

ELEMENTS OF A REGIONAL CLIMATE CHANGE
ADAPTATION STRATEGY BASED ON THE RISK-
SHARING APPROACH — WEST AFRICA

June 2007

Consultant : Mr. Madiodio NIASSE

TABLE OF CONTENTS

I. REGIONAL CONTEXT	17
A. Strong Interdependence between the States in the area of Water	17
B. Vulnerability of West Africa to Climate Change	18
II. GOAL AND METHODOLOGY	22
A. Goal of the Study	22
B. Methodology	22
III. RESPONSES TO RECENT CLIMATE CHANGES IN WEST AFRICA	23
IV. LEVEL OF PREPAREDNESS FOR CLIMATE OUTLOOKS	25
A. Climate Outlooks	25
B. Current Responses to Climate Outlooks	26
V. JUSTIFICATION AND OBJECTIVES OF THE RISK-SHARING STRATEGY	31
A. Justification	31
B. Constraints	31
C. Goal and Specific Objectives of the Risk-Sharing Strategy	32
VI. COST-SHARING ACTIONS THAT CAN BE ENVISAGED IN WEST AFRICA	35
A. Strategic Objective 1: Collaboration in the establishment and use of decision-support knowledge bases	35
B. Strategic Objective 2: Collaboration in the development and sustainable exploitation of transboundary natural resources and ecosystems.	36
C. Strategic Objective 3: Identifying, promoting and disseminating appropriate climate change adaptation technologies, techniques and practices	44
D. Strategic Objective 4: Putting in place a regional framework for consultation on climate change and its impacts	46
VII. FINANCING OF ADAPTATION MEASURES	48
VIII. CONCLUSION	49

LIST OF ACRONYMS

ABN: *Autorité du Bassin du Niger*
ABV: *Autorité du Bassin de la Volta*
ACMAD: African Centre of Meteorological Application for Development
AEO: Africa Environmental Outlook
AIACC: Assessments of Impacts and Adaptations to Climate Change
AMMA: African Monsoon Multidisciplinary Analyses
ANBO: African Network of Basin Organizations
AU: African Union
CBLT: *Commission du Bassin du Lac Tchad*
CCAA: Climate Change Adaptation in Africa
CCNUCC: *Convention Cadre des Nation Unies sur les Changements Climatiques*
CEA: *Commission Economique pour l'Afrique*
CIDA: Canadian International Development Agency
CILSS: Permanent Interstate Committee for Drought Control in the Sahel
ECA: Economic Commission for Africa
ECOWAS: Economic Community of West African States
FAO: Food and Agriculture Organisation
FEWS: Famine Early Warning System
FRIEND-AOC: Flow Regimes from International Experimental and Network Data in West and Central Africa
GEF: Global Environment Facility
GHENIS: Upper Niger Hydro-Ecological Management Project
GIEC: *Groupe Intergouvernemental sur l'Évolution du Climat*
GIRENS: Upper Niger Integrated Water Resource Management
GLOMIS: Global Mangrove Database and Information System
GWP: Global Water Partnership
HYCOS-WCA: Hydrological Cycle Observation System for West and Central Africa
IND: Inner Niger Delta
INERA: *Institut de l'Environnement et de Recherches Agricoles* (Institute of the Environment and Agricultural Research)
IPCC: Intergovernmental Panel on Climate Change
ISARM: Internationally Shared Aquifer Resources Management
IWRM: Integrated Water Resource Management
LCBC: Lake Chad Basin Commission
LDC: Least Developed Countries
NAPA: National Adaptation Programme of Action
NBA: Niger Basin Authority
NEPAD: New Partnership for Africa's Development
NESDA: Network for Environment and Sustainable Development in Africa
NGO: Non-Governmental Organisation
OAU: Organization of African Unity
OMVG: Gambia River Basin Development Organization
OMVS: Organisation for the Development of the Senegal River Basin
OSS: *Observatoire du Sahel et du Sahara* (Sahara and Sahel Observatory)

PDF-B: Programme Development Facility – Phase B
PMA: *Pays les Moins Avancés*
PRAI-MFD: *Programme Régional d'Aménagement Intégré du Massif du Fouta Djallon*
(Fouta Djallon Mountains Regional Integrated Development Program)
PRESAO: *Prévision Saisonnière en Afrique de l'Ouest* (Seasonal Forecast for West Africa)
RBTDfs: *Réserve de Biosphère Transfrontalière du Delta du Fleuve Sénégal*
(Senegal River Delta Transboundary Biosphere Reserve)
SADC: Southern African Development Community
SEAF: Special Emergency Assistance Fund for Drought and Famine in Africa
SFFS: Strategic Framework for Food Security
TAR: Third Assessment Report
TOR: Terms of Reference
UCRE: *Unité de Coordination des Ressources en Eau* (Water Resource Coordination Unit)
UICN-WARO: World Conservation Union – West Africa Regional Office
UNEP: United Nations Environment Programme
UNESCO: United Nations Educational, Scientific and Cultural Organization
UNFCCC: United Nations Framework Convention on Climate Change
USD: US Dollar
VBA: Volta Basin Authority
WAEMU: West African Economic and Monetary Union
WAPP: West Africa Power Pool
WAWP: West Africa Water Partnership
WHYCOS: World Hydrological Cycle Observing System, West and Central Africa Component
WMO: World Meteorological Organization
WRCU: Water Resources Coordination Unit
WWF: World Wildlife Fund

EXECUTIVE SUMMARY

This document lays the foundations of a regional climate change adaptation strategy based on the risk-sharing approach. In this document, the risk-sharing approach is understood to mean the sharing of the burden of the development and implementation of response measures that help avoid or attenuate the impacts of climate change. Therefore it consists of collaborating, in particular at the international level—contiguous countries, riparian countries of a river basin, countries belonging to regional integration entities—in the implementation of climate change adaptation measures.

The West African context is favorable to promoting the concept of sharing the costs of climate change adaptation responses through regional collaboration. Firstly, West African countries display common ecological and physical features as well as cultural and social traits (ethnic groups, languages, etc.). They are confronted with the same development challenges with regard to climate change and climate variability. In addition, in areas such as water, West African countries are so interdependent that isolated strategies targeting their shared resources are doomed to fail. Furthermore, because of their economic weakness, countries in the West Africa region often face difficulties in mobilizing the financial resources they need to develop their resources and protect themselves against climate risks. Finally, when they participate in international gatherings in an uncoordinated manner, West African countries fail to have the power required to influence decisions that will be made, even when they are directly affected by those decisions.

It should be emphasized that West Africa has not remained inactive in the face of the climate variations that affect the region since the 1970s. The region's responses—essentially reactive and spontaneous responses—to climate variability were of diverse types: structural and institutional, local, national and regional. Even if these responses have to some extent attenuated the vulnerability of West Africa to the vagaries of the climate, recent food crises (in some regions of Niger) show that there remains a lot to be done to improve the resilience of the region.

With the prospects of amplified climate disturbances, a number of initiatives are being taken. At the national level, States are engaged in processes of formulating adaptation measures in the short term (National Adaptation Action Plans) and in the medium and long term (National Communications on Climate Change). At the regional level, there is a growing number of initiatives such as the Dialogue on Water and Climate (facilitated by IUCN, CILSS and GWP) or the CILSS-ECA-ACMAD initiative aimed at developing a Sub-Regional Action Plan for Reducing West Africa's Vulnerability to Climate Change or the World Bank-IUCN-CILSS-GWP Initiative consisting in formulating a Regional West Africa Climate Change Adaptation Strategy focusing on the Niger and Senegal River basins.

Regarding the national processes underway, it can be noted that the effective and sustainable achievement of most of the identified measures requires some form of

interstate collaboration and coordination either at the level of transboundary river basins or at the level of the Region. With regard to regional processes, they lack synergies among themselves and lack continuity from one initiative to the other.

In such a regional context, there are solid justifications for an adaptation strategy based on the risk-sharing approach. The main elements of justifications can be summarized as follows:

- West Africa is the poorest subregion of one of the poorest regions of the world and the countries it is composed of are often unable to bear alone the high costs of designing and implementing appropriate climate change adaptation measures;
- Some of the key natural resources of the region are transboundary—case of surface water and aquifers—and are therefore not properly integrated in strictly national strategies;
- Interstate collaboration in the design and dissemination of adaptation measures can help countries achieve economies of scale, by pooling together available expertise and by sharing best practices.

On the basis of these elements of justification, we note that there are good reasons for promoting the risk-sharing approach to climate change adaptation in West Africa. Such a strategy does not replace national efforts or current regional initiatives, but complements them. It is an opportunity to develop synergies and promote coordination of regional initiatives by providing the region with a space for consultation on climate change.

But there are also constraints that are related to the regional approach and/or to the West African context. Among these constraints are the following:

- Many of the regional structures which could act as a driving force in implementing regional adaptation initiatives are more effective in the policy than in the operational area. Most river basin organizations that are managing transboundary river basins are in a state of lethargy and are faced with serious difficulties to collect contributions from their member States in order to finance their operating costs and often do not have the necessary credibility in the eyes of potential donor partners. There are exceptions to the rule. And OMVS has shown an exceptional vitality and is considered by many as a successful model of river basin organization. NBA, after years of lethargy, is reorganizing itself and is becoming more attractive to development partners. After having played a pivotal role in efforts to fight desertification, CILSS seems to need a new start, to reorient and adjust its strategy.
- It is easier to mobilize funding for national initiatives than for regional ones. At the national level, the borrower, government, is clearly identified whereas for regional intergovernmental and non-governmental institutions it is less easy to define who is responsible for what. It is probably for these reasons that financial instruments such as the Less Developed Countries Fund (LCDF) that support adaptation efforts only

target countries, even though it is obvious that in sectors like water, national strategies have no chance to succeed if they are not complemented by efforts at the regional level.

- Governments are often sensitive to anything that touches on their national sovereignty and are therefore reluctant to endow regional institutions with the legal powers that would allow them to fulfill their mandates.
- Even if shared resources such as water offer opportunities for collaboration, they are also often disputed resources and sources of conflicts.
- Climate change is an area in which there remain unanswered questions. Because climate predictions remain only grossly accurate, decision makers tend not to consider climate issues among their priority strategic areas of intervention.

The means to remove the above constraints and the constraints related to suggested strategic areas (see below) will need to be examined more systematically during feasibility studies to be conducted for each of the specific interventions selected.

The goal of the proposed strategy is to reduce West Africa's vulnerability to climate risks by sharing adaptation costs at the regional level. It is assumed that by minimizing risks and by taking advantage of opportunities related to climate change, one contributes significantly to the development of West Africa and to the well-being of its people.

Strategic Objective 1. *Promoting sub-regional and regional collaboration in the establishment and use of decision-support knowledge bases on climate change and its impacts*

- ☞ Improving and harmonizing climate information collection networks (and supporting basin organizations in their efforts to strengthen their internal capacities to collect, analyse and absorb scientific climate data)
- ☞ Strengthening and expanding networks of experts and research projects such as HYCOS-WCA (Niger, Chad, Volta, Senegal), PRESAO, AMMA
- ☞ Supporting and/or collaborating with sound initiatives such as the World Bank-funded IUCN-GWP-CILSS Project, especially with regards to the activities planned on climate prediction models
- ☞ Revitalizing and strengthening the IPCC-Sahel (CILSS) and helping expand its mandate to the entire West Africa region

Strategic Objective 2. *Promoting subregional and regional collaboration in the development and sustainable exploitation of transboundary natural resources and ecosystems*

With regards to transboundary watercourses and aquifers, the following actions can be envisaged:

- ☞ Support and take advantage of efforts underway in the context of the West Africa Power Pool (WAPP) through the following specific actions: (a) in collaboration with the Volta River Basin (newly established), assist basin countries to set in place a mechanism for sharing power production benefits from existing and planned dams in the Volta Basin; (b) in collaboration with NBA, help

basin countries in their efforts to strengthen the regional functions of the Kainji dam in Nigeria and envisage the planned large dams in a basin-level transboundary benefit-sharing perspective; (c) in collaboration with the ECOWAS Water Resources Coordinating Unit (ECOWAS-WRCU), promote the adoption of a Regional Water Protocol for West Africa, following the model of the SADC Water Protocol. Such a Protocol would endow West Africa with a legal base that would be an enabling factor for the West Africa Power Pool.

- ☞ Increase the number of transboundary projects for fighting sand encroachment in the watercourses by targeting the Senegal and Volta River basins as well as the Komadugu Yobe basin (North Nigeria-South East Niger)

- ☞ Promote integrated development programmes in transboundary sub-basins such as between Senegal, Mali and Guinea along the Senegal River or the transboundary reach between Niger and Benin on the Niger River.

- ☞ Strengthen the capacities of West Africa basin organizations (NBA, LCBC, VBA, OMVG, OMVS) to address climate change issues

- ☞ Support and accompany initiatives on transboundary groundwater resources (West Africa component of the UNESCO-ISARM initiative) or the OSS Initiative on the lullemeden Aquifer system. On the basis of the results of research efforts underway as part of these two initiatives, it could be envisaged to help create mechanisms for consultation around some of the key aquifer systems of the West Africa region.

- ☞ Help strengthen mechanisms for conflict prevention and management by: (a) supporting the design and implementation of capacity building programmes for conflict management, targeting in particular river basin organizations; (b) supporting the GWP-UNESCO initiative for promoting the 1997 UN Framework Convention on the Non-Navigational Uses of Transboundary Watercourses.

With regards to other transboundary ecosystems, the following actions are suggested:

- ☞ Help improve the knowledge of the functions of the Inner Delta of the Niger River with regard to climate change.

- ☞ Support the conservation and sustainable use of the Transboundary Biosphere Reserve of the Delta of the Senegal River

- ☞ Help conserve coastal mangrove forests

- ☞ Support the conservation and integrated and sustainable management of the Fouta Djallon Mountains

Strategic Objective 3. *Identifying, promoting and disseminating appropriate climate change adaptation technologies, techniques and practices*

- ☞ Identify and replicate promising adaptation techniques and practices

- ☞ Explore the feasibility of setting in place a Disaster Fund aimed at minimizing the impacts of climate change

Strategic Objective 4. *Putting in place a regional framework for consultation on climate change and its impacts*

☞ Help put in place a regional consultation framework on climate change and its impacts

For each of these strategic areas, specific actions are suggested. But it is important to validate in a participatory way the suggested strategic areas as well as proposed interventions.

With regard to the mobilization of the financial resources required for the implementation of the proposed actions, the CCAA programme could help in the following domains:

- Support training of stakeholders on existing financial instruments for climate change adaptation
- Make available funding to help solve the co-financing constraint which often limits the accessibility of adaptation Funds that are governed by the GEF principles
- Help establish regional funding mechanisms that promote risk sharing at the regional level

RESUME ANALYTIQUE

Le présent document jette les bases d'une stratégie régionale d'adaptation au changement climatique basée sur l'approche de partage des risques. Cette approche est comprise dans le présent document dans le sens de partage du fardeau de la conception et de la mise en œuvre des réponses appropriées pour éviter ou atténuer les impacts du changement climatique. Elle consiste donc à collaborer sur le plan international en particulier — échelles de pays contigus, de pays riverains d'un bassin fluvial, de pays appartenant à une organisation d'intégration régionale — dans la mise en œuvre de mesures d'adaptation au changement climatique.

L'Afrique de l'Ouest offre un environnement favorable à une approche de partage des coûts d'adaptation au changement climatique par la collaboration régionale. D'abord les pays de la région présentent de grandes similitudes du point de vue éco-géographique mais aussi du point de vue culturel et social (ethnies, langues, etc.). Ils font face à des enjeux de développement identiques et sont confrontés aux mêmes défis en ce qui concerne la variabilité et le changement climatiques. Il s'y ajoute que, dans des secteurs tels que celui de l'eau, les pays de l'Afrique de l'Ouest sont si interdépendants que des stratégies cloisonnées de gestion des ressources partagées sont souvent contreproductives. Ensuite, du fait de leur faiblesse économique, les pays de la sous-région ont souvent des difficultés à mobiliser de façon isolée les ressources dont ils ont besoin pour développer, mettre en valeur leurs ressources et se prémunir contre les risques climatiques. Enfin, en allant en ordre dispersé dans les grandes rencontres internationales, les pays de l'Afrique ont du mal à peser sur les décisions prises, même si celles-ci les concernent directement.

Il faut dire que face aux perturbations climatiques qui affectent la région depuis les années 1970, l'Afrique de l'Ouest n'est pas restée inactive. Les réponses — pour l'essentiel réactives et spontanées — apportées à la variabilité climatique ont été de divers ordres (structurels et institutionnels, locaux, nationaux et régionaux). Même si ces réponses ont atténué dans une certaine mesure la vulnérabilité de l'Afrique de l'Ouest aux aléas climatiques, des crises alimentaires récentes (exemple de certaines contrées du Niger) montrent qu'il reste beaucoup à faire pour renforcer la résilience de la région. Devant les perspectives d'amplification des perturbations climatiques, différentes initiatives sont en train d'être prises. Au niveau national, les Etats sont engagés dans des processus de formulation de mesures d'adaptation à court terme (avec les Plans d'Action Nationaux d'Adaptation) et à moyen et long terme (avec les Communications Nationales sur les Changement Climatique). Au plan régional, avec la multiplication d'initiatives diverses telles le dialogue régional eau et changement climatique (animé par l'UICN, le CILSS et le GWP) ou l'initiative CILSS-CEA-ACMAD en cours visant l'élaboration d'un Plan d'Action Sous-Régional de Réduction de la Vulnérabilité de l'Afrique de l'Ouest au changement climatique ou encore l'initiative Banque Mondiale-UICN-CILSS-GWP de formulation d'une stratégie régionale d'adaptation au changement climatique en Afrique de l'Ouest avec un focus sur les bassins des fleuves Niger et Sénégal. En ce qui concerne les processus nationaux en cours, on peut dire que la réalisation efficace et durable de la plupart des mesures

mentionnées nécessite une forme de collaboration interétatique et de la coordination au niveau des bassins fluviaux ou de la région. En ce qui concerne les processus régionaux, ils sont caractérisés par une absence de synergies mais aussi une absence de continuité d'une initiative à l'autre.

