IUCN
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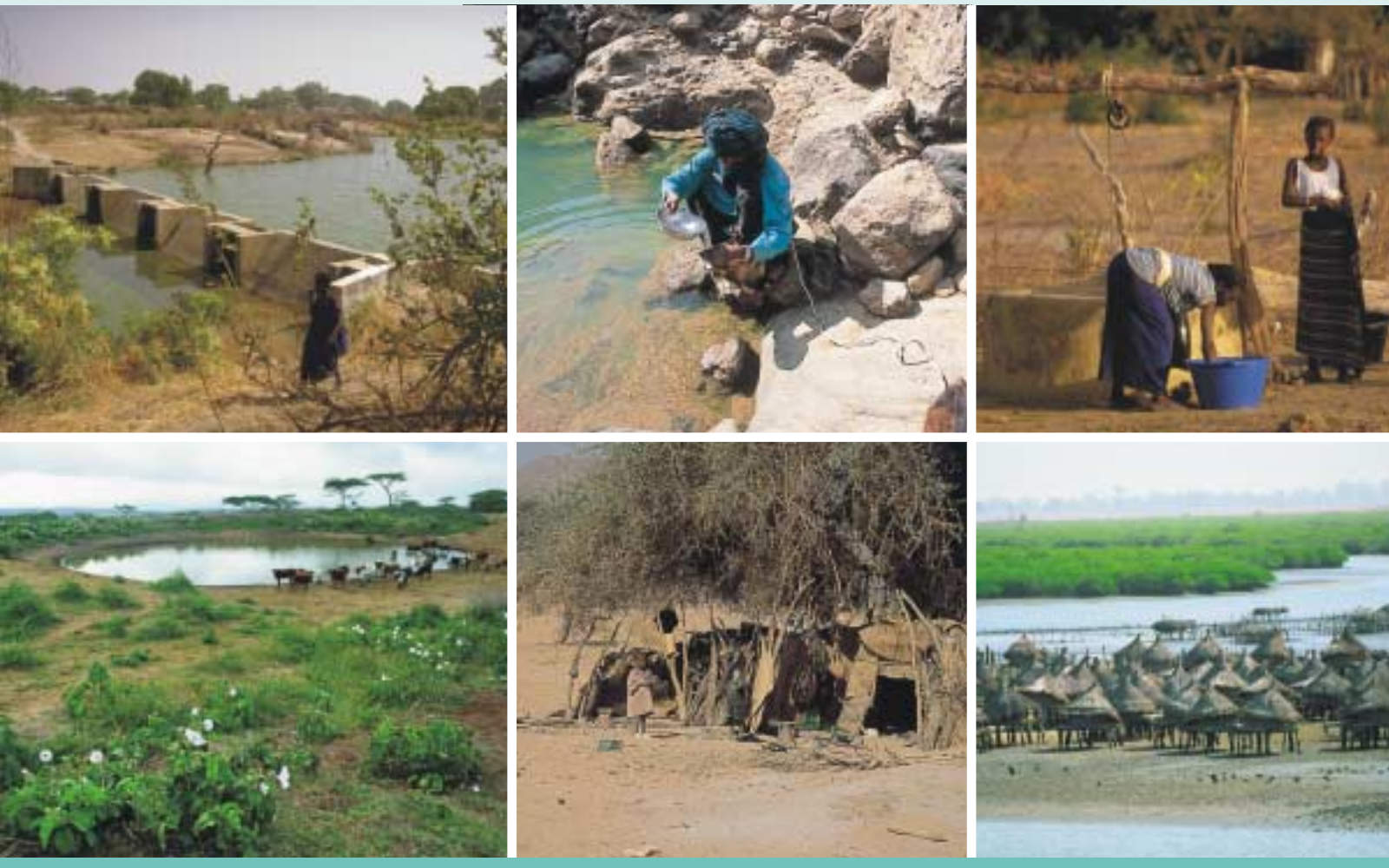
Reducing West Africa's Vulnerability to Climate Impacts on Water Resources, Wetlands and Desertification

Elements for a Regional Strategy for Preparedness and Adaptation

Edited by
Madiodio Niasse, Abel Afouda and Abou Amani



dialogue on water and climate
Global Water Partnership West Africa
CILSS
IUCN The World Conservation Union

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IUCN – The World Conservation Union
2004

This publication has been made possible by funding from the Secretariat of the Dialogue on Water and Climate and CIDA.

