

ISME/cenTER/CAW  
**Report on the  
Africa Regional Workshop  
on  
the Sustainable Management of Mangrove Forest Ecosystems**



Centre for African Wetlands, University of Ghana, Legon, Accra, Ghana

February 17-19<sup>th</sup> 2003

Edited by

Donald J. Macintosh and Elizabeth C. Ashton

Funded by The World Bank



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Front row: Don Macintosh, Liz Ashton, Edward Obiaw, Stephen Amakye  
Middle row: Jesse Ayivor, Dean Prof. W.A. Asomaning, Catherine Ekut-Isebor, Liamidi Akambi  
Back row: Abdoulaye Diame, Chris Gordon and James Kairo



A stand of mature mangrove trees (*Avicennia africana*) visited during the workshop field visit to Songor Ramsar Site.

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## PROGRAMME

### **Day 1. 17<sup>th</sup> February**

*Registration* (8.00 -9.00)

**Session I:** (9.00 am-10.30 am)

#### ***Opening Programme***

Introductory Remarks Professor Chris Gordon

Welcome Address: Prof. W. A. Asomaning, Dean Faculty of Science, University of Ghana; Board Member, Centre for African Wetlands.

Introduction of Participants: Prof. Chris Gordon

Introductory remarks and Background to the workshop: Prof. Donald Macintosh

*Coffee Break:* (10.30 - 11.00)

**Session II:** (11.00 am - 1.00 pm)

#### ***Key Issues from Countries***

Presentation of prepared case studies:

1. Ghana (20 min.)
2. Kenya (20 min.)
3. Benin (20 min.)

Discussion

*Lunch Break:* (1.00 - 2.00 pm)

**Session II continued:** (2.00 - 5.00 pm)

#### ***Key Issues from Countries continued***

Presentation of prepared case studies:

4. Senegal (20 min.)
5. Nigeria (20 min.)
6. Mozambique (20 min.)

Discussion

*Snack Break:* (3.30 - 4.00 pm)

Discussion (continued)

Formulation of working groups and introduction to workshop tasks by Don Macintosh

### **Day 2 (18<sup>th</sup> February)**

**Session I.** (9.00 - 1.00 am)

Working groups:-Discussions and reviewing of draft code (based on Bangkok meeting)

*Coffee Break:* (10.30 - 11.00)

Working groups:-Discussions and reviewing of draft code continued

*Lunch Break:* (1.00 - 2.00 pm)

**Session II** (2.00 - 5.00 pm)

Working groups:-Discussions and reviewing of draft code continued

*Snacks Break:* (3.30 - 4.00)

Working groups:-Discussions and reviewing of draft code continued

**Day 3 (19<sup>th</sup> February)**

**Session** (9.00-1.00 pm)

Discussions and reviewing of draft code of conduct (Continued)

*Coffee Break* (10.30 - 11.00 am)

Discussions and reviewing of draft code of conduct (Continued)

*Lunch Break:* (1.30 - 2.00 pm)

**Session II** (2.00 - 5.00 pm)

Plenary and Final Discussion

*Snacks Break:* (3.30 - 4.00)

**Closing** (5.00 pm)

**Day 4 (20<sup>th</sup> February)**

***Field Trip to mangrove coastal areas in Western Ghana***

*(Volta river mouth, Ada, Keta lagoon and Songor Ramsar site)*

Farewell reception (1.30 - 3.00 pm)

***Return to Accra*** (6.00 pm)



## **SESSION I: OPENING PROGRAMME**

### **CHAIRMAN'S INTRODUCTION BY PROF. CHRIS GORDON**

#### **DIRECTOR, CENTRE FOR AFRICAN WETLANDS, VOLTA BASIN RESEARCH PROJECT**

Dear Friends and colleagues, it gives me great satisfaction to welcome you to the Centre for African Wetlands (CAW) on the occasion of the "Africa workshop to assist in the development for a Code of Conduct for the sustainable management of mangrove ecosystems". As you are aware this workshop is one of a series of three and as the second workshop, is key in providing substance to the process of preparing the Code of Conduct.

For a detailed description of the Centre for African Wetlands (CAW), please refer to the document provided in your workshop folder.

To open the meeting formally, we need a chairman who is well versed in the activities of the Centre and of wetlands in general. I have great pleasure in introducing Prof W.S. Asomaning, Dean for the Faculty of Science, University of Ghana and Member of the Management Board, of the Centre for African Wetlands. As the Universities representative on the Interim Steering Committee in the formative stages of the Centre and as a member of the Management Board he had assisted in the mature guidance of the affairs of the Centre, despite being an organic chemist whose scientific interest in wetlands is limited to the medicinal plants that wetlands support. Ladies and Gentlemen, Prof. Asomaning.

*[Information on the Centre for African Wetlands is included as Appendix 1 to the Workshop report]*

**OPENING ADDRESS BY PROF. W. A. ASOMANING**  
**DEAN OF FACULTY OF SCIENCE**  
**UNIVERSITY OF GHANA AND**  
**MEMBER OF THE MANAGEMENT BOARD OF THE CENTRE OF AFRICAN**  
**WETLANDS**

The Dean of the Faculty of Science warmly welcomed the participants on behalf of the Vice-Chancellor of the University of Ghana and the Management Board of the Centre for African Wetlands. He especially welcomed those from overseas who were making their first visit to Ghana.

The Dean observed that the organisers, (World Bank, ISME) could not have chosen a better venue for this meeting as the Centre for African Wetlands (CAW) was created specifically to support events such as this Africa workshop to assist in the development for a code of conduct for the sustainable management of mangrove ecosystems, just one of a series of regional workshops aimed at strengthening wetland networks in Africa.

In giving a brief history of the Centre, he noted that the Centre was created three years ago with generous assistance from the Government of the Netherlands. The goal of the Centre is to contribute to the preservation of the global, regional, national and local values of West African wetlands for the benefit of society as a whole. The activities of the Centre will seek to maintain wetland biodiversity and enhance the general ecological integrity of wetlands and through this improve the quality of life for people living within and around wetlands.

CAW was created from the outset as a sub-regional establishment for West Africa, with notable long term goals, including advocacy for sustainable mangrove management, education and promoting public awareness. Thus, the theme of the workshop falls clearly within the scope and interests of the CAW.

The Dean concluded by mentioning that wetlands are disappearing at an alarming rate and therefore the workshop is a timely effort to consider ways to safeguard mangrove wetlands for future generations. Finally, Prof. Asomaning wished all the workshop participants a very enjoyable stay at the University of Ghana and declared the meeting opened.

**WELCOME ADDRESS BY PROF. DON MACINTOSH**  
**DIRECTOR, CENTRE FOR TROPICAL ECOSYSTEMS RESEARCH,**  
**UNIVERSITY OF AARHUS**

It is my great pleasure to be here in Ghana, a country I have not visited before, and to welcome you to this important workshop. I am extremely grateful to Prof. Chris Gordon and the Centre for African Wetlands at the University of Ghana for agreeing to provide the venue for our meeting, and for making all the arrangements for your participation.

I shall now give you a brief summary of the events leading up to this workshop and explain something about its main purpose and expected outputs.

In December 2000, discussions with the World Bank led to an agreement that we would prepare a review report on the status of mangrove biodiversity and conservation, which would serve as a reference text for the subsequent development of a Code of Conduct for the Sustainable Management of Mangrove Ecosystems. The review was prepared as a desk study and submitted to the World Bank in June 2001. The review report included case studies from three pilot countries that we were already familiar with, and where mangrove resource utilisation and conservation management efforts are very important, namely Malaysia, the Philippines and Thailand; a start was also made on a case study from Vietnam, based on our experience there from previous research projects. The preparation of these, and other country case studies follows a standard format set out as a template listing the topics to be covered and the kind of information under each topic.

From this experience, the World Bank then agreed to finance a second contract to expand the work to cover a further 10 countries (as case studies), which are representative of the three main regions of the tropics, South and Southeast Asia, Africa, and Central and South America. With support from a Danida CZM project, Cambodia was also included, making 14 countries in total at the present time. Reflecting the general geographical distribution and importance of mangroves worldwide, seven of the selected countries are in South and Southeast Asia, four are here in Africa, and three are in Central and South America. In recognition of its outstanding role in mangrove conservation and research worldwide, ISME (International Society for Mangrove Ecosystems) was then requested to be the contract holder for this second phase of the project.

The first workshop, for South and Southeast Asia, was held in the Institute of Technology (AIT) in Bangkok in October 2002. This, the second workshop, convened in Accra, Ghana, enables us to review with you the draft articles for a Code of Conduct which were formulated in Bangkok and to adapt them to make them equally appropriate for Africa. It is also an opportunity to seek your expert advice regarding practical examples of mangrove management or problems for management in your countries that we can use to illustrate the Code of Conduct (these are the boxed examples referred to in the draft code). The supporting work for the Code of Conduct also includes substantial case studies from the 14 selected countries mentioned earlier, and for Africa these are Ghana, Kenya Mozambique and Senegal. We would of course also welcome case studies from any of the other countries represented among you at this workshop, either now as part of the present phase of the study, or at a later date as a follow on activity.

The third workshop, for Central and South America, will be held in Fortaleza, Brazil in mid-March 2003. The draft Code of Conduct, based on the three workshops and other consultations, will be submitted to the World Bank on 30<sup>th</sup> March 2003. With your help, we can meet this deadline and present a carefully formulated draft Code of Conduct for consideration and endorsement by the World Bank, other concerned international agencies, such as FAO, ITTO and IUCN, and by governments in the many countries throughout the world where the conservation of mangrove forests is an important issue in coastal zone management.

## INTRODUCTION TO CODE OF CONDUCT OBJECTIVES

PROF. DON MACINTOSH

The project of which this workshop is a component has the title

*“Mainstreaming Conservation of Coastal Biodiversity through Formulation of a Code of Conduct for Sustainable Management of Mangrove Forest Ecosystems”.*

### Workplan

There are FOUR tasks (activities) specified in the contract for the work signed between ISME and the World Bank. Activity 3 includes three regional consultation workshops, this the workshop for Africa being the second of the three meetings. The project terms of reference provided in the next section explain the scope and format for each regional workshop.

#### ACTIVITY 1

Complete a further 10 country case studies from countries representing major regions of the world where mangroves are a significant natural resource (Bangladesh, India, Vietnam, Ghana, Kenya, Mozambique, Senegal, Brazil, Colombia, Nicaragua). In addition, as case study from Cambodia is being contributed from a Danida funded project.

#### ACTIVITY 2

Consult with policy makers, environmental managers and mangrove specialists in all the countries selected (for case studies), in order to critically examine the information documented in the review and case studies to date, and to prioritise topics to be included in the draft Code of Conduct

#### ACTIVITY 3

Undertake three regional workshops to consult with institutions and experts, and others concerned with environmental management, in the countries participating in the case studies. The workshops will cover (a) South and Southeast Asia; (b) Africa; and (c) Central and South America.

#### ACTIVITY 4

To formulate, as outputs from the case studies and workshops, a draft Code of Conduct for consideration by the Bank and its development partners, and a clear strategy recommended to help the countries adopt the Code of Conduct.

## **Terms of Reference**

### **Background and Objective(s)**

A desk review was undertaken in January-February 2001 on the above theme to formulate information and guidance materials as the basis for developing a Code of Conduct for Sustainable Mangrove Forest Management (the Code) for World Bank staff, development partners, and clients.

The overall terms of reference for the review were to:

*“Undertake a desk review which will form the resource document to complement and support subsequent case studies leading towards the development of a generic Code of Conduct for sustainable management of mangrove forest ecosystems.”*

A draft review was submitted to the Bank in March 2001 containing a detailed overview of the topic, supported by model country case studies from Malaysia and Thailand. An additional country case study for the Philippines was completed in September 2001. The country case studies were based on a structured template to enable standard reporting on the national legal and management framework for mangroves in each country, plus national and local experiences in managing mangroves sustainably. A national expert, assisted by the consultants has prepared each case study.

The country case study template was also circulated to experts in other countries to assess their interest in contributing to the study. This resulted in strong interest among several other countries and additional case study materials were received (e.g. from Kenya, and Vietnam), or proposed by mangrove experts on behalf of other countries if financial support could be made available (e.g. India and Nicaragua).

### **Program of Activities**

The work will be undertaken by consultants from ISME (International Society for Mangrove Ecosystems, based in Okinawa Japan) in association with CenTER Aarhus (Centre for Tropical Ecosystems Research, University of Aarhus, Denmark). ISME operates four regional centres in Brazil, Fiji, Ghana, and India and CenTER Aarhus has offices in Bangkok, Thailand and Cantho, Vietnam. The country offices of ISME and CenTER will be used to coordinate the regional activities leading to the three planned workshops covering South and Southeast Asia, Africa and Central and South America.

The countries selected for case studies and follow up consultations are listed below, by region:

#### **South and Southeast Asia**

- Bangladesh
- India
- Malaysia
- Philippines
- Thailand

- Vietnam (additional financial support requested from Danida)
- Cambodia (financial assistance requested from Danida)

#### **Africa**

- Ghana
- Kenya
- Senegal
- Mozambique (financial support to be requested from Danida)

#### **Central and South America**

- Brazil
- Colombia or Ecuador
- Nicaragua

Each regional workshop will bring together 8-10 national representatives and mangrove experts from the above regions, in order to combine knowledge of the legal framework for mangroves in each country with practical experiences of mangrove ecosystem management.

#### **Present Status of the Code of Conduct**

Based on our earlier work, plus the consultations during and after to Bangkok workshop for South and Southeast Asia, the Conceptual Framework for a Draft Code of Conduct has developed into a document with 14 major Articles, plus introductory sections, a glossary of terminology used in mangrove management, and a reference list. This is the draft document that we shall follow during the workshop for Africa. A summary of its contents is provided below in Table 1.