Devant un tel contexte régional, il existe de solides justifications pour une stratégie d'adaptation basée sur le partage des risques. Les principaux éléments de justification de la stratégie régionale d'adaptation basée sur le partage des risques peuvent être résumés comme suit :

- L'Afrique de l'Ouest est la région la plus pauvre de l'une des régions les plus pauvres du monde et les pays qui la composent ne peuvent souvent pas faire face seuls aux coûts élevés de conception et de mise en œuvre des mesures appropriées d'adaptation au changement climatique ;
- Certaines des ressources naturelles critiques de la région sont transfrontalières — cas des eaux de surface et des eaux souterraines — et ne sont donc pas prises en compte de façon appropriée dans le cadre de stratégies strictement nationales ;
- La collaboration interétatique dans la conception et dissémination de mesures d'adaptation permet aux pays de réaliser des économies d'échelle, de mettre en commun les expertises disponibles et de partager plus facilement les bonnes pratiques.

Sur la base de ces éléments de justification, on constate qu'il existe de bonnes raisons pour envisager une stratégie régionale de partage des risques liés au changement climatique. Une telle stratégie ne se substitue pas mais vient plutôt en complément aux efforts nationaux et aux initiatives régionales en cours ou envisagées. Elle permet en outre d'aider à avoir plus de synergie et de coordination entre les initiatives régionales qui se multiplient tout en dotant la région d'un espace de concertation sur le changement climatique.

Mais il existe aussi des contraintes liées à l'approche régionale en général et/ou au contexte ouest-africain. Parmi ces contraintes, on peut mentionner les suivantes :

- Beaucoup des structures régionales qui devraient jouer un rôle moteur dans la mise en œuvre des initiatives régionales sont plus efficaces dans le domaine politique qu'opérationnel. La plupart des organismes de bassin gérant des bassins fluviaux transfrontaliers sont dans un état de léthargie et ont des difficultés à recouvrer les contributions de leurs Etats membres pour leur budget de fonctionnement et n'ont pas souvent la crédibilité nécessaire auprès des partenaires au développement afin de mobiliser des financements substantiels. Des exceptions existent cependant. Et l'OMVS fait preuve d'un dynamisme particulier et est cité comme modèle réussi d'organisme de bassin. L'ABN, après plusieurs années de léthargie, se réorganise et regagne la confiance des bailleurs. Le CILSS, après avoir été au cœur des efforts

de lutte contre la désertification, semble avoir besoin d'un nouveau souffle, de réorienter et ajuster sa stratégie

- Il est plus facile de financer des initiatives au niveau national que régional. Au niveau national, l'emprunteur, l'Etat, est bien identifié alors qu'au niveau des institutions régionales intergouvernementales ou non-gouvernementales, les responsabilités sont souvent mal définies. C'est peut-être pour ces raisons que, dans leurs stratégies d'adaptation, des instruments financiers tels que le Fonds PMA d'appui aux pays pauvres ciblent exclusivement les Etats, même s'il reste évident que dans des secteurs tels que l'eau, les stratégies nationales n'ont aucune chance de réussir si elles ne sont pas complétées par des efforts au niveau régional
- Les Etats sont souvent sensibles à tout ce qui touche leur souveraineté nationale et rechignent par conséquent à doter les institutions régionales des pouvoirs juridiques leur permettant de remplir leurs mandats.
- Même si certaines ressources partagées telles que l'eau sont des opportunités de collaboration, elles sont aussi souvent des ressources disputées et sources de conflits.
- Il y a aussi que le changement climatique reste un domaine dans lequel il subsiste des questions sans réponses. Le fait que les prédictions climatiques restent grossières n'incite pas toujours les décideurs politiques à en faire un axe stratégique prioritaire.

Les voies et moyens pour lever les contraintes ci-dessus et celles qui sont liées aux axes stratégiques suggérées (voir ci-dessous) devront être examinés dans les études de faisabilité à réaliser pour chacune des interventions spécifiques retenues.

L'objectif général de la stratégie proposée est de réduire la vulnérabilité de l'Afrique de l'Ouest aux risques climatiques par le partage aux échelles sous-régionale et régionale des coûts d'adaptation au changement climatique. Il est postulé qu'en minimisant les risques et en prenant avantage des opportunités liés au changement climatique, on contribue de façon significative au développement de l'Afrique de l'Ouest et à l'amélioration du bien-être de ses populations.

Objectif stratégique 1. *Promouvoir la collaboration sous-régionale et régionale dans la mise en place et l'exploitation de bases de connaissances d'aide à la décision sur le changement climatique et ses impacts*

- ☞ Amélioration et harmonisation des réseaux de collecte de l'information climatique (et appuyer les organisations de bassin à renforcer leurs capacités internes en matière de collecte, d'analyse et d'absorption de données scientifiques liées au climat)
- ☞ Renforcement et élargissement des réseaux d'experts et des projets de recherche tels que : HYCOS-AOC (Niger, Tchad, Volta, Sénégal), PRESAO, AMMA
- ☞ Appuyer et/ou collaborer avec des initiatives pertinentes telles que le Projet UICN-GWP-CILSS financé par la Banque Mondiale, notamment en ce qui concerne le travail envisagé sur les modèles de prévision de changement climatique
- ☞ Revitalisation et renforcement des capacités du IPCC-Sahel (CILSS) et élargissement de son mandat à toute l'Afrique de l'Ouest

Objectif Stratégique 2. *Promouvoir la collaboration sous-régionale et régionale dans le développement, l'exploitation durable de ressources naturelles et écosystèmes transfrontaliers.*

En ce qui concerne les cours d'eau et aquifères transfrontaliers les actions suivantes sont envisageables :

- ☞ Appuyer et tirer avantage des efforts en cours dans le cadre du West Africa Power Pool (WAPP) à travers les actions spécifiques suivantes : (a) en collaboration avec l'Autorité du Bassin de la Volta (nouvellement créée) aider les pays du bassin de la Volta dans leur volonté de mettre en place un mécanisme de partage des bénéfices de la production d'énergie des barrages existants et envisagés dans le bassin de la Volta ; (b) en collaboration avec l'ABN, aider les pays du bassin du Niger dans leurs efforts en vue de renforcer la vocation régionale du barrage de Kainji au Nigeria et d'inscrire les nouveaux grands barrages planifiés dans le bassin dans une logique de partage transfrontalier des bénéfices ; (c) en collaboration avec l'Unité de Coordination des Ressources en Eau de la CEDEAO (CEDEAO-UCRE), promouvoir l'adoption d'un Protocole Régional de l'eau en Afrique de l'Ouest en suivant le modèle de la SADC. Un tel protocole permettrait de disposer d'une base légale qui favoriserait la mise en œuvre du WAPP.
- ☞ Multiplier les exemples de projets transfrontaliers de lutte contre l'ensablement des cours d'eau en ciblant les fleuves Sénégal et Volta ainsi que le bassin du Komadugu Yobe (Nord Nigeria-Sud Est Niger).
- ☞ Promouvoir des programmes de développement intégré dans des sous-bassins transfrontaliers comme la zone frontalière Sénégal-Mali-Guinée autour du fleuve Sénégal ou la zone transfrontalière entre le Niger et le Bénin sur le fleuve Niger.
- ☞ Renforcer les capacités des organismes de bassins de la région (l'ABN, la CBLT, l'ABV, l'OMVG, l'OMVS) à prendre en charge le changement climatique
- ☞ Appuyer et accompagner les initiatives sur les eaux souterraines transfrontalières (composante Afrique de l'Ouest de l'Initiative UNESCO-ISARM) ou l'initiative de l'OSS sur le système aquifère de l'Iullemeden. Sur la base des résultats des recherches en cours dans le cadre de ces deux initiatives, il pourrait être envisagé d'aider à la création de cadres de concertation autour de certains des principaux aquifères transfrontaliers de la région.
- ☞ Aider au renforcement des mécanismes de prévention et gestion des conflits autour des eaux partagées par : (a) l'appui à la conception et à la mise en œuvre d'un programme de renforcement des capacités de prévention et de gestion des conflits de l'eau ciblant en particulier les organismes de bassin ; (b) un appui au processus GWP-UNESCO sur la promotion de la Convention Cadre des Nations Unies de 1997 sur l'Utilisation des cours d'eau transfrontaliers à des fins autres que la navigation.

En ce qui concerne les autres écosystèmes transfrontaliers, les actions préconisées sont les suivantes :

- ☞ Aider à améliorer les connaissances sur le rôle du Delta Intérieur du Niger (DIN) dans un contexte de changement climatique.
- ☞ Appui à la conservation et gestion durables de la Réserve Transfrontalière de Biosphère du Delta du Fleuve Sénégal
- ☞ Protection des peuplements côtiers de mangroves
- ☞ Appui à la protection et au développement intégré et durable du Massif du Fouta Djallon

Objectif stratégique 3. *Identifier, promouvoir et diffuser des technologies, techniques et pratiques appropriées d'adaptation au changement climatique*

- ☞ Identification et réplication de techniques et pratiques prometteuses d'adaptation
- ☞ Etude de la faisabilité de la mise en place de fonds de calamité pour atténuer les impacts liés au changement climatique

Objectif stratégique 4. *Mettre en place un cadre de concertation régionale sur le changement climatique et ses impacts*

- ☞ Aider à la mise en place d'un cadre de concertation régionale sur le changement climatique et ses impacts

Pour chacun de ces axes stratégiques des actions spécifiques sont proposées. Mais il est important de valider de façon participative aussi bien les axes stratégiques suggérés que les interventions proposées.

En ce qui concerne la mobilisation du financement requis pour la mise en œuvre des actions préconisées, le programme ACCA peut agir dans les directions suivantes :

- formation de parties prenantes sur les instruments financiers existants
- mise à disposition de fonds pour aider à résoudre la contrainte du cofinancement qui rend souvent difficile l'accès au Fonds d'adaptation qui sont régis suivant les règles du GEF
- aide à la mise en place de mécanismes régionaux d'assurance qui favorisent le partage au niveau régional du risque climatique

INTRODUCTION

West Africa is both one of the poorest regions in the world and one of the most vulnerable to the vagaries of the climate, as the scope of the impacts of climate variability over the last three or four decades has shown. Images of famine in the Sahel were seen around the world in the 1970s and 1980s. Since then, significant adaptation efforts have been undertaken in every sector of the region on both the national and the local scale. However, recent food crises in countries such as Niger are reminders of the continuing vulnerability of the region to the vicissitudes of climatic conditions.

Climate changes scenarios for West Africa indicate that the climatic variability we are currently experiencing will increase and intensify. Droughts and floods will increase not only in frequency but also in scope. The trend of declining rainfall and annual average flows, which we have experienced over the last three decades, is expected to continue.

To address such prospects and reduce the social, economic and environmental impacts of the expected climate changes, the States of the Region have identified medium- and long-term adaptation measures in National Communications on Climate Change and urgent priority measures in the framework of their National Adaptation Plans of Action (NAPAs). While these efforts are important and deserve to be continued and supported, it is also important to complement them with concerted adaptation responses or interstate and interregional plans. It can be argued that in certain sectors such as water, West African States are so interdependent that it is difficult to even imagine that an adaptation measure focusing on the resource could succeed without integrating the regional dimension or at least the river basin or the transboundary aquifer in which the resource is found. It can also be argued that, taken individually, African States are so economically weak that it is often difficult for them to mobilise singly the resources—particularly the financial resources—needed to design and implement suitable adaptation measures (such as dam construction, for instance). Finally, envisaging responses to climate change from a collaborative perspective helps reduce the costs borne by each of the individual countries involved.

This report attempts to lay the foundations of a regional strategy for interstate collaboration in efforts to reduce the cost of adapting to climate change. It focuses on the water sector, but also tries, in so far as possible, to take account of other sectors.

Part one of the proposed strategy describes the West African regional context, stressing the factors that justify regional collaboration in efforts to reduce vulnerability to the climate (interdependence in terms of water, level of vulnerability to climate change). Part two reviews the TOR of the present study and explains the methodology used. Part three presents a brief analysis of the types of responses West Africa has made to recent climate changes characterised by strong variability. Part four examines West Africa's level of preparation for the prospects of climate change, including measures envisaged at the national and regional levels. Part five formulates the principal elements justifying a cost-sharing approach to adaptation to climate change. Then, it examines

the principal constraints involved in such an approach and proposes a goal and strategic objectives to form the pillars of the recommended strategy. Part six describes the specific actions and activities to be carried out for each strategic objective. Part seven briefly describes financial instruments that could help finance the proposed interventions. Appended are a Logframe summarizing part six of the report as well as a brief review of the relevance of the actions recommended in specific NAPAs from a transboundary, regional perspective.

I. REGIONAL CONTEXT

From a geographical standpoint, West Africa comprises the following two major entities: (a) the Sahelian countries, of which there are nine (9), including Burkina Faso, Cape Verde, Chad, The Gambia, Guinea Bissau, Mali, Mauritania, Niger and Senegal; (b) the Gulf of Guinea countries, of which there are eight (8): Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria, Sierra Leone and Togo.

From the standpoint of rainfall, most West African countries cover several eco-geographical zones, including: (a) the Sahara desert zone (with an average annual rainfall of less than 150 mm); (b) the arid Sahelian zone (annual rainfall of 150-400 mm); (c) the semi-arid Sudano-Sahelian zone (annual rainfall of 400-600 mm); (d) the subhumid Sudanian zone (annual rainfall of 600-900 mm); and (e) the humid Sudano-Guinean and Guinean zone (with annual rainfall ranging from 900 mm to over 1500 mm).

This unusual situation is reflected in the very marked contrast between humid and arid regions. However, this contrast is greatly attenuated by the configuration of the river system. The principal watercourses in the region (Niger, Senegal, Gambia, and Lake Chad system) flow from the water-rich Sudano-Guinean regions across the Sahelian zones with their chronic pluviometric deficits. Thus, these watercourses transfer fresh water resources from the humid regions to the arid regions.

A. Strong Interdependence between the States in the area of Water

Although it covers less than a quarter of the surface area of the African continent, West Africa boasts 25 transboundary river basins (Figure 1 and Tableau 1), or a little less than half of the roughly 60 international watercourses found in Africa. Among these basins, the biggest are the Niger (shared by 11 countries counting both the active and inactive portions of the basin), the Senegal (4 countries), the Volta (6 countries), Lake Chad (8 countries), and the Comoé (4 countries). With the exception of the island nation of Cape Verde, every country in the region shares at least one international watercourse. The countries generally have a dependency factor of over 40%; the dependency factor represents the total share of a country's renewable water resources that are produced outside of its boundaries. It should be noted that countries such as Niger and Mauritania have dependency factors in the area of 90%. In all, transboundary river basins cover nearly 70% of the total surface area of the region.

The distribution of the ground water also has an important regional dimension. A study currently being conducted by UNESCO's ISARM¹ Project has identified 11 major transboundary aquifers in West Africa, which store hundreds of billions of m³ of water at depths ranging from a few dozen metres to over 1000 metres.

¹ Internationally Shared Aquifer Resources Management Project or *Projet de Gestion des Ressources des Aquifères Internationalement Partagés*.

