in agriculture (%)	65	76	-	49	42	34	69
2011**	WB database	Averaged grain yield (kg/ha)	1 127	1 409	1 555	1 179	1 615	1 197	1 554
1990*-2011**	WB database	Change of this yield from 1990 to 2011 (%)	12	-3	2	15	122	51	29
2009-2012	AMESD	Climatic condition index for agropastoralism ****	25	7	18	0	23	40	0
FORESTRY									
2005-2010	FRA 2010	Gross deforestation rate (%/yr)	-0,4	0,5	0,5	0,7	0,6	0,5	0,7
2000-2010	AMESD	Fires/100 km ² /yr (2000-2010)	13	25	15	3	3	10	22
2000	FAOSTAT	Share of forestry in GDP (%)	0,9	1,9	13,3	8,2	6,0	1,3	4,9
LIVESTOCK									
2011	FAOSTAT	Livestock per capita (TLU/1,000 inhab)	193	398	382	39	628	299	112
FISHERIES									
Most recent (2003-2008)	FAOSTAT	Share of fisheries in GDP (%)	2,5	3,6	4,0	3,2	4,2	1,9	9,4
2010	FAOSTAT	Fisheries production (tonnes/1000 inhab)	26,2	10,7	4,4	0,1	6,4	32,1	33,4
COASTLINE									
2011	WB database	Share of land < 5m asl (%)	16,6	1,1	9,5	0,4	-	4,5	3,0
2010	Atlas of mangrove	Share of mangroves (km ²)	583	2 043	3 002	110	-	1 289	1 055

Year	Source		Gambia	Guinea	B. Guinea	Liberia	Mali	Senegal	S. Leone
VULNERABILITY									
<i>Gouvernance</i>									
2011	WB database	Public sector governance index*****	3,2	2,6	2,6	2,8	3,3	3,6	3,1
<i>Biodiversity</i>									
2008	WB database	GEF biodiversity index (0=nil, 100=max)	0,1	2,3	0,6	2,6	1,5	1,0	1,3
<i>Water</i>									
2011**	WB database	Population with access to drinkable water (%)	89	74	64	73	64	72	55
1990*-2011**	WB database	Change of this share from 1990 to 2011 (%)	20	45	78	26	129	18	45
<i>Food Security</i>									
2011**	WB database	Prevalence of malnutrition (% of children < 5)	16	21	17	20	28	19	21
1990*-2011**	WB database	Change of this share from 1990 to 2011 (%)	-32	-2	-	15	-27	1	-16
<i>Health</i>									
2011**	WB database	Hospital beds (per 1 000 people)	1,1	0,3	1,0	0,8	0,1	0,3	0,4
1990*-2011**	WB database	Change of this ratio from 1990 to 2011	80,1	-45,5	-34,9	-	-	-53,9	-
<i>Poverty</i>									
2011**	WB database	Population sous le seuil national de pauvreté (%)	28	18	18	24	13	15	28
<i>Insecurity</i>									
2013	French Min. of FA	Insecurity index (0 to 100)***	-	0	7	50	91	12	-
<i>Infrastructures</i>									
2011**	WB database	Road density (km/100 km ²)	33	18	12	10	2	8	-
2011**	WB database	Paved roads (% of total)	19	10	28	6	25	32	8

*Or most recent year for the 1976-1999 period

**Or most recent year for the 2000-2012 period

***Weighting on local risks index calculated by the French Ministry of Foreign Affairs (Not recommended = 100, only for compelling reason = 50, normal = 0)

****Weighting local conditions index calculated by AMESD (favourable = 100, not favourable = -100, normal = 0)

*****based on European Policy Institute Network database, (1 = weak to 6 = strong)

Data sources:

WB database: <http://databank.worldbank.org/>

FAOSTAT: <http://faostat.fao.org/>

Global Assessment of Human-induced Soil Degradation (GLASOD): <http://www.isric.org/projects/global-assessment-human-induced-soil-degradation-glasod>

UN: http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_data.shtml

African Monitoring of the Environment for Sustainable Development (AMESD): <http://www.agrhymet.ne/AMESD.htm>

Ministry of Foreign Affairs (*Ministère des affaires étrangères* - MAE): <http://www.diplomatie.gouv.fr/fr/conseils-aux-voyageurs/>

Annex 2 – USAID research questions and baseline questionnaires

→ USAID research questions

The two questions, included in the terms of reference, were as follows:

Q1: To what extent has AEMIP institutionalized gender-responsive climate change into the course/research curriculum? (Based on baseline, mid-term, and post-survey results measuring stakeholder knowledge and perceptions of climate change as a component of the curriculum. Based as well on a measurement of the knowledge-base that has been established [databases, papers, conferences, etc.] over the same time period).

Q2: To what extent has the new curriculum and research supported by AEMIP led to improved technical extension work and agricultural practices of male and female farmers as they relate to addressing new conditions brought upon through climate change? (Based on the number of applied research field activities conducted, adoption of technology, number of hectares under improved management, and yields. Based also on complementary qualitative indicators, such as survey of farmers participating in projects using new techniques).

→ Winrock research sub-questions

The two USAID questions were detailed by Winrock into 12 sub-questions (seven for Q1, five for Q2), also included in the terms of reference, as follows:

Q1.1: To what extent can AET faculty articulate an academic-level understanding of climate change adaptation, biodiversity or NRM topics?

Q1.2: What is the current scope, depth and effectiveness of climate change adaptation, biodiversity and NRM certificate/degree-granting programs, coursework, short-term training, and research in AET institutions in Guinea?

Q1.3: What is the current scope and depth of faculty credentials (degrees, certificates, short-term training, and published research) in climate change adaptation, biodiversity and NRM topics?

Q1.4: To what extent do AET students and faculty have access to external coursework, short-term training, research funding and practicums on climate change adaptation, biodiversity and NRM topics? Who are the external providers? And to what extent are they utilizing this access?