Published by: IUCN, Gland, Switzerland and Cambridge, UK

IUCN
The World Conservation Union

Citation: Niasse, Madiodio, Afouda, Abel and Amani, Abou. (Eds.) (2004). *Reducing West Africa's Vulnerability to Climate Impacts on Water Resources, Wetlands and Desertification: Elements for a Regional Strategy for Preparedness and Adaptation*. IUCN, Gland, Switzerland and Cambridge, UK. xviii + 66pp.

ISBN: 2-8317-0782-X

Cover design: IUCN Publications Services Unit

Cover photos: Front: Salt-intrusion dam in the Saloum Delta, Senegal, *Lucas Chambers/IUCN WWRP*; A Twareg nomad in Tamgak, Aïr, collects water from a rare shallow well, *John Newby/SSIG*; women at a well in the Saloum Delta, Senegal, *Lucas Chambers/IUCN WWRP*; Manyara Plain,Tanzania, *ICONOTEC*; Joal-Fadiuth village, Senegal, *ICONOTEC*
Back: Dried up floodplain (delta) in the Diawling national park, Mauritania, *Lucas Chambers/IUCN WWRP*

Layout by: IUCN Publications Services Unit

Produced by: IUCN Publications Services Unit

Printed by: Henry Ling Ltd, Dorchester, UK.

Available from: IUCN Publications Services Unit
219c Huntingdon Road, Cambridge CB3 0DL
United Kingdom
Tel: +44 1223 277894, Fax: +44 1223 277175
E-mail: info@books.iucn.org
www.iucn.org/bookstore
A catalogue of IUCN publications is also available

The text of this book is printed on Fineblade Extra 90gsm made from low chlorine pulp

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Foreword

The Regional Dialogue through and at the end of which the current document was developed has been a significant effort of inclusiveness and exchange. The initiators and facilitators of this Dialogue – the West Africa Regional Office of the World Conservation Union (IUCN-BRAO), the West Africa Water Partnership (GWP-WAWP) and the Permanent Inter-States Committee for Drought Control in the Sahel (CILSS) – have realised since the beginning that the sharing of available information is a pre-requisite for the success of the Dialogue, as it would help avoid a dialogue among deaf parties.

For this reason, since the beginning, it was decided to commission a synthesis of the state of knowledge concerning the impact of climate variability and change on water resources, wetlands and desertification in West Africa. This synthesis work has been carried out by Prof. Lekan Oyebande (University of Lagos), Dr Gil Mahé (French Institute for Development Research – IRD), Dr Isabelle Niang Diop (University Cheikh Anta Diop of Dakar) and Dr Abou Amani (CILSS-Agrhymet). This report was further revised and improved by CILSS (under Dr Amani's coordination) with a view to better addressing desertification dimensions. Later on, Dr Isabelle Niang Diop and Mr Mamadou Honadia (Burkina's National Climate Change Focal Point) were asked to look into national initial communications prepared by West African countries as part of the UN Framework Convention on Climate Change (UNFCCC). The aim of this exercise was to synthesise West African governments' assessments of their own level of vulnerability to climate variability and change, and document and analyse the adaptation measures suggested at the national level. Dr Winston Andah (Ghana's Water Resources Institute) provided a specific contribution on the energy crisis faced by Ghana in 1998 as a result of water deficits in the reservoir of the Akosombo Dam.

Prof. Abel Afouda (National University of Benin) compiled, synthesised and enriched all these contributions and played the role of facilitator throughout the dialogue process.

The success of the West Africa Regional Dialogue on Water and Climate and the development of this current strategy document owe a lot to the sharing of the essential information base made available through these expert reports.

This strategy document has also benefited from written contributions and illustrations (maps, figures) provided by Mr Oumar Ould Ali (Niger Basin Authority), Mr Lambert Tam (Lake Chad Basin Commission), Mr Bernard Gomez (The Gambia's National Climate Change Committee), Mr Adama Sanogo (OMVS-Senegal River Basin Development Authority), Dr Gil Mahé (IRD) and Mr Dam Mogbanté (GWP-WAWP). All these inputs along with the sustained support of the consultants, in particular Prof. Afouda and Dr Amani, have greatly facilitated the task of drafting this document.