Fig. 1 Transboundary Rivers in West Africa (Niasse, 2004)

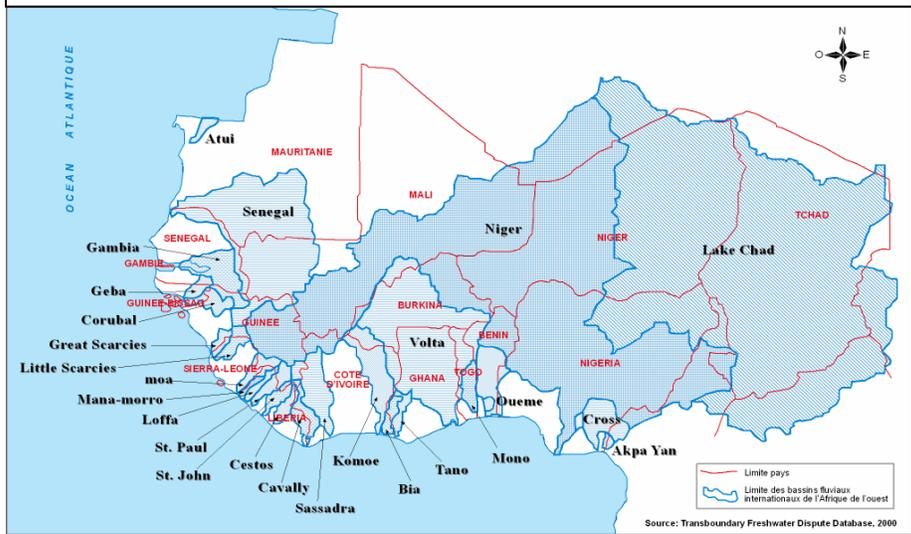
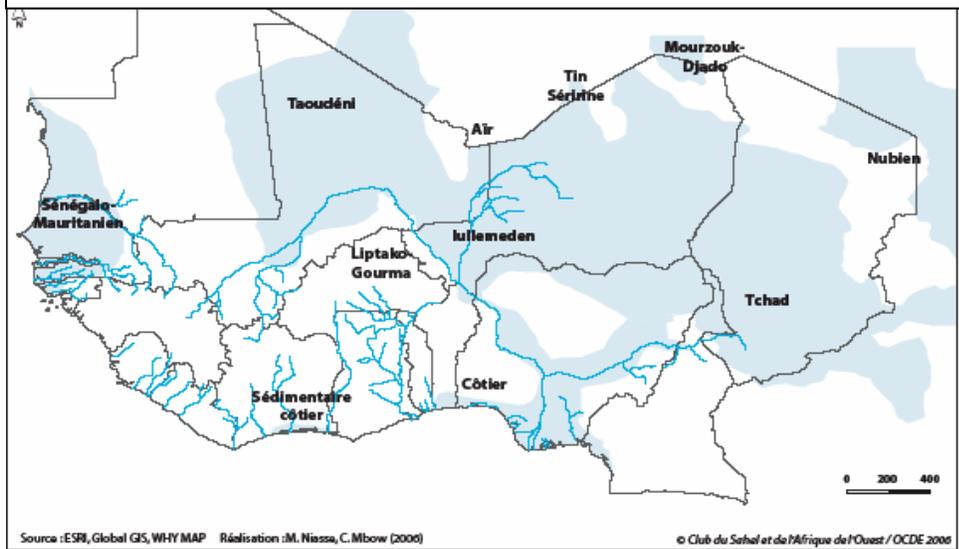


Fig. 2 Principal transboundary Aquifers in West Africa (Niasse, 2006)



B. Vulnerability of West Africa to Climate Change

West Africa, and particularly its Sahelian region, is not only an arid area, but has also experienced major disturbances in its climatic conditions in recent years. These

disturbances have taken on considerable scope since the early 1970s. The region experienced a shift in its pluviometric and hydrometric series around 1968-1972. The drop in average rainfall before and after 1970—a pivotal year from the standpoint of recent trends in the Sahelian climate—ranged from around 15% to over 30% according to the zone. This situation resulted in a gradual shift of the isohyets about 200 km southwards. The average flows of the region’s major rivers experienced concomitant variations, which were even more pronounced than the changes in average rainfall. Indeed, an average drop of 40-60% was observed in river flows beginning in the early 1970s (Niassé et al. 2004).

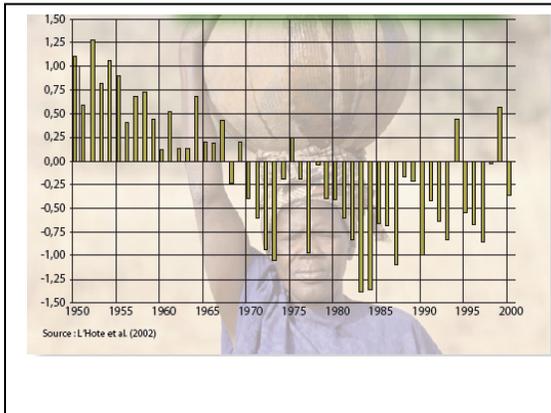


Fig.3 Trends in rainfall in the Sahel from 1950 to 2000 (Niassé, 2006)

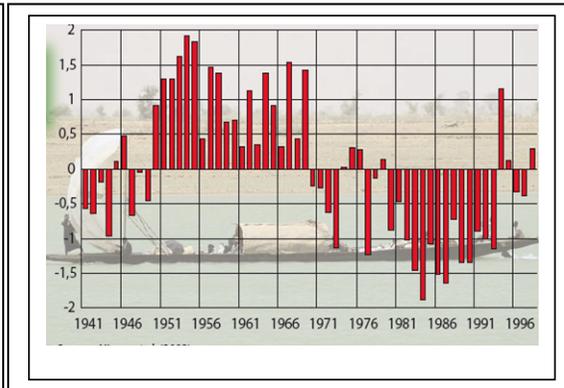
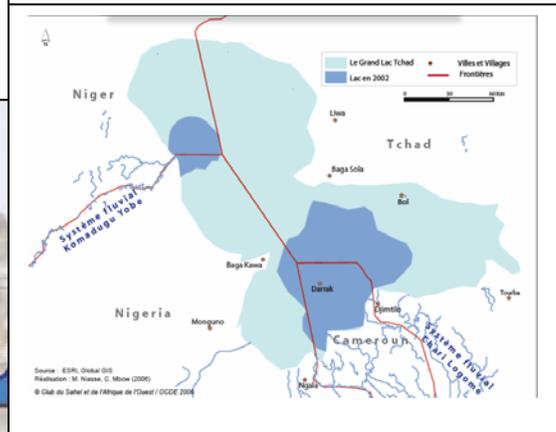
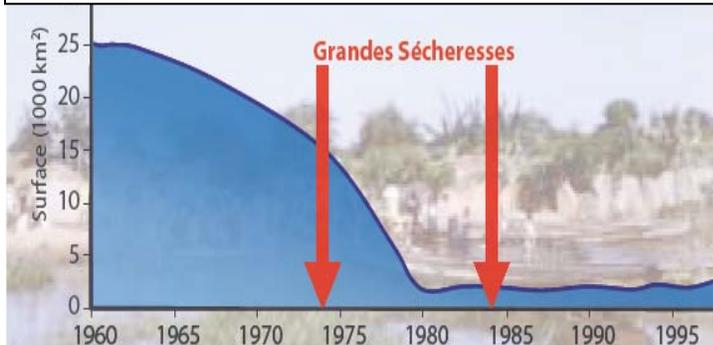


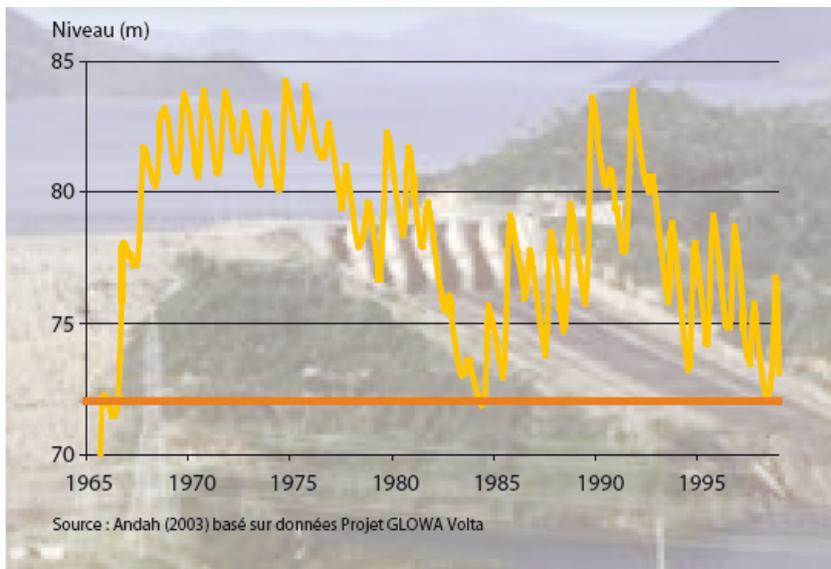
Fig.4 Average flows of the Niger River in Niamey – Mean deviation 1950-2000 (Niassé, 2006)

Much of West Africa’s wetlands are now endangered due to climate variability, as witnessed by the significant reduction of their size in recent years. The average surface area of the Hadéjia Nguru floodplain (in the Komadugu Yobe river system in Northern Nigeria) has dwindled from 2350 km² in 1969 to less than 1000 km² in 1995. The maximum flooded area of the Inner Niger Delta, which is the second largest wetland area in Africa, has dropped from approximately 37,000 km² in the early 1950s to around 15,000 km² in 1990. Since the 1990s, the water surface of Lake Chad, evaluated at over 20,000 km² during the water-rich years prior to 1970, only covers between 7000 and 2000 km². This is reflected in the separation of the lake into two parts: a northern part and a southern part. Now, only the latter is permanent.

Figs. 5 and 6 Trend in average surface areas flooded by Lake Chad (According to LCBC, quoted in Niasse, 2006)



Climatic variability has had direct impacts on the living conditions of the rural populations and as well as on the national economies of West African countries, especially Sahelian countries. There are three principal reasons: (a) the role of rainfed agriculture, which remains important for the economy of the region; (b) poor water management; (c) poor conditions for the filling of reservoirs on which certain countries are sometimes heavily dependant for the production of electricity and for industrial and household water supply (i.e. Ghana, see box below). For these different reasons, it is not surprising that at the regional level, a strong correlation can be observed between annual rainfall and flows on the one hand, and the economic growth rate on the other hand. (Niasse et al, 2004)



Energy crisis in Ghana: In February 1998 and more recently in November 2006, Ghana has been faced with severe energy crises following drops in the water level in Lake Volta to below the level required by the turbines of the Akosombo dam. With the more modest Kpong dam located downstream, this dam covers 95% of the electricity consumption of Ghana.

Fig.7 Fluctuations in the level of the Akosombo reservoir, Ghana. Sources: van de Giesen et al. 2001; Niasse, 2006

Climate variability and change are punctuated by extreme weather events (devastating floods, droughts, sudden changes in temperature) which seem to be growing more frequent in West Africa. Their environmental and socioeconomic costs are often very high. In 1999, torrential rains on the Niger River and its tributaries in Benin and Nigeria led to the opening of the floodgates of the Kainji, Jebba and Shiriro dams in Nigeria, causing tremendous losses of property and human lives. That same year, flooding of the Ghanaian section of the White Volta caused dozens of deaths and destroyed hundreds of houses. After a devastating flood which displaced hundreds of thousands of people in 1998, the Komadugu Yobe Valley in northern Nigeria was again underwater in 2001: over 200 deaths and 35,000 displaced persons were recorded. More recently, in January 2002, southern Mauritania and northern Senegal were affected by torrential rains accompanied by a cold snap. This inclement weather caused dozens of deaths and the loss of over 50,000 bovines and 500,000 small ruminants in Senegal. Examples such as these, of which many more could be mentioned, are now a regular feature of the West African climate. (Niasse et al., 2004)

As we can see, West Africa is presently facing serious climatic threats. Given this situation, the natural environment and human and animal populations have reacted in different ways with varying results. Below, we will focus on the political and institutional responses.



Fig. 8 and 9 Livestock decimated by the climatic catastrophe (torrential rains and a cold snap) that affected northern Senegal and southern Mauritania in January 2002.

II. GOAL AND METHODOLOGY

A. Goal of the Study

The goals of the present study on the risk-sharing approach to regional climate change adaptation strategies are the following:

- Knowledge management to assist in decision making: Improve knowledge on climate change and adaptation to support appropriate anticipatory measures aimed at reducing the vulnerability of African economies to climate variability
- Transboundary alliances: Promote transboundary alliances, with a view to facilitating the development and implementation of a regional adaptation framework within which NAPAs could be effectively executed
- Capacity building: Improve and create water resource management capacities in order to enhance understanding of the complexities of adaptation to climate change and the need to integrate climate change into sectorial policies and sustainable development
- Sharing of practical adaptation experiences: Identify and remove constraints that hinder regional sharing of good climate change adaptation practices
- Regional framework on climate change adaptation: Set up a regional institutional framework for adaptation to climate change involving shared water resources.
- Knowledge on water resource management: Help improve knowledge and understanding of water management strategies as a means of promoting water governance in order to help reduce vulnerability to climate change

As requested in the TOR, the present study is to analyse the opportunities and constraints involved in a regional risk-sharing approach, provide a detailed analysis of a regional adaptation strategy, provide indications for a commitment strategy, and analyse relevant regional dynamics for the implementation of the strategy based on the risk-sharing approach.

Since the preparation of a strategy document requires extensive consultation between stakeholders and participatory validation of the strategic options advocated—a process which will not be completed at this stage—the present study will concentrate on suggesting strategy elements that can be used as a foundation to build a regional strategy at a later stage.

B. Methodology

The methodology used to conduct the present study includes the following elements:

Capitalisation of my recent experience in the area: I took account of and capitalised on my recent research on transboundary water resources and climate change in West Africa (Niasse et al, 2004; Niasse, 2004; Niasse, 2006; Niasse, 2007a; Niasse, 2007b).

Missions and interviews in Senegal, Burkina Faso and Niger:

Meetings and discussions were organised in Senegal, Burkina Faso and Niger with government officials (especially those in charge of the National Communications on Climate Change and NAPAs); officials from subregional and regional organisations and basin organisations (Senegal, Niger and Gambia River), research and training centres (Agrhymet in Niamey), regional integration institutions (ECOWAS Water Unit, WAEMU, NEPAD-Environment).

Documentary Review:

An extensive documentary review was conducted on the subject, including on the Internet. The review focused particularly on the risk-sharing approach in climate change adaptation efforts. It should be noted that most of the documentation on the subject of climate change risk-sharing examines the subject from the perspective of financial mechanisms and insurance schemes (Stern, 2006; Hoff et al., undated; Dowlatabadi & Cook, 2006; Bals, Burton et al., 2005)

One of the rare documents addressing the risk-sharing approach from the perspective of interstate cooperation is the 2001 IPCC Evaluation Report (IPCC, 2001). The report mentions that climate change mitigation and adaptation strategies may be enhanced by using a risk-sharing approach between countries. For the countries, such an approach could consist of attempting to share the burden of conservation of critical species threatened by climate change. From the standpoint of the report (IPCC, 2001), the risk-sharing approach could consist of targeting transboundary nature reserves.

In the present report, climatic risk is examined from two different perspectives: that of preventing risk by stressing the measures to be taken to avoid or attenuate the potential impact of the risk; and that of risk management when the risk has become a reality.

III. RESPONSES TO RECENT CLIMATE CHANGES IN WEST AFRICA

In West Africa, various responses have been made to pluviometric deficits and the food crises that have accompanied them. In the present context, we will mention a few such responses relating to water resource management:

i. On the grassroots community scale, climatic deterioration has led to chronic food insecurity in rural areas, pushing the rural population progressively southward. Seasonal emigration (initially) was soon followed by rural exodus, or drift away from the land. International migration intensified as the climatic crisis worsened. Those who stayed in rural areas attempted to diversify their production systems as a risk-reduction strategy. Populations bordering on Sahelian watercourses (middle Senegal River Valley, Niger, Komadugu Yobe Valley) were able to reduce their food vulnerability during periods of chronic hydro-climatic deficits through flood recession agriculture, which they combined with rainfed agriculture and eventually with irrigated agriculture (see Magistro & Lo, 2001 on the Senegal River Valley).

ii. Throughout West Africa, increased investments in water management can be seen: (a) village hydraulics; (b) pastoral boreholes; (c) stronger policies promoting irrigated agriculture; (d) increased investments in dams. It should be noted that West African currently totals 100 to 150 large dams (as compared to 1300 for the whole of Africa).

iii. At the national level, there has been a growing interest in the legal and institutional aspects of water management. The water sector reform process, which is often supported by international institutions, should be viewed in this context. In relation to these sector reform processes, a space is often made for the private sector, particularly in the distribution of drinking water. In addition to or in the framework of these processes, several countries have developed laws on water (Senegal in 1981, Burkina Faso in 2001, Mali in 2002, etc.). Similarly, it can be observed that on the heels of Burkina Faso (2003), several States are in the process of or envisage developing a National Plan of Action on Integrated Water Resource Management, taking advantage of the commitment made during the Johannesburg summit in 2002 for all of the States to develop IWRM plans before 2005. Thus, Senegal and Mali, which have benefited from the support of Canadian cooperation, are currently finalising their IWRM plans. Cape Verde and Benin, with support from Dutch cooperation, have just begun the process of developing their IWRM Plans.

iv. Also at the national level, almost all West African countries have developed national action plans and strategies against drought, in the framework of the United Nations Convention to Combat Desertification (1992). These national plans were complemented by the development of a subregional plan of action to combat desertification.

v. The creation of CILSS (*Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel*, or Permanent Interstate Committee for Drought Control in the Sahel) is also one of West Africa's regional responses to climate variability, and particularly chronic drought. CILSS was founded in 1973, with a mission *to seek to achieve food security and combat the impacts of drought and desertification*. CILSS currently comprises nine member States: Burkina Faso, Cape Verde, Chad, The Gambia, Guinea Bissau, Mali, Mauritania, Niger and Senegal.

vi. The creation of basin organisations: each of the major transboundary watercourses in West Africa now has its basin authority, whose mission includes making the necessary investments for the development of the resource and coordinating interventions by riparian States.

This list of responses at the local, national and subregional level is necessarily incomplete. We could add certain policies in the areas of agriculture, animal husbandry, the environment, etc.

An indulgent assessment of the performances of the above adaptation measures would stress that the images of famine in the Sahel which we used to see in the 1970s have grown less common, and that could be attributed to the effectiveness of the reactive adaptation measures, including spontaneous actions or thought-out strategies. But such an assessment would have to be qualified, because with the exception of the mid 1980s (1984 in particular), the region has not experienced pluviometric deficits as severe as those of the 1970s). Furthermore, the spectre of recent food crises and even famines

continues to haunt the sleep of Sahelians, as witnessed by the serious cereal deficit experienced just a year ago in certain regions of Niger. Indeed, we may even deduce from the continued vulnerability of the Sahel that the effectiveness of the current adaptation responses is limited.