Q1.5: To what extent do AET students and faculty have access to information services/knowledge bases related to climate change adaptation, biodiversity and NRM (national, regional and international databases, papers, conferences, journals)? And to what extent are they utilizing this access? What are the information services/knowledge bases they are most commonly accessing?

Q1.6: To what extent are AET students and faculty participating in national, regional and international dialogues, networks and platforms for climate smart agriculture, biodiversity and NRM?

Q1.7: What efforts have been made by the Ministry of Higher Education's to integrate climate change adaptation into AET in Guinea? What additional efforts are necessary?

Q2.1: To what extent are AET institutions developing climate smart agricultural technologies for male and female farmers and entrepreneurs? To what extent are they developing these by conducting applied research field activities? What are the mechanisms and platforms (other than applied research field activities) used to disseminate climate smart agricultural technologies to male and female farmers and entrepreneurs? How effective are these mechanisms and platforms?

Q2.2: To what extent are surveyed community-level institutions engaged in climate adaptation activities (such as developing and executing an adaptation management plan, forestry plan, land use plan, practicing conservation agriculture, etc). How are these activities reinforcing technology uptake? To what extent have these activities resulted in increased number of hectares under improved management, and increased yields?

Q2.3: What are the current mechanisms and platforms to coordinate with AET institutions to advance national gender-responsive climate change policies and protocols, and develop and disseminate climate smart technologies - among the public sector (ministries, government research institutions, and public extension systems), private sector (input suppliers, business development services, processors, wholesalers and retailers), and civil society sector (cooperatives, producer groups, forest and water user groups, non-governmental organizations [NGOs] and community-based organizations [CBOs])? How effective are these mechanisms and platforms?

Q2.4: What are the current mechanisms and platforms for civil society (such as cooperatives, producer groups, forest and water user groups, non-governmental organizations [NGOs] and community-based organizations [CBOs]) to coordinate with government and AET institutions to advance national climate change policies and protocols, and develop and disseminate climate smart technologies? How effective are these mechanisms and platforms?

Q2.5: What are the current mechanisms and platforms for the agribusiness private sector (input suppliers, business development services, processors, wholesalers and retailers) to coordinate with government and AET institutions to advance national climate change policies and protocols, and develop and disseminate climate smart technologies? How effective are these mechanisms and platforms?

→ Translation of USAID questions and Winrock sub-questions into baseline questionnaires

Seven groups of stakeholders were identified: AET faculty, AET student, agriculture researchers, leaders/members of umbrella farmers' groups (Federation or Union), leaders/members of farmers' groups (grassroot level), private stakeholders, and rural radio. The questionnaires that follow are registered as is: PROF = AET faculty, ETUD = AET student, IRAG = agriculture researchers, FAIT = leaders/members of umbrella farmers' groups, OPA = leaders/members of farmers' groups, PRIV = private stakeholders, and RADIO = rural radio.

For each group, the USAID questions and Winrock/AEMIP sub-questions were "translated" into simpler multiple choice questions (in easy French and avoiding conceptual terms), with the possibility to add comments any time deemed necessary by the investigator and/or the person investigated. Therefore, in the questionnaires, most of the questions (number in 1st column) are linked to one or two sub-questions (number in 2nd column, i.e. 1.3 corresponds to the 3rd sub-question / question 1).

The questions which are not linked to sub-questions serve as "revealing questions":

- For PROF, ETUD, IRAG, and RADIO questionnaires: the six first questions are straightforward (Yes I know, No I do not know): (i) Can you explain the greenhouse effect phenomenon? (ii) if yes, can you name the three main GHG in the agricultural sector? (iii) If yes, do you know what is the increase of temperature considered dangerous by the international community? (iv) Do you know what is the major objective that came out of the Nagoya conference on biodiversity? (v) Do you know the names of the three Rio conventions? (vi) What is the "Great Green Wall"?

If, for instance, a person investigated has no any clue about the greenhouse effect phenomenon, or mix it with other issues (e.g. ozone layer, earthquake, etc.), the investigator will be vigilant in the following questions and avoid taking answers as face value if they are apparently contradictory with the revealed level of knowledge of the investigated person (e.g. contradiction if an investigated person has no clue about climate change but claims having frequent training/information about it).

The "multifaceted" natures of the concepts and the openness of the questions are indeed favourable to questionnaire bias, i.e. an investigated person tending to respond the way he expects the investigator would like (e.g. an investigated person having no clue about climate change could claim receiving information about these topics and be interested in it if they assume the investigator would then latter facilitate their involvement in a project focused on climate change)

- For PRIV, FAIT, and OPA questionnaires: the six first questions aim at assessing the level of perception by the person investigated of global and local environmental changes (i.e. whether she/he noticed a change in terms of climatic conditions, biodiversity richness, or soil fertility/texture), as well as her/his perception of the impacts caused on their production, and her/his (potential) change of practices to cope with these global and local environmental changes.

Once again, having these questions/answers exchanges at the beginning of the interview allow the investigator to triangulate answers given to the following questions.