I would like therefore, on behalf of IUCN and partner institutions (CILSS and GWP-WAWP) to thank all those who contributed directly or indirectly in the drafting of this strategy document which, I hope, will play an effective role in raising the awareness of the general public and decision makers in West Africa and help better conceive our region's responses to the challenges posed by climate variability and change in the water sector.

Madiodio Niasse

Executive summary

West Africa is among the most vulnerable regions to climate change worldwide. The often disastrous impact of climate variability and extreme events over the past thirty years is a striking illustration and a harbinger of this vulnerability. It is therefore urgent that decision makers and the general public in West Africa be fully sensitised on the climatic challenges facing the region and actions to be taken, to enhance the region's level of preparedness in order to cope with the predictable impacts of climate variability and change and the associated extreme events.

This document contributes to achieving this objective.

This document was prepared in a participatory manner through a process of open dialogue involving various categories of stakeholders. The process started during the last quarter of 2001 and was jointly conducted by the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), the West African Water Partnership (GWP-WAWP) and the West Africa Regional Office of IUCN – The World Conservation Union (IUCN-BRAO). This dialogue is part of a global process of national and regional dialogues whose establishment was decided during the second World Water Forum in 2000. The overall objective of the dialogue in West Africa is to establish a regional forum enabling stakeholders from various backgrounds to exchange views on the impacts of climate variability and change on water resources and aquatic ecosystems in West Africa.

Significant vulnerability to climate change and variability

The concept of climate change and variability is defined in this document as *significant climate modification or variation of natural or of anthropogenic origin*.

West Africa is vulnerable to climate change and variability because some of its physical and socio-economic characteristics predispose it in such a way as to be disproportionately affected by the adverse effects of climatic variations.

One of the region's most noticeable characteristics is the highly visible contrast between wetlands and arid zones. Meanwhile, it is important to point out that this contrast is much attenuated by the drainage configuration of the hydrographical network. Indeed, the region's major watercourses (the rivers Niger, Senegal, Gambia and Volta and the Lake Chad hydrographical network) have their sources in high rainfall areas, before flowing through the Sahelian area prone to low rainfall. Thus, these watercourses ensure an interzonal transfer of freshwater from wet to arid areas. Thanks to these transfers, large Sahel areas, measuring up to 4.6 million hectares during years with good flow regimes, are flooded on a yearly basis. These Sahelian floodplains include the Inland Delta of the River Niger in Mali, the depressions of the middle valley of the River Senegal, the Hadéjia Nguru floodplain in the Komadugu Yobe Basin across northern Nigeria, the floodplains of Lake Chad, etc.

The interzonal transfers are an indication of the significant interdependence of West African countries in freshwater resources use and management. Another indication of this interdependence is the fact that the region's major river systems (Niger, Senegal, Volta, Lake Chad, Gambia, Comoé, etc.) are shared among several countries. With the

exception of Cape Verde, each country of the region shares at least one international watercourse.

In addition to the contrast between areas and the interdependence of countries, the third main characteristic of the region is its long sea front of approximately 15,000km. Out of the 17 countries of the region, only four are landlocked (Mali, Burkina Faso, Niger and Chad). The population of the region's coastal area (located within 60km from the coast) was estimated at 42.68 million in 1994, which represents a quarter of the population of countries with a sea front. The bulk of these countries' economic and communications infrastructures is concentrated on this coastal area.

The region's fourth distinctive characteristic is its extreme poverty. Out of the 30 countries with the lowest human development index, 14 are in West Africa, that is, all the countries in the region, with the exception of Liberia that has not been ranked, Ghana and Cape Verde. The 49 Least Developed Countries (LDC) listed worldwide include 14 West African States, that is all of them except Ghana, Nigeria and Côte d'Ivoire. Moreover, Africa's average GDP (USD700) is twice that of West Africa (USD340). This means that West Africa is the poorest region of the poorest continent in the world.

Despite the massive exodus to urban areas over the past four decades, the bulk of West Africa's population still lives in the countryside and their main source of livelihood depends heavily on agriculture, mainly rainfed. On average, two-thirds of the West African working population is engaged in agriculture. It accounts for about 30% of the region's Gross Domestic Product.