Table 1: Basin Organisations on the major West African Rivers

Basin Organisation	Headquarters	Year Founded	Member Countries
NBA (Niger Basin Authority)	Niamey	1980	Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria, Chad
LCBC (Lake Chad Basin Commission)	N'Djaména	1964	Niger, Nigeria, Chad, Cameroon, Central Africa
OMVG (Gambia River Basin Development Organization)	Dakar	1978	Gambia, Guinea, Senegal, Guinea Bissau
OMVS (Organisation for the Development of the Senegal River Basin)	Dakar	1972	Guinea, Mali, Mauritania, Senegal
VBA (Volta Basin Authority)	Ouagadougou	2006-7	Burkina Faso, Togo, Ghana, Côte d'Ivoire, Mali, Benin: Ratification of the Convention is imminent

IV. LEVEL OF PREPAREDNESS FOR CLIMATE OUTLOOKS

A. Climate Outlooks

West Africa is one of the three regions in the world that have recorded the most unfavourable changes in precipitation over the 1900-2000 period—the others are the Horn of Africa and the Southwest of Latin America. Over the last 50 years, water availability per African has dropped 75%, due to a combination of two factors: (a) reduced rainfall and flow of watercourses; (b) increased population.² If these demographic and climatic processes continue and countries maintain their development ambitions, they will need to go further than the implementation of their existing policies and institutional responses to variability. The measures to be undertaken must be equal to future climatic challenges, which must first be analysed.

In 2001, the Third Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC) reviewed the major climate changes experienced around the world in the 20th century and predicted even greater changes in the 21st century. It is expected that the coming changes will take on the following forms:

² Source; IPCC. Third Assessment Report on climate change (TAR)

- Temperature increases at an unprecedented rate, compared to the changes that have occurred over the last ten millennia
- Intensification of the hydrological cycle, reflected in some regions of the world by increased precipitation and flooding (high latitudes) while other regions of the world (tropical latitudes) will experience increased risks of pluviometric deficit and drought.
- Rise in sea level

The impact of these climate changes will take many forms and affect the planet on a broad scale. The biophysical environment will undergo major transformations affecting the fauna, the flora and biodiversity in general. Massive destruction of homes and physical infrastructure can be expected as a consequence of flooding and the advancement of the sea. The ensuing disruptions in industries such as agriculture, fisheries and herding, etc. will have significant impacts on the economies of the affected areas and on the food security of the population.

However, this is only a rough outline and there are some uncertainties as to the scope of the expected changes and the way in which these changes will manifest themselves in specific regions of the world. The uncertainties are due to the complexity of feedback in the global climatic system and sizeable differences in assumptions about greenhouse gas emissions, one of the essential factors shaping the climate of the future.

Although there are uncertainties regarding the future, the Intergovernmental Panel on Climate Change (IPCC) reckons that, in general, continued global warming will lead to higher temperatures, increased dryness in the Sahel, increased variability in precipitations and storms of heightened intensity. In catchment areas, particularly in the Sahel, we will see a reduction in the vegetational cover, infiltration and runoff; soil erosion is expected to accelerate. These different processes will profoundly impact the hydrological regime of the watercourses as well as the conditions of refilling of the water table. (3rd IPCC Assessment Report quoted in Cornet, 2002: 113-114).

In summary, despite the uncertainties that exist, foreseeable global climate change should lead, in dry subtropical zones, to an increase in arid conditions, which would aggravate the pressure of the population on resources and land deterioration (Cornet, 2002).

It is therefore important that in regions such as West Africa, efforts are undertaken to integrate the climatic factor into development programmes and particularly the management of freshwater resources, which will be a growing economic and geopolitical issue. The major transboundary river basins of the region (Niger, Senegal, Chad, Volta, Gambia) will more than ever dictate an imperative of equitable cooperation and sharing between riparian States, but they will also be potential sources of interstate tensions and conflicts.

B. Current Responses to Climate Outlooks

Three kinds of responses are envisaged in West Africa to deal with the forecast climate change:

First of all, there are measures of adaptation to current variability, based on the idea that a measure that is effective against variability can at least contribute to reducing the

impact of climate change, given that climate change largely consists of an amplification of current variability and an accentuation of trends to worsening hydro-climatic conditions (with the drop in rainfall and river flows).

1. Measures identified on the national scale

Next, there are adaptation measures envisaged by the States on the national scale in the framework of the United Nations Framework Convention on Climate Change. These particularly include National Communications on Climate Change, and National Adaptation Programmes of Action (NAPA).

a) National communications

With the exception of Guinea Bissau, Sierra Leone and Liberia, every country in West Africa submitted an initial National Communications between 1997 and 2003, and Ghana, Mauritania, The Gambia and Niger have begun formulating their 2nd Communication. Although National Communications focus on mitigation (inventories of greenhouse gas emissions and measures of attenuation), they also include vulnerability analyses and recommend adaptation measures.

In their National Communications, countries rarely go beyond the identification of a certain number of adaptation measures, which are rarely evaluated economically or classified by order of priority. A review of the adaptation measures proposed in the water resource sector reveals a certain convergence among the proposals, which could be explained by the relative homogeneity of the situations in the different countries but also by their common experience in terms of combating desertification over the last three decades. The most common measures include: (i) promotion of integrated water resource management (IWRM); (ii) enhancing knowledge on water resources; and (iii) combating erosion and deteriorating water quality through reforestation of catchment areas. Here and there, the National Communications suggest adaptation measures such as inter-basin water transfers; combined use of surface and subterranean water; artificial refilling of aquifers; popularisation of water-saving technologies and behaviours; recycling of wastewater (domestic and industrial); collection of rainwater; reinforcement of early warning systems in case of extreme events (droughts, flooding) and agro-hydro-meteorological monitoring; etc.

However, due to the reasons mentioned previously (strong regional interdependence in terms of water, economic weakness of the States), effective and sustainable implementation of most of the abovementioned measures will require some form of interstate collaboration and coordination at the level of the river basins or the region.

b) National Adaptation Programmes of Action (NAPAs)

NAPAs are developed by countries on the LDC (Least Developed Countries) list, which includes all West African countries with the exception of Nigeria and Ghana. NAPAs identify priority activities to be implemented to respond to immediate and urgent needs

in terms of adaptation to climate change. NAPA measures those aimed at enhancing the level of adaptation to current climate variability, so as to enable countries to deal with the initial impacts of climate change. Mauritania, Niger and Senegal have already submitted their NAPAs. The appended tables (Appendix 2) reveal that the integration of this dimension is critical for many of the measures recommended in the NAPAs of Mali (report completed but still to be submitted to the UNFCCC), Niger and Senegal. Even in the cases where the regional dimension is not indispensable, it is often important or useful in order to achieve economies of scale (covering a wide area or adapting and reproducing solutions that have been successfully tested elsewhere).

In West African National Communications and NAPAs, little space is given to the regional dimension of adaptation, as the recommended measures are essentially designed on the national scale only, even in cases where the resources at stake are of a transboundary nature (such as the water resources of transboundary river basins).

c) Measures envisaged at the regional or subregional level

One of the 6 areas of intervention of the NEPAD Environmental Action Programme adopted in 2002 focuses on climate change, and 3 other areas are also involved in the issues of the present study on risk sharing. These are: (a) combating soil deterioration, drought and desertification; (b) wetlands conservation; (c) transboundary management and conservation of natural resources. The implementation status of the NEPAD Environmental Action Plan is not systematically monitored, but it remains obvious that most of the initiatives identified in the Plan remain at the project design stage.

CILSS, in collaboration with CEA and ACMAD, organized an international conference on reducing the vulnerability of West Africa's natural, economic and social systems to climate change in January 2007 in Ouagadougou. At the outcome of the Conference, ACMAD, CEA and ECOWAS were asked to set up an expert panel to formulate a Subregional Plan of Action on reducing the vulnerability of West Africa (including Chad) to climate change.

The West Africa Regional Office (UICN-WARO), in collaboration with CILSS and the West Africa Water Partnership (GWP/WAWP), organised a Regional Dialogue on Water and Climate Change in West Africa from 2002 to 2004. This Dialogue, conducted in the framework of the Global Dialogue on Water and Climate, received financial support from CIDA and Dutch cooperation. It culminated in the formulation of a regional strategy and a plan of action. To date, implementation of the areas of intervention identified in the Plan of Action has not yet begun.

Since April 2007, the UICN West Africa Regional Office, CILSS and the West Africa Water Partnership, supported by the World Bank, have launched an initiative entitled "Responding to climate change in West Africa". This initiative, which focuses mainly on the Senegal and Niger River basins, is conducted in collaboration with the OMVS and NBA. The initiative consists of: (a) using global models to assess the expected impacts of climate change in West Africa; (b) examining the measures that could be envisaged

to deal with the expected impacts; (c) elaborating a Framework of Action for the implementation of the measures selected to respond to climate change. The validated Framework of Action—which is the final output of the initiative—is scheduled for June 2008 and should be followed by a search for financing for the implementation of the interventions included in the Framework of Action.

This list of recent initiatives on climate change in Africa, and in West Africa in particular, is not exhaustive. However, it is indicative of the lack of synergy between joint initiatives and the lack of continuity from one initiative to another. The CCAA Programme will have achieved a positive outcome if it manages to create bridges between existing initiatives and build on what has already been accomplished in the subregion.

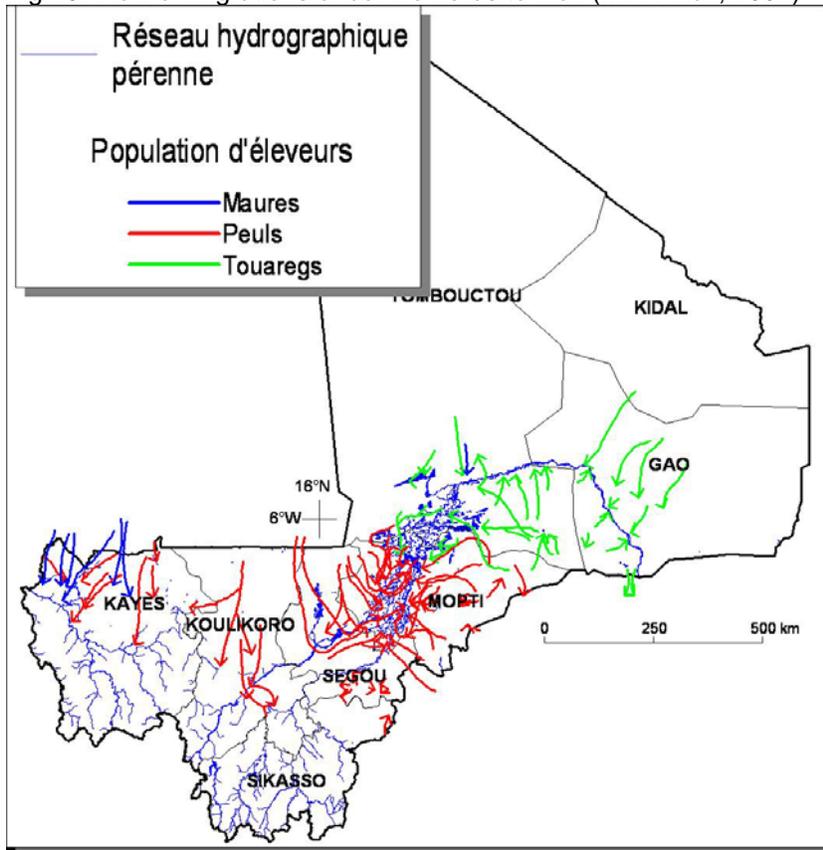
d) Limitations of Current Measures

First of all, the initiatives that could be described as regional consist mainly of processes of elaborating strategies, plans and frameworks of actions, which have not yet culminated in practical implementation. In addition, these processes are carried out simultaneously or successively, but in an isolated fashion.

The regional dimension is not well integrated into the national processes (National Communications and NAPAs), despite the economic weakness of the countries and the fact that many of the resources targeted in national adaptation efforts are transboundary resources. More specifically, the insufficiencies of the measures currently implemented and those envisioned can be summed up as follows:

- i. Lack of recognition of the transboundary nature of certain resources on which responses and adaptation strategies are focused, and in particular shared water resources in West Africa or transboundary ecosystems (wetlands, forest formations including mangrove forests)
- ii. Lack of recognition of the migrations of resource users, as in the case of transhumant pastoralism and nomadism, which reduces the effectiveness of cattle range conservation measures (regeneration of the soil and herbaceous flora) if a regional perspective is not used. These transboundary pastoral movements are illustrated in the western border of Mali with Mauritania.

Fig.10. Flow of migrations of bovine herds to Mali (MDR-Mali, 2002)



iii. Adaptation measures too grand in scope to be envisaged on the scale of a single State. Adaptation measures such as building large dams are often too costly to be envisaged on the scale of a single State. This often leads the States promoting such investments to spend years seeking hypothetical foreign financial support. It is therefore unsurprising that many dams planned individually by the States remain at the planning stage despite their validity and economic, social and environmental justifications or their usefulness as measures of adaptation to climate variability and change. Such dams include Bui (in Ghana on the Black Volta), Fomi (Guinea), Tossaye (Mali), Kandadji (Niger), etc.

iv. Low levels of capitalisation and efforts to replicate good adaptation practices. Here and there, and often independently, West Africans and Sahelians in particular have demonstrated their spirit of initiative and considerable ingenuity in seeking ways and means to adapt their lifestyles, their production systems and even their systems of governance to the hydro-climatic conditions prevailing in the subregion. Regarding agrarian practices, for instance, several local adaptation strategies have been implemented. Examples include agricultural diversification, the “zai” system, half-moons, etc. in countries such as Burkina Faso.

There are therefore great opportunities—which are being missed for the time being—to envisage adaptation responses to climate change from a regional perspective, share the cost of such responses and achieve economies of scale.

V. JUSTIFICATION AND OBJECTIVES OF THE RISK-SHARING STRATEGY

A. Justification

There are arguments for and against the implementation of a “Risk-Sharing” approach in response to climate issues in the West African subregion.

The following observations speak in favour of sharing adaptation risks through a regional approach:

- ☞ West Africa is the poorest region of the poorest continent³. Thus, in light of the weak economies of the countries comprising the region and the high cost of dealing with climate change, cost-sharing is a necessity in order to address climate change issues.
- ☞ The current compartmentalisation of national adaptation approaches reduces opportunities for economies of scale
- ☞ There is a low level of exchanges of adaptation experience, including good practices.
- ☞ National expertise, taken individually, is often insufficient to meet the scientific challenges of climate change.
- ☞ Certain natural resources are transboundary—particularly many of the freshwater resources in the area (surface water but also underground water)—and are therefore not appropriately dealt with in the framework of strictly national strategies.
- ☞ A framework for consultation on climate change in West Africa would be useful in light of the strong similarities from one country to another in terms of problems linked to climate change.

B. Constraints

There are also, however, a certain number of constraints, which should not be ignored. These constraints are either inherent in the regional approach itself, or specifically linked to the West African environment. They may be summed up as follows:

³ Niasse et al, 2004

- Many regional organisations which should play a driving role in the implementation of regional initiatives are more effective in the political sphere than in the operational sphere. Most of the basin organisations managing transboundary river basins are in a state of lethargy and are faced with serious difficulties to collect member State contributions in order to finance their operating costs and often lack the necessary credibility in the eyes of potential donor partners to raise substantial financing. There are exceptions to the rule. OMVS has shown an exceptional vitality and is considered by many as a successful model of river basin organisation. The NBA, after years of lethargy, is reorganising and becoming more attractive to development partners. After having played a pivotal role in efforts to fight desertification, CILSS seems to need a new start, to reorient and adjust its strategy.
- The decision-making mechanism, which is often consensual within regional organisations, leads to slow programme implementation.
- It is easier to mobilise funding for national initiatives than for regional ones. At the national level, the borrower, government, is clearly identified whereas for regional, intergovernmental and non-governmental institutions it is harder to define who is responsible for what. It is probably for that reason that financial instruments such as the Less Developed Countries Fund (LCDF) that support adaptation efforts only target countries, even though it is obvious that in sectors like water, national strategies have no chance to succeed if they are not complemented by efforts at the regional level.
- In terms of sustainability of interventions, regional processes often experience greater difficulties than national processes. Enthusiasm at the regional level tends to fade as soon as foreign financing dries up and there are rarely viable regional institutions able to take over and ensure the continuity of the interventions.
- There is also the fact that climate change is an area in which unanswered questions remain. Because climate predictions are only grossly accurate, decision makers tend not to consider climate issues among their priority strategic areas of intervention.
- Governments are often sensitive to anything that touches on their national sovereignty and are therefore reluctant to endow regional institutions with the legal powers that would allow them to fulfil their mandates.
- Even if shared resources such as water offer opportunities for collaboration, they are also often disputed resources and sources of conflict (see Insert).

The ways and means of overcoming the above constraints and those related to the suggested strategic areas (see below) will need to be examined more systematically during the feasibility studies to be conducted for each of the specific interventions selected.

C. Goal and Specific Objectives of the Risk-Sharing Strategy

Objectives of the climate change risk-sharing strategy:

Long-term goal: *To ensure the development of West Africa and contribute to the well-being of its people by minimising risks and by taking advantage of opportunities related to climate change.*

Due to poor water management and the generally high level of dependency of African economies on exploitation of natural resources, West Africa is extremely vulnerable to the vagaries of the climate, both on the household scale and on the national scale. That is why years of prosperity follow years of want in the West African countryside, depending on whether annual rainfall was satisfactory or insufficient. Similarly, at the national level, the ups and downs of economic growth rates correspond to variations in annual rainfall. From a climate change perspective, unless something is done, we can expect the present vulnerability of the people and countries of West Africa to be accentuated. It is also important to recognise that certain aspects of climate change can offer opportunities. In responding to climate risks, for instance, through better water management, we can achieve levels of protection against climate variation that have never been reached before, and corresponding record performances in terms of agricultural production.