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PROF-	Prénom :	Nom :	Sexe :	Fonction :	Institution :	Date :	Enquêteur :	
# Q	TdR	Questions			Réponses			
1		Savez-vous à quoi est dû l'effet de serre ?			Emissions de GES	Ne sait pas	Autre :	
2		Si oui, pouvez-vous citer les 3 principaux GES du secteur agricole ?			CO2, CH4, N2O	Ne sait pas	Autre :	
3		Si oui, connaissez-vous le seuil d'augmentation de T jugé "inquiétant" par la communauté int. ?			+2°C (par rapport à 1750)	Ne sait pas	Autre :	
4		Savez-vous quel est l'objectif majeur qui est sorti de la Conférence de Nagoya sur la biodiversité ?			Viser 17% d'AP terrestre	Ne sait pas	Autre :	
5		Connaissez-vous les noms des 3 conventions de Rio ?			CCNUCC / CBD / UNCCD	Ne sait pas	Autre :	
6		Qu'est ce que la "Grande Muraille Verte" ?			Boisement sub-saharien	Ne sait pas	Autre :	
7		Pour quelle institution / quel type de client formez vous principalement vos élèves ?			Fonction publique	OPA	Secteur privé	Autre :
8	1.5	Avez-vous accès à de l'information sur l'adaptation au changement climatique ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
9	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
10	1.5	Avez-vous accès à de l'information sur la protection de la biodiversité ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
11	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
12	1.5	Avez-vous accès à de l'information sur la protection des ressources naturelles ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
13	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
14	1.3	Avez-vous reçu des formations, voire publié, sur l'adaptation au changement climatique ?			Diplôme univ.	Certificat	Formation courte	Publi
15	1.3	Si oui, titre (de l'attestation ou l'article), date (année) et revue (si publi) ?						
16	1.4	Si oui, nom de l'organisme de formation et modalité d'accès (si payant : combien ?)						
17	1.3	Avez-vous reçu des formations, voire publié, sur la protection de la biodiversité ?			Diplôme univ.	Certificat	Formation courte	Publi
18	1.3	Si oui, titre (de l'attestation ou l'article), date (année) et revue (si publi) ?						
19	1.4	Si oui, nom de l'organisme de formation et modalité d'accès (si payant : combien ?)						
20	1.3	Avez-vous reçu des formations, voire publié, sur la protection des ressources naturelles ?			Diplôme univ.	Certificat	Formation courte	Publi
21	1.3	Si oui, titre (de l'attestation ou l'article), date (année) et revue (si publi) ?						
22	1.4	Si oui, nom de l'organisme de formation et modalité d'accès (si payant : combien ?)						
23	1.1	Abordez-vous la question de l'adaptation au changement climatique dans vos cours ?			En profondeur	Superficiellement	Non	Comment:
24	1.2	Si oui, sur quels sujets précis et pendant combien d'heures dans l'année ?						
25	1.1	Abordez-vous la question de la protection de la biodiversité dans vos cours ?			En profondeur	Superficiellement	Non	Comment:
26	1.2	Si oui, sur quels sujets précis et pendant combien d'heures dans l'année ?						
27	1.1	Abordez-vous la question de la protection des ressources naturelles dans vos cours ?			En profondeur	Superficiellement	Non	Comment:
28	1.2	Si oui, sur quels sujets précis et pendant combien d'heures dans l'année ?						
29	2.1	Avez-vous déjà développé des pratiques agricoles résilientes au CC pour des paysans/transformateurs ?			Oui, plusieurs fois	Oui, au moins 1 fois	Jamais	Comment:
30	2.1	Si oui, comment avez-vous fait le développement			Transposition	Essai en station	Essai milieu paysan	Comment:
31	2.1	Si oui, avez-vous disséminé ces pratiques et comment ?			ANPROCA	CNOP-G	Fédé :	Autre :
32	2.1	Si oui, pouvez-vous estimer le nombre d'adoptants ?			> 1000	1 000 > x > 100	< 100	Autre :
33	2.2	Si oui, avez-vous communiqué vos résultats à des AET ou OPA ou privés, en dehors de votre Région ?			Non	Oui (comment ?) :		
34		Discussion libre (capture d'éléments non ciblés dans les questions)						

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ETUD-	Prénom :	Nom :	Sexe :	Fonction :	Institution :	Date :	Enquêteur :	
# Q	TdR	Questions			Réponses			
1		Savez-vous à quoi est dû l' effet de serre ?			Emissions de GES	Ne sait pas	Autre :	
2		Si oui, pouvez-vous citer les 3 principaux GES du secteur agricole ?			CO2, CH4, N2O	Ne sait pas	Autre :	
3		Si oui, connaissez-vous le seuil d'augmentation de T jugé "inquiétant" par la communauté int. ?			+2°C (par rapport à 1750)	Ne sait pas	Autre :	
4		Savez-vous quel est l'objectif majeur qui est sorti de la Conférence de Nagoya sur la biodiversité ?			Viser 17% d'AP terrestre	Ne sait pas	Autre :	
5		Connaissez-vous les noms des 3 conventions de Rio ?			CCNUCC / CBD / UNCDD	Ne sait pas	Autre :	
6		Qu'est ce que la " Grande Muraille Verte " ?			Boisement sub-saharien	Ne sait pas	Autre :	
7		Pour quelle institution / quel type de client comptez vous travailler une fois diplômé(e) ?			Fonction publique	OPA	Secteur privé	Autre :
8	1.5	Avez-vous accès à de l' information sur l' adaptation au changement climatique ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
9	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
10	1.5	Avez-vous accès à de l' information sur la protection de la biodiversité ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
11	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
12	1.5	Avez-vous accès à de l' information sur la protection des ressources naturelles ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
13	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
14	1.2	Avez-vous reçu des formations sur l' adaptation au changement climatique ?			Souvent (> 1 module)	Rarement (< 1 mod.)	Jamais	Comment:
15	1.2	Si oui et dans l'AET, thèmes et date (année) ?						
16	1.4	Si oui et hors AET, nom de l' organisme de formation et modalité d'accès (si payant : combien) ?						
17	1.2	Avez-vous reçu des formations sur la protection de la biodiversité ?			Souvent (> 1 module)	Rarement (< 1 mod.)	Jamais	Comment:
18	1.2	Si oui et dans l'AET, thèmes et date (année) ?						
19	1.4	Si oui et hors AET, nom de l' organisme de formation et modalité d'accès (si payant : combien) ?						
20	1.2	Avez-vous reçu des formations sur la protection des ressources naturelles ?			Souvent (> 1 module)	Rarement (< 1 mod.)	Jamais	Comment:
21	1.2	Si oui et dans l'AET, thèmes et date (année) ?						
22	1.4	Si oui et hors AET, nom de l' organisme de formation et modalité d'accès (si payant : combien) ?						
23	2.1	Avez-vous déjà développé des pratiques agricoles résilientes au CC pour des paysans/transformateurs ?			Oui, plusieurs fois	Oui, au moins 1 fois	Jamais	Comment:
24	2.1	Si oui, comment avez-vous fait le développement			Transposition	Essai en station	Essai milieu paysan	Comment:
25	2.1	Si oui, avez-vous disséminé ces pratiques et comment ?			ANPROCA	CNOP-G	Fédé :	Autre :
26	2.1	Si oui, pouvez-vous estimer le nombre d'adoptants ?			> 1000	1 000 > x > 100	< 100	Autre :
27	2.2	Si oui, avez-vous communiqué vos résultats à des AET ou OPA ou privés, en dehors de votre Région?			Non	Oui (comment ?) :		
28		Discussion libre (capture d'éléments non ciblés dans les questions)						