The region's hydro-agricultural potentials are currently underutilized. Water harnessing for agricultural, domestic, industrial uses and hydropower generation is estimated at less than 3% of existing renewable water resources. With an area almost equal to that of the United States and China, West Africa has only 110 large dams (15m high dams or having a reservoir volume of over three million cubic metres), compared to more than 6,000 and 20,000 for the USA and China respectively. West Africa accounts for one-third of Africa's surface area but possesses less than one-tenth of the continent's 1,300 large dams. Accordingly, the level of freshwater control in West Africa is particularly poor.

Impacts of climate change and variability

The climate of West Africa, particularly in its Sahelian part, has been undergoing recurrent variations of significant magnitude, particularly since the early 1970's. The region has experienced a marked decline in rainfall and hydrometric series around 1968–1972, with 1970 as a transitional year. The decline in average rainfall, before and after 1970, ranges from 15% to over 30% depending on the area. This situation resulted in a 200km southward shift in isohyets. Average discharge in the region's major rivers underwent concomitant and highly pronounced variations compared to rainfall values. An average decline in the range of 40–60% in discharge has also been observed since the early 1970s.

The recorded decline in the discharge of major watercourses has resulted in the significant reduction in surface area of the main natural wetlands. The average area of the Hadéjia Nguru floodplain (on the Komadugu Yobe river system in northern Nigeria) decreased from 2,350km^2 in 1969 to less than 1,000km^2 in 1995. That of the Inland Delta of the Niger River decreased from 37,000km^2 in the early 1950s to about 15,000km^2 in

1990. The surface area of Lake Chad evaluated at 20,000km^2 during the wet years before 1970, has shrunk to less than 7,000km^2 since the early 1990s, leading to the splitting of the lake into two parts. Today, only the southern part contains water permanently.

The proliferation of floating weeds (water lettuce, water hyacinth, *Typha*, etc.) results from the general disruption of the climate in the region. This is particularly due to the reduced flow velocity in watercourses, temperature change as well as the deterioration of water quality. These weeds hinder fishing, navigation, the functioning of irrigation schemes, hydroelectric developments. Furthermore, they provide favourable conditions for the multiplication of vectors of water-borne diseases, such as malaria and the outbreak of new diseases (e.g. the Rift Valley fever). They also choke several water bodies of the region, including wetlands with biological diversity of global importance.

The recharge of the region's aquifers has also noticeably decreased, often due to the decline in rainfall and surface runoffs. For instance, on the Bani sub-watershed, across the upper reaches of the Niger River in Mali, water tables reached their lowest levels in 1997. The decline in water tables has significant consequences on the depletion coefficients (e.g. the Senegal River at Bakel or the Niger River at Koulikoro).

The variability of the climate has not spared the coastal areas. Very sensitive to erosion, beaches and dune ridges along West Africa's coastal area show evidence of retreat at variable paces: from 1–2m, to more than 20–30m per annum in Senegal and along the Gulf of Guinea, respectively. In Senegal, an accelerated retreat of the coastline was observed between 1987 and 1991 and resulted in the disintegration of the dune ridges.

The recurrent drought, resulting from climate change and variability, accelerates desertification, which in turn contributes to the persistence of drought. This cycle is likely to play a part in increased desert encroachment. The increase in discharge observed over some sub-watersheds such as the Nakambé, can be explained by increased runoff coefficient due to the degradation of the vegetative cover and the soil. As an illustration of the accelerated erosion, one can cite the case of the Niger River and its tributaries along its middle course, where important transport of solids was observed in the main riverbed, which consequently tends to silt up the latter.

Climate variability directly affects West African countries' national economies in general, and those of the Sahelian States in particular. Three main reasons account for the above situation: (a) the significant contribution of rainfed agriculture to the region's economy; (b) the poor level of water control; (c) the poor replenishment of reservoirs on which some countries sometimes depend heavily for the generation of hydropower and electricity supply to industry and households. The city of Ouagadougou, which is supplied from impoundments, experienced severe supply shortfalls in 2002 and 2003. In February 1998, Ghana was faced with a severe energy crisis as a result of the drop in water level in Lake Volta, sometimes below the required threshold for feeding the turbines of the Akosombo dam. This dam, together with the more modest one of Kpong, account for 95% of Ghanaian electricity consumption. Due to these various reasons, it is hardly surprising that at the regional level, a significant correlation exists between annual rainfall and flow conditions on the one hand, and economic growth rates on the other hand.

Extreme events (devastating floods, droughts and sharp temperature changes) characterize climate change and variability, and seem to occur more frequently in West Africa.

