Project Proposals on Management of Key Habitats

MANGROVE MANAGEMENT IN SUB-SAHARAN AFRICA

1. IDENTIFIERS

Project Number: HAB 3

Project Title: Mangrove Management in Sub-Saharan Africa.

Requesting Country(ies): Senegal, The Gambia, Cote d'Ivoire, Ghana, Nigeria, Kenya, Tanzania and Mozambique

Requesting Regional or National Organisation:

National: Ministries responsible for Environment or Forestry in participating countries.
The Gambia: National Environment Agency (NEA).
Senegal: Office of Environment and the Classified Establishment.
Cote d'Ivoire: Ministry of Environment.
Ghana: Ministry of Environment & Science.
Nigeria: Federal Ministry of Environment, Federal Department of Forestry,
Kenya: Kenya Marine and Fisheries Research Institute; Ministry of Environment and Natural Resources.
Tanzania: Vice-President's Office (Division of Environment).
Mozambique: Ministry for Coordination of Environmental Affairs.

Possible Executing Agencies: **Senegal:** Office of Environment and the Classified Establishment, CRODT, DPN, DEFCCS.
Gambia: Department of Forestry.
Ghana: MES/EPA/District Assemblies.
Nigeria: Fed. Department of Forestry/ Fed. Ministry of Environment.
Mozambique: Ministry for Coordination of Environmental Affairs and Department of Forestry & Wildlife
Tanzania: National Environment Management Council; Division of Forestry & Bee-keeping.
Kenya: NEMA/KENFRI/National Environment Secretariat

Required National Partners:

Relevant sectors of the participating Governments, Universities, Research Institutions, and NGOs.
Gambia: Department of Forestry, Local village communities, Departments of Community Development, Fisheries, NEA:
Senegal: Oceanographic Research Center of Dakar Thiaroye (CRODT), the Office of the National Park (DPN) and the Office of Waters and Forests, Hunting and Soils Conservation (DEFCCS), West African Association for Marine Environment (WAMME);
Cote d"Ivoire: Centre Recherches d'Oceanographique **(**CRO), READ (NGO).
Ghana: EPA, Forestry Commission, Ministry of Tourism, Resource & Environment Development Organisation (NGO).
Nigeria: Federal Ministry of Environment, NIOMR, Nigeria Conservation Foundation (NGO).
Kenya: Forest Department; National Environment Management Authority, Kenya Wildlife Services.

	Tanzania: National Environment Management Council; Division of Forestry & Bee-keeping; University of Dar-es-Salaam. **Mozambique:** Department of Forestry & Wildlife; FNP (Forum Natureza em Perigo); Oceanographic Research Centre (ORI); Centre for Forestry Research (CEF).
Priority Issue(s) Addressed:	
	GIWA Issue 12: Loss of ecosystems and ecotones GIWA Issue 13: Modification of ecosystems or ecotones GIWA Issue 14: Over-exploitation
Regional Scope:	Sub-Saharan Africa
Project Location:	Selected areas in participating countries. **Gambia:** Bintang Bolong, Western Gambia. **Senegal:** Saloum estuary; Casamance estuary. **Cote d'Ivoire:** Ebrie lagoon. **Ghana:** Ada-Volta Estuary-Anyanui Complex; Elmina-Eture wetlands. **Nigeria:** Niger Delta and other areas invaded by exotic Nypa Palm. **Kenya:** Tana river, Kiuga MPA, Mida creek; Gazi –Funzi systems. **Tanzania:** Rufiji delta, Chakomble; Fumbwini; Matumbini; Kisiwa; Kikuu. **Mozambique:** Quirimbas Archipelago; Mozambique Island; Beira City; Sofala Bay; Inhaca Island; Maputo Bay.
Project Duration:	Five (5) years
Working Group of the African Process:	WG 5: Management of key habitat and ecosystems (HAB-3). Linkages exist for participation and synergy with the following working groups. Key Habitat (HAB-1); Tourism (TOU-3, 4 and 5); Coastal erosion (COS-2 and 3); Sustainable use of living resources (RES-3 and 5).

2. SUMMARY

The Project aims at enhancing the productivity, stability as well as the functional integrity of mangrove ecosystems in sub-Saharan Africa through appropriate interventions under a five (5) year programme of activities. These interventions will lead to massive reduction in mangrove over-use and promote sustainable harvesting, protection of sensitive mangrove habitats and create awareness among stakeholders of their critical importance mankind. Participating countries are Senegal, Gambia, Cote d'Ivoire, Ghana, Nigeria, Kenya, Tanzania and Mozambique

The main activities will be to:

- Inventorise mangrove environments to assess the present bio-physical status of the mangrove wetlands in the region.
- Carry out socio-economic studies and training on mangrove related issues.
- Generate/increase awareness on importance of mangroves among the communities and general public.
- Provide demonstration projects on mangrove rehabilitation and alternative sources of energy and building materials.
- Establish mangrove forest reserves.
- Initiate steps to strengthen the livelihood security of the human population living in areas adjacent to mangrove wetlands through agroforestry and other activities which can help to meet their wood and non-wood requirements and reduce their dependency on mangroves to sustainable levels.