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IRAG-	Prénom :	Nom :	Sexe :	Fonction :	Institution :	Date :	Enquêteur :		
# Q	TdR	Questions			Réponses				
1		Savez-vous à quoi est dû l'effet de serre ?			Emissions de GES	Ne sait pas	Autre :		
2		Si oui, pouvez-vous citer les 3 principaux GES du secteur agricole ?			CO2, CH4, N2O	Ne sait pas	Autre :		
3		Si oui, connaissez-vous le seuil d'augmentation de T jugé "inquiétant" par la communauté int. ?			+2°C (par rapport à 1750)	Ne sait pas	Autre :		
4		Savez-vous quel est l'objectif majeur qui est sorti de la Conférence de Nagoya sur la biodiversité ?			Viser 17% d'AP terrestre	Ne sait pas	Autre :		
5		Connaissez-vous les noms des 3 conventions de Rio ?			CCNUCC / CBD / UNCDD	Ne sait pas	Autre :		
6		Qu'est ce que la "Grande Muraille Verte" ?			Boisement sub-saharien	Ne sait pas	Autre :		
7		Pour quelle institution / quel type de client menez-vous principalement vos recherches ?			Fonction publique	OPA	Secteur privé	Autre :	
8	1.5	Avez-vous accès à de l'information sur l'adaptation au changement climatique ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:	
9	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?							
10	1.5	Avez-vous accès à de l'information sur la protection de la biodiversité ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:	
11	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?							
12	1.5	Avez-vous accès à de l'information sur la protection des ressources naturelles ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:	
13	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?							
14	1.3	Avez-vous reçu des formations, voire publié, sur l'adaptation au changement climatique ?			Diplôme univ.	Certificat	Formation courte	Publi	
15	1.3	Si oui, titre (de l'attestation ou l'article), date (année) et revue (si publi) ?							
16	1.4	Si oui, nom de l'organisme de formation et modalité d'accès (si payant : combien ?)							
17	1.3	Avez-vous reçu des formations, voire publié, sur la protection de la biodiversité ?			Diplôme univ.	Certificat	Formation courte	Publi	
18	1.3	Si oui, titre (de l'attestation ou l'article), date (année) et revue (si publi) ?							
19	1.4	Si oui, nom de l'organisme de formation et modalité d'accès (si payant : combien ?)							
20	1.3	Avez-vous reçu des formations, voire publié, sur la protection des ressources naturelles ?			Diplôme univ.	Certificat	Formation courte	Publi	
21	1.3	Si oui, titre (de l'attestation ou l'article), date (année) et revue (si publi) ?							
22	1.4	Si oui, nom de l'organisme de formation et modalité d'accès (si payant : combien ?)							
23	1.1	Abordez-vous la question de l'adaptation au changement climatique dans vos recherches ?			En profondeur	Superficiellement	Non	Comment:	
24	1.2	Si oui, sur quels sujets précis et depuis combien de temps ?							
25	1.1	Abordez-vous la question de la protection de la biodiversité dans vos recherches ?			En profondeur	Superficiellement	Non	Comment:	
26	1.2	Si oui, sur quels sujets précis et depuis combien de temps ?							
27	1.1	Abordez-vous la question de la protection des ressources naturelles dans vos recherches ?			En profondeur	Superficiellement	Non	Comment:	
28	1.2	Si oui, sur quels sujets précis et depuis combien de temps ?							
29	2.1	Avez-vous déjà développé des pratiques agricoles résilientes au CC pour des paysans/transformateurs ?			Oui, plusieurs fois	Oui, au moins 1 fois	Jamais	Comment:	
30	2.1	Si oui, comment avez-vous fait le développement			Transposition	Essai en station	Essai milieu paysan	Comment:	
31	2.1	Si oui, avez-vous disséminé ces pratiques et comment ?			ANPROCA	CNOP-G	Fédé :	Autre :	
32	2.1	Si oui, pouvez-vous estimer le nombre d'adoptants ?			> 1000	1 000 > x > 100	< 100	Autre :	
33	2.2	Si oui, avez-vous communiqué vos résultats à des AET ou OPA ou privés, en dehors de votre Région?			Non	Oui (comment ?) :			
34	Discussion libre (capture d'éléments non ciblés dans les questions)								