**Table 1. Outline and Articles of the Draft Code of Conduct for the Sustainable Management of Mangrove Forest Ecosystems (version 10<sup>th</sup> February, 2003)**

**A Code of Conduct for the Sustainable Management of Mangrove Forest Ecosystems**

*Macintosh D. J. and Ashton E. C.*

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Preface

Introduction

Nature and Scope of the Code

*General Objectives of the Code*

*General Implementation, Monitoring and Updating*

*General principles*

- |            |   |
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| Article 1  | Mangrove Management Objectives                                  |
| Article 2  | Precautionary Approach  |
| Article 3  | Legal Framework   |
| Article 4  | Implementation  |
| Article 5  | Mangrove Inventory and Support for Management                   |
| Article 6  | Socio-Economic Considerations                                   |
| Article 7  | Cultural and Social Issues                                      |
| Article 8  | Capacity Development  |
| Article 9  | Forestry/Silviculture   |
| Article 10 | Fisheries and Aquaculture Development                           |
| Article 11 | Tourism, Recreation and Education                               |
| Article 12 | Mangrove Products and Responsible Trade                         |
| Article 13 | Mangrove research   |
| Article 14 | Integration of Mangrove Management into Coastal Area Management |

Glossary

References



## **OBJECTIVES OF THE AFRICA REGIONAL WORKSHOP**

Centre for African Wetlands, Accra, Ghana

17-19<sup>th</sup> February, 2003

1. To review the draft articles for a Code of Conduct which were developed from the Bangkok workshop for South and Southeast Asia, and to adapt them to make them equally appropriate and useful for Africa.
2. To discuss and agree good practical examples of mangrove management in Africa to illustrate the Code of Conduct (these are the boxed examples referred to in the draft code).
3. To discuss and recommend mechanisms to ensure that the Code of Conduct is widely accepted and used in Africa to support the sustainable management of mangrove ecosystems.
4. To finalise responsibilities and deadlines for producing the country case studies (presently Ghana, Kenya Mozambique and Senegal are included), but additional country case studies from Africa would be much appreciated.
5. To discuss and recommend any other follow up actions to support sustainable mangrove management in Africa as downstream activities from the Code of Conduct.

## **SESSION II: PRESENTATION OF KEY ISSUES BY COUNTRY**

**GHANA: PROF. CHRIS GORDON AND MR. JESSE AYIVOR  
CENTRE FOR AFRICAN WETLANDS, ACCRA, GHANA**

**Brief Background of Ghana**

*Regional setting*

Ghana lies along the Gulf of Guinea in West Africa. It lies within longitudes 3° 5'W and 1° 10'E and latitude 4° 35'N and 11° N. It covers an area of about some 238,540 km<sup>2</sup>, with the Exclusive Economic Zone (EEZ) constituting an additional 110,000 km<sup>2</sup> of the sea to the territorial area. Ghana has a southern coastal shoreline of 540 km. The country is bordered to the east by Togo, La Cote d'Ivoire to the west and Burkina Faso to the north.

*Population*

Ghana's population in the 2000 census was 18,912,079 with an average annual growth rate of 2.7% compared to 2.9% for West Africa and 1.5% for the world. The population is currently estimated at 19.5 million.

*History*

Ghana was the first place in sub-Saharan Africa where Europeans arrived to trade - first in gold, later in slaves. It was also the first black African nation to become independent. Ghana enjoys double the per capita output of poorer countries in the region, but the income of its citizens is among the lowest in the world.

Like its neighbours, Ghana's post-independence history has been one of political and economic decline. Despite being rich in mineral resources, and endowed with a good education system and efficient civil service, Ghana fell victim to corruption and mismanagement soon after independence in 1957.

In 1966, its first president and pan-African hero, Kwame Nkrumah, was deposed in a coup. In 1981, Flight Lieutenant Jerry Rawlings staged his second coup. The country began to move towards economic stability and democracy.

In April 1992 a constitution allowing for a multiparty system was approved in a referendum, ushering in a period of democracy.

*Economy*

Main exports include gold, cocoa, timber, tuna, bauxite, aluminium, manganese ore and diamonds. In recent times, tourism has also become a very important foreign exchange earner. The average annual income is US \$350.

*Physical Features*

The land is generally below 600m above sea level with the lowest lying areas occurring in the middle Volta Basin and in a broad belt along the coast. Physiographic regions include the

coastal plains, the Buem-Togo ranges, the forest dissected plateau, the southern Voltain Plateau, the Savanna High Plains and the Gambaga Scarp.

### *Vegetation*

The country extends over three main biogeographic regions: the Guinea Congolian in the south-west, the Sudanian in the north and the Guinea-Congolian/Sudanian transitional zone in the middle and south east.

The distribution of vegetation throughout West African sub-region tends to be banded in zones running approximately parallel to the equator, a phenomenon which is largely explained on the basis of climatic factors, mainly rainfall and temperature, which are limited to the Inter-Tropical Continental Zone (ITCZ) position. The tropical forest of West Africa occupy a band approximately 320 km wide, the southern limit of which is defined by the Atlantic coastline. The southern half of Ghana lies within this belt. Table 1 is a summary of various vegetation types and the area of land covered.

**Table 1. Area of Land Covered by the Vegetation types in Ghana.**

<b>Formation Group</b>	<b>Area (sq km.)</b>	<b>Percentage cover</b>
Wet Evergreen	6,570	2.75
Moist Evergreen	17,770	7.45
Upland Evergreen	292	0.12
Moist Semi-deciduous	32,890	13.79
Dry Semi-deciduous	21,440	8.99
Southern Marginal	2,360	0.99
Southeast Outlier	20	0.0083
<b>Total Forest</b>	<b>81,342</b>	<b>34.1</b>
Tall-grass Savanna	144,948	60.77
Short-grass Savanna	10,540	4.42
<b>Total Savanna</b>	<b>155,488</b>	<b>65.19</b>
Mangrove forest*	1,670	0.7
<b>Total Ghana</b>	<b>238,500</b>	<b>99.9</b>

*\*Include open water areas; actual area of mangrove is estimated at 100 km<sup>2</sup>.*

### **Summary of Mangrove Resources and Biodiversity**

Out of the 81,342 km<sup>2</sup> of total forest area in Ghana, mangroves cover an estimated 100 km<sup>2</sup>. They are limited to a very narrow, non-continuous coastal area around lagoons on the west of the country; and to the east, on the fringes of the lower reaches and delta of the Volta River. They are most extensive in the stretch between Cape Three Points and Côte d' Ivoire to the west, especially, areas around Half Assini, Amanzure lagoon, Axim, Princes Town and Shama, among others. To the east of the country, they are best developed at Apam, Muni lagoon, Winneba, Sakumo-1 lagoon, Botwiano, Korle lagoon, Teshie, Sakumo-2 lagoon, Ada, Sroegbe and Keta lagoon.

The local populations who live in the mangrove areas have traditionally used mangrove products and the mangrove environment over the years. They have mainly exploited it for wood, fish, crabs and oysters. Nevertheless, mangrove areas in the country have received virtually no attention in terms of conservation and sustainable management.

Mangrove ecosystems support a wide array of biodiversity in Ghana. The ecosystems and their associated wetlands provide habitat for high concentrations of birds, mammals, reptiles, amphibians, fish and invertebrate species. Thousands of waterfowl, many of them migratory, visit Ghana during the northern winter. Mangroves serve as sanctuaries and nestling grounds for most of these birds. The most common mangrove species found in Ghana are *Rhizophora racemosa*, *Avicennia nitid* and *Drepanocarpus lunatus* (a climber).

Despite the ecological and economic importance of mangroves, they continue to be over exploited on a daily basis with little or no control. In most coastal communities in Ghana, mangrove ecosystems are used in a variety of ways such as fishponds, salt pans, sugarcane fields, human settlements and other agricultural uses. The mangrove stands from the forest are fell for firewood which serve variety of purposes, including domestic fuel, fish smoking and distillation of "akpeteshie" (local gin). A large quantity of the mangrove wood is also used for constructional purposes and for fishing (Lawson (1986), Singh (1987), Amatekpor, 1998).

Moreover, coastal areas are one of the most favoured sites for settlements in Ghana, as in West Africa as a whole because of the opportunities they offer. They provide fertile lands for agricultural production, marine resources and access to external markets through water transport. These economic activities in turn have attracted a high concentration of population to places like Keta, Ada, Accra, Winneba, Takoradi and Axim.

Mangrove exploitation intensified, particularly in the Volta Basin, following the construction of the Volta dam in 1964 and the consequential loss of fishing and farming opportunities for downstream communities. In all about 70% of the mangrove forest of the country has been lost through deforestation (I.I.E.D., 1992).

### **Institutional and Cross-sectoral Issues involved in Mangrove Management**

Ministries and agencies whose activities border on mangroves and biodiversity in general include:

- National Development Planning Commission
- Ministry of Environment and Science
- Ministry of Lands and Forestry
- Ministry of Food and Agriculture
- Ministry of Justice
- Ministry of Local Government
- Environmental Protection Agency
- Forestry Commission
- Fisheries Commission

- Water Resources Commission
- Wildlife Division
- Ghana Wildlife Society

The National Development Planning Commission has the overall responsibility for developing the national development framework within which all sectoral programmes, policies and attendant legislations have to converge. Basically, it is at this Commission that harmonization and integration of sector policies and programmes into a holistic composite is carried out to ensure sustainable socio-economic, cultural and environmental development.

The implementation of composite national or sector policies, programmes and legislation is undertaken by special departments, research institutions and agencies under policy making in the ministries. While individual departments or agencies are mandated to manage, develop and conserve specific natural resources, it is the Environmental Protection Agency that is entrusted with the overall responsibility of environmental regulations. Other institutions and agencies which also have research and other responsibilities include:

- Water Resources Commission
- Fisheries Commission
- Forestry Division of Forestry Commission
- Wildlife Division of Forestry Commission
- Fisheries Directorate
- The Universities
- Council for Scientific and Industrial Research
- Centre for Scientific Research into Plant Medicine
- Non Governmental Organisations
- District Assemblies
- Local Communities and associated community-based organisations
- Youth and Women's groups.

In spite of the existence of a number of institutions and departments, mangrove management and conservation has been far from satisfactory. A major constraint has been the lack of coordination, collaboration and networking among the policy developing institutions on one side and policy-implementing institutions on the other.

There is also the problem of lack of capacities of some institutions. This results in lack of baseline data and deficiencies in information management.

### **Legislative Framework**

There are a number of legislation governing management, development and conservation of specific natural resources. Most of the legislation tends to be sector-based; they may be conflicting, obsolete, deficient and unenforceable. More so, there is no single comprehensive legislation in the country that handles all natural resources in totality. Neither is there a

specific elaborate legislation on biological diversity. However, there is legislation of relevance to biodiversity use and conservation. Some of the Acts and Decrees that apply to the environment are outlined in Box 1.

Despite the existence of various legislations, the conservation and management of the country's biological resources still leaves a lot to be desired. While legislation on the use of resources of the terrestrial systems abound, there are only a few national laws that deal with the protection of the marine environment. The consequence of this is the misuse and abuse of the marine environment for the discharge of domestic and industrial waste from land, ships and aircraft.

Although Ghana is signatory to and has ratified a number of international conventions and agreements relating to the environment in general and biological resources in particular, she has failed to translate many of them into national legislation for implementation purposes. (A partial list of conventions to which Ghana is signatory has been provided in Box 2)

**Box 1: Partial list of Legislation in Ghana relevant to mangrove ecosystems.**

Forest Protection Decree, 1974 (NRCD 243)  
Trees and Timber Decree, 1974 (NRCD 273)  
Trees and Timber Regulations, 1961  
Wild Animals Preservation Act, 1961 (Act 43)  
Wildlife Conservation Regulation 1971 (LI 685)  
Wildlife Reserves Regulations 1971 (LI 710) 1983  
Oil in Navigable Waters Act, 1964  
River, Lakes and Beach Law (under review)  
Fisheries Decree (1972)  
The Fisheries (Amended) Regulations (1977)  
The Fisheries (Amended) Regulations (1984)  
The Volta River Development Act 1961  
The Ghana Water and Sewerage Act 1965  
Land Planning and Soil Conservation Act, 1957  
Town and Country Planning Ordinance 1945 (Cap 84)  
Minerals and Mining Law 1986 (PNDC 153)  
Prevention and Control of Bushfires Law (1990)  
Economic Plants Protection Decree, 1979 (AFRCD 47)  
Forest Ordinance 1902  
Forest Ordinance 1927 (Cap 157)  
Trees and Timber Ordinance, 1949  
Forest Fees Regulations 1976 (LI 1098)  
Forest Protection (Amendment) Law 1986 (PNDCL 142)  
Timber Resource Management Act, 1997 (Act 547)

**Box 2: Conventions Related to Biodiversity Conservation to which Ghana is a Signatory.**

1. International Convention for the Prevention of Pollution of the Sea by Oil: 21st October 1962
2. Convention on the African Migratory Locust: 25th May 1962
3. Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water: 5<sup>th</sup> August 1963
4. International Convention for the Conservation of Atlantic Tunas: 4<sup>th</sup> May 1966
5. African Convention on the Conservation of Nature and Natural Resources: 15<sup>th</sup> September 1968
6. International Convention on Civil Liability for Oil Pollution Damage: 29<sup>th</sup> November 1969
7. International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties
8. Convention on Wetlands of International Importance, Especially as Waterfowl Habitat: 2<sup>nd</sup> February 1971
9. Treaty on the Prohibition of the Emplacement of Nuclear Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof: 11<sup>th</sup> January 1971
10. International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage: 18<sup>th</sup> December 1971
11. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxic Weapons and on their Destruction: 10<sup>th</sup> April 1972
12. Convention Concerning the Protection of the World Cultural and Natural Heritage: 16<sup>th</sup> November 1972
13. Convention on International Trade in Endangered Species of Wild Fauna and Flora: 3<sup>rd</sup> March 1973
14. Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents: 26<sup>th</sup> June 1974
15. Convention on the Military for Any Other Hostile Use of the Environmental Modification Techniques: 10<sup>th</sup> December 1976
16. Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration: 20<sup>th</sup> June 1977
17. Convention on the Conservation of Migratory Species of Wild Animals: 23<sup>rd</sup> June 1979
18. United Nations Convention on the Law of the Sea: 10<sup>th</sup> December 1982
19. International Tropical Timber Agreement: 18<sup>th</sup> November 1983
20. Montreal Protocol on Substances that Deplete the Ozone Layer: 16<sup>th</sup> September 1987
21. Vienna Convention for the Protection of Ozone Layer: 24<sup>th</sup> July 1989
22. Convention on Biological Diversity: June 1992
23. Convention to Combat Drought and Desertification
24. Framework Convention on Climate Change: June 1992

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## KENYA: DR. JAMES G. KAIRO

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#### **Background**

##### *Area and Forest Resources*

Kenya covers an area of 582,600 km<sup>2</sup>, which includes about 10,700km<sup>2</sup> of lake area (principally Lake Victoria and Turkana). The total forest covers in Kenya constitutes 1.7 million hectares, classified as coastal forests, dry zone forests, montane forests or rainforests (Wass, 1995). Mangroves occupy 64426.9 ha (or 3%) of the forest cover.