Expected results are:

(i) Updated information including database on conservation status of mangroves in the sub-Saharan region.
(ii) Assessment of traditional laws and other socio-cultural beliefs in relation to mangrove conservation.
(iii) Trained manpower and an informed public on the importance of mangroves including a reference and training manual on mangrove conservation and management methods.
(iv) Demonstrative community plantations of suitable species as substitutes to mangroves for fuelwood and building material.
(v) Pilot demonstrative mangrove reforestation projects and rehabilitation of degraded areas.
(vi) Pilot demonstrative alternative livelihood projects.
(vii) Establishment of mangrove reserves.
(viii) Optimal strategies for sustainable livelihoods. This will be done by modelling the ecological and economic impacts of alternative livelihood projects with the view to identifying the most optimal strategies.

At the national level and sub-regional levels, the project will improve fisheries, preserve biodiversity, protect shorelines and property from floods as well as contributing positively to the role of tropical forests in reducing the rate of global warming. It therefore contributes to poverty alleviation and promotes sustainable development.

Several indicators, for example, decreased rate of deforestation of mangrove, number of restored and managed sites, number of communities responding to mangrove management plans, revised Mangrove Atlas, and number of mangrove reserves established will serve as milestones.

The entire project is estimated at US$ 1,500,000 for each participating country. This includes both capital and in-kind expenditure. The duration of the project is 5 years. Financial sources for the implementation of the project are expected to come from financial institutions, the donor community and bilateral arrangements. The participating countries should provide about 10% of the total cost in kind or in cash.

3. COST AND FINANCING (MILLION US$) AVERAGE PER PARTICIPATING COUNTRY[1]

International & bilateral sources:

	Required financing by potential source	US$ 1.35 million
	Subtotal International financing	US$ 1.35 million
Co-financing:	Governments in cash & kind	US$ .15
	Subtotal Co-financing	US$.15
Total Project Cost for each country		US$ **1.50 millon**

Total project cost for 8 (eight) participating countries **US$ 12.0 million**

[1] This budget is preliminary and has not undergone a full consultation process with the respective countries. Therefore, it does not indicate the actual financial commitment that would be provided by participating countries once the project proposal and its components are finalised.

4. GOVERNMENT ENDORSEMENT (S)

Senegal: Mrs. Fatima Dia Toure, Director of the Environment and Classified Establishments.
Gambia: Susan Waffa OOGU, Secretary of State for Fisheries, Natural Resources and the Environment
Cote d'Ivoire: Ministry of Environment and Way of Life and Focal point: Centre Ivoirien Anti Pollution (CIAPOL)
Ghana: Hon. Prof. D. Fobih, Minister of Environment & Science.
Nigeria: Hon. Minister of Environment, and Hon. Minister of Agriculture
Mozambique: Hon. John Kachamila, Minister of Environment
Tanzania: Minister for Natural Resources & Tourism/Ministry of Environment
Kenya: Ministry of Agriculture and Rural Development

5. GOVERNMENT FOCAL POINT (S)

Senegal: Office of the Environment and Classified Establishments.
Gambia: National Environment Agency
Cote d'Ivoire: Centre de Recherches Oceanographiques
Ghana: Ministry of Environment & Science
Nigeria: Mr. Catherine Isebor- Nigerian Institute for Oceanography and Marine Research Lagos, Ministry of Environment/ Forestry
Mozambique: Ministry of Environment/ Centre for Forestry Research/ MICOA
Tanzania: Institute of Marine Sciences
Kenya: Kenya Marine & Fisheries Research Institute

6. AFRICAN PROCESS WORKING GROUP FOCAL POINT (S)

(i). Dr. Anthonio Hoguane (Regional Coordinator)
Eduardo Modlane University
Department of Physics
Maputo, Mozambique

(ii) Mr. A. K. Armah (Regional Expert)
Department of Oceanography & Fisheries
University of Ghana, Legon, Ghana.

(iii). Dr. Helena Motta (Regional Expert)
Ministry for the Coordination of Environmental Affairs
Coastal Zone Management Unit
P.O. Box 678, Maputo, Mozambique

1.1 PROJECT DESCRIPTION

Project Title: Management of Mangroves in Sub-Saharan Africa.

1. Background & Justification

In December 1998, several ministers from sub-Saharan Africa met in Cape Town and adopted a programme, The African Process for the Development and Protection of the Coastal and Marine Environment, which included the recommendations of an earlier meeting in Maputo (Maputo Declaration), to strengthen the existing Abidjan and Nairobi Conventions for the judicious management of coastal resources and protection of the marine environment.