As a result, minimising climate risk is a necessary condition—even though it is not always sufficient—for sustainable improvement of the living conditions of the people of West Africa.

General goal: *To reduce West Africa's vulnerability to climate risks by sharing climate change adaptation costs at the subregional and regional levels.*

Efforts to reduce West Africa's vulnerability to climate change seem to be dominated by national approaches for the time being. National Communications in the framework of the UNFCCC and NAPAs are exclusively national processes. As shown in the appended tables (Appendix 2), many of the measures outlined by the countries in their NAPAs have some degree of regional relevance. Certain of the measures are even difficult to envisage without a regional approach. Even for those that can be carried out at the national level, the States should take account of the regional dimension (to achieve economies of scale, take advantage of the existence here and there of responses that have been proven effective, etc.).

Strategic Objective 1. *Promoting sub-regional and regional collaboration in the establishment and use of decision-support knowledge bases on climate change and its impacts*

Today in West Africa, a large number of institutions are involved in collecting and analysing data linked to the climate. Climate research institutions in West Africa include the CILSS regional agro-hydro-meteorological centre (Agrhymet), the African Centre of Meteorological Application for Development (ACMAD), and research projects and networks such as HYCOS-WCA (Hydrological Cycle Observation System for West and Central Africa), AIACC (Assessments of Impacts and Adaptations to Climate Change,

particularly its West African components), the international network on flow regimes in West and Central Africa (FRIEND-AOC), and AMMA (African Monsoon Multidisciplinary Analyses Programme). By reinforcing synergies and complementarities between these different centres and initiatives, we can increase the effectiveness and affordability of climate information collection, processing and dissemination in the region.

Strategic Objective 2. *Promoting subregional and regional collaboration in the development and sustainable exploitation of transboundary natural resources and ecosystems*

Ecosystems (particularly wetlands, coastal ecosystems and forest formations) are home to a high proportion of the world's biodiversity, especially in the West African region. However, this function is strongly dependent on variations in the weather and in water space and quality. It is therefore essential to promote measures to reduce the impacts of climate variability and climate change on these ecosystems so that they continue to play their role as biodiversity reservoirs and sanctuaries. On the other hand, due to their multiple functions—water storage, flood buffers, surface stabilisation, water purification, carbon sequestration, etc.—these ecosystems constitute important means for capacity building in terms of adaptation to climate variability and change. In contexts such as West Africa, many of the most significant ecosystems—in terms of their size or the richness of their biodiversity—are transboundary ecosystems. Sustainable conservation and management of such ecosystems requires international collaboration, in the context of adjacent countries, transboundary river basins or subregional integration organisations (such as CILSS, WAEMU, and ECOWAS).

Strategic Objective 3. *Identifying, promoting and disseminating appropriate climate change adaptation technologies, techniques and practices*

Efforts to adapt to climate variability and change in West Africa are not only limited (due to scarce resources) but they are also undertaken in an isolated manner on the State scale. One important issue to resolve involves the low level of exchanges of adaptation experiences, including good practices. The current compartmentalisation of adaptation efforts undertaken by the different States in the region reduces, *inter alia*, opportunities to achieve economies of scale. Indeed, designing and implementing appropriate responses to climate change is a tremendous scientific and technical challenge that the poor countries of West Africa cannot meet individually. They would do well to try to pool their expertise and resources for greater effectiveness. Finally, the strong interdependence between the countries in the area of water resources demands a regional approach to the elaboration and implementation of adaptation measures.

Strategic Objective 4. *Putting in place a regional framework for consultation on climate change and its impacts*

The aim in this case is to create effective lines of communication between research institutions, political, economic and community decision-makers, basin organisations, users of water and other natural resources (such as forests), civil society, partners, etc.

This objective consists in fact of pursuing and formalising regional dialogue on water and climate change led by the UICN between 2002 and 2004 in partnership with CILSS and the West African Water Partnership (GWP/WAWP).

VI. COST-SHARING ACTIONS THAT CAN BE ENVISAGED IN WEST AFRICA

This part of the report proposes a series of adaptation activities, founded on the risk-sharing approach, which can reduce the impact of climate change.

A. Strategic Objective 1: Collaboration in the establishment and use of decision-support knowledge bases

In order to effectively address climate change, it is essential to have the most accurate information possible on trends in climate change and the forms its impacts will take. While, globally, major uncertainties remain as to the evolution of the climate, despite scientific advances in recent years, on the regional and local scales the margin of uncertainty is amplified since climate-change scenarios are based on outputs of global Models often poorly adapted to the reduced scale. Thus, considerable work is required in terms of refining downscaling methods for global Models in order to obtain the most accurate resolutions possible for climate-change scenarios on the local scales of the region (West Africa, Sahel), the river basins and the countries.

Such refining requires collaboration, particularly through the following specific actions:

- ☞ Improving and harmonizing climate information collection networks (and supporting basin organisations in their efforts to strengthen their internal capacities in collecting, analysing and absorbing scientific climate data)
- ☞ Strengthening and expanding networks of experts and research projects such as HYCOS-WCA (Niger, Chad, Volta, Senegal), PRESAO, AMMA
- ☞ Supporting and/or collaborating with sound initiatives such as the World Bank-funded IUCN-GWP-CILSS Project, especially with regards to the work planned on climate prediction models
- ☞ Revitalising and strengthening the IPCC-Sahel (CILSS) and helping expand its mandate to the entire West Africa region.

Insert: Initiatives to better understand and address climate change in West Africa

Since January 2000, the NBA and AGRHYMET have been implementing the pilot phase of **HYCOS-WCA**, which is the West African component of the World Hydrological Cycle Observing System (WHYCOS) of the WMO (WMO/MAE, 1997). HYCOS-WCA sets up data collection and transmission mechanisms providing information on the availability of surface-water resources in the subregion in real time or almost in real time. These mechanisms contribute to better management of water resources, enable information exchanges between countries in the same river basin and make it possible to give the alert in case of flooding and/or insufficient flows. From this standpoint, their relevance as responses to climate change is indisputable. On the basis of the pilot phase in the Niger basin, a second Niger HYCOS Phase is being implemented and the same model is being replicated in the basins of the Volta, the Chad and soon the Senegal.

The **PRESAO** initiative (seasonal forecast for West Africa) was launched in 1998 by a consortium including the African Centre of Meteorological Application for Development (ACMAD), AGRHYMET and the Niger Basin Authority (NBA). The aim of PRESAO is capacity building in the area of seasonal forecasting. In that context, at the start of each rainy season, PRESAO generates a forecast on probable rainfall conditions throughout the subregion (ACMAD/WMO, 1998). Since 1999, the activities of PRESAO also include seasonal forecasting of flows for the principal watercourses of the subregion (ACMAD/WMO, 1999).

The goal of the **AMMA** programme (African Monsoon Multidisciplinary Analyses) is to improve understanding of the West African Monsoon and its impact on the physical and chemical environment and the biosphere, on the regional and global scales.

B. Strategic Objective 2: Collaboration in the development and sustainable exploitation of transboundary natural resources and ecosystems.

Inter-state collaboration is often important or even indispensable to prevent and manage the impacts of climate change on transboundary resources such as watercourses, shared aquifers and other shared ecosystems. We observe for instance that 75% of the hydroelectric potential in West Africa is concentrated in 3 countries: Nigeria (37.6%), Guinea (25.8%) and Ghana (11.4%). Since these countries are either upstream (Guinea) or downstream (Nigeria and Ghana) of transboundary watercourses, unilateral exploitation of such potential by these countries runs the risk of creating tensions or even inter-state conflicts.

1. Transboundary watercourses

Regarding transboundary watercourses, we shall begin by recalling certain recent measures of international cooperation:

Due to the continuous shrinking of Lake Chad over the last three to four decades—the current surface area of the lake only represents 10% of its surface area in the late

1960s—the member States of the Lake Chad Commission envisage refilling the lake with water transferred from the Oubangui River in the Congo River Basin. The project is at the feasibility study phase.

The *Programme Régional de Lutte contre l'Enablement dans le Bassin du fleuve Niger* (Regional programme to fight sand encroachment in the Niger River Basin) financed by the ADB, is aimed at halting the sand encroachment process in the river, which is unfavourable to agriculture. While the project involves all NBA member countries, practical interventions against sand encroachment focus on the parts of the Niger Basin located in Niger, Burkina Faso and Mali, i.e. the southernmost and driest parts of the basin. The concrete action planned includes dune fixation, bank protection, gully correction, tree planting, land recuperation for agro-sylvo-pastoral purposes, etc. One of the expected outcomes of the Programme is the formulation of a master plan for sustainable conservation of the resources of the Niger River Basin, focusing more specifically on protection against water erosion and sand encroachment.⁴

The Upper Niger Hydro-Ecological Management Project (GHENIS) focused on a 140 000 km² area in the transboundary portion of the Niger River between Guinea and Mali from 1999 to 2002. The activities conducted under the project included: improvement of hydro-ecological knowledge in the targeted sub-basin; facilitation of decision-making linked to the risk of deterioration of the water of the River and the associated resources. GIRENS (Upper Niger Integrated Water Resource Management), which is built on the achievements of GHENIS, aims to promote sustainable development in the sub-basin and fight poverty through pilot Integrated Water Resource Management activities in a transboundary perspective and through the identification and promotion of alternative income-generating activities.

Specific actions that could be envisaged:

☞ *Supporting and taking advantage of efforts underway in the context of the West Africa Power Pool (WAPP).* One of the key arguments in favour of energy integration in Africa, and particularly in West and Central Africa, is based on the fact that the expected climate changes should have less or little impact on the flows of watercourses located in the lower latitudes, whereas the average water flows in tropical (Sahelian and Sudano-Sahelian) latitudes will continue to decrease sharply. An interconnected regional electric network would make it possible to compensate for insufficient electrical production in middle latitudes through dams built on watercourses at lower latitudes (Desanker & Magadza, 2001). For the producing countries in lower latitudes, this would provide an export market that generates hard currency.

The goal of WAPP is to realise this energy integration. It aims to enhance regional interconnection of power distribution networks. The hydro-agricultural investments (such as hydroelectric dams) planned for under WAPP will make it possible to diversify the region's power sources (many countries depend almost exclusively on thermal power); to increase control of watercourses (and therefore attenuate vulnerability to flooding and

⁴ During our trip to Niamey in April 2007, the master plan was in the validation phase.

serious water deficits). To this is added the fact that hydroelectric power generally emits negligible amounts of greenhouse gas and also the possibility of optimising the impact of the dams by assigning them supporting functions in irrigated agriculture and domestic and pastoral drinking water supply. However, to create the conditions for inter-state cooperation in dam building, mechanisms to ensure equal sharing of investment costs and benefits are indispensable. In this regard, the OMVS cost and benefit distribution key for shared structures is worthy of interest and could be adapted to other river contexts in West Africa and beyond. The support provided by the WAPP process could therefore consist of documenting and sharing benefit sharing mechanisms.

West Africa Power Pool (WAPP). In October 2000, 14 members of the Economic Community of West African States (ECOWAS) signed an agreement to launch a project to boost power supply in the region. Under the West African Power Pool (WAPP) agreement, countries hope to develop energy production facilities and interconnect their respective electricity grids. According to the agreement, the work would be approached in two phases. The first involves countries already interconnected, including Nigeria, Benin, Burkina Faso, Côte d'Ivoire, Ghana, Niger and Togo. The second phase involves countries not yet connected: Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Senegal and Sierra Leone. Countries will work to harmonize the regulatory frameworks that govern their electricity sectors. ECOWAS estimates that 5,600 kilometres (km) of electricity lines connecting segments of national grids will be put in place.

Madamombe, I. 2005. Energy key to Africa's prosperity. *Africa Renewal*, Vol. 18#4 (January 2005). Source: <http://www.un.org/ecosocdev/geninfo/afrec/vol18no4/184electric.htm>

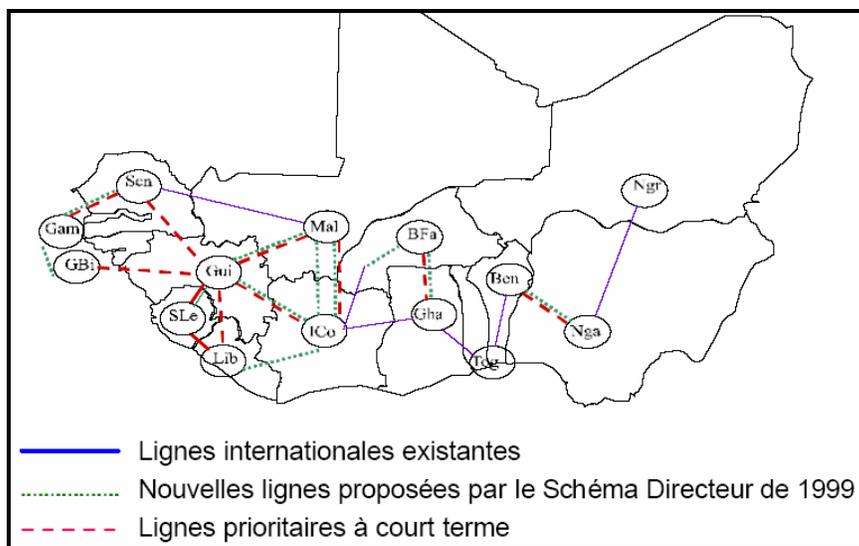


Fig.11. Electrical Interconnections in the West African Power Pool (WAPP) Master Plan. ECOWAS (1999).

Concrete initiatives that could be supported in a risk-sharing (and benefit-sharing) perspective include the following:

- The increasingly suggested idea of evolving towards a form of equitable sharing of the costs and benefits of power production in the Volta Basin. The outputs of

the existing Akossombo and Kpong dams and the new dams envisaged in the basin (Bui and large dams in the part of the basin located in Burkina Faso) would be shared between the 6 riparian States of the Volta River: Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali and Togo.

- Reinforcement of the regional vocation of the Kainji dam in Nigeria, which partially supplies Niger with electricity, and construction of new large dams in the Niger Basin (Kandadji, Tossaye, Fomi) as joint initiatives by the countries of the basin in the NBA framework.
- Promotion of the adoption of a Regional Protocol on Water in West Africa, following the SADC model. The protocol would provide a legal foundation promoting WAPP's implementation.

☞ *Increasing the number of transboundary projects to fight sand encroachment in watercourses.* These initiatives could draw on the lessons learned from the sand encroachment project currently being conducted by NBA. Specific intervention areas could include:

- The Senegal River, with special emphasis on the upper part of the basin, downstream of the Manantali dam and the middle valley (border area between Senegal and Mauritania).
- Komadugu Yobe Basin (a tributary of Lake Chad) particularly in the border area between Niger and Nigeria.
- The White Volta Basin, particularly in the border area between Burkina Faso and Ghana, downstream of the Bagré dam.

☞ Promoting integrated development programmes in transboundary sub-basins, along the lines of the GIRENS model. Target sub-basins could include:

- The border area between Senegal, Mali and Guinea along the Senegal River.
- The transboundary reach between Niger and Benin on the Niger River.

☞ *Strengthening the capacities of West Africa basin organisations to address climate change issues.* Target basin organisations are: NBA, LCBC, VBA, OMVG, and OMVS. Support for the basin organisations could take on the following forms:

- Information/awareness for basin organisations on climate change (an issue that is now much more than a "subject for conversation" between basin organisations in West Africa).
- Assistance for basin organisations in designing and implementing concrete measures to adapt to climate change. Concrete measures that could be envisaged include: (a) existing and envisaged "climate-proofing" investments and programmes (protection against the impact of climate change); (b) setting up or reinforcing flood alert systems (one of the essential components of such a system would consist of identifying areas at risk for flooding in a context of climate change); (c) feasibility, social and environmental impact study formulation and analysis, on structural investments such as dams or irrigated perimeters; (d)

support for users of water resources (diversification of production systems, storage and preservation of agricultural produce, access to markets).

☞ *Supporting and accompanying initiatives on transboundary groundwater resources.* There are a growing number of regional initiatives on transboundary water resources in West Africa. In the framework of the UNESCO-ISARM Programme (Internationally Shared Aquifer Resources Management Project), a series of studies is conducted to improve knowledge of available water resources and the dynamics of transboundary aquifers, including those in West Africa. Note should also be taken of the OSS (Sahara and Sahel Observatory) Initiative on Transboundary Risk Management in the Iullemeden Aquifer system, which is an underground water sheet shared by Niger, Nigeria and Mali. The Project, which is currently in Phase PDF-B, is a GEF Project implemented by OSS with technical supervision by the International Water Division of UNESCO. The objective of the project's PDF phase is to set in place a joint strategy for the development and conservation of the aquifer. Based on the results of these two initiatives and other work conducted on the country scale (such as detailed studies of the Maastrichian aquifer in Senegal), the following can be envisaged:

- Support for the creation of consultation frameworks on the major transboundary aquifers in the region (Senegalo-Mauritanian basin, Iullemeden, Taoudeni, etc.). It remains understood that, because they are often fossilised, water availability in the deepest water tables (i.e. in the major aquifers mentioned above) is very little subject to inter-annual climate variations. Joint use of groundwater with rain and surface water in agriculture as well as for human and animal consumption would significantly reduce the region's vulnerability to climate variability and change

☞ *Helping strengthen conflict prevention and management mechanisms relating to shared water resources.* Due to current climate variability—reflected over the last four decades by a significant decrease in the availability of rainwater and the flows of major watercourses—the risk of water conflicts has increased in West Africa (Niasse, 2005). While the trends observed in terms of decreased water availability are expected to continue or be accentuated due to climate variability and change, competition over shared water (refer to water resources) is expected to intensify and areas of tension, disputes, and even conflicts are expected to increase. It is therefore urgent to reinforce water conflict prevention and management mechanisms in West Africa. For this purpose, the following initiatives can be envisaged.