##### *History*

In the history of human activity on the East African coast, mangroves have played a long and important role. Records indicate that along with slave and ivory, mangrove poles made up a major regional trade by the 9<sup>th</sup> century (M. Niebuhr, 1792 *Quoted* in Rawlins, 1957). Mangrove exploitation for building poles is the traditional livelihood of the Lamu region. For many years, house construction in the Arab countries dependent on mangrove poles brought by dhows from the East African coast. By the beginning of the 20<sup>th</sup> century Kenya was exporting an annual average of 24,150 scores of mangrove poles from Lamu forests, equivalent to 483,000 poles per year Grant (1938). Between 1941 and 1956 this export averaged 35,451.3 scores, dropping to 11,088.7 scores in the period 1991/96 (Fig. Kenya-2). The drop after 1982 could be explained by a Presidential Order to ban further mangrove export from Kenya, as well as lack of proper accounting by Forest Department personnel on all wood products leaving the forest.

##### *Population*

In the 1999 national census, the total population of Kenya was estimated at 30,000,000. The annual population growth rates predicted by the Kenya Central Bureau of Statistics for the period to year 2005 are 8.0% for urban population and 2.5% for rural population, though the rural growth patterns show considerable local variation. Along the coast, population densities range from 1 house hold per 5 km<sup>2</sup> in semi-arid areas to more than 400 households per km<sup>2</sup> in urban and peri-urban centers. The highest population densities along the coast are in urban centres like Mombasa, Malindi, Lamu and Kilifi. The pressure here for mangroves is very high as the population depend on the forests for firewood and building.

##### *Mangrove resources and biodiversity*

The mangrove forests in Kenya are found in tidal estuaries, creeks and protected bays scattered all along the 600 km coastline, between latitudes 1° 40'S and 4° 25'S and longitudes 41° 34'E and 39 17'E. The forest provides goods and services that are of economic, ecological and environmental value to the people. Moreover, being

renewable resources, mangroves are capable of providing these services indefinitely, only if they are managed effectively to the end (Kairo, 1996).

All the nine mangrove species recorded in East African region are represented in Kenya (Table Kenya-1). Two of the species, *Rhizophora mucronata* Lam. and *Ceriops tagal* (Perr.) C. B. Robinson, are dominant and are represented in almost all mangrove formation. The rare species are *Heritiera littoralis* Dryand in Aint. and *Xylocarpus moluccensis* (Lam.) Roem. (Macnae, 1968; Kokwaro, 1986; Dahdouh-Guebas et al; 2000; Kairo, 2001).

Mangroves of Kenya display distinct zonation pattern that is influenced mainly by the level of inundation and the salt content of the soil/water (Van Speybroeck, 1992). A typical zonation pattern from the seaward to the landward is: *Sonneratia alba*, *Rhizophora mucronata*, *Bruguiera gymnorrhiza*, *Ceriops tagal*, *Avicennia marina*, *Xylocarpus granatum*, *Lumnitzera racemosa* and *Heritiera littoralis*. *B. gymnorrhiza* does not form a distinct zonation in Kenya but occurs interspersed with *Rhizophora* and *Ceriops* (Kairo, 2001). 'Double zonation' (Dahdouh-Guebas *et al.*, (in review)) is displayed by *Avicennia*. This is a situation in which a species may be abundant in two different zones of the forest (Macnae, 1968).

**Table Kenya-1: Mangroves of Kenya.**

Family	Species	Local name	Main Uses
Avicenniaceae	<i>Avicennia marina</i> (Forsk) Vieh.	MCHU	Timber, firewood, charcoal
Rhizophoraceae	<i>Bruguiera gymnorrhiza</i> (L) Lam.	MUIA	Timber and firewood
Rhizophoraceae	<i>Ceriops tagal</i> (Perr) C. B. Robinson	MKANDAA	Timber and firewood
Rhizophoraceae	<i>Rhizophora mucronata</i> Lam.	MKOKO	Timber and firewood
Combretaceae	<i>Lumnitzera racemosa</i> (Willd)	KIKANDAA	Firewood and fencing
Sonneratiaceae	<i>Sonneratia alba</i> Sm.	MLILANA	Firewood , Ribs for boats
Meliaceae	<i>Xylocarpus granatum</i> (Koen)	MKOMAFI	Timber, firewood and curving
Meliaceae	<i>Xylocarpus moluccensis</i> (Lam.) Roem.	?	Firewood and fencing
Sterculiaceae	<i>Heritiera littoralis</i> Dryand in Aint	MSIKUNDAZI	Poles, timber, boat mast

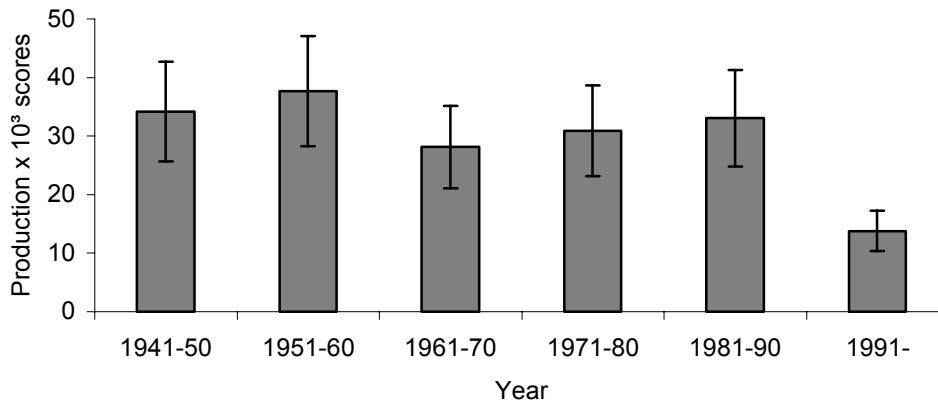
? = Unknown local name.

## Cross-sectoral Issues in Mangrove Management

### Forestry

Like any other products of the ocean, coastal people in Kenya still regard mangroves as a *resource free* for the taking by anyone with the will to do so. Where the *Tragedy of the Commons* (Hardin, 1968) suggests a natural tendency to over-exploit a resource that has no restriction of access, the ownerless mangrove forests has had a built-in-tendency to be over-exploited. As early as 1947, the colonial government in Kenya took strict control of mangrove exploitation by granting concession to private firms whose activities could easily be monitored. This was a highly unpopular move among the cutters/*nahodha* because of the general belief that mangroves were inexhaustible, and the long established custom of freedom from any sort of control. Not only did the cutters and dhow crews resent such interference, but also the middlemen, the traders, many of who had never been inside a mangrove swamp and who therefore could not appreciate the situation.

These restrictions were of a temporary nature until trained forest officers could be spared to make a thorough investigation of the swamps and prepare a work plan for the future. The survey was carried in 1949 and early parts of 1950 when trained forest officers were made available.



**Figure Kenya- 2. Trends in production of mangrove poles in Lamu, Kenya. (Data source: Rawlins, 1956; Forest Records (1950-2000)).**

In 1950, the Lamu Forestry Office issued a statement to the effect that Lamu mangroves were significantly degraded. In 1951 the colonial government introduced the first Mangrove Working Plans for Lamu mangroves. The idea behind these Working Plans were, *firstly*, to keep up the supply of firewood to Mombasa, *secondly*, to sustain the supply of domestic building materials to urban areas along the coast, and of ‘*Boriti*’ sized poles to Lamu for export overseas, and *thirdly* to keep alive the mangrove trade. The Lamu Felling Series introduced in 1951 constituted an annual cut of one-twentieth of the total 40,000 ha available in Lamu. This 20 years rotation cycle started at Mkunumbi in 1951 (*see* Fig. 3), the annual plot shifting northwards to Kiunga.

The Forestry Department in collaboration with the Spartan Air Services Ltd. of Ottawa, Canada carried out an exhaustive inventory of Lamu mangroves in 1967. The entire Lamu mangrove forests were surveyed and divided into five geographical regions as follows. The total area of mangroves in Lamu district was given as 46,184 hectares. Of this, 25% (or 11,504 ha) was non-forested, giving a forested area of 34,680 ha.

The Forest Department carried out another inventory of Lamu mangroves in 1981, and the results published in March 1983. This inventory gave a total mangrove area of 46,230 ha, of which 34,884 ha was classified as forested, a result remarkably similar to the 1967 inventory. In 1993/5 the entire mangroves of Kenya were again surveyed using aerial photographs and GIS (Ferguson, 1993). Unfortunately none of these information has been used to prepare management plan for Kenya’s mangroves.

From the inventories of 1967, 1981, and 1993, it became clear that the growing stock of mangroves in Kenya had depleted significantly. This happened primarily because of the over-exploitation of the two principal species i.e., Mkoko (*Rhizophora mucronata*) and Mkandaa (*Ceriops tagal*). To stop further degradation of the forest the government placed a

ban on mangrove export in 1982. However, it should be noted here that, even after the ban on poles export the problem of mangrove deforestation in Kenya has intensified to meet the growing local demand (Kairo & Kiviyatu, 2000; Dahdouh-Guebas *et al.*, 2000, Kairo *et al.*, 2002). In most mangrove forests today, new saplings or emergent trees of inferior quality have replaced removed quality mangrove trees. Therefore, the depletion of the forest is more in terms of a reduced quality of the forest, which is not necessarily reflected by the area under trees in the forest.

The production of mangrove forest products could be sustained if Forest Department takes immediate action. A comprehensive working plan must be prepared to act as a guide for the management of mangroves in Kenya. Such a plan should provide accurate annual allowable cuts, designate specific cutting areas and emphasise the need and importance of maximum utilisation and adequate control.

### ***Fisheries***

Like other mangrove forests in the world, the mangroves of Kenya play a significant role in maintaining the productivity of the coastal fishery resources (Kimani *et al.*, 1996). Materials from mangrove forests are pumped into the aquatic system as leaves, twigs, flower buds, detritus etc. These materials then enter in sequence through the detritus feeders (shellfish and other invertebrates), primary consumers and secondary consumers. Various components of this food web are harvested by the coastal human population (Kapetsky, 1985). At present it is not possible, in Kenya, to quantify the dependency of marine fisheries on mangroves.

The role of mangrove swamps in the ecology and productivity of marine fisheries has not received much attention in Kenya. A few studies have been conducted on mangrove and associated ecosystems fish communities in Kenya including Little *et al.*, (1988), in Tudor creek, Kimani *et al.*, (1996), Ntiba *et al.* (1993), De Tronch *et al.* (1996), Van de Velde *et al.*, (1994) Beuls (1995) in Gazi Bay. Wakwabi (1999) compiled the list of all fish encountered in Gazi Bay and mangrove creek

## **Overview of the Existing Legislation**

### ***Regulatory frameworks***

According to the 1982 surveys of land resources in Kenya, mangrove forests cover some 52,980 ha (Doute, *et al.*, 1982). Lamu district with 33,500 ha has the largest area of mangroves; followed by Kwale, Kilifi, Tana River and Mombasa districts (Table Kenya-2). These figures contradict the records maintained by the Forest Department that indicate the total area of gazetted mangroves in Kenya to be 64,426.90 ha, with Lamu having 46,229.0 ha (GoK, Sessional Paper 1, 1968 [Table 1]. Variations in estimation of total cover of mangroves could be attributed to differences in estimation techniques, time of the survey, classification and delineation of areas considered to be mangrove ecosystem.

**Table Kenya-2: Distribution of mangrove in Kenya.**

District	Doute et al., 1982	Forest Department
Lamu	33,500	46229
Tana River	2665	369
Kilifi	6606	6378
Mombasa	1960	3059
Kwale	8795	6345.5
<b>Total</b>	<b>52980</b>	<b>64426.9</b>

*Laws and legal status*

The mangrove forests in Kenya have legally been declared as government reserve forests since the Proclamation No. 44 of 30<sup>th</sup> April 1932, and later by Legal Notice No. 174 of 20<sup>th</sup> May 1964. Under this "Gazette Notification for Mangrove Forest....

All land between high water and low water marks (ordinary spring tides) in the localities as described below, viz.:

1. On the mainland and islands adjacent to the coast from Kimbo Creek in the South, to the village of Kiunga on the mainland in the north;
2. On the banks of Tana river (northern branch) between Kipini and Kao (Kau);
3. On the mainland and islands to the coast from the mouth of the northern Kilifi river in the north, to Ras Ngomeni in the south;
4. In the following creeks and all branches thereof: Mida (Uyombo), Kilifi (Southern), Takaungu and Mtwapa;
5. In all tidal areas lying to the north west, west and south west of the straight line between Ras Kinangone (Flora point) at the entrance of Port Reiz, and Ras Jundas (southern most point of subdivision 232 of section II, mainland Morth at the entrance to Port Tudor, but excluding any portion of the shore of Mombasa island);
6. On the mainland and islands adjacent to the coast from Chale Point in the north, to the boundary of the Trust Territory of Tanzania in the south.

**Institutional Responsibilities for Mangroves**

Authority for exploitation and conversion of mangrove forest in Kenya must be obtained from the government's Ministry of Environment and Natural Resources with permission being given by the minister in-charge of Forestry and Environmental matters. The basic management unit is the District Forest Offices in the coast province. There are 7 districts in the coast province of which 6 have mangroves (see Table Kenya-2). The District Forest Officer is vested with the responsibility for protection of the forest, issuance of harvesting permits and the collection of revenue in his district.

The present management practices are only limited to the licensing of extraction of wood products with no particular silvicultural operations. Quotas for pole extraction are decided annually on unspecified basis. Extraction operations on site are not supervised by the

management agencies, nor is any systematic management plan applied. As a consequence the cutters take all they need from the more accessible fringes of the forest.

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(Full references to be provided by Dr. Kairo)

**BENIN: MR. LIAMIDI AKAMBI**  
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**Introduction**

The Republic of Benin is a West African country located on the Gulf of Guinea between Nigeria to the East and Togo to the West. It is bordered to the North by Burkina Faso and Niger. Benin covers an area of 114,763 km<sup>2</sup> of which 70,050 km<sup>2</sup> (that is 61.4%), are cultivable.

Number of inhabitants:	6.4 million (2001)
Urban population:	41.9% (2001)
Population under 15	46.0% (2001)
Population density:	57.2 inhabitants/ km <sup>2</sup>
Gross birth rate (for 1000):	41.4 (2001)
Gross mortality rate (for 1000):	12.5 (2001)
Annual population growth rate:	2.7% (2001)
Annual urban population growth rate:	4.9% (2001)
Average life expectancy:	53.9 years (2001)
Index of human development:	0.435: (UNDP 1999)
GNP per inhabitant:	US\$380 (1998)

The population is mainly rural (64% of the total population). Agriculture is the main activity and is carried out in around 450,000 small-scale, family-based farms (between 0.5 ha in the South and 0.2 ha in the North). Cotton is the main industrial crop and tubers and cereals are the main food crops.