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FAIT-	Prénom :	Nom :	Sexe :	Fonction :	Institution :	Date :	Enquêteur :	
# Q	TdR	Questions			Réponses			
1		Avez-vous remarqué des changements (pluie, température, etc.) depuis plusieurs années ?			Oui	Non	Ne sait pas :	
2		Si oui, comment les expliquez-vous ?			Effet de serre	Ne sait pas	Autre :	
3		Avez-vous modifié vos pratiques agricoles à cause de cela ?			Oui	Non	Comment :	
4		Avez-vous remarqué un appauvrissement de la faune et/ou flore depuis plusieurs années ?			Oui	Non	Ne sait pas :	
5		Pensez-vous que cela a des incidences sur votre production ?			Oui	Ne sait pas	Comment :	
6		Avez-vous remarqué une dégradation des ress. naturelles (en général) depuis plusieurs années ?			Oui	Non	Ne sait pas :	
7		Avez-vous remarqué des incidences de la dégradation des ress. naturelles sur votre production ?			Oui	Ne sait pas	Comment :	
8	2.2/2.4	Avez-vous accès à des informations , des conseils sur l' adaptation au changement climatique ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
9	2.2/2.4	Si oui, noms des supports (IRAG, ANPROCA, OPA faitière, ONG/projet, radio rurale, autre) ?						
10	2.2/2.4	Si oui, description très succincte de ces informations/conseils ?						
11	2.2/2.4	Si oui, avez-vous noté une amélioration de votre production avec ces informations/conseils ?			Oui, fortement	Oui, faiblement	Non	Comment:
12	2.2/2.4	Avez-vous accès à des informations , des conseils sur la protection de la biodiversité ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
13	2.2/2.4	Si oui, noms des supports (IRAG, ANPROCA, OPA faitière, ONG/projet, radio rurale, autre) ?						
14	2.2/2.4	Si oui, description très succincte de ces informations/conseils ?						
15	2.2/2.4	Si oui, avez-vous noté une amélioration de votre production avec ces informations/conseils ?			Oui, fortement	Oui, faiblement	Non	Comment:
16	2.2/2.4	Avez-vous accès à des informations , des conseils sur la protection des ressources naturelles ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
17	2.2/2.4	Si oui, noms des supports (IRAG, ANPROCA, OPA faitière, ONG/projet, radio rurale, autre) ?						
18	2.2/2.4	Si oui, description très succincte de ces informations/conseils ?						
19	2.2/2.4	Si oui, avez-vous noté une amélioration de votre production avec ces informations/conseils ?			Oui, fortement	Oui, faiblement	Non	Comment:
20	2.1	Avez-vous déjà été associé à des essais de pratiques agricoles résilientes au CC ?			Oui, plusieurs fois	Oui, au moins 1 fois	Jamais	Comment:
21	2.1	Si oui, description très succincte des essais ?						
22	2.1	Si oui, avez-vous noté une amélioration de votre production avec ces essais ?			Oui, fortement	Oui, faiblement	Non	Comment:
23	2.1	Si oui, pouvez-vous estimer le nombre d'adoptants ?			> 10000	1 000 > x > 100	< 100	Autre :
24		Discussion libre (capture d'éléments non ciblés dans les questions)						

**Agriculture Education and market Improvement Programme (AEMIP)
Baseline study for the AEMIP Global Climate Change Integration Pilot**

PRIV-	Prénom :	Nom :	Sexe :	Fonction :	Institution :	Date :	Enquêteur :	
# Q	TdR	Questions			Réponses			
1		Avez-vous remarqué des changements (pluie, température, etc.) depuis plusieurs années ?			Oui	Non	Ne sait pas :	
2		Si oui, comment les expliquez-vous ?			Effet de serre	Ne sait pas	Autre :	
3		Avez-vous modifié vos pratiques agricoles à cause de cela ?			Oui	Non	Comment :	
4		Avez-vous remarqué un appauvrissement de la faune et/ou flore depuis plusieurs années ?			Oui	Non	Ne sait pas :	
5		Pensez-vous que cela a des incidences sur votre production ?			Oui	Ne sait pas	Comment :	
6		Avez-vous remarqué une dégradation des ress. naturelles (en général) depuis plusieurs années ?			Oui	Non	Ne sait pas :	
7		Avez-vous remarqué des incidences de la dégradation des ress. naturelles sur votre production ?			Oui	Ne sait pas	Comment :	
8	2.2/2.4	Avez-vous accès à des informations , des conseils sur l' adaptation au changement climatique ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
9	2.2/2.4	Si oui, noms des supports (IRAG, ANPROCA, OPA faitière, ONG/projet, radio rurale, autre) ?						
10	2.2/2.4	Si oui, description très succincte de ces informations/conseils ?						
11	2.2/2.4	Si oui, avez-vous noté une amélioration de votre production avec ces informations/conseils ?			Oui, fortement	Oui, faiblement	Non	Comment:
12	2.2/2.4	Avez-vous accès à des informations , des conseils sur la protection de la biodiversité ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
13	2.2/2.4	Si oui, noms des supports (IRAG, ANPROCA, OPA faitière, ONG/projet, radio rurale, autre) ?						
14	2.2/2.4	Si oui, description très succincte de ces informations/conseils ?						
15	2.2/2.4	Si oui, avez-vous noté une amélioration de votre production avec ces informations/conseils ?			Oui, fortement	Oui, faiblement	Non	Comment:
16	2.2/2.4	Avez-vous accès à des informations , des conseils sur la protection des ressources naturelles ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
17	2.2/2.4	Si oui, noms des supports (IRAG, ANPROCA, OPA faitière, ONG/projet, radio rurale, autre) ?						
18	2.2/2.4	Si oui, description très succincte de ces informations/conseils ?						
19	2.2/2.4	Si oui, avez-vous noté une amélioration de votre production avec ces informations/conseils ?			Oui, fortement	Oui, faiblement	Non	Comment:
20	2.1	Avez-vous déjà été associé à des essais de pratiques agricoles résilientes au CC ?			Oui, plusieurs fois	Oui, au moins 1 fois	Jamais	Comment:
21	2.1	Si oui, description très succincte des essais ?						
22	2.1	Si oui, avez-vous noté une amélioration de votre production avec ces essais ?			Oui, fortement	Oui, faiblement	Non	Comment:
23	Discussion libre (capture d'éléments non ciblés dans les questions)							