They sometimes entail very high environmental and socio-economic costs. In 1999, torrential rains over the Niger River and its tributaries located in Benin and Nigeria, led to the opening up of the floodgates of the Kainji, Jebba and Shiriro dams in Nigeria, resulting in a heavy human death toll and considerable material loss. During the same year, floods over the Ghanaian portion of the White Volta River claimed tens of lives and destroyed hundreds of houses. After experiencing a devastating flood that resulted in the displacement of several hundred thousand people in 1998, the Komadugu Yobe Valley (Northern Nigeria) was flooded again in 2001: the death toll was over 200, with over 35,000 displaced people. More recently, in January 2002, heavy torrential rains accompanied by a cold wave affected southern Mauritania and northern Senegal, leading to the loss of dozens of human lives and decimating more than 50,000 cattle and 500,000 small ruminants. Such numerous examples are henceforth part of the usual décor of the West African climate.

The drop in water availability or the degradation of its quality (due sometimes to climate change and variability) often resulted in exacerbated competition for access to water. The high degree of interdependence of West African countries with regard to water, combined with the poor level of awareness of decision makers and the general public of the impacts of climate, is conducive to tension and even conflicts among states over water resources. Potential conflict areas include the lower half of the Niger River and the Volta Basin. Other consequences of climate change and variability – devastating floods, the proliferation of floating weeds along watercourses, the deterioration of water quality, etc. – are likely to contribute to straining relations between countries in West Africa.

Thus, West Africa faces severe climate perils. Significant impacts have already been recorded. Therefore, worst-case scenarios can be expected if the climate variations observed in the recent decades continue or increase.

What future climate is to be expected?

Significant uncertainties surround the science of the future climate. Most climate change scenarios predict a decline in precipitation in the range of 0.5–40% with an average of 10–20% by 2025. Many of these scenarios portray a generally more pronounced downtrend in flow regimes and the replenishment of groundwater. As a result of the major droughts and a number of recent floods with unusual magnitudes, specialists expect exacerbated extreme climate events in some parts of West Africa. Most coastal countries also considered scenarios of increase in sea level (0.5. to 1m over a century), with more or less significant losses in housing zones and economic infrastructures and the disappearance of significant areas of mangrove and coastal wetlands. However, it is important to point out that the climate change scenarios used do not consist of definite predictions but rather present plausible future climates. Considering the many possible future scenarios, what matters is the ability to manage the uncertainty. This includes reducing current vulnerability to climate variability and extreme events as well as keeping management options open enough to deal with the worst-case scenarios and to take advantage of opportunities that may arise.

Is West Africa adequately prepared to cope with this situation?

West Africa has been faced with recurrent drought since the early 1970s. Many attempts have been made to respond appropriately to this situation. The most significant of them is unquestionably the creation of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS). Since then, CILSS has been very active in the following fields: (a) agro-hydro-climatic data collection and management; (b) the setting up of an early warning system; (c) research and training, through its AGRHYMET Regional Centre (AGRHYMET: Regional Centre for Training and the Application of Agrometeorology and Operational Hydrology). Other initiatives include PRESAO (Seasonal Rainfall and Flow Forecast for West Africa) launched in 1998; the West and Central African component of the Global Hydrological Cycle Observing System (HYCOS-AOC) whose pilot phase is being implemented since 2000; the West and Central African component of the FRIEND Project (Flow Regimes from International Experimental and Network Data) set up since 1992; and more recently, the AIACC programme for assessing the impacts and adaptations to climate change which includes projects for West Africa. Finally, the project on Strengthening the Capacities of CILSS Member States to Adapt to Climate Change, which was launched in October 2002 at the AGRHYMET Regional Centre.

Alongside these research initiatives, efforts aimed at water control were also observed. For instance, Burkina Faso has built more than 1,500 small water reservoirs over the past three decades and is currently experimenting with artificial rainmaking. The latter is envisaged in other countries of the sub-region (e.g. Senegal). Likewise, countries such as Niger, Benin, Mali and Senegal have also implemented the policy of constructing small water reservoirs. As mentioned previously, the region comprises only few large dams but many projects are planned. For example, there are more than 20 large dam projects that are planned on the Niger River alone (Fomi, Tossaye, Kandadji, Zunguru, Onitsha, etc…).