The African Process began with the production of national concept papers based on critical analysis of the main issues responsible for degradation of coastal resources and the marine environment. From these studies, the need for a new approach to mangrove management was identified as a critical issue at the national level by Senegal, Gambia, Cote d'Ivoire, Ghana, Nigeria, South Africa, Mozambique, Tanzania and Kenya. A series of meetings were held by experts from the above countries to identify causes and provide suitable interventions, in the form of project proposals, which would enhance the capacity of sub-Saharan African countries to restore and control the modification or loss of coastal ecosystems and habitats, among other issues and concerns. One of such key habitats and ecosystems identified by the group of experts is the mangrove ecosystem.

Mangroves constitute an important natural resource to the socio-economic livelihoods of several coastal communities and the environment at large. Mangrove forests have sustained some communities for generations but with increases in population, threats to their existence have mounted. In Kenya, for example, it has been exploited for centuries and the timber exploited to the Arabian peninsula. In other areas in Kenya, the mangrove habitats have been destroyed to make way for shrimp farming and solar salt production. The variety of uses of mangroves by local communities are so dispersed that it is considered unimportant in the national economy of many developing countries. This view is buttressed by the fact that, in contrast to the several lowland forest reserves, few if any, mangrove reserves exist in Africa.

Much of the value of mangroves is in non-market goods and services such as erosion control (serves as vegetation cover protecting shorelines from storms), nurseries and feeding for fish species often harvested elsewhere, sometimes in other neighbouring countries and provision of nutrients. Mangroves also provide both subsistence and commercial wood products in the form of fuel wood and construction materials.

The open access of most mangrove forests makes them easy targets for removal of wood for charcoal production or direct use as fuelwood. The demands of urban populations create attractive markets, which are difficult for local people to resist where there are no restrictions on mangrove use. Extensive areas have been turned over to national and sometimes international companies for solar salt production for export. In recent times, pressure has been mounting to convert more mangrove areas for shrimp production in Africa, as investors begin to shift/expand from their traditional locations in Southeast Asia and Latin America.

Due to the phenomenal growth in the population of the coastal zone, dependency on mangroves and encroachment of habitats has increased. This has led to over-exploitation of mangroves and pollution of its habitats with serious adverse effects in many parts of Africa. For example, early accounts show that well-developed mangrove communities were associated with, and largely confined to, semi-enclosed coastal lagoons or embayments, generally with constrained tidal exchange and limited (and markedly seasonal) freshwater input. Today, as a result of the development of large urban centres with significant industrialisation, the extent of these lagoon mangroves has been much reduced and several species that could be expected to occur are no longer found in several of such ecosystems in the region.

Direct impacts of mangrove loss and modification include change in the community structure of regenerating stands, e.g. regenerating mangroves are dominated by inferior species of low commercial and utility value as in Kenya and Senegal; shoreline instability resulting in erosion as reported in Kenya; relatively low fish diversity as reported for Tudor mangrove creek in Mombasa. Finally, is the loss of important nursery sites,

loss of productivity of rivers and estuaries leading to a decline in recruitment for fisheries and subsequently affecting the socio-economic status.

In many sub-Saharan countries, for example, Ghana, Benin, Togo, Cote d'Ivoire and Nigeria, mangrove loss through overexploitation is in excess of 70% of the original cover. Traditional management of mangroves, which existed in some countries, appear no longer sustainable. In Ghana, for example, cultivation and sale of mangroves are important elements in the economy of the riparian communities of the Volta River estuary. In the early 1960s areas cleared of mangrove were planted and harvested after 12 to 15 years. This allowed the plants to mature and set seed to feed the regeneration cycle. In recent years, mangroves are harvested only 5 to 8 years after planting (before maturity) jeopardising the traditional management practice.

The mangroves of the Niger delta, estimated to cover approximately 7000km^2 comprise a significant regional resource, with fishing being a major activity. The pressure of a subsistence population has adversely affected these mangroves but the discovery of hydrocarbon reserves in the mid-1950s in and around the delta may have been the final straw. Nigeria currently produces around 1.6 million barrels per day from more than 4,000 oil wells spread within the Niger delta and adjacent coastal areas. Twenty-three out of 62 oil fields are within the mangroves. Oil terminals are spread throughout the delta while 8,000 km of seismic lines (20-30m wide) and oil pipelines criss-cross the mangroves. Oil spills are common; according to the best figures available, between 1970 and 1982 alone, there were 1581 oil spills involving a total of two million barrels. While most of the spills have been small, they have tended to occur within the mangrove waterways. As a result, many of the surface waters are contaminated and undrinkable, localized fisheries production has declined and in many instances, inhabitants have been forced to emigrate to other areas. More importantly from a biodiversity perspective, the mangrove palm (*Nypa fruticans)* has recently become distributed throughout the Niger Delta, invading and replacing native mangrove species. Although (*N. fruticans)* is known from fossil record from the Niger delta, the current populations were introduced to Nigeria early this century from Singapore. Since then, it has spread throughout the Niger, Imo Bonny and Cross Rivers and while the spread has been slow, it appears to be accelerating, facilitated by local villagers who value its thatching properties.