**Agriculture Education and market Improvement Programme (AEMIP)
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RADIO-	Prénom :	Nom :	Sexe :	Fonction :	Institution :	Date :	Enquêteur :	
# Q	TdR	Questions			Réponses			
1		Savez-vous à quoi est dû l'effet de serre ?			Emissions de GES	Ne sait pas	Autre :	
2		Si oui, pouvez-vous citer les 3 principaux GES du secteur agricole ?			CO2, CH4, N2O	Ne sait pas	Autre :	
3		Si oui, connaissez-vous le seuil d'augmentation de T jugé "inquiétant" par la communauté int. ?			+2°C (par rapport à 1750)	Ne sait pas	Autre :	
4		Savez-vous quel est l'objectif majeur qui est sorti de la Conférence de Nagoya sur la biodiversité ?			Viser 17% d'AP terrestre	Ne sait pas	Autre :	
5		Connaissez-vous les noms des 3 conventions de Rio ?			CCNUCC / CBD / UNCDD	Ne sait pas	Autre :	
6		Qu'est ce que la " Grande Muraille Verte " ?			Boisement sub-saharien	Ne sait pas	Autre :	
7	1.5	Avez-vous accès à de l' information sur l' adaptation au changement climatique ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
8	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
9	1.5	Avez-vous accès à de l' information sur la protection de la biodiversité ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
10	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
11	1.5	Avez-vous accès à de l' information sur la protection des ressources naturelles ?			Souvent (1/mois)	Rarement (>1/mois)	Jamais	Comment:
12	1.5/1.6	Si oui, noms des supports (journal grand public, revue, internet, conférence, réseau/plateforme) ?						
13	1.3	Avez-vous reçu des formations sur l' adaptation au changement climatique ?			Diplôme univ.	Certificat	Formation courte	
14	1.3	Si oui, titre (de l'attestation) et date (année) ?						
15	1.4	Si oui, nom de l' organisme de formation et modalité d'accès (si payant : combien ?)						
16	1.3	Avez-vous reçu des formations sur la protection de la biodiversité ?			Diplôme univ.	Certificat	Formation courte	
17	1.3	Si oui, titre (de l'attestation) et date (année) ?						
18	1.4	Si oui, nom de l' organisme de formation et modalité d'accès (si payant : combien ?)						
19	1.3	Avez-vous reçu des formations sur la protection des ressources naturelles ?			Diplôme univ.	Certificat	Formation courte	
20	1.3	Si oui, titre (de l'attestation) et date (année) ?						
21	1.4	Si oui, nom de l' organisme de formation et modalité d'accès (si payant : combien ?)						
22	1.1	Abordez-vous la question de l' adaptation au changement climatique dans vos programmes radios ?			En profondeur	Superficiellement	Non	Comment:
23	1.2	Si oui, sur quels sujets précis et pendant combien d' heures dans l'année écoulée ?						
24	1.1	Abordez-vous la question de la protection de la biodiversité dans vos programmes radios ?			En profondeur	Superficiellement	Non	Comment:
25	1.2	Si oui, sur quels sujets précis et pendant combien d' heures dans l'année écoulée ?						
26	1.1	Abordez-vous la question de la protection des ressources naturelles dans vos programmes radios ?			En profondeur	Superficiellement	Non	Comment:
27	1.2	Si oui, sur quels sujets précis et pendant combien d' heures dans l'année écoulée ?						
28		Discussion libre (capture d'éléments non ciblés dans les questions)						

**Agriculture Education and market Improvement Programme (AEMIP)
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Annex 3 – Detailed planning of meetings carried out during the field mission