Benin has a straight and sandy coast of about 120 kms in total length.

**Benin Resources in Mangroves**

Mangroves cover lagoon and lake areas under tidal influence. Benin's mangroves cover an area of around 3000 ha (Baglo) and are located entirely in the south of the country. The main species of mangroves in Benin belong to three families: Rhizophoracea, Avicenniacea and Combretacea.

The most important concentrations of mangroves occur along the edge of lagoons.

**a) Between Togbin and Adounko**

The nicest formations of mangroves occur in an area, that is the furthest from the sea, with a particularly low salinity (4%). But it is also the area, with the heaviest rainfall (1200mm/year) and where salt exploitation is less developed. These mangroves cover an area of around 150 ha. They are very dense and are made up of *Rhizophora racemosa* and *Avicennia africana* with a height of 5 to 12 metres. Behind the *Rhizophora* and *Avicennia*, one can find in some places *Dalbergia* and *Drepanocarpus*. Mangroves have disappeared in the East of Tognom and have been replaced by a meadow of *Paspalum* scattered with *Acrostichum*.

**b) *Between Adounko and Ahouandji***

Mangroves have almost disappeared along nearly 14 kms of this region. Only few stands of *Rhizophora racemosa* remain along secondary channels.

**c) *Between Ahouandji and Nagoukodji***

This area is characterised by a continuous fringe of *Rhizophora racemosa*, *Rhizophora harrisonii* and *Avicennia africana* mangroves along the main channel and by a stand of 25 ha all in on piece, on the islet opposite Nogoukodki. The local populations exploit this clump.

**d) *Between Nagoukodji and Azizahoué***

Along 8 kms, plantations made by Projet Pêche Lagunaire have replaced today the former natural mangroves, which had almost disappeared by 1981.

**e) *Azizahoué***

One can find in this area the last big grove of mangrove forest made up of *Laguncularia racemosa* and *Conocarpus erectus*, although trees in the area are being felled by companies dealing in mangrove wood products.

**f) *From Azizahoué to Grand-Popo***

Only scattered young *Avicennia* remain in the *Paspalum* meadow of this region and along channels at Dokloboue, Meko and Djondki.

**g) *At Lake Ahémé***

Islets of *Rhizophora* forest and meadows with some young *Avicennia* plants occur in the North of the Lake, at Séhou Gbato, Ahoutou and around the Mitogbodji Island.

Overall, Benin's mangroves are in an advanced state of degradation.

**Constraints and Threats (reasons behind the degradation)**

The great speculation over land in Benin has, among other things, led to an accelerated occupation of land on the coast for housing, as well as tourist and industrial developments needs.

Mangroves (*Rhizophora* and *Avicennia*) are also exploited intensively for domestic needs and salt extraction. This exploitation is due to the fact that mangroves are the only forest tree species available in areas bordering coastal lagoons. Since the local populations do not have other means to get wood, they exploit mangroves plus other nearby and easily accessible resources.



Besides mangroves, other wetlands forest tree species such as *Manilkara multinervis*, *Anthocleista vogelii*, *Alstonia congensis*, *Cleistophilis patens*, *Symphonia globulifera* and *Syzygium ovariense* are also over exploited.

Many factors have had a degrading effect, on the physical and biological nature, of mangrove wetlands.

*From a physical point of view:*

Erosion of the banks of man-made lakes, filling and obstruction of man-made lakes, erosion of lakes bottoms and coastal erosion.

*From a biological point of view:*

Loss of biodiversity, loss of productivity of man-made lakes; loss of soil fertility and decline in agricultural yield.

### **Mangrove Restoration Efforts in Benin**

For almost 15 years, Benin has been carrying out a programme of restoration of its mangroves. For that purpose it was necessary to first orientate the thinking of local people and to encourage them to reforest degraded banks in their localities. Within this framework the Projet Pêche Lagunaire (Fishing in Lagoons Project, PPL-GTZ) tried out a programme<sup>1</sup> of restoration of Benin mangroves by giving the communities the necessary support to plant 500,000 young seedlings. The aforementioned programme also made possible the reintroduction of mangroves in ecosystems where it disappeared a long time ago (Lake Nokoué, Porto Novo lagoon, Ouémé Delta).

In view of the success obtained by PPL, the Programme d'Aménagement des Zones humides du Benin (Programme to develop wetlands in Benin) (PAZH) decided to continue the reforestation of the banks of the main river and lagoon ecosystems in South Benin departments.

Thanks to the institutional support of PAZH to the Fisheries Department, it was possible, between September 1998 and April 1999, to plant more than 200,000 *Rhizophora racemosa* and *Avicennia africana* mangroves, with a survival rate of more than 62% a year after planting them. A second planting campaign was organised some time in December 1999 by the Fisheries Department in collaboration with the Centre d'Action Regionale pour le Développement (Centre of Regional Action for Development) (CARDER). About 470,000 mangroves were planted on the banks of Lake Nokoué, Porto-Novo lagoon and in the coastal lagoon and Aho channel.

Awareness and information sessions on the importance of mangroves met with a positive response among communities in such a way that the participation of dignitaries, traditional leaders, members of fishing groups and riverside populations in general, was very enthusiastic.

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<sup>1</sup> Programme initiated and implemented by Mr. Marcel A. BAGLO

Specific examples of community participation in mangrove restoration are:

- A group of women from Avlekete also took part in the restoration of mangroves along the coastal lagoon by planting 35,000 *Rhizophora racemosa* seedlings.
- Also, an association of young planters planted 90,000 mangroves on the banks of Lake Nokoue (Godomey, Menontin, Houedogbadji) and Lake Aheme (Adja-Tokpa, Ahouango).
- A new programme to develop traditional fishing (PADPPA), which has just got off the ground, intends to continue the rehabilitation of degraded banks by planting mangroves.

### **Legal Measures Supporting the Management of Mangroves**

Benin has a set of laws and bills which will enable the country to manage its forestry heritage in general and its mangrove areas in particular. Some of these laws include:

- Law No. 90\_32 of 11 December 1990 on the Constitution of Benin;
- Law No. 98 -030 of 12 February 1999 on the outline Law on the Environment;
- Law No. 98-005 and Law No. 97-028 of 15 January 1999 on Decentralisation;
- Law No. 93\_009 of 2 July 1993 on regulations on forest in the Republic of Benin;

(Measures of the Law No. 93\_009 stipulate that the classification of forests and reforested areas should take into account the stabilisation of the hydrological system and the protection of river basins, sources of rivers and man-made lakes.)

Article No. 28 of the Law bans any clearance of wood and bushes within 25 metres along both sides of riverbanks and shores.

A three- month to three- year sentence and a fine of fifty thousand to five hundred thousand CFA francs or only one of these sentences punish any breach of the regulation on clearance along rivers and man-made lakes.

- The decree No. 96\_271 of 2 July 1996 on the implementation terms of the Law No. 93\_009 of 2<sup>nd</sup> July 1993;
- The forestry policy of Benin of July 1994
- The decree No. 82\_435 of 30 September 1982 to limit bushfires

As part of the multinational cooperation, Benin has signed many international agreements regarding the protection of wetlands resources. These include:

- Convention on Biological Diversity
- Bonn Convention
- CPM
- CITES
- Convention on the fight against Desertification
- AEWA
- Ramsar Convention on Wetlands.

Other agreements link Benin to international organisations such as IUCN, Wetlands International and WWF and enable the country to acquire appropriate tools for the sustainable management of mangroves.

### **Conclusion**

Despite the excellent achievements recorded through the reforestation programme, there are still, today, many threats to wetland resources in Benin, the main restricting factors being biological constraints – hydrological changes – poor fishing practices and damage caused by domestic animals.

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## **Introduction**

### *Regional framework*

Senegal participates in the politico-economic efforts of the Economic Community for West African States (ECOWAS) and West African Economic and Monetary Union (WAEMU). It ensures the leadership of the New Partnership for Africa Development (NEPAD) "Environment component".

As environmental planning tools, Senegal has the National Environmental Action Plan, a national biodiversity monograph, a national strategy and a national action plan for biodiversity conservation. There is also a national plan for combating desertification and a national poverty reduction plan.

### *Surface area*

Senegal is a Sahelo-Sudanian country with strong maritime influence, covering a terrestrial surface of one hundred ninety six thousand seven hundred twenty two (196,722) km<sup>2</sup>, i.e. a little less than its exclusive economic zone (EEZ) and 700 km of coast.

### *History*

The history of Senegal, beyond the internal and external evolution inherent to all human societies and all nations, is determined by its geography in relation to the transatlantic openings and towards the Maghreb. Senegal sheltered one of the main transit and trading posts during the period of slavery. It constituted a gateway to colonial conquest and where Christianity encountered a strong resistance by Islam.

### *Population and economy*

Senegal counts a population estimated at 9-10 million inhabitants in 2000, against 3 million in 1960, with an annual growth rate of 2.8%. The growth rate of the urban population, about 40% in 2000, is estimated to reach 60% by 2015. More than half the population is under 15. Another significant aspect of Senegal's demography is that 60% of the population is established on a 60-km stretch along the country's 700 kms of coastline.

Several ethnic groups make up the Senegalese population. The average density of the population is established at approximately 46 inhabitants/km<sup>2</sup> with great disparities between, for example, the area of Dakar (4,000 people/km<sup>2</sup>), the *Serer* country with 170 people/km<sup>2</sup> and Eastern Senegal with less than 5 people/km<sup>2</sup>.

The economy is dominated mainly by the primary sector. However, production of cash crops has slowed down over the past three decades. The fisheries sector, tourism and phosphates are the main currency sources for the national economy.

## **Wetlands Biodiversity, Interests and Development**

The Sine Saloum basin is part of the Senegalo-Mauritanian sedimentary basin. It covers a surface of 29,720 km<sup>2</sup>, 2,800 km<sup>2</sup> of which are permanently submerged by the tide. The climate is of the Sudano-Sahelian type (annual average: 480 mm in the northern part, and 880 mm in the south).

There are three main geomorphological units of interest concerning wetlands. They are mudflat areas, *tannes* (barren areas) and low grounds which occupy a significant proportion of the soils of Fatick and Kaolack. Particularly developed along the coast, where the water potential is more important, the Sine Saloum wetlands cover 45-70% of soils in spite of the ongoing drying process. The mangrove flats are more or less clay deposits surrounded by the rivers in the intertidal zone bathed by marine water. The mangrove-tanne complex, despite an apparent topographic homogeneity, is a milieu (milieu) where the tidal channels form a complex network. Due to inadequate river inflow, these channels are completely inundated by marine water. The system functions like a reversal estuary, the water being increasingly salted upstream. The mangrove formations are primarily in the form of linear bands of variable extension, which espouse the contours of the Rhizophora-dominated tidal channels. A second type of mangrove, set back from the Rhizophora, is comprised of sparse formations of *Avicennia* and *Laguncularia*.

Developing in the daily tide zones and decaying in highly saline waters, the mangroves extend mainly in the Saloum islands (estuarine part).

The *tannes* are slightly sloped soils under the influence of the periodic pulsations of the tides. They are a form of transition between mangrove and dry land where soil salinity due to periodic but non-daily exposure to the tide, explains the lack of vegetation and of agricultural development.

The *tannes* are more represented in the northern and north-eastern parts of Saloum, either permanently submerged, or covered with saline efflorescence (when they are exposed).

The sand bars and sand islands whose facies are strongly influenced by the coastal hydrodynamics, are essentially laid out along the coast.

The low grounds mainly located south of the Saloum, only cover a surface area of about 6,500 ha (i.e. slightly more than the 2% of the total Saloum wetlands), of which only 590 ha are permanently covered with water.

A last type of wetlands occupies a weak slope bordering the plains and continental basins in which surface waters accumulate during the rainy season. They cover a surface area of about 38,500 ha south of the Saloum. These soils are often uncultivated.

## **Examples of Inter-sectoral Issues Related to Mangrove Management**

### ***Forest tapping***

Mangrove forests are increasingly tapped by local populations, mainly for subsistence use, especially fuel wood for cooking and the processing of fish and for timber.

The economy of the populations living in the mangrove areas is dependent primarily upon fisheries. Overexploitation, as well as unwise harvest of fish and molluscan resources, is a great threat.

### *Fisheries*

The fisheries sector is the principal provider of currencies to the national economy. It forms a basis to economic activity subsectors which employ nearly a million individuals. Fish resources cover 70% of the animal proteins needs. The persistence of climate worsening, the intensification of desertification, the increasingly dense concentration of the populations on the coastal areas and the jeopardizing of the living conditions contribute to exacerbate the pressures on mangrove formations. As the traditional communities of fishermen know it better than anyone, the survival of many fishery resources depends on the presence and health of the mangrove ecosystems.

### *Aquaculture*

Aquaculture is a very dynamic branch, primarily invested in by women in the Saloum Delta and in Casamance. But imbalances between demand and stock renewal capacities is likely to jeopardize the potential which is currently highly strained.

### *Other sectors (agriculture and mining)*

Agriculture contributes to the reduction of the vegetal cover and the simplification of the trophic networks. In fact, it is mainly the mining activities that are alarming. The effects of sand extraction for building purposes expose the human settlements around Dakar and the Petite Côte. The midden shells of the Saloum are exploited for constructing feeder roads or producing lime. Fortunately, the peat exploitation projects on the northern coast of Dakar have now been abandoned.

### *Protection of the coastline*

Senegal has managed to set up a network of protected areas along the littoral zone. This made it possible to grant protection statutes to strategic coastal sections, including the Saloum mangrove. The enforcement of decentralization laws in 1997 led to the emergence of other categories of protected areas. Thus, three community natural reserves for the protection of mangrove formations, among others, have been created by the Rural Councils of Sindia (Lagoon of Somone, 1999) of Palmarin (2001), and Toubacouta (Bamboung, 2002).

The concept of community “natural space” and the emergence of the network of community natural reserves constitute sources of hope for the local responses to issues of sustainable management of mangrove forests and coastal areas.

### *Tourism and leisure*

The unrestrained development of tourism, especially of balneal type, upset the landscapes and ecological balances of the Senegalese coasts. The three main tourist poles of the country are localized on the littoral, as well as the bulk of infrastructure. The development of eco-tourism, a form of tourist exploitation which, in principle, respects local ways of life and is dependent upon the quality of natural landscapes and authenticity of the cultural inheritance, would be a strategic option for the development of alternative economic activities based on conservation, restoration and valuation of the natural and cultural landscapes of mangrove forests.