Mangrove forest cover in Ghana is estimated to be 10,000 hectares. Most of the mangroves have been lost through exploitation for fuel-wood and conversion of the habitats for solar salt production. In many instances, former mangrove habitats have been reduced to saline grasslands and herbs of *Paspalum vaginatum* and *Sesuvium portulacrastiun* respectively. Similar threats to mangroves exist in several countries in the sub-region such as Cote d'Ivoire, Gambia, and Senegal.

In Cote d'Ivoire several human activities have been attributed to mangrove degradation. For instance, unsustainable harvest of mangroves in the urban areas to meet the rising need for housing by the increasing population has led to the felling of mangrove wood as building poles. Mangroves in the urban areas of the Ebrie lagoon have disappeared as a result of industrial and domestic pollution generated by the city of Abidjan's 3.5 million inhabitants. Fisheries practices using pesticides have also impacted adversely on the mangrove forests in the Grand-Lahou area. Dam constructions on the Sassandra and Bandama Rivers have caused a decrease in freshwater input into the lower estuarine reaches of these rivers, thus, altering the intrusion of the estuarine salt wedge inland which ecologically affects the mangroves.

In Gambia, the Tujering lagoon and the River Kakima Delta support mangrove stands which have moderate to high ecological value for fisheries and avifauna. However, some human activities such as tourism development, timber collection, agricultural and road developments as well as commercial sand and salt winning pose serious threats to the mangrove ecosystem.

Damming of the Senegal River in Senegal has contributed 70% to the degradation of the mangrove and wetland ecosystems of the country. The other 30 % degradation is due to overexploitation of the mangrove resources for energy and fisheries. The main fishery activity leading to the degradation of mangroves is the harvesting of mangrove oyster by cutting the roots of mangal trees on which they are found. This problem is confined mostly to the Casamance estuary to the south of the country. The Saloum estuary located to the north of the Casamance estuary has suffered massive reduction in stream flow due to persistent drought culminating in the formation of sterile hyper-saline soils (tannes). Consequently, mangrove habitats associated with the estuary have been severely degraded.

In Eastern Africa, the total area of mangrove coverage has been estimated at 1,200,000 ha. Countries with notable mangrove stands are Kenya, Tanzania, Mozambique, Madagascar and to a lesser extent, South Africa. The stands are more extensive in Mozambique (over 500,000 ha.), Madagascar (350,000ha) and Tanzania (116,000 ha.) due to the several river systems jutting into the coast. Smaller stands occur in Kenya (65,000 ha.) and along the northern Kwa-Zulu-Natal coast of South Africa (2000 ha). Rates of deforestation may be as high as 15 % as in Maputo Province.

In Kenya, overexploitation of mangroves has resulted in shoreline instability resulting in damage to coastal infrastructure and several settlements. Further over 5,000 ha. of mangroves have been cleared in the Ngomeni Swamps for the construction of solar saltpans and shrimp aquaculture. Potential impacts include a shortage of building materials and firewood, reduction in fisheries and increased coastal erosion that affect agricultural fields. At Ungwana bay the decrease in prawn fisheries has been linked with the destructive uses of the support system particularly mangrove forests.

Mangrove over-harvesting has led to fragmentation and modification of many of the forests in Tanzania. Besides the common uses for firewood, charcoal and building, burning of live coral in kilns is a common practice in many parts of Tanzania. Other threats have been the conversion of mangrove habitats for solar salt pans, agriculture, aquaculture, infrastructure development and pollution.

Perhaps the country in sub-Saharan Africa with specific legislation on mangrove exploitation is Mozambique where they designated as "reserves" as no commercial extraction activity is allowed. Despite this worthy stand of the government, mangroves are still being threatened from over-extraction and pollution in urban areas, particularly in Sofara and Zambezi provinces. About 3.6% was lost between 1972 and 1990 with higher rates up to 15.2 % in Maputo Province.

In conclusion, the wanton overexploitation of mangroves in sub-Saharan Africa has not only posed a threat to ecological integrity and socio-economic stability of communities, but has, in many instances, led to loss of cultural heritage to communities and compromised intergenerational equity. The unacceptable rate at which mangroves are being lost in the region due to both natural and man made factors, underscores the urgent need for action to be taken to avoid total loss, which inevitably will have disastrous effects on the environment and the livelihood of several coastal communities.