Jour	Date	Olivier BOUYER	Mohamed DIAKITE / Aliou CAMARA	Saliou NIASSY
Samedi	01/03/2014	Arrivée 18h		
Dimanche	02/03/2014	Travail avec Mohamed sur planning, questionnaires, prise de RDV		
Lundi	03/03/2014	Travail de groupe (Melody Mc Neil - USAID, Ibrahima, Bara, Mohamed, Aliou, Olivier) sur planning, questionnaires, prise de RDV		
Mardi	04/03/2014	3 RDV : 1/ Min. Envi, 2/ Min. Agri, 3/ ANPROCA	Conakry => Mamou (5h)	
Mercredi	05/03/2014	3 RDV : 1/ ANDASA, 2/ Min Elevage, 3/ Min. Pêche	ENATEF Mamou (10 Quest. Élève + 4 Quest Prof)	
Jeudi	06/03/2014	3 RDV : 1/ DN Education technique, 2/ DG IRAG, 3/ PNUD	Mamou => Timbi-Madina/Bareng (2h30) FPFD (1 Quest Fédé) + Union FPFD (1 Quest Union) 6 OPA base FPFD (6 Ques. OPA)	Arrivé 18h
Vendredi	07/03/2014	Briefing Saliou/Olivier 2 RDV : 1/ AFD, 2/ USFS Steward	IRAG Bareng (5 Quest. Cherc) Bareng => Mamou (2h30) x? et X? (2 Quest. Privé. A identifier sur place la veille !)	Briefing Saliou/Olivier Conakry => Mamou
Samedi	08/03/2014	Conakry => Dubréka (1h) FOP-BG (1 Quest Fédé) + Union FOP-BG (1 Quest Union) Dubréka => Boffa (2h) ENAE Boffa (10 Quest. Élève + 4 Quest. Prof)	Mamou => Tolo (1/2h) ENAE Tolo (10 Quest. Élève + 4 Quest. Prof) Radio rurale Mamou Tolo => Mamou (1/2h)	
Dimanche	09/03/2014	Suite avec ENAE	Mamou => Faranah (3h) Après-midi libre	
Lundi	10/03/2014	Boffa => Koba (1/2 h) IRAG Koba (5 Quest. Cherc) Koba => Conakry (2h30)	ISAVF Faranah (5 Ques. prof + 10 Ques Élèves) Radio rurale Faranah	
Mardi	11/03/2014	Conakry => Kindia (2h30) IRAG Kilissi (5 Quest. Cherc)	Faranah => Macenta (4h30) Union. Banane + Union FEREPAH + Union riz (3 Quest Union)	Faranah => Macenta (4h30) ENAE Macenta (5 Quest. Prof.)
Mercredi	12/03/2014	Asso. nat. des aviculteurs de Guinée (1 Quest Fédé) 3 OPA base FOP-BG (3 Quest OPA) SIPEF-Guinée (1 Quest privé)	3 OPA base Union Banane + 3 OPA FEREPAH (6 Ques. OPA)	ENAE Macenta (10 Quest. Elève)
Jeudi	13/03/2014	3 OPA base FOP-BG (3 Quest OPA) x? (1 Quest privé)	Macenta => Sérédou (1/2h) IRAG Sérédou (5 Ques. Cherc)	
Vendredi	14/03/2014	Débriefing avec USAID Départ 22h45	Fédé. riz + FEREPAH + (2 Quest. Fédé) + Union riz (1 Quest Union) 6 OPA base riz (6 Quest. OPA)	
Samedi	15/03/2014		SOGUIPA et SOBRAGUI (2 Quest. Privé. A identifier sur place les jours d'avant !) Radio rurale N'Zérékoré	
Dimanche	16/03/2014		Saisie des réponses des questionnaires administrés	
Lundi	17/03/2014		N'Zérékoré => Kankan (7h)	
Mardi	18/03/2014		Journée libre	
Mercredi	19/03/2014		Fédé igname + 2 Unions Fédé igname (2 Quest Union) 6 OPA base Fédé igname (6 Quest OPA) Suite avec Fédé igname CG Coton (1 Quest privé)	ENAE Bordo (5 Quest prof) ENAE Bordo (10 Quest. Elève)
Jeudi	20/03/2014		Fédé riz + 2 Unions Fédé riz (2 Quest Union) 6 OPA base Fédé riz (6 Quest OPA) Suite avec Fédé riz	IRAG Bordo (5 Quest. Cherc) Radio rurale Kankan
Vendredi	21/03/2014		Un gros aviculteur - El Hadj Diané par ex (1 Quest privé)	Saisie des réponses des questionnaires administrés
Samedi	22/03/2014			
Dimanche	23/03/2014		Kankan => Kindia (9h) Kindia => Conakry (2h) Après-midi libre	
Lundi	24/03/2014		Saisie des réponses des questionnaires administrés	
Mardi	25/03/2014		Départ	

Annex 4 – Net margins calculations for rice and yam, traditional vs CS cropping

→ Traditional rainfed rice cropping

DESIGNATION	UNITES	QUANTITES	PRIX UNITAIRE EN FCFA	COUT TOTAL 1 HA EN FCFA	DESIGNATION	UNITES	QUANTITES	PRIX UNITAIRE EN FCFA	RECETTE TOTALE 1 HA EN FCFA
Location terre	ha	1	25 000	25 000					
semence tout venant	kg	50	400	20 000					
urée	kg	0	370	0					
NPK	kg	0	380	0					
Petit matériel	Forfait	1	4 500	4 500					
Sacs (100 kg)	Sacs	8	300	2 400	Paddy	Kg	800	155	124 000
Labour manuel	H/J	28	800	22 400					
Semis à la volée	H/J	2	800	1 600					
Desherbage	H/J	4	800	3 200					
Epannage d'engrais	H/J	0	800	0					
Surveillance oiseaux et ravageurs	H/J	30	800	24 000					
Récolte	H/J	31	800	24 800					
Battage et vannage	H/J	8	800	6 400					
CHARGES				134 300	RECETTE				124 000
MARGE BRUTE									-10 300

→ CS rice cropping

DESIGNATION	UNITES	QUANTITES	PRIX UNITAIRE EN FCFA	COUT TOTAL 1 HA EN FCFA	DESIGNATION	UNITES	QUANTITES	PRIX UNITAIRE EN FCFA	RECETTE TOTALE 1 HA EN FCFA
Location terre	ha	1	25 000	25 000					
semence améliorée	kg	50	625	31 250					
engrais vert (semence de pueraria)	kg	15	700	10 500					
NPK	kg	50	380	19 000					
Petit matériel	Forfait	1	4 500	4 500					
Sacs (100 kg)	Sacs	20	300	6 000	Paddy	Kg	2 000	155	310 000
Labour manuel	H/J	28	800	22 400					
Semi en poquet	H/J	18	800	14 400					
Rabattage plante couvrir/desherbage	H/J	12	800	9 600					
Epannage d'engrais	H/J	4	800	3 200					
Surveillance oiseaux et ravageurs	H/J	30	800	24 000					
Récolte	H/J	78	800	62 000					
Battage et vannage	H/J	20	800	16 000					
CHARGES				247 850	RECETTE				310 000
MARGE BRUTE									62 150