Overall, the most noticeable responses to the recurrent drought and pronounced climate variability experienced for the past three decades in West Africa relate mainly to data collection and analysis. Indeed, this is very important, but is far from sufficient to significantly reduce the vulnerability of the region to climate change and variability.

With regard to the future climate, many countries of the region have proposed, in their national communications, structural and economic measures that should help them to strengthen their capacity to adapt to the predicted changes. Yet, the solutions proposed by the States are often technically, financially and/or politically unachievable by individual countries. Many of these adaptation measures may be relevant only at the regional level.

Why a regional adaptation strategy?

Considering the magnitude of the climate threat and the specific characteristics of the West Africa region, it is clear that there is a real need for a regional strategy, justified by the following reasons:

- the poor level of awareness of the threat posed by climate change and variability in the region and the lack of significant counter-action;
- there is no consultative framework on climate change in the region;

- many of the freshwater resources in the region are transboundary watercourses which are not appropriately accounted for as far as national strategies are concerned;
- the current exchange of adaptation experiences is poor, even when good practices are concerned;
- the current focus on national approaches to adaptation limits opportunities for achieving economies of scale;
- availability of expertise, considered on a per country basis, is sometimes insufficient to face up to the scientific and technical challenges posed by climate change;
- science and policy are sometimes disconnected at the regional level, while there is a great need to put science at the service of decision-making and ensure that the concerns raised by decision makers are taken into account by scientists.

From the above reasons, it is apparent that a regional strategy is the missing link in the efforts aiming at strengthening the level of preparedness of the region to tackle the impacts of climate variability and change, in the water sector in particular. This strategy takes into account, supports and complements the national initiatives aimed at reducing vulnerability to climate change.

General objective of the regional strategy

The general objective of the strategy is to strengthen the region's capacity to tackle the impacts of climate variability and climate change on water resources and aquatic ecosystems in West Africa.

Strategic objectives:

Four strategic objectives are defined as the pillars of the regional strategy:

Strategic Objective 1. *Improving and sharing basic scientific knowledge and decision-support information.* This objective will first of all consist of working to strengthen the systems of data collection and analysis and the broadening of research activities. The next step will in particular consist of helping to ensure that research increasingly meets the concerns of decision makers and water users, and that research results are appropriately disseminated, and better taken into consideration in development policies.

Strategic Objective 2. *Promoting IWRM principles and the ecosystem approach in managing water resources, continental and coastal wetlands*. This objective will first of all consist of promoting measures to mitigate the impact of climate variability and change on coastal and inland aquatic ecosystems, in order to enable them to continue to play their role as reservoirs and refuge for biodiversity. The next step will then consist of the rehabilitation and sustainable management of wetlands. Actually, through their multiple functions (water storage, flood mitigation, stabilisation of soil surface conditions, water purification, carbon sequestration, etc.), the latter constitutes an important means of building capacity in adaptation to climate variability and climate change.

Strategic Objective 3. *Identifying, promoting and disseminating appropriate adaptation technologies, techniques and measures*. The design and implementation of appropriate responses to climate change is a tremendous scientific and technical challenge such that

poor West African countries would do better by pooling their expertise and resources rather than going it alone. That is why this objective will consist of enhancing the exchange of good practices and fostering joint initiatives with a view to enriching West Africa's choices of responses to climate change and variability.

Strategic Objective 4. *Setting up a regional consultative framework*. This objective will consist of building an efficient communication link between research institutions, political, economic and community decision makers, river basin agencies, water users, civil society, development partners, etc. Actually, the objective consists of pursuing and formalising the regional dialogue on water and climate change.

It is also worth noting that through these four strategic objectives, efforts will be made to assist the countries in the design and implementation of their national adaptation plans of action (NAPA).

Modalities for implementing the regional strategy

The implementation of the strategy requires the setting up of an operational action plan. The action plan will identify the priority activities. For each one of these priority activities, or group of activities, project outlines will be developed. These outlines will feature the estimated budget, and the key institutional partners (see Annex).

The preparation of the action plan will be carried out by a *Working Group* made up of people and institutions represented in the Dialogue on Water and Climate.

The pioneering institutions of the process (CILSS, GWP-WAWP and IUCN-BRAO) are in charge of resource mobilisation and implementing the identified projects. For each of the envisaged projects, appropriate institutional partners will be identified.