This proposal seeks to address two major categories of threats on the mangrove ecosystems in the region namely over exploitation and destruction of mangrove habitats, through appropriate interventions. Though this is not addressed by this project, it is also worth mentioning that mangrove habitats are extremely prone to the impacts of climate change and especially sea level rise.

2. Objectives & Expected Results

The Project (overall objectives) aims at the management of mangroves in Sub-Saharan Africa by enhancing their productivity, stability as well as the functional integrity of the ecosystems through appropriate interventions, under a five (5) year programme of activities. The project will provide jobs, generate revenue and alleviate poverty at the national as well as the regional level. As productivity of mangroves is increased, spawning grounds for national and transboundary fish stocks would be enhanced thereby improving the fisheries of the region and thus ensuring food security in the region. Other positive impacts of the project will be reduction in the exploitation of mangroves as well as enhanced alternative livelihoods for coastal communities.

Immediate objectives and expected outputs:

1. Socio economic studies, assessment of current biophysical status and training on mangrove related issues

Output 1.1: Creation of a sub-regional/regional database on mangrove locations, belief systems and taboos, ecological values, current and future economic benefits.

Output: 1.2: A new action framework and policy guidelines for the conservation and sustainable management of mangrove wetlands based on regionally or sub-regionally harmonized policies or laws.

Output: 1.3: Enhanced particpation of the local communities and all stakeholders in Joint Mangrove Management.

Output 1.4: Updated assessment of the current biophysical status of mangroves.

Output 1.5: Trained manpower for mangrove management.

Output 1.6: Establish short-term attachments: (1) between countries and (2) with appropriate regional organizations for exchange of lessons learned, information sharing and regional capacity building.

2: Generation of /increase in awareness on importance of mangroves among the communities and general public.

Output 2.1: Informed public and communities on the importance of mangroves.

Output 2.2. A detailed critical review of the past and current mangrove management projects and programs within the region from a multidisciplinary perspective which will include a primer on mangroves for the communities and general public.

3: Demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.

Output 3.1: Demonstration mangrove reforestation project.

Output 3.2: Community woodlots of suitable species, e.g. *Cassia sp*. as alternative source of energy and building materials.

Output 3.3: A decreasing dependence on mangroves as source of fuel.

4: Mangrove forest reserves

Output 4.1**:** Establish sensitive mangrove areas as reserves and nature parks.

1.2 5: Sustainable Livelihood development (based on assessment of impacts and models)

Output 5.1: Ecological-economic models of mangrove ecosystems

Output 5.2: Integrated mangrove management demo projects e.g. integrated fisheries in mangrove areas as alternative livelihood.

The above activities are expected to lead to an enhanced productivity of mangrove ecosystems in the sub-region. Several indicators, for example, decreased rate of deforestation of mangrove, number of restored and managed sites, number of communities responding to mangrove management plans and number of mangrove reserves established will serve as milestones.

3. Project Components/Activities

The following constitute the main components and their respective activities to be undertaken to deliver the results.

COMPONENT 1: Socio economic studies, assessment of current biophysical status and training on mangrove related issues

The objective of this component is to evaluate the socio-cultural, ecological values and rates of deforestation of mangroves. Additionally, scientific and technical information will be accessed and packaged for decision makers. Technical support will also be made available in the form of trained personnel who will be available to help in mangrove restoration and management.

Activity1.1: Update national and regional database for participating countries. Database will include information on location of mangrove, state of degradation, belief systems, ecological values, current and future economic benefits associated with it.

Activity1.2: Estimate the past and current states of mangrove and determine extent of deforestation.

Activity 1.3: Organise regional workshops and training sessions for personnel associated with mangrove management to enhance skills and bring them up to the state-of-the–art level.

COMPONENT 2: Generation/increase of awareness on importance of mangroves among the communities and general public.
One of the reasons for the wanton destruction of mangroves and their habitats is the extremely low awareness among communities and the general public of its importance to society and industry. An appreciation of the immense benefits mangroves offer by all the stakeholders and policy-makers would help in ensuring sustainability of the interventions proposed in this project.

Activity 2.1: Organise education of public using *int*er *alia* workshops, public fora, film shows, signage and primers for spreading the ecological and economic importance of mangrove wetlands to local school children and community members.

COMPONENT 3: New demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.
The objective of this project component is to develop on a pilot basis, mangrove rehabilitation projects, alternative sources of energy and building materials with the view to reducing dependency on mangroves and enhancing their productivity.

Activity 3.1: Identify suitable localities/communities in each participating country for the implementation of the pilot project and where appropriate, restore suitable hydrologic regimes in the areas to be restored.

Activity 3.2: Mobilise community, educate, motivate and involve them in reforestation exercise. Develop and teach propagation techniques to establish and maintain mangrove nurseries.
Activity 3.3: Acquire (where necessary) and prepare land for demonstration project and planting of propagules.

Activity 3.4: Access land and cultivate suitable plant materials, which may be used as fuelwood (coppicing) and as building material.