### *Protection of biodiversity*

The role of protected areas represents *in situ* conservation of the biodiversity of the habitats and biotic communities which characterize them. The parts of the most significant mangrove formations in the Saloum Delta are safeguarded in the transboundary socio-ecological complex of the Niimi-Saloum. The other parts are included in the biosphere reserve. To reinforce the conservation tools for nurseries, turtle egg-laying grounds, or to safeguard threatened species like manatee, local communities are establishing a network of community natural reserves.

Many projects are also currently involved in community-based programs of restoration of mangrove ecosystems in the Petite Côte.

### *Research and education*

The improvement of knowledge on the dynamics and productivity of mangrove ecosystems is a prerequisite to the implementation of sustainable and integrated management strategies, taking into consideration the short- and long-term survival concerns of the communities which depend upon them. In the light of their scientific, economic and social significance, several research studies are being carried out on mangrove formations by research and training institutes (ISRA, UCAD, IRD), by technical departments (DEFCCS, DPNS, DOPM) or by conservation-development projects (national and international NGOs). It is however advisable to take stock of the knowledge on natural and anthropologic environments in order to identify further research needs, in particular from the prospect of a sustainable mangrove forest management strategy.

## **Legal Framework**

### *Regulatory structures*

Most of the structures vested with powers of control are under the supervision of the Ministry of Environment and the Protection of Nature: Department of National Parks, Department of National Forestry and Hunting, Department of Environment.

The execution framework for the control activities is ruled by a number of codes: the forest code, the code of hunting and the protection of fauna and the environment code.

Senegal also adheres to most of the conventions relating to better management of environment and natural resources: CITES, Biodiversity, Desert Control, Ramsar, Bonn and Berne, Climate Change, World Heritage and Biosphere Reserves (UNESCO).

### *Institutional responsibilities relating to mangroves*

The main institutions directly involved in the management of mangroves are: *Direction de l'Océanographie et de la Pêche Maritime*, and *Direction de la Pêche Continentale et de l'Aquaculture* (which manage fishing activities in Senegal); *Direction des Parcs Nationaux* (which manages protected areas and coordinates the conservation-development activities in the Biosphere Reserve under its supervision); *Direction de l'Environnement et des Etablissements Classés* (which manages coastal erosion issues, in relation to Climate Change).

### *Laws and legal statutes*

The laws on regionalization and the Code of Local Communities and the Transfer of Competences to Regions, Communes and Rural Communities, respectively, confer local institutions the prerogatives, among others, of environment planning in the territories within their remit. The relevance and timeliness are illustrated by the emergence of the network of community natural reserves created and managed by the populations themselves.

In addition to the codes and conventions which determine the national habitat and biodiversity conservation policy, in particular for the conservation of mangrove forests, some sites have acquired these international statutes, for example: Ramsar Site, Biosphere Reserve, World Heritage Site, Transboundary Socio-Ecological Complex.

### *Zoning plans*

The Department of National Parks, supported by the scientific and backstopping think tank, the national biodiversity committee and the development partners, launched a process to provide each protected area with a development and management plan, as a cohesive, planning, coordination and follow-up/evaluation framework of the programs of conservation and integrated valorization of biodiversity in adjacent areas.

The Natural Community Space, a sort of local adaptation of the principles of management of a biosphere reserve, is presently adopted with a view to the insertion of the management of the protected areas in their surrounding socio-ecological context.

### **Other Actions Promulgated by the Senegalese Government to Protect Mangroves**

Orientation and Strategic Planning Papers elaborated in the post-Rio period: *National Environmental Action Plan*, *National Biodiversity Monograph*, *Biodiversity Conservation Strategy* and *National Action Plan*.

The main laws on the protection of mangrove forests include the: Forest Code (protection and tapping), Hunting Code (management of the protected areas and the fauna), Environmental Code (impact studies, pollution and nuisance, etc.) and the law on the national area (protection of the marine and river public area).



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## **Introduction**

Nigeria is a maritime state with a coastline of approximately 853 km; the country lies between latitudes 4°10' to 6°20'N and longitudes 2°45' to 8°5'E. Nigeria stretches from the western border with the Republic of Benin to the eastern border with the Republic of Cameroon. Nigeria established an Exclusive Economic Zone which is an area beyond and adjacent to the territorial sea extending 200 nautical miles from the baseline, within which to exercise sovereign rights for the purpose of exploring, exploiting, conserving and managing the natural resources.

The coastal area of Nigeria lies along the Atlantic Ocean with its continental shelf, the Exclusive Economic Zone and the coastal fresh water and brackish wetlands ramified by a network of rivers and creeks. Onshore the coastal area is dominated by extensive stretches of sandy beaches (barrier islands) lagoons, estuaries, mud beaches, creeks and a deltaic complex. Most of the 120 million population and the economic activities that support them are located along the coast with over 20% of the population inhabiting coastal areas. Of the thirty-six (36) states in the country nine (Lagos, Ogun, Ondo, Edo, Delta, Bayelsa, Rivers, Akwa Ibom and Cross River states) are located in the mangrove ecosystem.

The Mangrove swamp forest, which stretch across the entire coastline in the southern part of Nigeria occupies an area of about 970,000 to 1 million hectares (i.e. about 1% of the country's land area); FAO, (1981) and Okigbo (1984). The actual unclassified wetlands in the mangrove swamp cover over 750, 800 hectares, Adegbehin and Nwaibo (1990). Nigeria ranks third in the world after India (1.4 million ha) and Indonesia (4-6 million ha) in total mangrove cover.

Nigerias mangrove resources have remained underutilized and the forests in particular suffer from neglect in terms of management. The resources include petroleum and natural gas, sand and gravel, wildlife, fish and shrimps and the mangrove forests.

## **Forestry**

In terms of economically valuable tree species, the Nigerian mangroves consist mostly of Rhizophoraceae (Red mangrove); *Rhizophora racemosa*, *R. harrisonii* and *R. mangle*; the Avicenniaceae (white mangrove) and *Combretaceae* consisting of *Avicennia africana* and *Laguncularia racemosa* respectively. In West Africa, four families represented by seven species are found, however only three families represented by four species occur in Nigeria. In addition, the Palmae represented by *Raphia sp*, *Phoenix sp* and *Nypa fruticans* are also present as mangrove associates. The data on growth rate and standing volume of mangrove forest is tentative. A standing volume of 100-200m<sup>3</sup>/ha (volume under-bark to timber height of 7.5 cm diameter top) with a mean of about 184m<sup>3</sup>/ha was obtained from a mixed natural *Rhizophora* forest in the Niger delta; FENCO (1976). Commercially exploitable wood volume (for pole, pulp and paper) in the mangrove forest as at 1988 has been estimated at between 10 – 750

million m<sup>3</sup> based on the estimated total mangrove area of between 709,800 1 million ha (Okigbo, 1984; Moses, 1985). The need for an up-dated inventory becomes very important. At present, the most common uses of the mangrove species are for pole and fuelwood by the local inhabitants. It has been estimated that over 4 million m<sup>3</sup> of wood are extracted from the Nigerian mangrove forest annually (Adegbehin, 1993).

### *Fisheries*

Fish provide an estimated 40% of the total animal protein diet of the average Nigerian. In the coastal communities, fish may account for 80-100% of animal protein consumed by the people. The estuaries, creeks and coastal resources are exploited for pelagic, demersal and shell fish populations by the local fishermen. The pelagic fishery is composed of mainly *Sardinella* sp., *Ethmalosa fimbriata*, *Engraulis encrasicolus* and *Ilisha africana*. The demersal fish stock include Sciaenidae (*Pseudotolithus* sp.), the Polynemidae (*Galeoides* sp., *Polydactylus* sp. and *Pentanemys* sp.), the Ariidae (*Arius* sp.), the Cynoglossidae (*Cynoglossus* sp.), Pomadasysidae (*Pomadsys* sp.) and Carangidae (*Caramx* sp.). The shellfish resources consist of shrimps Penaeidae (*Penaeus* sp., *Parapenaeopsis atlantica*), Palaemonidae (*Macrobrachium* sp., *Nematopalaemon hastatus* and *Palaemonetes africana*), crabs (*Ocypode* sp., *Callinectes amnicola*) and molluscs including, oysters (*Crassostrea gazar*), cockles (*Anadara senegalensis*) and gastropod snails (*Thais* sp., *Tympanotonus* sp and *Pachymelania* sp.).

### *Aquaculture*

Aquaculture in the mangrove ecosystem is not developed despite its great potential. The poor success of aquaculture has been due to the high cost of investment and the acidic nature and soil characteristics of the mangrove swamps, which render such habitat unsuitable for aquaculture. Other aquatic culture systems include the "acadja" or "brush park" systems practiced by the local fishermen. These aggregate fish by attracting them to acadjas made from tree branches.

### *Oil and Gas*

Petroleum has become dominant in the Nigerian economy and over 90% of her foreign exchange earnings has been accruing from it annually for over 15 years. The Niger delta is a prolific oil producing zone where major oil discoveries have been made. Nigeria's current oil reserves are estimated at 21 billion barrels and gas reserves are approximately 11 trillion cubic feet. Nigeria is currently producing 1.9 million barrels per day of crude oil. Also she is producing about 200,000 barrels of gas-condensate per day. Current gross natural production most of which is associated gas is about 3,400 million cubic feet per day of which about 10% is consumed domestically, 10% is re-injected and 80% flared.

### *Sand and Gravel*

Sand and gravel are mined onshore from stream beds, burrow pits, lagoons, estuaries and beaches. Several million cubic meters of sand is dredged annually for oil companies by

dredging companies and by the construction companies. The glass making companies mine sand at the rate of 60-100 metric tonnes per day.

### *Agriculture*

Mangrove swamps in Nigeria are not suitable for arable agriculture due to the soil salinity and the presence of acid sulphate in the mangrove soil. However, cash crops such as oil palm, rubber and coconut seem to thrive in this environment.

### *Coastal Protection*

Coastal erosion occurs along the entire coastline, because of the nature of the topography and soil characteristics, impacts from high population growth and increased economic activities which have resulted in coastal degradation. These problems include beach erosion and flooding amongst others. Both natural forces and human activities are the major causes of coastal erosion. There are more than 50 erosion sites along the coast and average rates of erosion range from 18m to 30m/year. It has been observed that the buffering effect of mangroves is reduced where deforestation has occurred.

### *Tourism and Recreation*

Nigeria is not a major tourist destination, although a significant number of national, regional and international visitors do enjoy Nigeria's tourist facilities and coastal resources. In Lagos, Port Harcourt, Eket and Calabar, the swamps are being reclaimed for the development of tourist infrastructure.

### *Biodiversity Conservation*

The total reserved mangrove area is about 304 km<sup>2</sup> spread over the nine coastal states. The reserved areas provide sanctuary for migratory birds, threatened and endangered species of birds, mammals, reptiles and other wildlife.

### *Research and Education*

Research and education activities are carried out by Research Institutes, University and Non-Governmental Organization (NGOs) as well as Community Based Organization (CBOs).

### **Threats to the Mangrove Ecosystem**

Threats to the Nigerian mangrove forest include pollution (domestic and industrial), sand mining swamp reclamation, dredging, felling for fuelwood and fish curing, construction timber, oil and gas exploration and exploitation, development of residential and industrial areas.

### **Institutions Responsible for Marine and Coastal Resources**

Ministries of Agriculture (Department of Fisheries, Forestry and Water Resources), Transport, Works and Housing, Environment, Petroleum Resources, Justice and Solid Minerals, Nigerian Institute for Oceanography and Marine Research, Forestry Research Institute of Nigeria, Inland Waterways Authority, State and Local Government, NGOs and CBOs.

### **Institutional Responsibilities for Mangrove Management**

The following Ministries and agencies are concerned with mangrove ecosystems: Ministry of Environment, Ministry of Agriculture and Water Resources, Ministry of Petroleum Resources, Ministry of Solid Minerals, Ministry of Works and Housing, Ministry of Transport, Inland Waterways Authority, The Nigerian Navy, Research Institute (NIOMR), Universities, State Government, NGO, Local Government Authorities, International Organisations, Oil Companies (ExxonMobil, Texaco, Chevron, Shell, etc.)

### **Constraints**

There are various constraints to sustainable management of mangroves in Nigeria. The main constraints include: lack of baseline data; lack of coordination among the responsible ministries and agencies; and weak collaboration and networking among the stakeholders.

### **Existing Legislation**

The following legislation is relevant to mangroves in Nigeria:

- Forest Ordinance of 1937
- Mineral Act of 1946 affirming ownership of all minerals as the property of the Government.
- Petroleum Control Act of 1968.
- Petroleum Drilling and Production Regulation 1969.
- Wild Animal Preservation Law 1972.
- Forestry Amendment Edict 1973.
- Crude Oil Transportation and Shipment Regulation 1984.
- The Endangered Species Decree 1985.
- Federal Environmental Protection Agency Act 1988.
- Associated Gas Re-injection Act cap.20 1990.
- Harmful Waste Act cap.165 1990.
- Land use Act cap. 202 1990.
- Natural Resources Conservation Agency Council Act cap. 286 1990.
- Oil in Navigable Waters Act 1990.

- Sea Fisheries Decree 1992.

The Land Use Decree of 1978 states that all land resides with the Federal Government. The Decree provides for granting of statutory rights of occupancy over land and customary rights over rural land developers, Institutions and Government. The Decree empowers the Governor of each state to hold in trust and administer land for use by all Nigerians. All mangrove ecosystems in Nigeria come under this Decree.

### **International Agreements**

Relevant international agreements ratified by Nigeria include:

- Geneva Conventions on Territorial Sea and Continental Shelf 1964.
- African Convention on the Conservation of Nature and Natural Resources.
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1971.
- Convention on the Protection of the World Cultural and Natural Heritage 1972.
- Convention on the Prevention of Marine Pollution by the dumping of Wastes 1972.
- Convention for Biodiversity 1994.
- Convention on International Trade in Endangered Species 1973.
- Convention on the Conservation of Migratory Species of Wild Animals 1979.
- Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region 1981.

The legal framework for the management of environmental legislation in Nigeria is based on the Federal enactment with subsidiary instruments, as well as on State Laws as each State is autonomous within the sphere of its legislative competence.