- *Supporting the design and implementation of capacity building programmes for water conflict prevention and management.* It should be noted that basin organisations such as OMVS, LCBC, and NBA already play this role to a certain extent and are the first level of arbitration on disputes between riparian States over borders and water use. But the organisations need to reinforce their capacities in that area due to the risks of aggravation and multiplication of water conflict risks due to climate change.
- *Supporting the GWP-UNESCO process promoting the 1997 UN Framework Convention on the Non-Navigational Uses of Transboundary Watercourses.* This convention contains a large number of provisions promoting cooperation

involving shared watercourses with minimal risk of conflict. Its relevance for a region such as West Africa, where the States are strongly interdependent in terms of water, is obvious. However, so far, no West African country has ratified the Convention and only Côte d'Ivoire has signed it. The current GWP-UNESCO initiative consists of a study to better determine the reasons why the West African States have not ratified the convention—this study is being validated and finalised. The next step will be to define an information and awareness strategy for Governments—this phase could be supported by the CCAA Programme.

2. Conservation and sustainable management of transboundary ecosystems

Thanks to inter-zone transfers of fresh water, the major West African rivers overflow every year into the Sahel area, flooding vast surfaces that can reach 4.6 million hectares in years when water conditions are good. Among the Sahelian floodplains shaped by these annual floods, the largest are the Inner Niger Delta (3 million ha), the Middle Senegal Valley (500 000 ha), the Hadejia Nguru plain in northern Nigeria (400 000 ha), and the Chari-Logone plain between Cameroon and Chad (approximately 800 000 ha). Home to a great wealth of biodiversity (vegetation, fish and birds, in particular), these plains are also renowned for their great importance in supporting local production (flood recession agriculture, herding, fishing).

These different wetlands (often transboundary) play an important role in attenuating the impacts of climate variability and change. Indeed, the essential functions of wetlands include water storage, refilling of underground water tables, buffering floods, stabilisation of surface conditions and erosion control, water purification and carbon sequestration. As the climate changes, these functions become increasingly important. As a result, wetlands rehabilitation and sustainable management is an important measure of adaptation to climate variability and change (Bergkamp & Orlando, 1999; Bergkamp et al, 2003; Klein, 2001; Kabat et al. 2003). It should also be noted that inland and coastal wetlands are home to a significant proportion of the world's biodiversity, and particularly that of the West African region. This function depends strongly on variations in water level and quality over time and space. It is therefore essential to promote measures to reduce the impact of climate variability and change on the ecosystems so they can continue to act as biodiversity reservoirs and refuges.

Specific actions that could be envisaged:

☞ *Helping to improve knowledge of the functions of the Inner Niger Delta (IND) with regard to climate change.* The surface area of the Inner Niger Delta has decreased significantly in recent decades due to deteriorating hydro-climatic conditions in the Sahel, dropping from approximately 37 000 km² in the early 1950s to only 15 000 km² since the 1990s. Despite this substantial decline, IND remains Africa's largest wetland after the Okavango Delta in Botswana. As a wetland, it plays the abovementioned

roles in attenuating the impacts of climate variability and change. However, some also see IND as a giant boiler from which billions of m³ of water are evaporated each year. FAO estimates that the Niger River loses ¾ of its water between Ségou and Timbuktu (i.e. between entering and exiting IND), representing an average annual “loss” of 31 billion m³, due to infiltration but also and above all to evaporation (FAO, 1997). Thus, the idea of building a deep canal in place of the floodplain is advanced in certain circles as a means of addressing the decreased flow of the Niger River, which affects countries downstream such as Niger and especially Nigeria. However, to our knowledge, there has never been a serious study on the role of IND in the current context of climate variability and prospective climate change. It is suggested that the CCAA Programme could help fill this gap, based on which specific interventions could be subsequently envisaged.

- In collaboration with NBA, support the conduct of a hydro-climatic study to better understand the role of IND in the different plausible climate-change scenarios in West Africa and especially in the Niger River Basin. The results of such a study—which would include an analysis of management options for IND adapted to climate change outlooks—will be particularly useful for NBA and the Malian authorities as decision-making tools.

☞ *Supporting the conservation and sustainable use of the Transboundary Biosphere Reserve of the Delta of the Senegal River.* The Transboundary Biosphere Reserve of the Delta of the Senegal River (RBTDFS) covers a surface area of nearly 650 000 ha (including a central core area of 95 000 ha) on both banks of the river delta. The reserve includes a World Heritage Site (Djoudj) and 5 Ramsar sites (Djoudj, Diawling, Chat Tboul, Gueumbeul, and Ndiael). One of the most serious threats to the delta ecosystem is the proliferation of invasive water plants, especially typha. Given climate change prospects of reduced flows and increased frequency and amplitude of climatic extremes (flooding and droughts), it is important to protect the biosphere reserve and make the river estuary less vulnerable to the expected climatic disturbances. Concretely, the conservation of the reserve could be supported through:

- A targeted contribution to the Regional Coastal and Marine Conservation Programme, a joint initiative by UICN, Wetlands International and WWF with financial support from several donors including Dutch cooperation. Targeted support for this programme could consist of restoring seriously deteriorated mangrove stands in the estuary, updating (with a view to adaptation to climate change) management plans for the ecosystems of the Reserve, and implementing such management plans.

☞ *Protection of coastal mangrove forests:* Estimates of the surface area occupied by mangrove stands along the coastlines of the 12 coastal countries in West Africa (from Mauritania to Nigeria) vary from 27 000 km² to 45 000 km² according to sources, representing between 15 and 25% of the world’s mangroves (Blasco et al, 2001). In recent years, losses of mangrove stands in West Africa have been estimated at between 40 and 70% according to the country (NESDA. 2002). The importance of mangrove forests in protecting coastal areas against the advancing sea was underscored by the Tsunami that hit the Indian Ocean in December 2004. Given the

likelihood of a significant increase in the sea level over the coming decades due to climate change, mangrove stand restoration and conservation should be a priority adaptation measure (McLeod & Rodney, 2006). In addition, mangroves are also wells of carbon and their conservation is also a climate change mitigation measure.

☞ *Supporting the conservation and integrated and sustainable management of the Fouta Djallon Mountains.* The Fouta Djallon Mountains contain over 8000 springheads feeding a network of 14 transboundary watercourses and several other rivers in Guinea. Among the international rivers springing from sources in the Fouta Djallon Mountains are the Niger, the Gambia and the Senegal. Today, serious dangers threaten the Fouta Djallon Mountains. Factors such as bush fires, deforestation and erosion (promoted by the deterioration of the climate and population growth) interact to speed the deterioration of the land and the environment. In response to these threats, a Fouta Djallon Mountains Regional Integrated Development Programme (PRAI/MFD) was designed in the early 1960s. In the late 1970s and early 1980s, the OAU and UNEP successively included the development of the Fouta Djallon Mountains on their priority action agendas. Today, the Fouta Djallon Mountains Regional Integrated Development Programme has just completed the PDF-B phase with support from GEF and is seeking funding for the implementation of the Project proper. The following activities could be envisaged to help ensure sound management of the mountains:

- Support for the financing of the Fouta Djallon Mountains Regional Development Programme in the GEF framework
- Call for the setting up of a trust fund fed by a benefit-sharing mechanism on income drawn from use of the waters of the Senegal, Niger, Gambia and Konkouré Rivers to provide sustainable funding for conservation and moderate utilisation of the land, water and biological resources of the Fouta Djallon.

3. Food security

The Strategic Framework for Food Security (SFFS) is the CILSS reference document in the area of food security. The five specific objectives of SFFS with a view to achieving complete food security for the Sahel by 2015 are as follows:

(1) promotion of productive, diversified, sustainable and regionally integrated agriculture; (2) development, fluidification and subregional integration of national markets; (3) sustainable improvement of conditions of access of vulnerable groups and areas to food and basic social services; (4) improvement of food crisis prevention and management mechanisms, consistent with the building of structural food security; (5) capacity building for the actors and promotion of good food security governance. SFFS apparently has a very strong regional dimension, particularly with regards to its first two objectives and the objective on the food crisis prevention mechanism.

The objective of sharing good practices is taken into account in the 3rd strategic aim proposed by the present document. Regarding food security, exchanges could focus on experiences (especially successful experiences) involving soil and water conservation techniques/practices. The objective involving the crisis prevention mechanism is

partially included in the 1st strategic thrust calling for collaboration in the development and management of decision-support knowledge bases.

Due to the contrast between wetlands and arid lands and the spatial variability of rainfall over the year, surplus and deficit cereal production zones coexist (see map below). By promoting exchanges between the zones, the consequences of climate variability—which is expected to intensify with climate change—can be attenuated. It is therefore useful to focus especially on the 2nd SFFS objective, i.e. development and regional integration of national markets.

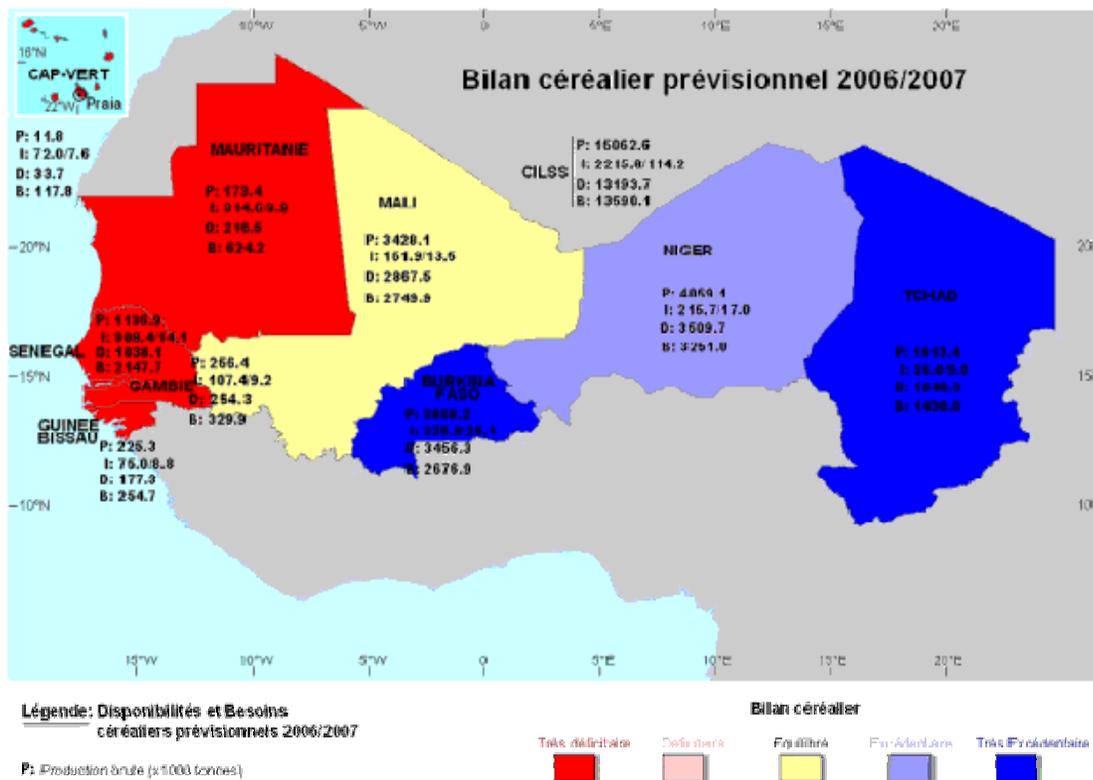


Fig.12. Provisional cereal balance in the Sahel in 2006-2007: Opportunity to promote intra-regional cereal trade (FEWS, 2007)

C. Strategic Objective 3: Identifying, promoting and disseminating appropriate climate change adaptation technologies, techniques and practices

Identifying and replicating promising adaptation techniques and practices. Here and there, adaptation techniques and practices can be found that yield good results in the current context of climate variability and which should be able to help reduce vulnerability to climate change. Certain of these techniques and practices are traditionally used in certain countries or certain areas of the region. Recent projects, such as the Agrhyment Climate Change Adaptation Capacity Support Project financed by

CIDA and the NBA sand encroachment project, have attempted to replicate certain of these traditional practices and/or tried to promote new techniques. Today, the zai and half-moon techniques are well-known examples in the countryside of Burkina Faso, but also in Mali and Niger. Zai is a traditional soil preparation technique. It consists of making small holes before the rainy season begins in order to store some of the run-off water. Then, millet or sorghum seeds are sown, which will be less sensitive to irregular rainfalls (Anonymous, 2004).



Figs. 13 and 14. “Half-moon” technique used in the Sahel to retain rainwater (Fig. 13 UNEP: AEO2, 2006; Fig. 14 Zougmore et al., undated)

Good adaptation practices can be identified, capitalised and disseminated through the following specific activities:

- Inventory good adaptation practices and techniques in different countries in the region through national studies to be summed up in a regional synthesis. These practices and techniques include those already in use and those designed in laboratories and research centres that have not yet been disseminated
- Based on the judgements of experts (through a regional workshop), select the most promising practices and techniques
- Capitalise on practices/techniques in use
- Promising techniques and practices that have not yet been put into practice could be tested in pilot experiments supported by the CCAA Programme. The pilot experiences could then be capitalised on
- The capitalised experiences would then be promoted and gradually disseminated throughout the region.



Fig. 15. Soil preparation using the zai system (Some, 2001)

☞ *Explore the feasibility of setting in place a Disaster Fund aimed at minimizing the impacts of climate change.* The AEO2 Report (UNEP, 2006) recommends setting up a financial mechanism for an Extreme Weather Reserve Fund. Such a fund could reduce the impact on the economy and losses of human lives and property due to extreme climatic events. For example, in its efforts to combat desert encroachment, the OAU which is now the AU, has SEAF (Special Emergency Assistance Fund for Drought and Famine in Africa) a special fund aimed at reducing the impact of extreme weather. With the prospect of climate change and predictions of increased numbers and greater intensity of devastating floods and severe droughts, this type of mechanism could be envisaged either on the regional scale (ECOWAS, WAEMU, CILSS space), at the level of the basin organisations (OMVS, NBA), or on the national scale. However, the choice of the relevant scale or scales, the mechanism for financing the fund, its organisation, etc. should be the focus of more in-depth specific studies.

- CCAA programme support for the completion of a feasibility study for a disaster fund to attenuate the impact of climate change on the national scale (with the selection of a pilot country); on the level of a basin organisation (for instance with OMVS as a pilot basin) and at the regional scale (for instance with support for WAEMU, CILSS or ECOWAS).

D. Strategic Objective 4: Putting in place a regional framework for consultation on climate change and its impacts

As this report has already mentioned, West African countries present great similarities from the eco-geographical standpoint as well as from the cultural and social standpoints (ethnic groups, languages, etc.). They also face identical development issues and are confronted with the same challenges in terms of climate variability and change. In addition, in sectors such as water, West African countries are so interdependent that

compartmentalised strategies for the management of shared resources are often counterproductive. Furthermore, due to their weak economies, the countries in the subregion often have difficulties mobilising individually the resources they need to develop their resources and protect themselves against climate risks. Finally, when they participate in international gatherings in an uncoordinated manner, West African countries fail to have the power required to influence the decisions that will be made, even when they are directly affected by those decisions. For all of those reasons, it is not only important for West African countries to collaborate operationally to initiate and implement common responses to climate change, but it is also essential for them to have a regional framework for consultation and dialogue in which:

- Government representatives (climate change focal points) can meet and exchange and adopt common positions to uphold in international negotiations on climate change
- Policy-makers can exchange with scientists so that the former can make enlightened policy choices supported by the best available scientific knowledge and the latter can know and address the questions asked by policy-makers
- Regional civil society (NGOs, producers' associations and associations of users of natural resources such as water) can make their voices heard.

Throughout the implementation of the Dialogue on Water and Climate facilitated by UICN, CILSS and GWP between 2002 and 2004, such a forum actually did exist in West Africa. But it has virtually ceased to function since the end of the project. We therefore suggest that the CCAA Programme reactivates this forum, and creates the necessary conditions for its continuation. The following actions can be envisaged:

- Updating the list of stakeholders in the Regional Forum on Climate Change and ensuring that it is more open to other sectors and not just focused on the water sector
- Taking the necessary steps to ensure that regional institutions such as CILSS, WAEMU, ECOWAS, the African Network of Basin Organisations (ANBO), the West Africa Water Partnership (GWP/WAWP) agree to form a consortium to steer and facilitate the process
- Taking advantage of the need to validate the present draft regional strategy to convene the Forum. The expected output of the first meeting of the Forum could be the validation of the Climate Change Risk-Sharing Strategy.

VII. FINANCING OF ADAPTATION MEASURES

Financial instruments that could be envisaged to finance the abovementioned adaptation measures include the following⁵:

The Marrakech funds: These funds were set up under the Marrakech agreements to help developing countries meet their needs in terms of adaptation to climate change. These funds include: (a) the LDC Fund which mobilised 42.8 million USD in mid-2005; (b) the Special Climate Change Fund whose commitments totalled nearly 40 million USD in mid-2005; (c) the Kyoto Protocol Adaptation Fund.