List of acronyms

ACMAD	African Centre of Meteorological Applications for Development
ADB	African Development Bank
AGRHYMET	Regional Centre for Training and Application of Agrometeorology and Operational Hydrology
AIACC	Assessments of Impacts and Adaptations to Climate Change
AMMA	Multi-Disciplinary Analysis of the African Monsoon and its Impacts
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
COP	Conference Of Parties
ECOWAS	Economic Community of West African States
EIER	Ecole Inter-Etats des Ingénieurs de l'Equipement Rural (Inter-State School of Rural Development Engineering)
FIBA	Fondation Internationale pour le Banc d'Arguin
FRIEND/AOC	Flow Regimes from International Experimental and Network Data/ Afrique de l'Ouest et du Centre (West and Central Africa)
GCM	General Circulation Models
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GWP	Global Water Partnership
GWP/WATA	Global Water Partnership/West African Technical Advisory Committee
GWP/WAWP	Global Water Partnership/West African Water Partnership
HYCOS/AOC	Hydrological Cycle Observing System/Afrique de l'Ouest et du Centre (West and Central Africa)
IHP	International Hydrological Programme (UNESCO)
IPCC	Intergovernmental Panel on Climate Change
IRD	Institut de Recherche pour le Développement (French Research Institute for Development)
ITCZ	Intertropical Convergence Zone
IUCN-BRAO	The World Conservation Union-West Africa Regional Office (Bureau régional pour l'Afrique de l'Ouest)
IWRM	Integrated Water Resources Management
LCBC	Lake Chad Basin Commission

LDC	Least Developed Countries
NAPA	National Adaptation Plan of Action
NBA	Niger Basin Authority
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organization
OMVG	Gambia River Basin Development Organization
OMVS	Senegal River Development Organization
PRESAO	Seasonal Forecast for West Africa
RCMP	Regional Coastal and Marine Programme
SAWEG	Sahelian Wetland Expert Group
SISCOA-IWRM	Secrétariat Intérimaire de Suivi de la Conférence Ouest Africaine sur la GIRE – Interim Secretariat for Follow Up of the West African Conference on Integrated Water Resources Management
SRES	IPCC Special Report on Emissions Scenarios
SRPA	Sub-Regional Plan of Action
TAR	Third Assessment Report
TWAS	Third World Academy of Sciences
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNO	United Nations Organization
USD	US Dollar
WAEMU	West African Economic and Monetary Union
WAM	West African Monsoon
WANBO	West African Network of Basin Organizations
WI	Wetlands International
WMO	World Meteorology Organization
WWF	World Wide Fund for Nature (World Wildlife Fund in North America)

Introduction

West Africa is one of the most vulnerable regions to climate change, but the level of awareness of the magnitude of the phenomenon is not commensurate with the risks to which the region is exposed. The sometimes disastrous impacts of climate variability and extremes of the last thirty years, are good illustrations of this vulnerability, as well as harbingers of the magnitude of the perils to be expected. In spite of this, climate change is a concern for only a few scientists and government experts involved in the implementation of the United Nations Framework Convention on Climate Change.

It is therefore urgent that West African decision makers and the public be sensitised on the climatic challenges facing the region. Furthermore, it is important to highlight the necessary actions aimed at enhancing the level of preparedness of the region to counter the future impacts of climate variability and change as well as associated extreme climate events.

The present document contributes to this objective. It is a regional strategy for preparation and adaptation to the impacts of climate variability and climate change on water resources, wetlands and desertification processes in West Africa.

The preparation of this document has been carried out in a participatory manner, through a process of open dialogue involving several categories of stakeholders. The process started in the last quarter of 2001, and it is jointly run by the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), the West African Water Partnership (GWP-WAWP), and the Regional Office for West Africa of IUCN – The World Conservation Union (IUCN-BRAO).

The general objective of the dialogue process was to establish an exchange forum between stakeholders from various horizons on the impacts of climate variability and change on water resources and aquatic ecosystems in the region. Specifically, it aimed first at raising the level of awareness of the major stakeholders in the region through the sharing of available knowledge on the magnitude, forms and impacts of climate variability and change in West Africa. That is why the dialogue started with a review of the state of knowledge of the extent, patterns and impacts of climate variability and change on water resources, wetlands and desertification in West Africa.[1]

The next step of the process then consisted of assessing the level of vulnerability to climate variability and change of the different countries in the region and in analysing the anticipated response options and the forms of support to a regional initiative that could complement the efforts at the national level (see Diop, 2003 and Honadia, 2003). Based on the sharing of national scientific knowledge and experiences, such a dialogue should lead to the formulation of a regional strategy on preparedness and adaptation. The purpose of the strategy is to strengthen the capacity of the region to cope with and to counter the negative effects of climate change and variability in the fields of water resource management, preservation of wetlands and combating desertification.