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## WEST AFRICAN ASSOCIATION FOR MARINE ENVIRONMENT (WAAME), SENEGAL: MR ABDOULAYE DIAME

### Introduction

Les actions de WAAME ont consisté d'abord à faire prendre conscience aux populations côtières et insulaires que la dégradation des écosystèmes fragiles de mangroves et ses conséquences sur la vie animale, végétale et humaine était réversible à partir d'actions communautaires concertées. Elle a débuté par une éducation environnementale dans les milieux formels et non formels, a fait tâche d'huile dans d'autres villages et commence à être un véritable levier pour le développement local et la conservation des mangroves et de sa biodiversité.

### Objectifs

L'initiative a pour objectif principal de contribuer à la gestion durable de la biodiversité dans les écosystèmes de mangrove. Pour ce faire, elle s'est fixée les objectifs opérationnels suivants:

1. Introduire des activités d'éducation relative à l'environnement marin axée sur la mangrove et tenant compte des usages, connaissances et coutumes locaux,
2. Promouvoir la formation en technologies appropriées pour une gestion durable des ressources naturelles et une meilleure adaptation des femmes aux effets des changements climatiques,
3. Contribuer par le reboisement et la constitution de pépinières de mangrove à la sauvegarde et à la restauration de la diversité biologique,
4. Améliorer les revenus des femmes insulaires rurales par la mise en place d'un fonds d'appui à l'environnement et au développement pour une gestion rationnelle de la production des ressources de mangrove.

### Activités

- *Reboisement de mangrove et mis en place de pépinières de mangroves et agroforestières*

Les reboisements sont faits dans des zones dégradées, anciennement colonisées par la mangrove. Il fallait sensibiliser d'abord les populations parce que les techniques de régénération n'étaient pas connues. Et dans ces milieux fortement islamisés, où, avant la sécheresse des années 1974, la nature régulait elle-même le milieu, la destruction s'expliquait par une volonté divine. Cette destruction des mangroves avait déjà entraîné l'ensablement des chenaux, la salinisation des rizières, la destruction des habitats, l'érosion côtière ainsi que le déplacement de villages etc.

Cette dégradation a en outre expliqué, la perte de la biodiversité, la baisse des captures des pêcheries et des rendements agricoles ainsi que la persistance de la pauvreté entraînant une forte migration surtout des jeunes vers les centres urbains et les pays limitrophes.

Les reboisements initiés à la suite des formations en sylviculture ainsi que l'expérimentation par la pratique qui prenait en compte les croyances et les formes d'organisations traditionnelles, tout comme l'introduction du concept genre, ont beaucoup contribué aux succès des actions communautaires de réhabilitation de vastes aires de mangroves.

- ***Ostréiculture durable***

La cueillette des huîtres est une activités de femmes. L'introduction de l'Ostréiculture durable dans le projet est motivée par trois faits essentiels :

- La coupe des racines de mangroves où les huîtres sont fixées au moment de la récolte,
- La forte mortalité des juvéniles à l'issue de cette coupe,
- Les travaux pénibles des femmes qui rament leur pirogue vers des sites plus en plus éloignés des villages à la recherche des huîtres.

Le projet PMF/FEM/PNUD a fait des tests réussis en ostréiculture durable en s'étant fixé comme sous-objectifs de :

- Former 10 groupements de 5 villages en techniques de captage des naissains sur des supports (coquilles d'huîtres enlacées en guirlandes, tuiles chaulées, etc.),
- Installer des champs d'expérimentation ostréicole avec collecteurs de naissains, parcs de grossissement et de stabulation,
- Echanger des connaissances avec des groupements d'autres régions et sites

- ***Education relative à l'environnement (ERE)***

Les activités d'éducation relative à l'environnement marin sont axées sur la gestion des écosystèmes de mangrove et tenant compte des usages, connaissances et coutumes locaux et en intégrant et mettant des passerelles entre les milieux formel et non formel. Les principales actions sont :

- Séances d'animations et de causeries villageoises,
- Manifestations théâtrales sur l'environnement et en langues locales,
- Séances d'expositions de photographies,
- Visites comparatives de sites,
- Conception et finalisation de documents didactiques,
- Couverture audiovisuelle (film vidéo, album photo et jeux de diapositives) des activités,
- Concours et échanges environnementaux en milieux scolaires et informels etc.

- ***Fonds d'appui à l'environnement et au développement (FAED)***



Le FAED a été initié avec le FEM/PMF/PNUD, dans un milieu caractérisé par un manque endémique de capital qui ne permet pas aux acteurs de réguler leur trésorerie fluctuante, ni d'investir pour intensifier leur système d'exploitation.

Le FAED, initié en 1998, au village de Mbam avec un fonds de près de 500 US \$. Les populations ont elles-même fixé, le taux d'intérêt de 10%, la durée de prêt de 4 mois et sont parvenues à des taux de recouvrement de 100%. En avril 2002, le fonds était de 1827 US \$ avec 307 demandes de crédits satisfaites et un taux de recyclage du crédit de 350 %.

Au village de Bassoul, le FAED, en 1998, avait un fonds de près de 1066 US \$. Les populations ont elles-même fixé, comme à Mbam, le taux d'intérêt de 10%, la durée de prêt de 4 mois et sont parvenues à des taux de recouvrement de 100%. En Février 2002, le fonds était de 3060 US \$ avec un taux de recyclage du crédit de 300 %.

Le FAED est utilisé comme instrument d'intermédiation financière par le crédit direct. Le FAED est une activité adaptée aux besoins de régénération de la mangrove et de lutte contre la pauvreté principale cause de surexploitation des ressources dans nos zones.

Il a comme tâche de contribuer à travers l'octroi de prêts autogérés par et aux groupements de femmes rurales à la (au):

- Diversification des sources de revenus et l'amélioration des conditions de vie des bénéficiaires,
- Réhabilitation des mangroves dégradées,
- Renforcement de la capacité d'autogestion et d'auto développement etc.

Avec deux villages au début du projet, le FAED est phase test dans trois autres villages et progresse vers d'autres îles et villages côtiers.

## Résultats

### □ *Eléments innovateurs*

- Les techniques de captage des huîtres permettent d'épargner la mangrove, de sauvegarder les naissains d'huîtres détruites avec des formes d'exploitation anté-initiatives, et de réduire le temps de travail des femmes et les risques tout en augmentant les revenus.

Avec cette initiative, la réduction de la destruction des racines de palétuviers a été de plus de 95% entraînant une nette modification du comportement environnemental des populations et surtout des femmes, principales gestionnaires des ressources de mangroves.

- La réhabilitation des sites entraîne le retour d'une diversité de ressources animales (Gastéropodes, Mollusques, Céphalopodes, Crustacés, Poissons etc.) que les riverains consomment à l'état frais ce qui améliore sensiblement leur santé et leur confère une résistance à beaucoup de maladies. A la santé des populations locales, s'ajoute la résolution des carences nutritionnelles et la sécurité alimentaire.
- Une nurserie de mangrove a été aménagée et les plants mis en croissance servent au reboisement de sites plus dégradés dont les semis directs peuvent être perturbés par les vagues et les courants de marées. Le but de ces actions est surtout de mesurer et divulguer l'importance des écosystèmes de mangrove et aussi de maintenir les équilibres

précaires, de protéger ces forêts ainsi que la vie végétale, animale et humaine dans ces écosystèmes.

- Dans une vision plus globale dépassant le cadre villageois, le projet a contribué à l'atténuation des effets des changements climatiques (effet de serre) grâce aux reboisements qui favorisent le captage du carbone.

Cette initiative, a permis de faire comprendre aux populations que la mangrove pouvait être reboisée !

Par le biais des reboisements, le projet a permis la reconstitution des habitats naturels de diverses espèces animales menacées de disparition (ex. Lamantins, oiseaux paléarctiques migrateurs). En outre, grâce aux suivis communautaires des réalisations et la vulgarisation des résultats et données (recherche/développement) de terrain, l'initiative a favorisé une contribution scientifique non négligeable à l'évolution des connaissances sur les écosystèmes de mangrove, leur composition faunique et floristique ainsi que leur productivité. La dégradation des mangroves qui entraîne une grave perte de biodiversité, une érosion des berges et une baisse des ressources monétaires et nutritionnelles, n'a commencé à trouver des solutions qu'avec les séances communautaires de reboisement.

- Les expériences de WAAME sont partagées avec les partenaires et les pays suivants : Kenya, Srilanka, The Gambia etc. Elle a aussi contribué à la mise en réseau de plusieurs organisations travaillant sur la mangrove en Afrique de l'Ouest ou West African Mangrove Network (WAMNET).
- Les actions étaient au début localisées et financées pour deux villages côtier et insulaire mais les activités ont directement touché en cours d'exécution 30 villages côtiers et 10 insulaires. Divers groupes sont conscientisés et sensibilisés : les élus locaux, chefs coutumiers, les chefs religieux, les élèves, pêcheurs, femmes formatrices, etc. Plus de 100 000 personnes sont soit directement ou indirectement sensibilisées y compris les différentes sphères de l'Etat.
- WAAME a aussi innové en sensibilisant l'opinion nationale et internationale sur les impacts de la désertification et de la sécheresse sur les écosystèmes de mangroves et les zones humides à travers des publications, articles de presse, interviews et en participant aux CCD COP 2 (Dakar) et COP 5 (Genève), COP8. Avant cette initiative, le concept de la désertification n'était perçue qu'à travers ses impacts sur les terres arides et non sur les zones humides et les estuaires.

### **Diminution de la pauvreté**

Dans quelle mesure l'initiative a-t-elle amélioré les conditions socioéconomiques et le bien-être de la collectivité?

- Utilisation des croyances traditionnelles et la culturelles comme médium de communication/sensibilisation environnementale (sports, cérémonies rituelles, etc.), a largement contribué à la réhabilitation et restauration de sites sacrés par le biais du reboisement de mangrove. En retour, les populations locales encore adeptes des religions africaines traditionnelles (très soucieuses de la conservation de la biodiversité) ont avec engouement contribué à démultiplier les sites villageois réhabilités.

- Disponibilité et accès aux produits alimentaires de base grâce au revolving solidaire, à l'ostréiculture et à la réapparition de certaines espèces (arches, murex, cymbium etc.) grâce à la réhabilitation de sites. Ce retour de la biodiversité a beaucoup amélioré les conditions nutritionnelles (alimentaires) dans ces îles enclavées dont la salinisation des rizières occasionne des carences céréalières aiguës. La restauration des mangroves avec ses zones de frayères, a contribué à l'augmentation des stocks halieutiques et la sécurité alimentaire.
- Les nombreux produits de pharmacopée traditionnelle que fournissent les mangroves contribuent à l'amélioration de la santé des populations
- Avec les reboisements de mangrove les populations retrouvent une perception de la beauté de leur paysage qu'elles avaient perdu avec la dégradation causée entre autres par l'accentuation de la sécheresse et de la désertification sur les mangroves
- Le FAED, grâce à la diversification des activités génératrices de revenus, a facilité et augmenté le degré de monétarisation dans les villages cibles. Le FAED a renforcé la capacité d'autofinancement par l'accès des femmes au crédit. Avec des crédits en majorité de moins de cent dollars américains (100US \$), accordés principalement aux femmes la situation sociale des bénéficiaires qui peuvent ainsi trouver des fonds nécessaires pour satisfaire des besoins de première nécessité (santé, nourriture, habillement, frais scolaires etc.). Dans certains cas, certains produits de premières nécessité sont accessibles au village grâce à ces micro-crédits. Les hommes qui n'y participaient pas commencent à accéder aux crédits, cependant bien que leur nombre étant limité, leur crédit dépassent les 100 US \$ généralement accordés aux femmes. Ce FAED dans les sites pilotes et de l'avis des bénéficiaires, ont amélioré le niveau de pauvreté.

### **Effets sur la biodiversité**

Dans quelle mesure l'initiative a-t-elle contribué à la conservation ou à l'utilisation durable de la biodiversité ainsi qu'au partage juste et équitable des avantages découlant des ressources génétiques?

- Régénération de 75 ha de mangrove (rhizophora) soit 324,000 propagules en écartement de (2x1m) a constitué un important moyen de restauration des équilibres dans les habitats fragiles dont dépendent une grande diversité biologique. Les populations locales ont elles même constaté le retour de la biodiversité dans les zones restaurées (crustacés, mollusques, poissons, murex, arches, huîtres oiseaux d'eaux, reptiles etc. ), quelques temps après la restauration des mangroves.
- A côté de la restauration des habitats, un accent particulier est mis sur le suivi de quelques espèces clés de la biodiversité dont des lamantins, des dauphins, des oiseaux d'eau et des tortues marines. La pêche traditionnelle des mammifères tels les lamantins procure beaucoup de revenus financiers dans ce contexte de pauvreté. Cependant, l'initiative continue avec succès la sensibilisation sur la sauvegarde des mammifères tels les lamantins et dauphins, qui seront suivis (identification, structure de la population, distribution, comportement, alimentation, etc.). Une attention particulière sera donnée

aux chasseurs traditionnels qui constituent une réelle menace pour la survie de ces animaux aquatiques.

Le suivi des colonies en reproduction à l'île aux oiseaux et autres vasières, se fait avec une bonne participation des populations surtout les enfants. Dans certaines localités, le braconnage des oiseaux par les enfants a nécessité l'intégration des connaissances sur les oiseaux dans les programmes scolaires et le plan de gestion villageois.

Les mammifères marins y compris dauphins et lamantins ainsi que les oiseaux et tortues figurent en bonne place dans la stratégie de sensibilisation des populations qui à partir de l'engouement né des reboisements réussis, ont pris conscience de la nécessité d'une prise en charge intégrale de la gestion de la biodiversité qui dépend de ces milieux fragiles de mangroves.

- Organisation des petits pêcheurs de crevette et leur appui pour une meilleure gestion des ressources mais aussi pour un partage plus équitable des revenus tirés de cette activité de pêche. IL consiste à appuyer les petits pêcheurs de ces localités, en équipements adaptés à une pêche durable soucieuse du renouvellement des stocks et de la sécurité des petits pêcheurs. Ces populations locales, avec ce commerce équitable, bénéficient des retombées de la biodiversité grâce de meilleurs prix au producteurs. La sécheresse a entraîné une forte paupérisation des populations suite a la dégradation voire disparition des mangroves. Et, dans les villages un pêcheur pouvait devoir un remboursement de filet pris en crédit chez le mareyeur pendant trois ans. Et pendant toutes ces périodes de pêche, il doit obligatoirement vendre au mareyeur toute sa production au prix que ce dernier peut fixer et faire fluctuer à sa guise, au gré de ses « humeurs » commerciales. Certains mareyeurs vont jusqu'à régler toutes les dépenses liées aux cérémonies familiales (mariage, décès ainsi que les besoins vitaux ) pendant la période de soudure. Le paysan-pêcheur rembourse en nature (et dans ce deal, il a l'obligation de vendre à son mareyeur-tuteur. Les noyades étaient monnaies courantes à cause des techniques de pêche mais aussi nombre de pêcheurs ne savent pas nager, ils sont souvent mus par l'appétit du gain.