These funds administered according to GEF (Global Environment Fund) rules are criticised for their lack of flexibility. GEF finances incremental costs for activities that generate advantages or positive impacts on the global environment. It so happens that adaptation actions are often very local in scope, and are rarely significant for the national or regional environment, much less the global environment. Another constraint is that adaptation activities are often diluted in more general actions—targeting water, desert encroachment, and disaster prevention—within which it is often difficult to isolate what portion applies to adaptation. The Marrakech funds could be used to finance incremental costs of achieving sustainable development, to the extent that the costs are imposed by the impact of climate change. The issue of co-financing remains to be resolved.

In addition to the Marrakech funds, there are also the following opportunities:

- Financing through bilateral sources (which often finance adaptation through contributions from rich countries to GEF in general and the Marrakech funds in particular).
- Multilateral financing: multilateral organisations such as the World Bank have established financial instruments to support adaptation efforts. The World Bank Carbon Fund has resources of over US \$2 billion distributed between 9 funds including the BioCarbon Fund and the Community Development Fund. These funds finance projects that could potentially contribute to reducing the vulnerability of grassroots communities to the impacts of climate change, while playing a positive role in terms of mitigation.
- NGOs often help with access to the abovementioned funds
- The private sector can finance adaptation activities through direct investments in sectors such as infrastructure

Finally, there is insurance. Use of insurance as an adaptation measure remains rare in developing countries. And yet, insurance is an effective mechanism for sharing climate risk—sharing on the national scale but also on the level of economic organisations such

⁵ This section of the report is inspired by: Parry et al., 2005

as WAEMU and ECOWAS. Insurance options that could be envisaged as adaptation measures include the following:

- International Insurance Pool: This pool was originally envisaged for small islands threatened by rising sea-levels. It is aimed at sharing loss risks.
- Public-Private Insurance Partnerships: In this system, the Government sets up a system to protect private investors against the risk of potential losses due to climate change.
- Regional Catastrophe Insurance Schemes: These are financial reserves set up at the regional level and fed by contributions from the member States. States experiencing crisis due to climate change have access to funds set in place in the form of loans.

In the framework of the CCAA Programme, the following interventions can be envisaged:

- ☞ Organising training sessions on financial instruments that can be used to finance adaptation measures included in the NAPAs and envisaged by regional and subregional integration organisations. The target audience for such training could be made up of focal points on climate change, NAPA coordinators, coordinators of National Communications on Climate Change, basin organisation heads, heads of organisations such as CILSS, WAEMU, ECOWAS, and regional NGOs.
- ☞ Helping mobilise co-financing to promote access to the Marrakech funds for viable national adaptation initiatives.
- ☞ Helping establish regional insurance mechanisms such as International Insurance Pools, public-private insurance or disaster insurance schemes (as suggested above in Strategic Objective 3).

VIII. CONCLUSION

Unless they come together in an organised manner, West African countries will have difficulties dealing with climate change. Due to the weakness of their economies and their strong interdependence in the sharing of certain vital natural resources such as water, West African countries would do well to combine their national-scale efforts at adaptation with interstate collaboration. Such collaborative action could reduce adaptation costs through economies of scale, replication of good practices and sharing of the burden of large transboundary investments.

Due to these concerns, we propose this Draft Regional Climate Change Adaptation Strategy based on Risk-Sharing. The four pillars of this strategy are as follows: (a) Promotion of subregional and regional collaboration in the setting up and operation of decision-support knowledge bases on climate change and its impacts; (b) Promotion of subregional and regional collaboration in the development and sustainable use of

transboundary natural resources and ecosystems; (c) Identification and dissemination of appropriate climate change adaptation technologies, techniques and practices; (d) Setting in place of a regional consultation framework on climate change and its impacts.

For each of these strategic thrusts, specific actions are proposed. But it is important to ensure participatory validation of both the suggested strategic thrusts and the proposed interventions.

Regarding the mobilisation of the financing required to implement the recommended actions, the CCAA programme can act along the following lines:

- Training stakeholders on existing financial instruments
- Provision of funding to help overcome the cofinancing constraint that often makes access to the Adaptation Funds governed by GEF rules difficult
- Helping set up regional insurance schemes to promote climate risk sharing at the regional level.

BIBLIOGRAPHY

Anonymous. 2004. Des paysans innovateurs sur les pratiques culturelles : la pratique du zaï au Burkina. Dossier *Grain de Sel* No. 27 – juin

Bals, C.; Burton, I. et al. 2005. Insurance-Related Options for Adaptation to Climate Change. The Munich Climate Insurance Initiative (MCII)

Blasco, F., Carayon, J.L. and Aizpuru, M. 2001. World Mangrove Resources. In *GLOMIS Electronic Journal*. Vol.1 No.2. July (GLOMIS: Global Mangrove Database and Information System)

Bergkamp, G and B. Orlando. 1999. Wetlands and Climate Change. Exploring Collaboration between the Convention on Wetlands and the UN Framework Convention on Climate Change. IUCN. Gland.

Bergkamp, G.; B. Orlando & I. Burton. 2003. Change. Adaptation of Water Resources Management to Climate Change. UICN. Gland (Switzerland) & Cambridge (UK).

Cornet, A. 2002. La désertification à la croisée de l'environnement et du développement: un problème qui nous concerne. In Barbault, Robert; Antoine Cornet; Jean Jouzel; Gerard Megie; Ignacy Sachs; Jacques Weber. *Johannesburg. Sommet Mondial du Développement Durable. 2002. Quels enjeux? Quelle contribution des scientifiques?*. French Ministry of Foreign Affairs. ADPF. pp 93-134.

Desanker, P.V. and C. Magadza. 2001. Africa. In: McCarthy, J.J., O.F. Canziani, N.A. Leary, D.J. Doken and K.S. White (eds.). *Climate Change 2001: Impacts, Adaptation and Vulnerability*. IPCC Working Group II, Third Assessment Report. Cambridge University Press.

Dowlatabadi, H. & C. Cook. 2006. *Climate Risk Management & Institutional Learning*. Institute for Resources, Environment and Sustainability (University of British Columbia).

FAO. 1997. *Irrigation Potential in Africa. A Basin Approach*. FAO Land and Water Bulletin 4. FAO. Rome

FEWS, 2007. *Rapport Mensuel sur la Sécurité Alimentaire. Sahel et l'Afrique de l'Ouest. Janvier 2007*. Source:
www.fews.net/centers/innerSections.aspx?f=r1&pageID=monthliesDoc&m=1002230

Hoff, H; Bouwer, L.; Berz, G.; Kron, W.; Loster, T. *Management in Water and Climate – the Role of Insurance and Other Financial Services*. Dialogue on Water and Climate. Wageningen. No date

Julien, F. 2006. Maîtrise de l'eau et développement durable en Afrique de l'Ouest : De la nécessité d'une coopération régionale autour des systèmes hydrologiques transfrontaliers. In *Vertigo*. Vol 7 No. 2. Septembre

Kabat, P.; R.E. Schulze; M.E. Hellmuth & J.A. Veraart (eds). 2003. *Coping with Impacts of Climate Variability and Climate Change in Water Management. A Scoping Paper*. Dialogue on Water and Climate (DWC). Wageningen.

Klein, R.J.T., 2001: *Adaptation to Climate Change in German Official Development Assistance—An Inventory of Activities and Opportunities, with a Special Focus on Africa*. Deutsche Gesellschaft für Technische Zusammenarbeit, Eschborn, Germany, 42 pp.

IPCC, 2001. *Climate Change 2001: Impacts, Adaptation and Vulnerability*. Intergovernmental Panel on Climate Change, Working Group II Contribution to the Third Assessment Report of the IPCC. Geneva, Switzerland.

Madamombe, I. 2005. Energy key to Africa's prosperity. *Africa Renewal*, Vol.18#4 (January 2005). Source:
<http://www.un.org/ecosocdev/geninfo/afrec/vol18no4/184electric.htm>

McLeod, Elizabeth and Salm, Rodney V. (2006). *Managing Mangroves for Resilience to Climate Change*. IUCN, Gland, Switzerland. 64 pp

Ministère du Développement Rural (Mali). 2002. Recensement National du Cheptel Transhumant et Nomade. Rapport final. Vol.1 MDR/Cellule de Planification et de Statistique. Union Européenne. Mai.

Niasse, M. 2005. Climate-Induced Water Conflict Risks in West Africa: Recognizing and coping with increasing climate impacts as a means of defusing tensions around shared watercourses. Paper presented during the International Workshop on *Human Security and Climate Change* organized by PRIO (International Peace Research Institute). Oslo (Norway) — 21–23 June 2005

Niasse, M. 2006. Les bassins fluviaux transfrontaliers. In *Atlas de l'Intégration Régionale en Afrique de l'Ouest*. Série *Espaces*. CEDEAO-CSA/OCDE. Août. (Source: www.oecd.org/dataoecd/26/9/37825140.pdf)

Niasse, M. 2004. Prévenir les conflits et promouvoir la coopération dans la gestion des fleuves transfrontaliers en Afrique de l'Ouest. In *Vertigo (Revue électronique sur les sciences de l'Environnement)*. Vol 5 (1). Mai
http://www.vertigo.uqam.ca/vol5no1/art5vol5no1/vertigovol5no1_niasse.pdf

Niasse, M. 2007a. Mesures politiques et institutionnelles concrètes envisageables pour faciliter la gestion adaptative au changement climatique en Afrique de l'Ouest. Text presented at the Writeshop on Water Resource Management in the framework of

adaptation to climate change in West Africa. Workshop organized by NCAP (The Netherlands Climate Assistance Programme) and ENDA-TM in Dakar, 21-24 February 2007

Niasse, M. 2007b. West Africa Regional Situation Analysis — Global Water Initiative. IUCN, Gland (Switzerland).

Niasse, M.; A. Afouda; A. Amani (eds). 2004. *Réduire la Vulnérabilité de l'Afrique de l'Ouest aux impacts du climat sur les ressources en eau, les zones humides et la désertification. Eléments de stratégie régionale de préparation*. IUCN, Gland (Switzerland) & Cambridge (UK).

Parry, J-E; Hammill, A.; Drexhage, J. 2005. Climate Change and Adaptation. International Institute for Sustainable Development (IISD)

NESDA. 2002. Indicateurs de l'état de l'environnement pour l'Afrique de l'Ouest. Réseau pour l'Environnement et le Développement Durable en Afrique (NESDA) – PNUE. Abidjan.

Some, L. 2001. Soil and Water Management Techniques for Plant Resources Conservation in the Northern Burkina Faso International Agroecology Short Course. 13-24 Aug. IPGRI. Rome. <http://www.agroecology.org/cases/sahelianfarming/pictures.htm>

Stern, N. 2006. The Economics of Climate Change. The Stern Review. HM Treasury (Part V: Policy Responses for Adaptation).

UNEP. 2006. Africa Environment Outlook 2 – Our Environment, Our Wealth (AEO-2). UNEP. Earthprint.
http://www.unep.org/DEWA/Africa/docs/en/AEO2_Our_Environ_Our_Wealth.pdf

Van de Giesen, N.; M. Andreini, A. van Edig; P. Vleg. 2001. *Competition for Water Resources of the Volta Basin*. Center for Development Research. University of Bonn.

Zougmore, R.; Z. Zida. Sd. Récupération agronomique des terres encroûtées par la technique de demi-lune. Fiche Technique No.5. INERA. Koudougou (Burkina).
<http://www.fidafrique.net/IMG/pdf/Leaf5.pdf>

APPENDIX 1: Geopolitical Constraints involved in Regional Cooperation: Risks of Conflict

Examples of transboundary watercourses in West Africa (Niasse, 2004; Julien, 2006)

While interdependency in relation to water is an opportunity for cooperation on adaptation initiatives based on risk-sharing at the regional level, it also represents an obstacle to collaboration. Indeed, competition over shared water resources is often rough and the risks of conflict are serious. The focus and underlying causes of risks of conflict are diverse, as are the forms in which conflicts occur and are managed. The following are some of the most common characteristics in West Africa.

i. Construction of water control works by a given State or States in the framework of a basin organisation may incite riparian countries to “mark their territory”, each one trying to control the largest possible portion of the land improved by the dams (i.e. the conflict between Senegal and Mauritania in 1989; the current border dispute between Benin and Niger over Lété Island on the Niger River)

ii. West African migratory habits and traditional land-resource use and management method ignore political borders. Modern States often close their eyes on such practices. However, when new issues are at stake—such as opportunities to develop land following water control investments—political borders are upheld. The logic of the governments then enters into contradiction with that of the people. With each State focusing on defending its political borders and citizens, neighbourly relationships deteriorate. This was the case during the crisis between Senegal and Mauritania, triggered by unauthorised movements of people from one side to the other of the Senegal River. This was also the case in the border dispute between Cameroon and Nigeria in the southern part of the Lake Chad Basin (arbitrated in 2002 by the International Court of Justice in favour of Cameroon).

iii. To obtain acceptance of their sovereignty over disputed land, some States refer to international conventions (particularly those of the OAU on the intangibility of borders inherited from colonisation) or to basin organisation conventions (OMVS in the case of the Senegal-Mauritania conflict; LCBC in the dispute between Nigeria and Cameroon). Other States draw on traditional land customs and practices (Senegal versus Mauritania; Nigeria versus Cameroon). It should be noted that in both cases (Senegal/Mauritania and Nigeria/Cameroon) modern, positive law prevailed over customary law.

iv. The impacts or anticipated impacts of dams built or planned in upstream countries often cause tensions between riparian States—such as Burkina Faso and Ghana. These impacts may be seen in terms of increased drain on water resources (and therefore reduced flows downstream) or a change in water quality (temperature, turbidity, invasive species proliferation factor). It should be noted that in most cases, the

incriminated countries upstream tend to deny or minimise their responsibility (Burkina Faso): see box below

Box: Risks of conflict over Lake Volta: The energy crisis in Ghana in 1998

During the energy crisis that hit Ghana in 1998 following the water shortage in Lake Volta (also the reservoir of the Akosombo hydroelectric dam), a segment of public opinion and even of the Ghanaian leadership suspected that Burkina Faso was the cause of the problem. In the opinion of some, the drop in the water level in Lake Volta was due to increased drainage of water by Burkina Faso from the upstream sections of the White Volta and Black Volta Rivers—two tributaries that contribute 56% of its water to Lake Volta under average conditions. This hypothesis seemed all the more plausible since, between the late 1960s and the mid 1990s, Burkina Faso built 1500 small dams and 3 large dams and increased its irrigated surface area from 2000 ha to 25000 ha in the Upper Volta Basin. Analysis showed that the total water storage capacity of all small and large dams of Burkina Faso, even adding three planned large dams, only represented 1.49 billion m³, or less than 5% of the normal volume of water in Lake Volta. There was therefore clearly another, more credible cause for the water shortages in Lake Volta: the climate (Andreini et al. 2000; van de Giesen et al. 2001).

v. In certain cases, existing basin organisations have played an important role in crisis management. OMVS, for instance, continued to operate throughout the crisis between Senegal and Mauritania, and during the period when diplomatic relations were suspended between the two countries, serving as a framework for dialogue between the countries, which contributed considerably to the progressive decrease of tension. The organisation also served as a framework for arbitration during a recent crisis (in 2000) over the re-flooding of the fossil valleys of Senegal. LCBC served as an initial level of arbitration between Cameroon and Nigeria regarding the south of Lake Chad. The initial demarcation work establishing the border between the two countries in the Lake Chad area was carried out by LCBC. NBA continues to serve as a framework for dialogue between Mali and Niger on the one hand (over the Tossaye dam project) and Niger and Nigeria on the other hand (over the Kandadji dam project). We can also mention the work done by NBA in facilitating the dialogue between Cameroon and Nigeria on the Bénoué River (one of the tributaries of the Niger River).

Fortunately, for the time being, none of the crises over water in West Africa has led to open military confrontation. However, one might wonder how long that will last, particularly since pressure over water resources is expected to heighten due to increased demand, construction of numerous large dam projects, and continued deterioration of hydro-climatic conditions.

In light of such challenges, it is important for the region to strengthen its conflict prevention and resolution capacities and therefore its ability to promote consultation, particularly on the management of shared watercourses.