The present strategy is built on the key concepts of climate variability, climate change, desertification, vulnerability and adaptation. These different concepts are defined in this document as follows:

[1] Reference: CILSS, 2002 : Oyebande, Lekan *et al*., 2002.

West Africa: In this document, the West Africa region is considered to include 17 countries, that is the 15 member states of the Economic Community of West Africa (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo), Mauritania and Chad.

Climate variability: refers to the intra- and inter-annual natural variation of the climate.

Climate change: refers to the significant long-term modification (or variation) of the climate due to anthropogenic activities. This modification adds to the effects of the natural climate variability.

Climate change and variability: Considering the difficulty in distinguishing between the effects of climate change and those due to natural variability, the participants of the various workshops organised within the framework of the regional dialogue recommended the use of the concept of "climate variability and change" in order to better reflect the issue which is of concern to all in West Africa, and to steer the debate on the regional adaptation strategy away from complex and endless discussions on terminology. The concept of climate variability and change is herein considered as ***significant climate modification or variation of natural or of anthropogenic origin***.

UNFCCC and IPCC Definitions of Climate Change

The United Nations Framework Convention on Climate Change: the concept of climate change refers to climate change caused by direct or indirect human activity, modifying the composition of the global atmosphere and which adds to natural variability observed on a comparable time scale.

Intergovernmental Panel on Climate Change (IPCC): climate change refers to a statistically significant variation in the average condition of the climate or in its variability, a variation that persists over a long period of time (decades or more). Climate change can be due to internal natural processes or exogenous forcing or to persisting anthropogenic changes in the atmosphere or land uses.

It should be noted that the definition of climate change used here is a simplified wording of that of the UNFCCC. But by combining the concept of climate variability and change, this report also takes into account the definition of the IPCC whose concept of climate change refers to any long-term variation of the climate, whether of anthropogenic or of natural origin.

Desertification: refers to land and soil degradation in arid, semi-arid and dry subhumid areas due to various factors, among which climate change and human activities.[2]

Vulnerability: refers to the proneness of a natural or human system to be adversely affected by the negative impacts of climate change, variability or extreme events. It expresses the capacity of a person, community or natural milieu to anticipate, resist or adapt to the negative impacts of the climate or to recover from such impacts.[3]

[2] This is the definition given by the United Nations Convention on Desertification (Article 1).

[3] A definition borrowed from Kabat *et al.,* (2003) who also quoted IPCC definitions and other sources.

Level of preparedness: refers to pre-defined emergency actions that could be activated when extreme climate events or natural disasters occur in order to minimise damages, which are likely to result.[4]

Adaptation: refers to any adjustment in natural systems or in human activities, in response to actual or predicted climate change impacts – adjustment that enables the attenuation of the adverse effects or takes advantage of the opportunities. The UNFCCC distinguishes adaptation from mitigation. Mitigation refers to measures to reduce the emissions of greenhouse gases such as carbon dioxide, methane, nitrogen oxides, etc.

Whether adaptation is in anticipation (taken before the occurrence of initial impacts) or in reaction (developed and implemented in response to initial impacts), it enables the reduction of vulnerability to climate change of the system or sector concerned.

Considering that West Africa's contribution to global greenhouse gas emissions is very marginal, this strategy is built around preparedness to face extreme climate events and adaptation to climate variability and change, rather than the mitigation of climate change.

The document is structured as follows. Part one succinctly presents the West African regional context. Part two presents a synthesis of the state of knowledge on the experienced and anticipated impacts of climate variability and change in West Africa. Part three analyses the West Africa region's level of vulnerability and adaptation to, and preparedness for, climate variability and change as presented in the national communications under the auspices of the UNFCCC. Part four presents the justification of the regional strategy and formulates the general and specific objectives on which this strategy is built. Part five describes the planned activities for each component of the strategy. Part six, which is the last one, briefly presents the operational terms and conditions for implementing the strategy.

[4] A definition adapted from Kabat *et al*., op.cit.