Activity 3.5: Encourage the use of other sources of fuel (such as natural gas) through education.

COMPONENT 4: Mangrove forest reserves
Most participating countries have established protected forest reserves in their hinterlands. Sensitive mangrove forests of near pristine conditions with biodiversity relatively undisturbed will have to be protected in a similar manner either as marine protected areas or Ramsar sites on national or transborder basis.

Activity 4.1: Identify sensitive or near pristine mangrove forests (national and transboundary, e.g. Bakassi Peninsula between Nigeria and Cameroon) and enact appropriate national/bilateral legislation for their protection.

1.3 COMPONENT 5: Sustainable Livelihood development
This may involve introduction of land- or water-based livelihoods (freshwater fish ponds, mariculture), promotion of existing sustainable livelihoods, modifications or improvements to existing livelihoods and

campaigns against destructive practices. The approach is new and will be based on assessment and modeling of ecological and economic impacts of alternative livelihoods with the view to identifying the most optimal strategies. These will then be marketed to the management sectors. In most instances, case study areas will be selected in each of the participating countries.

Activity 5.1: Jointly organise regional training programs on ecological-economic modeling for participating countries.

Activity 5.2: Determine optimal management strategies through ecological-economic modeling of mangrove resources in participating countries.

Activity 5.2.1: Establish appropriate income-enhancing alternative livelihoods such as pilot fish farms, vegetable farms and honey harvesting.

4. Linkages to Other National or Regional Activities/Transboundary Aspects

Almost all the coastal wetlands of tropical Africa had been covered with extensive mangrove swamps until recent times. A number of these mangrove swamps have catchments shared by neighbouring countries. Additionally, mangrove products and other resources of the wetlands are shared by communities close to swamp environments. Some are also exported across the borders e.g. Aby lagoon in Cote d'Ivoire. Togo and Benin, Cameroon and Nigeria, DR and Congo, Senegal and Gambia, Tanzania and Kenya: all share wetlands that have mangroves. Other countries which could join include Sierra Leone, Guinea Bissau, Republic of Guinea, Liberia, Cameroun and Gabon on the basis of commonality of issues.

The Abidjan and Nairobi Conventions: These conventions seek, *inter alia*, to promote conservation of biodiversity, sustainable utilization of ecosystems as well as urging member countries to cooperate towards achieving the aims of the convention. The parties to the Abidjan and Nairobi Conventions are seeking ways towards harmonizing their existing programs. Those that seek to prevent degradation of mangrove habitats will promote biodiversity conservation and contribute to preservation of spawning grounds of many fishes shared by large marine ecosystems of the regions.

Aspects of programs by UNEP, UNIDO, GEF, SEACAM, WIOMSA, WWF, IUCN in the region have contained elements that reduce directly or indirectly mangrove degradation. These include poverty reduction programs, flood control measures, use of biogas for energy, protection of coastal areas. Projects such as the Gulf of Guinea Large Marine Ecosystem with ICAM components have contributed positively, to some degree, to the objectives of this project proposal.

DFID, WWF, SAREC, USAID, SIDA, GEF, UNDP and UNIDO have either supported similar projects or are currently supporting mangrove regeneration projects within the region. The GEF funded Gulf of Guinea Large Marine Project of West Africa, World Bank and CIDA projects in Tanzania had components addressing mangrove management. DFID had also supported studies on mangrove management studies at the Lower Volta in Ghana. In Nigeria, the Federal Government has initiated on a pilot basis, community-based restoration of mangroves in some areas invaded by the Nypa palm. Under the National Coastal Zone Management Program of Mozambique, the World Bank is implementing a GEF financed Coastal and Marine Biodiversity Management Project with elements that will address establishment of marine conservation areas. In Kenya, mangrove plantations for the rehabilitation of degraded mangrove areas have in the past been supported by WWF and USAID. The ongoing programs on ecological economics of mangrove associated fisheries in Ungwana bay is being supported by SAREC through WIOMSA.

5. Demonstrative Value & Replicability

The importance of mangrove ecosystems is widely appreciated, hence the need to enhance their productivity and stability. Due to the wide spread of the mangrove vegetation throughout the West and East African sub-regions, and the fact that species assemblage and structure differ, a sub-regional approach rather than a national approach to its rehabilitation would have a greater impact. Hence a successful demonstrative project on mangroves in any of the sub-regional countries has a high potential of replication throughout the sub-region. This factor is further underscored by the similarities in the biophysical and socio-cultural

environment in each of the sub-regions. As some countries are ahead of others in mangrove management efforts, adopting a regional approach will lead to greater impacts as, for example, lessons learnt can be shared; and also, as the fishes that utilize the mangrove habitats are transboundary.

The approaches outlined in the project components could also be replicated for other instances of threatened habitats and ecosystems that need immediate attention in terms of conservation or rehabilitation.