APPENDIX 2: Logframe

Action	Activities	Scale/Country	Partnership
SO1: Collaboration in the establishment and use of decision-support knowledge			
1. Enhance and harmonise climate information gathering networks (and support basin organisations in their internal capacity-building in terms of gathering, analysis and absorption of scientific data on the climate)	- Conduct a needs evaluation on climate information gathering and monitoring mechanisms. Targets: basin organisations Climate research centres	Target river basins	OMVS, NBA, OMVG, LCBC, VBA
	- Define support and enhancement actions for data gathering and management mechanisms	River basins	OMVS, NBA, OMVG, LCBC, VBA
2. Reinforce and extend experts' networks and research projects	-- Help develop appropriate training curricula and modules	Region	UICN-CILSS-GWP
	-- Help set in place and/or support reference centres	Region	2IE; CILSS/Agrhymet; ACMAD
	-- Support the HYCOS-WCA process (Niger, Chad, Volta, Senegal)	River basins	2IE; CILSS/Agrhymet; ACDMAD
	-- Support broadening of regional coverage by climate monitoring/research programmes and the process	Region	OMVS, LCBC, AGRHYMET
	-- Support scientific networks on climate change	Region	FEWS, PRESAO, AMMA
3. Support and/or collaborate with relevant climate change modelling and forecasting initiatives	-- Support the "climate knowledge/climate modelling" component of the WB-IUCN-GWP-Agrhymet Project	Region	FRIEND Network WB-IUCN-GWP-Agrhymet
4. Revitalise and strengthen the capacities of IPCC-Sahel (CILSS) and extend its mandate throughout West Africa	Support CILSS in the extension and revival of IPCC-Sahel	Region	CILSS; ECOWAS/WRCU

Action	Activities	Scale/Country	Partnership
SO2: Collaboration in the development and sustainable exploitation of transboundary natural resources and ecosystems.			
<u>Shared water resource management:</u>			
1. Supporting and taking advantage of ongoing efforts in the context of the West Africa Power Pool (WAPP)	-- Assist the Volta Basin countries in setting up a benefit-sharing mechanism relating to power production by existing and planned dams in the basin	Volta Basin	VBA
	-- Help the countries of the Niger Basin in their efforts to enhance the regional vocation of the Kainji dam in Nigeria and ensure that the planned large dams in the basin are envisaged in a transboundary benefit-sharing perspective	Niger Basin	NBA
	-- Promote the adoption of a Regional Water Protocol in West Africa according to the SADC model	Region (ECOWAS space)	ECOWAS/WRCU; OMVS; OMVG; NBA, etc.
2. Increase the number of transboundary projects fighting sand encroachment in watercourses	-- Support sand encroachment initiatives in the target basins: Senegal; Komadugu Yobe, Volta	Target sub-basins	OMVS, LCBC, VBA
3. Promote integrated development programmes in transboundary sub-basins following the GIRENS model	--Integrated development initiatives for target zones (i.e. Senegal-Mali-Guinea border areas along the Senegal River; Transboundary reach between Niger and Benin on the Niger River)	Target sub-basins	Targeted countries; OMVS, NBA
4. Strengthen the capacities of basin organisations to address climate change issues	-- Basin organisation information/awareness on climate change -- Assistance in designing and implementing concrete measures of adaptation to climate change.	River basins	NBA, LCBC, VBA, OMVG, OMVS
5. Support and accompany transboundary	-- Support the ISARM process -- Support the OSS initiative on the Lullemeden	Region Lullemeden Region	UNESCO-ISARM OSS UNESCO, OSS,

Action	Activities	Scale/Country	Partnership
<p>initiatives on groundwater resources</p> <p>6. Help strengthen mechanisms for conflict prevention and management linked to shared water resources</p>	<p>basin</p> <p>-- Support the creation of consultation frameworks on the large transboundary aquifers of the region (Senegalo-Mauritanian basin, lullemeden, Taoudeni, etc.).</p> <p>-- Design and facilitate the implementation of a water conflict prevention and management capacity-building programme</p> <p>-- Support the GWP-UNESCO process promoting the 1997 UN Framework Convention on the Non-Navigational Uses of Transboundary Watercourses</p>	<p>Region</p> <p>Region</p>	<p>ECOWAS/WRCU, GWP</p> <p>TBD</p> <p>UNESCO, GWP, WWF</p>
<p><u>Conservation and sustainable management of transboundary ecosystems:</u></p>			
<p>7. Better understand the role of the Inner Niger Delta (IND) with regard to climate change.</p>	<p>--Support studies on the IND in relation to plausible climate change scenarios in the Niger River Basin</p>	<p>Inner Niger Delta</p>	<p>Wetlands International, Agrhymet, IRD, ACMAD</p>
<p>8. Support the conservation and sustainable use of the Transboundary Biosphere Reserve of the Delta of the Senegal River</p>	<p>-- Update (in a climate change perspective) ecosystem management plans for the ecosystems making up the Reserve</p> <p>-- Support the implementation of updated management plans for the ecological units of the Reserve</p>	<p>Senegal River Delta</p>	<p>UNESCO, UICN, Wetlands International, target Governments</p>
<p>9. Conserve coastal mangrove forests</p>	<p>-- Preliminary studies of the status of estuary mangrove forests</p> <p>-- Support for the restoration of degraded stands of estuary mangroves</p>	<p>Coastal Zone (Region)</p>	<p>PRCM (UICN, WI, WWF)</p>
<p>10. Support the conservation and integrated and sustainable management of the Fouta Djallon Mountains</p>	<p>-- Support for financing of the Fouta Djallon</p>	<p>Fouta Djallon</p>	<p>AU Coordination Bureau -</p>

Action	Activities	Scale/Country	Partnership
	<p>Mountains Regional Development Program in the context of GEF</p> <p>-- Support the setting up of a “benefit-sharing” fund with income from the exploitation of the water of the rivers flowing from the Mountains</p>	<p>Mountains</p> <p>Region</p>	<p>Conakry; OMVS, NBA; OMVG; Government of Guinea</p>
SO3: Identifying, promoting and disseminating appropriate climate change adaptation technologies, techniques and practices			
<p>1. Identify and replicate promising adaptation techniques and practices</p> <p>2. Set in place a disaster fund aimed at minimizing the impacts of climate change</p>	<p>-- Support inventories of adaptation practices/techniques</p> <p>-- Regional synthesis of inventories</p> <p>-- Organisation of expert meetings to select priority techniques/practices</p> <p>-- Initiating pilot activities to test promising techniques developed through research</p> <p>-- Elaboration and implementation of a dissemination strategy for selected techniques/practices</p> <p>-- Support conduct of feasibility studies</p> <ul style="list-style-type: none"> ■ National scale (pilot country) ■ Basin organisation scale ■ Regional scale 	<p>Region</p> <p>Target countries</p> <p>Target basins</p> <p>Region</p>	<p>National research centres (agriculture, forestry, water engineering)</p> <p>TBD</p> <p>TBD (OMVS?)</p> <p>ECOWAS; WAEMU; CILSS</p>
SO4: Putting in place a regional framework for consultation on climate change and its impacts			
<p>1. Help put in place a regional consultation framework on climate change and its impacts</p>	<p>-- Update the list of stakeholders in the Regional Forum on Climate Change</p> <p>Train a steering and facilitation consortium for the Forum</p> <p>-- Organise the 1st meeting to validate the Risk-Sharing Strategy and formulate a Forum road map</p>	<p>Region</p>	<p>UICN; GWP, CILSS, ECOWAS, ANBO, WAEMU</p>

APPENDIX 3: Analysis of the relevance of the regional dimension to adaptation measures recommended at the national level

Nota:

The term “**useful**” refers to measures that can be the focus of regional information exchanges, but where the absence of such exchanges does not fundamentally challenge the validity of the measure

The term “**Important**”: means that the adoption of a regional perspective in the design and implementation of the measure is important, either to reduce the costs borne by the country proposing the measure or to ensure long-term results, in light of regional interactions.

The term “**critical importance**” means that the effectiveness of the recommended measure is questionable without a regional or basin-wide perspective. It may also mean that unilateral implementation of the measure may heighten risks of conflict with neighbouring/riparian States.

APPENDIX 3.1. Analysis of the relevance of the regional dimension to adaptation measures in the NAPA of Mali

Sector	Activities	Relevance from an interstate/interregional perspective	Comments
Agriculture and Food Security	<ul style="list-style-type: none"> • development of improved, drought-adapted varieties of the principal cereal crops; • adoption of new cropping systems; • diversification of production; • construction of hydro-agricultural works; • use of weather information to improve agricultural production; • development of feed crops and management of watering places; • training/awareness on hygiene and sanitation; • improved food availability and strengthening of the alert system; • strengthening of innovation capacities. 	<p>Important</p> <p>Useful</p> <p>Useful</p> <p>Critical importance</p> <p>Important</p> <p>Important</p> <p>Useful</p> <p>Critical importance</p> <p>Useful</p>	
Natural Resources	<ul style="list-style-type: none"> • awareness for the population; • introduction of the findings of applied research into agriculture and 	<p>Useful</p> <p>Important</p>	

Sector	Activities	Relevance from an interstate/interregional perspective	Comments
	herding; <ul style="list-style-type: none"> • recycling of domestic and industrial waste water; • protection of water against pollution of all kinds (urban, industrial, agricultural effluents); • integrated water resource management to take account of the specificities of the different users; • reinforcement of intersectorial consultation through strong involvement of institutions representing women and youth; • stronger involvement/empowerment of producers in decision-making relating to sustainable management of sylvo-pastoral resources; • development of advocacy/awareness by and for the actors in sustainable development. 	Useful Critical importance Critical importance Useful Useful Useful	
Power	<ul style="list-style-type: none"> • implementation of energy efficiency; • promotion of woodfuel alternatives; • implementation of energy efficiency; 	Useful Useful Useful	
Health	<ul style="list-style-type: none"> • training, awareness, information and communication on the negative effects of climate change on human health and welfare; • training and awareness on hygiene and sanitation in rural and urban communities; • capacity building on preventing and combating potentially epidemic and deadly diseases; • capacity building on intervention at different levels and national programmes in the context of climate change; • establishment of political institutions to assist and coordinate adaptation activities regarding climate change and variability (Creation of a national bureau on climate change and variability and health, a climate change support fund, etc.); • evaluation of the real impacts of climate change and variability on the health and welfare of the people of Mali. • development of extreme weather alert plans to prevent impact on the people. 	Important Useful Important Important Important Important Critical	
Infrastructure	<ul style="list-style-type: none"> • Strengthening of exchanges in the country and subregion; 	Critical	

Sector	Activities	Relevance from an interstate/interregional perspective	Comments
	<ul style="list-style-type: none"> • Reinforcement of interurban connection networks; • Establishment of links with decentralisation; • Development plans for inhabited areas and measures to ensure application of those development plans; • Avoid building housing on flood plains; • Ensure adherence to security standards in terms of the dimensions and construction of hydraulic works 	Critical Useful Useful Critical Critical	

APPENDIX 3.2. Analysis of the relevance of the regional dimension to adaptation measures in the NAPA of Senegal

Programme	Project	Activities	Relevance from a regional perspective	Comments
Development of agro-forestry		<ul style="list-style-type: none"> • Development of community woods • Installation of community nurseries • Control of land salting • Support for forest research institutes • Training • Development of microcredit • Improvement of soil fertility • Support for produce diversification • Dune fixation 	Useful	
Rational Water Use	<ul style="list-style-type: none"> • Revitalisation of the drainage system of valley bottoms, temporary pools and artificial lakes in support of the “retention basin” programme • Promotion of drip irrigation techniques 	<ul style="list-style-type: none"> • Promotion of drip irrigation techniques • Agricultural use of waste water 	Critical importance	

Programme	Project	Activities	Relevance from a regional perspective	Comments
Conservation of the Seaboard		<ul style="list-style-type: none"> • Reduction of erosion at Sangomar spit • Restoration of mangrove forests • Promotion of energy wood savings techniques • Dune fixation • Construction of protective structures • Control of sea sand extraction • Redefinition of the notion of maritime public land • Application and reinforcement of regulations in effect • Development of master plans for coastal cities 	Critical Importance	
Awareness and Public Education		<ul style="list-style-type: none"> • Develop and implement an education, information and communication strategy tailored to each category of actors; • Enhance technical and scientific meetings and reflection on certain sectors, especially agriculture, hydraulics, fisheries, tourism, health, • Adapt the scientific information provided by the intergovernmental panel on climate to the context and actors involved; • Integrate the dimensions of climate change and adaptation to climate change into sectorial development policies in Senegal 	Useful	

Sector	Action	Activities	Relevance from an interstate/ interregional perspective	Comments
	<ul style="list-style-type: none"> • Creation of cereal banks 	<ul style="list-style-type: none"> • adhering to crop planning schedules; • awareness on use of appropriate crop species; • support accessibility and affordability of agricultural inputs; • support information, education and communication; • capacity building for technical departments; • improvement of the food and nutritional security of the people; • construction of catch basins; • monitoring-evaluation. • information and awareness for the population; • construction of storage facilities; • purchasing and storage of stocks; • stock management; • setting up of Management Committees (MCs); • training of MC members; • monitoring-evaluation. 	Useful	
Agriculture; Herding	<ul style="list-style-type: none"> • Support for the promotion of periurban market gardening and herding 	<ul style="list-style-type: none"> • establishment and empowerment of local veterinary health services; • support for the promotion of IGAs involving herding for women; • fodder development; • supply and management of stocks of concentrates; • construction of storage facilities for storing inputs; • training of producers on preservation and processing techniques; • creation and organisation of production chains 	Useful	

Sector	Action	Activities	Relevance from an interstate/ interregional perspective	Comments
	<ul style="list-style-type: none"> • Promotion of income-generating activities and Development of mutuals • Production and dissemination of agro-meteorological information 	<p>and setting up of sales stands;</p> <ul style="list-style-type: none"> • facilitation of the sale of produce and products; • monitoring-evaluation. • availability of improved seeds • land purchase, rental and development by women; • availability of fodder and veterinary care for animals; • support and advice for women on animal husbandry and veterinary care; • reinforcement and/or creation of savings and loan mutuals in the target regions; • allocation of the necessary financial resources; • setting in place of credit management committees; • beneficiary information, awareness and training; monitoring-evaluation. • setting up of community radio stations in Kaou, Sakabal, Tondikiwindi, and Tamallolo; • identification with producers of relevant information to disseminate; • consultation with partners (local technical departments) in charge of gathering basic data and those in charge of dissemination (community radios, POs, NGOs); • producer training; • training of information gathering and dissemination partners; • reinforcement of the weather observation network in the target areas and provision of technical 	<p>Useful</p> <p>Useful</p>	

Sector	Action	Activities	Relevance from an interstate/ interregional perspective	Comments
		departments with data gathering and processing equipment; <ul style="list-style-type: none"> • gathering and transmission of basic data; • production and dissemination of agro-climatic information bulletins; • monitoring-evaluation 		
Water Resources, Agriculture	<ul style="list-style-type: none"> • Water control 	<ul style="list-style-type: none"> • creation and/or rehabilitation of modern water points; • development of surface water watering points; • creation and/or rehabilitation of groundwater retention structures for small-scale irrigation (drill-holes, wells, catch basins, etc.); • development of irrigation farming around waterholes; • fishing and fish farming activities; • reforestation; • monitoring-evaluation 	Useful	
Health	<ul style="list-style-type: none"> • Helping control climate-sensitive diseases 	<ul style="list-style-type: none"> • information and awareness for the population on good practices to avoid these diseases; • reinforcement of the climate-linked epidemic alert and risk-management system; • quantity and quality training of healthcare personnel; • distribution of insecticide-treated mosquito netting; • treatment of mosquito beds with insecticide; • provision of equipment, drugs and qualified personnel for health centres; • monitoring-evaluation. 	Useful	
Agriculture, Forestry, Herding	<ul style="list-style-type: none"> • Development of groundwater conservation and soil protection and restoration action for farms, 	<ul style="list-style-type: none"> • construction of small structures (filter dikes, stone barriers, half-moons, zai, etc.); • putting in place of anti-erosion systems; 	Useful	

Sector	Action	Activities	Relevance from an interstate/ interregional perspective	Comments
	<p>forests and pasturelands</p> <ul style="list-style-type: none"> • Popularisation of the animal and plant species best suited to climate conditions • Material, technical and organisational capacity building for rural producers 	<ul style="list-style-type: none"> • reforestation, grassing, creation of mini nurseries • dune fixation; • monitoring-evaluation. • popular information and awareness on the advantages of the species; • making the species available to producers; • creation of nurseries; • popularisation of animal and plant species; • monitoring-evaluation. • infrastructure rehabilitation and creation; • support for information, education and communication initiatives for rural producers; • support the creation of suitable financing structures; • support accessibility and affordability of inputs; • monitoring-evaluation. 	<p>Useful</p> <p>Useful</p>	
Water Resources	<ul style="list-style-type: none"> • Protection of wadi banks and rehabilitation of sanded up pools 	<ul style="list-style-type: none"> • construction of bench terraces on the banks of wadis; • planting of living hedges and fixation of dead hedges; • sand removal from pools; • monitoring-evaluation. 	Useful	

APPENDIX 4. LIST OF INSTITUTIONS AND PERSONS INTERVIEWED

Senegal

- OMVS: - Tamsir Ndiaye, Director, Environment Observatory
OMVG: - Amadou Camara, Environmentalist
NEPAD-Environment: - David S. Njiki-Njiki, Executive Secretary
- Cheikh Fofana, Assistant to the ES
- Oumar Baldé, Programme Manager
ENDA: - Jean-Philippe Thomas
UNDP-GEF: - Ndèye Djigal Sall

Burkina Faso:

- INERA: - Léopold Somé, Assistant Director, INERA & NAPA
Coordinator, Burkina Faso
UICN-WARO: - Dr. Yazon Gnoumou, Coordinator, ACACIA Programme
ECOWAS/Water Unit: - Dr. Rui Silva
GWP/WAWP: - Dam Mogbanté, Executive Secretary
WAEMU: - The Hon. Ismail K. Binguitcha-Fare, Commissioner in
Charge of Rural Development, Natural Resources and the
Environment
- Issaka Hachimou, Environment Manager

Niger

- CNEDD: - Dr. Kalaye Maâzou, National Coordinator, Draft Second
National Communication on Climate Change,
CNEDD (National Environmental Council for Sustainable
Development) Niamey, Niger
- Gousmane Moussa: Expert, Climate Change Unit
NBA: - Oumar Ould Ali: Coordinator, Hydro-Niger and Niger
HYCOS
- Seyni Seydou, Coordinator, *Projet Lutte contre
l'Ensamblage dans le bassin du fleuve Niger*
CILSS/AGRHYMET: - Dr. Seydou Traoré, Chief, Scientific Coordination Unit
- Dr. Hubert N'Djafa Ouaga, Climate Change Pilot
Project Coordinator