## **Partenariats**

Pour chacun des partenaires, décrivez le type de partenariat, ses origines et dans quelle mesure le partenariat a contribué au succès de cette initiative.

- ONG, Projets et OCB dans le cadre de la démultiplication de l'effort de réhabilitation des mangrove ont reçues des formations pratiques. Il s'agit entre autre de UICN (Sénégal), PAGERNA, CARITAS etc. Ce partenariat, avec les ONG, Projets, et OCB a contribué à vulgariser les techniques de reboisement et augmenter les surfaces réhabilitées.
- Autorités administratives locales, régionales et nationales en charge de l'environnement et des ressources naturelles. Elles ont été consultées dès le début. Leur collaboration a permis de coordonner les efforts et créer une synergie et une meilleur visibilité auprès des populations.
- Collectivités locales pour l'accès des femmes à la terre (cas de la pépinière expérimentale de Bassoul entre autres). Elles ont en charge la gestion de l'environnement depuis la loi nationale sur la Décentralisation. Leur participation et soutien à cette initiative a permis

de lever beaucoup de contraintes (accès des femmes rurales à la terre, sensibilisation sur des mesures alternatives au fumage du poisson par des fours grands consommateurs de bois de mangrove etc.).

- Usine de traitement de produits halieutiques (Ikagel-Mbour) dans le cadre du commerce équitable de crevette, écoles et structures de formations (Université, Chaire Unesco etc.), conservateur du PNDS, gardiens des totems et sites sacrés traditionnels etc.

Le secteur privé a participé à l'initiative de commerce équitable de la crevette appuyé par NC-IUCN dans le cadre du projet de gestion des ressources des zones humides. En effet, l'Usine IKAGEL achète au prix les productions crevettières des villages pilotes. Cette situation a permis aux petits producteurs d'avoir de meilleurs prix tout en luttant contre la surexploitation et l'utilisation de maille non sélectifs. De ce fait, dans un contexte de pauvreté qui entraîne la surexploitation des juvéniles de crevette, l'initiative a permis l'introduction et la mise en application pour les pêcheries crevettières, de la notion de pêche responsable telles que recommandée par la FAO. Lutter contre la pauvreté et préserver la biodiversité marine dont dépend la crevette, tel a été le principal résultat du partenariat ONG (WAAME)-Petits Pêcheurs-Privé (IKAGEL).

### **Durabilité**

Depuis quand cette initiative est-elle en œuvre? Quels sont les principaux éléments sociaux, institutionnels, financiers et écologiques qui rendent cette initiative durable?

- Date de mise en œuvre :

Elle peut être subdivisée en trois phases :

*La première phase:* Elle a été en 1997 et 1998 appuyé par le Programme des Régions Côtières et Petites Iles (CSI/UNESCO) et avait comme tâche de sensibiliser et tout en démontrer par la pratique que la mangrove pouvait être réhabiliter. Cette phase de sensibilisation a aussi intéressé le milieu scolaire.

*La deuxième phase:* Débutée en 1998 –2001 avec le projet de « gestion intégrée de la biodiversité des écosystèmes de mangroves dans la Réserve de Biosphère du Delta Saloum (RBDS) » financé pour deux villages (une île et un côtier) par le Programme de Micro Financement du Fonds pour l'Environnement Mondial (PMF/FEM/PNUD).

*La troisième phase:* 2001 –2002 avec le renforcement du projet de « gestion intégrée de la biodiversité des écosystèmes de mangroves dans la Réserve de Biosphère du Delta Saloum (RBDS) » sur la base d'une évaluation et d'une forte demande des populations et du financement du « projet de réhabilitation et de gestion intégrée des ressources de zones humides dans le site Ramsar du Delta du Saloum » par le Small Wetlands Programme du Comité Néerlandais pour l'UICN (Pays Bas). Cette phase coïncide avec l'extension des acquis et des villages touchés et l'introduction de la notion de « commerce équitable » pour juguler la forte pression sur les ressources végétales (bois de mangrove comme source d'énergie) et crevettières.

Les succès de ces phases pilotes successives, ont influé sur l'acceptation du «projet d'appui à la conservation des mangroves » par l'Union Européenne qui permettra d'élargir la base des

actions locales vers un programme de développement lié à la conservation des écosystèmes de mangroves.

- Sociaux : L'initiative a utilisé les croyances et connaissances endogènes pour sensibiliser vers l'action de conservation et de réhabilitation des écosystèmes. Les personnes marginalisées ont été d'un grand apport dans la réussite du programme à travers (chants, théâtre rurale etc.). La base sociale de l'initiative est très élargie.
- Institutionnels : L'initiative connaît un réel succès. C'est ainsi que l'UE a accordé un financement au projet WAAME (Sénégal) et ADG (Gembloux/Belgique) sur trois. Cet important apport contribuera à asseoir une bonne base institutionnelle de cette initiative.
- Financiers : Le FAED mis en place octroie des prêts à partir de 30 US\$ qui contribuent à alléger la pauvreté. Les remboursements se font à 100% avec un taux d'intérêt de 10% et une échéance allant de 4 à 6 mois. Ces ressources financières augmentent et tendront d'ici quelques années à de véritables institutions financières locales mieux adaptées parce que autogérées par les bénéficiaires elles-même qui en fixent les modalités autour de la garantie communautaire. Une pirogue et un filet de pêche acheté par les femmes contribuent à l'accroissement des revenus autogérés par les femmes dans le village de Bassoul et issus de la pêche et de la commercialisation des produits transformés.
- Ecologiques : les mangroves réhabilités font la fierté des villageois conscients de leur rôle dans la diversité biologique, la lutte contre l'érosion côtière, la sécurité alimentaire etc. Les initiatives de réhabilitation sont prises par elles même avec l'appui de WAAME. Les institutions de recherche et de formation mettent sur les sites reboisés des étudiants pour suivre et évaluer ainsi que tirer les renseignements scientifiques sur les activités du projet en partenariat avec les populations locales. Les femmes sont d'accord à injecter une partie des revenus du micro crédit dans des activités de réhabilitation des mangroves soit directement par le reboisement des zones dégradées soit par l'achat d'équipements adaptés tels les fours et foyers améliorés pour la cuisson et le fumage du poisson et des huîtres.

### Autres renseignements

Est-ce qu'il existe d'autres éléments importants à transmettre au sujet de l'initiative?

- Cette initiative est appuyée dès sa phase de gestation par le programme Coastal zone and small islands (CSI) de l'Unesco à travers deux subventions, (3 000 US dollars) ensuite elle fut prise en charge par le projet du FEM/PMF (50 000 US dollars) et est actuellement appuyé par le NC-UICN à travers son SWP (50 000 Euro) et elle va vers sa phase de maturité avec un financement de l'UE (1 000 000 Euro).
- L'initiative se déroule dans la Réserve de Biosphère du Delta du Saloum (RBDS) aire qui se situe entre 13°35 et 14°00 de latitude nord et 16°00 et 17°00 de Longitude ouest, L'importance écologique et économique du Delta du Saloum a incité l'Etat sénégalais et la communauté internationale à prendre des mesures pour la protection de ce site. Ainsi en 1976, 76 000 ha des ensembles maritimes et amphibies ont été érigés en Parc National (Parc National du Delta du Saloum, PNDS). En 1981, l'ensemble continental a été joint au parc pour être inscrit au patrimoine mondial de la biosphère (Réserve de Biosphère du

Delta du Saloum, RBDS) avec 330 000 ha. Enfin en 1984, son statut de zone d'accueil de plusieurs espèces paléarctiques, lui a valu être classé Zone Humide d'Importance Internationale ou site Ramsar.

### **Personnes-ressources**

Personne(s)-ressource(s) chargée(s) de l'initiative ou de l'activité faisant l'objet d'une mise en nomination :

- Abdoulaye DIAME, West African Association for Marine Environment (WAAME), 21, Cité Belvédère, Dalifort Dakar, BP 26352, Sénégal, Tél: + 221 832 51 23, Fax: + 221 824 44 13 Email : [a.diame@lycos.com](mailto:a.diame@lycos.com)
- Fatima Dia Touré, Directrice de l'Environnement du Sénégal, Email: [sdtoure@metissacana.sn](mailto:sdtoure@metissacana.sn)

## WORKSHOP DISCUSSIONS

### Workshop Day 1: Monday 17<sup>th</sup> February

The five stated objectives for the workshop were discussed briefly. It was agreed that the meeting should be kept as informal and flexible as possible, with the option from Day 2 of splitting into smaller working groups as necessary to speed up the discussions and revisions to the draft Code in order to complete the 14 Articles of the Code by the end of the workshop.

It was pointed out by Prof Macintosh that the first workshop, in Bangkok, had concentrated on drafting the Articles of the Code from the theoretical framework provided by the consultants. Lack of time at the workshop had prevented discussion on other key issues, especially mechanisms to ensure that the Code is widely adopted and used. Since the Bangkok Workshop, the consultants and national mangrove experts had put considerable effort into restructuring the draft articles, adding good examples of mangrove management, and generally improving the draft document. As the draft Code was available to the Ghana meeting in its improved form, it was agreed that the participants should allocate a reasonable amount of the time to discussing and agreeing mechanisms to promote use of the code, including essential downstream activities.

### Workshop Day 2: 18<sup>th</sup> February

The first discussion session focussed strongly on the Preface to the Draft Code of Conduct. The meeting noted that the Preface did not give an adequate explanation of what mangroves are, the benefits of mangroves to society, and the threats facing mangroves worldwide. A clear definition of what mangrove ecosystems are, and their benefits and threats must be included, especially to make the Code understandable to non technical readers of the Code, including political leaders.

It was pointed out that the objective stated at the end of the Preface "quote" was unachievable within the scope of this project to produce a Code of Conduct. Thus it should be redefined as a "long-term" objective (i.e. equivalent to the development objective in many project LFAs).

Two other important issues were discussed at length with the following recommendations:

- After the long-term objective, a specific objective (for the Code) is required and should be added to the preface, namely its use as a tool for sustainable management of mangroves.
- Downstream activities, including follow-on projects, should be proposed immediately as producing the Code would not be effective by itself, without strong downstream activities to promote and disseminate the Code, training stakeholders in its use, testing the application of the Code in selected mangrove sites, adapting the code to regional, sub-regional and national needs, including *inter alia* translation of the Code into local languages.

As an example under the second recommendation, Prof. Gordon expressed the importance of requesting funds for follow up workshops for East Africa and West Africa to discuss and



adapt the Global version of the Code to meet the particular management and educational needs of these sub-regions of Africa.

The second discussion session covered the Introduction to the Code. Initially, the discussion raised the question of climate change and its effects on mangroves. This is a particular important issue in Senegal where drought caused by climate change is having a progressively damaging impact on mangroves.

It was advised strongly that the word "voluntary" should be dropped in reference to the Code of Conduct, otherwise there will be no incentive for the Code to be adopted for mangrove management in Africa and other tropical regions.

Some revision to the final paragraph of the Introduction was agreed, to make it clearer what the Code is expected to be used for, and to achieve (i.e. a tool for management).

The rest of the second discussion period concentrated on revisions to the Logical Framework matrix at the end of the Introduction. Several additions to the column "interventions" were proposed and adopted.

In the afternoon, the participants worked as a single group under a Chairman (Dr Diaw, Senegal) to discuss and review each Article paragraph by paragraph. Many details were discussed within each Article, as well as suggestions given for photographs and case study materials from Africa to illustrate many of the example boxes. Articles 1-5 were covered in this way during the afternoon session on 18<sup>th</sup> February.

Finally, the participants agreed to divide into two subgroups on Workshop Day 3, in order to review Articles 6-13 within the limited time available. The group divided themselves into a "social analysis" group to review Articles 6, 7, 8 and 13 and a "sectoral analysis" group to review Articles 9, 10, 11 and 12. The participants would then reconvene in the final plenary session in the afternoon to discuss Article 14 on integrated management of mangrove ecosystem resources.

### **Workshop Day 3: 19<sup>th</sup> February**

The first discussion session was devoted to a brief review of the changes to Articles 6 to 13 by the two sub groups.

The second (and final) discussion session was devoted to consideration of follow up activities after publication of the Code of Conduct, to ensure the Codes widespread adoption and use in management. Follow up activities were discussed as follows:

- Publication of the Code of Conduct and Country Case Studies.
- Training of trainers at different levels in use of the Code.
- Sub regional proposals for institutional development and networking (see draft proposal).
- Field site testing of the Codes usefulness in helping to improve mangrove forest ecosystem management.

In the lively discussions on the above recommendations the following additional points were recorded:

1. The Code of Conduct itself should be published as a small booklet along the lines of the FAO Code of Conduct for Sustainable Fisheries; but, additionally, the Code of Conduct for mangroves should be well illustrated with photographs and should include boxed examples of mangrove management worldwide (as already indicated in the draft Code see Annex 1).
2. The country Case Studies should be published as a substantial volume in A4 book format, the ISME/ITTO publication of "The Mangrove Atlas of the World" is a suitable model in this regard. The consultants should consult with ISME and ITTO to see whether these organizations would be receptive to supporting publication of the country case studies in a similar manner.
3. Training of trainers is regarded as a vital and immediate follow up to the publication of the Code of Conduct. Among the various categories and levels of training identified by the workshop participants the following should be given priority:
  - Community leaders,
  - NGOs,
  - Staff of departments with responsibilities for mangrove management (Environment, Forestry, Fisheries etc).

The consultants also briefed the meeting on the World Bank's stated interest in making the Code useful to its own project staff and no doubt other donor and implementation agencies will show a similar degree of interest once the Code is available.