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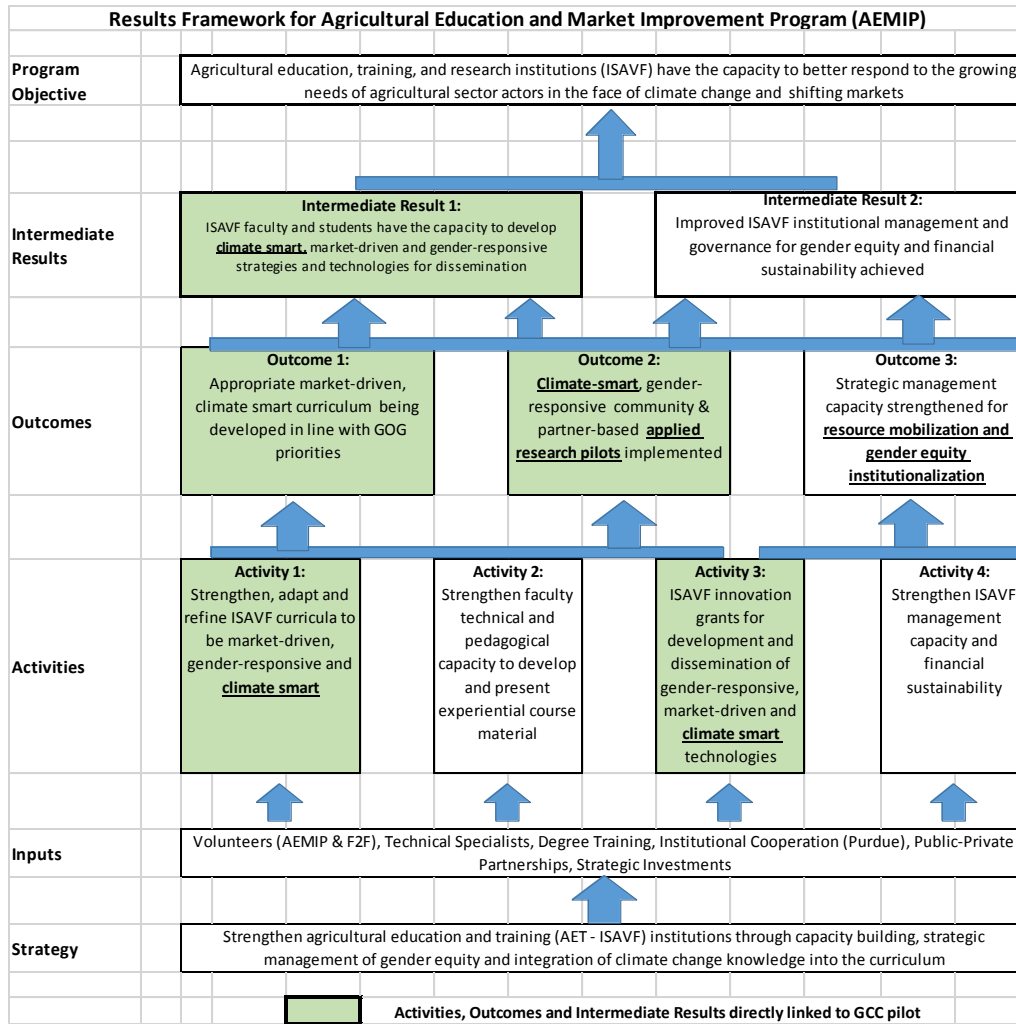
→ Traditional yam cropping

CHARGES D'EXPLOITATION					RECETTES D'EXPLOITATION				
ITEM	UNITE	QUANTITE	PU (FCFA)	PT (FCFA)	ITEM	UNITE	QUANTITE	PU (FCFA)	PT (FCFA)
Achat des semenceaux tout venant*	nb	5 000	250	1 250 000	Igname*	kg	6 500	250	1 625 000
Engrais vert (semences de Pueraria)	kg	-	700						
NPK	kg	-	380						
Buttage*	Butte	5 000	150	750 000					
Désherbage*	hj	30	800	24 000					
Tuteurage	hj	-	800						
Apport de fertilisant	hj	-	800						
Récolte/triage*	hj	60	800	48 000					
Transport (camion Kia)*	Forfait	1	150 000	150 000					
CHARGES				2 222 000	RECETTE				1 625 000
MARGE BRUTE									-597 000

→ CS yam cropping

CHARGES D'EXPLOITATION					RECETTES D'EXPLOITATION				
ITEM	UNITE	QUANTITE	PU (FCFA)	PT (FCFA)	ITEM	UNITE	QUANTITE	PU (FCFA)	PT (FCFA)
Achat des semenceaux améliorés*	nb	5 000	375	1 875 000	Igname	kg	20 000	250	5 000 000
Engrais vert (semences de Pueraria)**	kg	15	700	10 500					
NPK***	kg	290	380	110 200					
Buttage	Butte	5 000	150	750 000					
Rabattage Pueraria / désherbage	hj	60	800	48 000					
Tuteurage	hj	50	800	40 000					
Apport de fertilisant	hj	5	800	4 000					
Récolte/triage	hj	185	800	148 000					
Transport	Forfait	3	150 000	450 000					
CHARGES				3 435 700	RECETTE				5 000 000
MARGE BRUTE									1 564 300

Annex 5 – AEMIP Results Framework and Indicators



Indicators

Goal: Decision-makers promote career opportunities for men and women in climate-smart agriculture

IR 1: *Number of stakeholders with increased capacity to adapt to the impacts of climate variability and change as a result of USG assistance* *

IR 2: Number of AET stakeholders involved annually in ISAVF outreach efforts

Outcome 1: Percent annual increase in the number of applied research projects addressing climate-smart, market-driven, gender-responsive technologies and practices conducted at ISAVF

Outcomes 1 & 2: Number of climate adaption tools, technologies and methodologies developed, tested and/or adopted as a result of USG assistance.

Outcome 2: (1) Number of individuals participating annually in grant program; (2) Number of farmers and others who have applied new technologies or management practices as a result of USG assistance

Outcome 3: Percent annual increase in the annual enrollment of women at ISAVF

Activity 1: Number of new course modules integrated into ISAVF curriculum.

Activity 2: (1) Number of ISAVF faculty receiving short-term TOT training annually; (2) Number of faculty and students using new educational resources for coursework; (3) Number of individuals who have received long-term agricultural sector productivity/food security training

Activity 2&3: Number of people receiving training in global climate change as a result of USG assistance.

Activity 3: (1) Number of individuals participating annually in grant program; (2) number of individuals who have received USG supported short-term agricultural sector productivity/food security training

Activity 4: Number of new mechanism/approaches established and utilized for networking with external AET stakeholders

* Only Winrock indicator in USAID/Guinea's PMP