6. Risks and Sustainability

The major risk to the project will be the acceptance and rejection of the projects by the communities within the mangrove areas and whose activities especially impact the mangroves. Without adequate education and change in attitude, restorative, protective and preservative efforts to enhance the mangrove ecosystems will not be productive. Also without the provision of an alternative source of fuelwood and building material, there could still be the tendency for the harvesting of mangroves for such purposes. The availability of land for the project and seedlings for planting are also potential constraints that could affect the projects. Lack of rain or incidence floods could also adversely affect the projects.

Legislative mechanisms at protecting the mangrove ecosystems must be strengthened, or where it is non-existent, be enacted to serve as a deterrent. This would mostly be influenced by policies of local and national government who might not, for example, be enthusiastic about mangrove ecosystems or who might sacrifice mangroves for some other economic gain (such as oil and salt, for example). Finally economic inputs from government and development partners may be lacking which would hamper the smooth implementation to the projects.

Measures that may mitigate/minimize the risks include the enactment of appropriate legislation to serve as a disincentive to anyone who might still want to destroy the mangroves. Ownership of mangrove and frequent monitoring can also be ways in which their destruction can be reversed. Governments and local authorities must be made aware of the importance of mangroves and encouraged to help in their protection. The various environmental agencies of the governments should also take an active part in this endeavour.

The economic benefits of the mangroves may not be readily obvious, however, increases in fishery resources and a cleaner environment are some of the benefits of mangroves. Immediate benefits of the project include high mangrove productivity, biodiversity conservation, erosion control, flood and storm control. The economic benefits may include tourism where mangrove boardwalks (for example) can be created for tourists and contribute to the local economy and promote poverty reduction.

Measures to ensure the sustainability of project outcomes will largely depend on the willingness of local authorities and governments (as well as NGOs) to continue with the sponsorship of the projects. Pilot projects, such as planting of woodlots, can be sustained by local communities so long as they are properly managed. For example, woodlots would provide additional income to which could be added higher income generating activities like honey gathering. The involvement of research institutions such as universities and other research institutions in the project during its inception phase will ensure adequate trained manpower and institutional willingness in providing the necessary technical assistance to the project. In terms of recurrent funding, this will depend largely upon the locality and its potential income generating capability. For example, mangrove ecotourism should be able to be self-financing but protecting mangroves in remote areas will have to be supported from central government sources.

The most critical measure in sustaining the project will be the education of the inhabitants of the communities living near the mangroves on the true value of mangroves and the willingness of local authorities and governments to continually support the project. The inclusion of enhanced economic livelihoods would ensure self-sustenance of the project.

7. Stakeholder Participation

The immediate beneficiaries and stakeholders of the projects would be the mangrove dependent human communities. Local authorities and national governments and agencies related to the environment would also be stakeholders as well as beneficiaries of the projects. These will be identified during the initial assessment

on current biophysical status of mangroves and socio-cultural practices of the communities (See Component 1). Other stakeholders include environmental organizations and NGOs, sub-regional, regional and international bodies and projects such as the World Bank, ADB, OMVG, GTZ, GEF, USAID, EXIM Bank, WWF, IUCN, UNDP, JICA, UNEP, DFID, DANIDA, UNIDO, WACAF, NORAD, CIDA,ITTO, ISME.

8. Project Management & Implementation Arrangements

The project is expected to be implemented under the auspices of the ministries of environment/forestry of the participating countries, and executed by the appropriate sector agencies which, in most countries, is the Environment Protection Agency or its equivalent. In certain situations, setting up of separate bodies or inter-agency coordinating mechanism will be more appropriate where the projects overlap two or more ministerial sectors.

Several organisations may be involved as subsidiaries in the execution of project activities under the key executing body. These may include the Wildlife Department, Forestry Department, Ministry of Tourism, metropolitan and local authorities, NGOs, the universities and research institutes. The research components such as assessments of rates of mangrove degradation and modeling of ecological-economic relationships will fall under the domain of universities and research institutes. NGOs would be the primary contact bodies with the communities and responsible for the coordination of activities such as awareness creation, demonstration projects on mangrove rehabilitation and creation of alternative energy sources and sustainable livelihoods.

A possible implementation strategy would involve the establishment of two sub-regional coordinating offices for East and West Africa respectively. This will facilitate the harmonization of sub-regional policies and possibly laws, networking across the sub-region as well as allow regional information sharing, networking and sharing of best practices and lessons learned. National coordinators should be appointed through advertisements, interviews and located within appropriate sector agencies, e.g. Forestry Departments or the Ministry of the Environments. Remuneration must be internationally competitive for both regional and national coordinators. Human resources required may include socio-economists, environmentalists, mangrove experts, marine biologists, gender specialists and coastal zone management experts. The project, preferably, should be led by a coastal zone management expert of varied experience involving scientific work on mangroves, NGOs and community work.