4. The workshop participants strongly endorsed the suggestion from CAW that sub regional training courses for Africa would be most valuable. It would also be necessary to convene workshops for the African sub regions to review the Code of Conduct and raise awareness in Africa on the Code's objectives and value to management. To demonstrate the importance Africa attaches to training and awareness raising once the Code is published, Professor Chris Gordon put forward a short concept note detailing the most helpful assistance which the World Bank or other donors could provide to make these downstream activities possible in Africa (see proposal below).
5. It was agreed at the Workshop that feedback from practical use of the Code, based on site field testing, would be a valuable and much needed component of the downstream activities once the Code is available. Several of the locations and projects which the African participants are involved with are already potential suitable field sites, where the Code could be adopted and then used to support local area management of the mangrove ecosystem.
6. Finally, the meeting agreed that as a tool for mangrove management, the Code of Conduct represents a specific output which could be used very effectively to promote networking among the African countries. The Code of Conduct would enable the various members of the current network of African wetland specialists and institutions to collaborate on training and awareness raising. They could then develop specific versions of the Code suited to different sub regions or countries within Africa including its translation into local languages. At a later stage, the

network could facilitate the gathering of feedback from on site field testing involving use of the Code as a tool for local area management and pass out such experiences to a broad audience within Africa, and beyond.

## APPENDIX 1: THE CENTRE FOR AFRICAN WETLANDS

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### Origin of the Centre for African Wetlands

The initial concept of the Centre for African Wetlands (CAW) goes back to the mid-1990s and the idea was to establish a wetland research and training centre in Ghana. The Centre would carry out wetland-related scientific research that would benefit the whole West African sub-region, through links between this centre, other institutions in West Africa and other institutions involved in wetland research. Subsequent bilateral discussions with key partners confirmed the need for such a centre within the West African sub-region and highlighted the necessity to reinforce the regional character of the centre and extend its mandate beyond research and training activities.

In November 1997, a Strategic Planning Workshop of some forty African Wetland Experts was held in Accra with support from the Dutch Government. The Workshop confirmed the common need for such a Centre within the sub-region. The workshop participants further recommended the establishment of the Centre in Accra and mandated it to focus on research, capacity building, networking, information dissemination, policy development and advocacy, for the purpose of promoting sustainable wetland management in West Africa.

Based on the initial concept, the discussions with key partners and the discussions at the November 1997 workshop, a proposal for the establishment of the Centre was developed by the University of Ghana in June 1998. The final version of this proposal was submitted to the Netherlands Development Administration for funding in August 1998.

The main proposal advocated a two-phased approach for the implementation of the project, covering a 15-year period, by which time the Centre is expected to become self-sustaining. Phase I, covering the initial 5 years was planned in 3 stages:

- *Stage I: (1 yr) establishment of the Centre,*
- *Stage II: (2 yrs) implementation of the first set of activities, as well as development of a long-term strategy and financing mechanisms for the Centre, including advocating for other partners and funding agencies; and*
- *Stage III: (2 yrs) implementation of CAW programme and definition of programme of activities for Phase 2*

In December 1999, the budget for Phase 1 Stage I of CAW was released (about US\$ 1,000,000) and the project activities started. The Netherlands Government in pledging funds for Stage II indicated that there would be a need for co-funding from other donors.

### Goal of CAW and Objectives of Phase I (Stage I)

The ultimate goal of CAW is to *contribute to the preservation of the global, regional, national and local values of West African wetlands for the benefit of society as a whole.* The activities of the Centre will seek to maintain wetland biodiversity and enhance the general ecological integrity of wetlands and through this improve the quality of life for people living within and around wetlands.

The initial phase of CAW aims to:

- *demonstrate the strong sub-regional commitment to the project;*
- *identify other sources of supplementary funding;*
- *define and agree on priorities and programme of activities for the subsequent phases of CAW, as well as partners and collaborators;*

- *define the institutional/operational structures and procedures required for the effective implementation of the Centre and obtain the agreement of partners of the CAW mandate; and*
- *obtain formal endorsement of the establishment of CAW by all partners.*

This Phase has addressed four of the project outputs defined in the main project document, namely:

- *The Centre for African Wetlands (CAW) is established and ready to operate,*
- *A multi-disciplinary network of West African wetland experts established,*
- *Interested partner institutions in the Netherlands and elsewhere identified, and collaborative arrangements initiate,*
- *Needs in the fields of research, training, networking and advocacy identified and activities to meet these needs designed and tested.*

### **Activities of Phase I Stage I and Strategy for Implementation**

Key activities during this period included:

- *country studies in selected countries within the sub-region to build on the sub-regional commitment and identify needs,*
- *development of CAW mandate, appropriate institutional structures and operational manuals,*

The Stage will end with an evaluation mission, the findings of which will provide the basis for continuation of activities and funding for the subsequent phases of the project. CAW has initially focused on twelve countries: **Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Ghana, Guinea-Bissau, Liberia, Mali, Mauritania, Nigeria** and **Senegal**, for the partnership development and the subsequent establishment of the CAW network and focal points. A team of consultants have visited these countries and worked with in-country consultants to:

- *Identify ongoing wetland conservation and research work within the West African sub region and institutions involved;*
- *Identify and review relevant networks existing in West Africa at the sub-regional and national levels;*
- *Identify potential partners for the sub-regional network of national focal points and satellites;*
- *Identify wetland research, human resource and training needs;*
- *Identify key national ministries and agencies at which advocacy activities should be directed and;*
- *Identify current activities on policy and legal/regulatory aspects within the focal countries, with special emphasis on laws affecting wetland resources.*

The reports from the country studies have formed the basis for the definition of CAW's activities for the subsequent phases. The reports also form the basis for the discussions at the General Meeting of potential CAW partners. The General Meeting brings together individuals, institutions, and donors, as well as local and international NGO partners, such as WWF, IUCN, and Wetlands International. The Centre for African Wetlands is based in a purpose built facility beside the Zoology Department Legon. The physical infrastructure includes seven offices; a seminar room for up to 50 people a library and a laboratory.

#### Wetland Research

West African Wetlands share many characteristics both with regard to the forms of human exploitation (fisheries, grazing, and the harvesting of mangroves, reeds, *Typha* and other higher

plants) and with regard to their seasonality and ecological dynamics. Many of the problems associated with wetland conservation, the lack of scientific database for effective wetland management and the inadequacy of in-country technical expertise for wetland management are common to the countries in the region. Hitherto, most of the scientific studies and development of an integrated vision for the rational management and exploitation of wetlands and wetland resources have depended on external expertise.

A major focus of CAW would be to promote the development of scientific research capacity within the sub-region, focusing on mission-oriented research that will address pertinent wetland management issues.

Research areas to be focused on by CAW will include:

- Valuation of Wetland benefits
- Demonstrating the value of wetland benefits is instrumental in advocating the need for the conservation and sustainable management of wetlands. Information on wetland values is also crucial in decisions on natural resources management and development projects and programmes. Too often instruments such as cost-benefit analyses and environmental impact assessment are not based on sound information as data on/or assessment of wetland values are not available. Even basic information on fisheries or agricultural production in wetlands is usually lacking as the fish caught or the agricultural products involved often do not appear in official statistics.
- Although emphasis should be put on economic valuation, other valuation techniques should be considered, as many benefits are difficult to express in economic terms.
- In addition to generating data and assessments on wetland values, the proposed research should aim at developing approaches for the rapid evaluation/estimation of benefits in situations where data is lacking, based on indicators and reference to the values of well/better documented wetlands.

#### *Sustainable resource use*

- Although wetland benefits are crucial to people in, around and in some cases far beyond wetlands, little is known on the current level of realisation of these benefits, and even less on the possibilities to enhance these benefits. This also applies to resources and products extracted from wetlands by local people, or enjoyed by visitors for recreational or educational purposes. Research in this field is both complementary and closely linked to research in the field of wetland benefits valuation. It is therefore suggested to carry out these research activities simultaneously and as much as possible favour synergy between them.
- The proposed research will eventually lead to the development of strategies for the sustainable use and extraction of wetland resources and products. This will require accurate assessments of stocks, sound knowledge on the biology of the involved resources, and careful determination of threshold of resource utilisation. Ultimately it will also require transferring (at least part) of the acquired knowledge to resources, and the current use and importance of these resources.
- Fragmentary but recurrent examples from West African Wetlands show that wetland inhabitants often have devised ingenious ways to use resources. Nowadays, these local resource management systems and techniques are denigrated for the sake of modernity. Such systems or techniques undoubtedly constitute a very valuable basis material for the development of innovative and wetland adapted ways to enhance wetland benefits.

#### *Characterisation of major wetland types of West Africa*

Although approaches to wetland typology may differ, the general characteristics of the major wetland types occurring in the world are known. However, local conditions (e.g. climatic conditions) give rise

to considerable differences between areas or regions in the ecology, dynamics, processes and functioning of wetlands. These differences are crucial in terms of wetland management.

With a few exceptions, knowledge on the characteristics of West African wetlands is still poor, which impedes the required understanding of wetland ecosystem functioning and therefore prevents sound design and planning of wetland management. Although acquiring comprehensive knowledge on the variety of wetlands occurring in West Africa is definitely not a near-future possibility, an approach based on the study and review of the better documented wetlands of the sub-region and the selective testing of some aspects of ecosystem functioning in a limited number of less known but representative wetlands should allow the development of preliminary models for major West African wetland types.

This would facilitate in turn, for instance, forecasting of the effects of conservation and management measures on a wetland, wetland monitoring, assessment of environmental (and socio-economic) impact of interventions, design of wetland restoration projects, etc.

#### *Ecological research on biological resources of wetlands*

- A number of biological resources such as migratory birds, fish and other species are shared by different countries of West Africa and, in some cases, by different regions of the world. While understanding of the status, ecology, movement and requirements of these species is required to ensure conservation or sustainable management of populations, the necessary co-ordinated efforts and co-operation between involved countries are still poor.
- Although much attention is being paid (and should be paid) to migratory birds, other resources equally deserve to be investigated. These include fish, herpetofauna as well as riverine mammals such as the manatee.
- Knowledge should be gained not only on species of importance to biodiversity conservation, but also on species of socio-economic value.

#### *Policy research*

Policy oriented research is essential to provide data on which to base changes in policy and serve as background for advocacy. Special attention should be paid to formal and informal laws affecting wetland resources.

For more information, contact:

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## APPENDIX 2: DRAFT PROJECT CONCEPT NOTE FOR DISCUSSION

By Prof. Chris Gordon, Centre for African Wetlands, Legon Ghana

Project Title: Raising of awareness of the Code of Conduct for the sustainable management of mangrove ecosystems as a means for the integrated management of key wetlands in Africa

Duration of Project: two years    Timetable (start-end of project): 2004-2006

Zone of intervention: Africa-wide, sub-region by sub-region, taking account distribution of mangroves (Possibly West + Central Africa and East + South Africa)

Linkages to existing regional and/or international frameworks: NEPAD Capacity-Building Initiative, CBD, Ramsar, UNEP, ITTO

Total Estimated Cost: US\$ 250,000

Existing level of funding (if any): US\$ 50,000 (including in-kind contributions)

Additional funding required: US\$ 200,000

Problem background/rationale: It is universally recognised by states and stakeholders that the poor management of mangroves are a contributing cause of poverty and a primary cause of species loss, ecosystem decline and as such pose a threat to sustainable development in many coastal regions. The Code of Conduct for the sustainable management of mangrove ecosystems has been prepared by the World Bank as an instrument to guide policy direction for the sustainable management of mangrove ecosystems. It is appreciated that the mere creation of the Code of Conduct will not ensure its use and that currently it is only a small circle of mangrove ecologists and technical staff who are aware of the Code of Conduct. There is a need to evolve a dissemination strategy and public information plan to ensure that knowledge of the Code of Conduct goes to a wide audience and that the Code is understood in its entirety. It is proposed that the dissemination of the code should be done regionally through the creation and operation of sub-regional hubs so that States may learn from the lessons of other States. The full implementation of the code would help avoid the unnecessary wastage of scarce resources in project duplication, loss of experience and the poor deployment of staff.

Project Objective: *To disseminate the Code of Conduct for the sustainable management of mangrove ecosystems throughout Africa at all levels of decision making.*

### Project Components/Activities

- a. Establishment and enhancement of networks for mangrove management in Africa
- b. Sharing of mangrove management experience with the view of placing a regional perspective on the Mangrove Code of Conduct
- c. Establishment and enhancement of sub-regional information hubs for mangrove management in Africa
- d. Production of appropriate information materials from the Mangrove Code of Conduct for mangrove management in Africa at all levels
- e. Dissemination of appropriate information materials from the Mangrove Code of Conduct for mangrove management in Africa at all levels



**Activities within each component:**

Activity a1: Design a survey protocol for identifying existing networks for mangrove management in Africa

Activity a2: Conduct the survey and Compile a directory of mangrove networks in Africa

Activity a3: Sub-regional workshops to identify additional networks if needed

Activity a4: Creation of new networks to fill gaps in networks or extension of existing network coverage to fill gaps

Activity b1: Organise sub-regional workshops to learn and shared experiences on mangrove management in Africa with the view to “regionalise” the Mangrove Code of Conduct.

Activity b2: Document experiences and lessons learned to strengthen the Mangrove Code of Conduct.

Activity c1: Identify existing institutions carrying out mangrove management using the mangrove Code of Conduct within the region

Activity c2: Establish mechanisms for information exchange and flow between the identified institutions

Activity c3: Select a sub-regional hub as an information clearing house

Activity c4: Support sub-regional hubs to function

Activity d1: Collate available/existing information (from inside and outside Africa) on the operation of the Mangrove Code of Conduct

Activity d2: Catalogue the collected information

Activity d3: Review the information collected

Activity d4: Synthesise the information for applicability to the African setting

Activity d4: Produce awareness and information materials for all levels

Activity e1: Identify relevant stakeholders and decision makers active in mangrove management

Activity e2: Develop strategies for promoting the awareness of the Code of Conduct

Activity e3: Implement strategies for promoting the awareness of Code of Conduct

Activity e4: Disseminate Code of Conduct information materials

Activity e5: Evaluate efficacy and impact of Code of Conduct information materials

Project Outputs/results

- a. At least two of the five coastal sub-regions of Africa with mangrove networks established or enhanced
- b. Three sub-regional workshops
- c. Awareness created on the Mangrove Code of Conduct in all regions by 2006
- d. Information materials produced on the Mangrove Code of Conduct in all sub-regions
- e. Information materials disseminated on the Mangrove Code of Conduct in all sub-regions

Stakeholders involved: Policy-makers, managers and technical staff responsible for land, water, mangrove and natural resource management, training institutions, research institutions, etc.

Suggested or potential focal point/ contact institutions: Ramsar, Wetland International, ITTO, WWF, IUCN regional organisations (ECOWAS, SADC, IGAD, UMA, CEMAC, CILSS and COMESA) specialised organisations such as Centre for African Mangroves, NESDA, NIOMR, KEMFRI, ISME, WAAME