9. Project Financing & Duration

The entire project is estimated at US$ 1,500,000 for each participating country. This includes both capital and recurrent expenditure. The duration of the project is 5 years. Financial sources for the implementation of the project are expected to come from financial institutions, the donor community and bilateral arrangements. The participating countries should provide about 10% of the total cost in kind or in cash. The bulk of the cost may come from sources like the Global Environment Facility as the nature of the project falls under its biodiversity module and has several transboundary components. Table 1 summarises the relevant financial information.

10. Monitoring, Evaluation & Dissemination

Monitoring will be conducted on a quarterly basis and evaluated annually. Two independent local experts from the participating country selected by the executing body should conduct monitoring. Annual evaluation should be done by three experts; two from the participating country and one from outside the participating country. The quality and impacts will be measured through site visits, questionnaires and interviews. The main indicators will be the level of reduction on dependence of mangroves and the number of alternative livelihood activities successfully established. The economic impacts of the alternative activities introduced should be assessed through surveys and improved health statistics. At the end of the project period, an international mangrove expert should be called in to evaluate the project.

11. Work Plan and Timetable

The project is scheduled over a 5-year horizon for the various components. The duration of each component is indicated in Table 2.

1.4 TABLE 1 COMPONENT AND ACTIVITY FINANCING

COMPONENT	EXTERNAL SOURCE OF FUNDS			NATIONAL GOVERNMENT		TOTAL
	SOURCE 1	SOURCE 2	SOURCE 3	CASH	IN-KIND	US$
COMPONENT 1: Socioeconomic studies, inventory of bio-physical components of mangroves and training on mangrove related issues.	**180**				**20**	**200**
Activity1.1: Create national and regional database for participating countries. Database to include information on location of mangrove, state of degradation, belief systems, ecological values, current and future economic benefits associated with it.	90				10	100
Activity 1.2: Estimate the past and current states of mangroves and to determine extent of deforestation.	45				5	50
Activity 1.3: Organise regional workshops and training sessions for personnel associated with mangrove management.	45				5	50
COMPONENTS 2: Generation/increase awareness on importance of mangroves among the communities and general public.	**90**				**10**	**100**
Activity 2.1: Organise education of public using *inter alia* workshops, public for a, film shows, signage and primers.	90				10	100
COMPONENT 3: Demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.	**450**				**50**	**500**
Activity 3.1: Acquire and prepare land for demonstration project and planting of propagules.	90				10	100
Activity 3.2: Mobilise community, educate, motivate and involve them in reforestation exercise.	45				5	50
Activity 3.3: Accessing of land and the cultivation of suitable plant materials, which may be used as fuelwood (coppicing) and as building material.	270				30	300
Activity 3.4: Encourage the use of other sources of fuel (such as natural gas) through education.	45				5	50

1.5

COMPONENT	EXTERNAL SOURCE OF FUNDS			NATIONAL GOVERNMENT		TOTAL
	SOURCE 1	SOURCE 2	SOURCE 3	CASH	IN-KIND	US$
COMPONENTS 4: Mangrove forest reserves	**180**				**20**	**200**
Activity 4.1: Identification of sensitive or near pristine mangrove forests (national and transboundary, e.g. Bakassi Peninsula shared between Nigeria and Cameroon) and the enactment of appropriate national/bilateral legislation for their protection.	**180**				**20**	**200**
COMPONENT 5: Sustainable livelihood development.	**450**				**50**	**500**
Activity 5.1: Joint regional training programs on ecological-economic modeling for participating countries.	90				10	100
Activity 5.2: Determine optimal management strategies through ecological-economic modeling of mangrove resources in participating countries.	90				10	100
Activity 5.3: Establish appropriate income-enhancing alternative livelihoods, such as pilot fish farms, vegetable farms and honey harvesting.	270				30	300

Note: This budget is preliminary and has not undergone a full consultation process with the respective countries. Therefore, does not indicate the actual financial commitment that would be provided by participating countries once the project proposal and its components are finalised.

ANNEX A: (LOGFRAME MATRIX)

Overall goal of the intervention	Objectively verifiable indicators	Means of verification (monitoring focus)	Critical assumptions
Sustainable management of mangrove habitats	1. Enhanced productivity and stability of mangroves.	Field visits, interviews and questionnaires, vegetation maps and stand tables.	No major natural hazard or industrial impact and good cooperation from communities involved.
	2. Establishment of mangrove forest reserves.	Field visits with monitoring of level of disturbance. Stratification of mangroves into protected, utililization and protection zone	No major natural hazard and good cooperation from communities involved.

1.5.1 Objective of the project	Objectively verifiable indicators	Means of Verification (Monitoring focus)	Critical Assumption
1. Enhancing the productivity and stability of mangroves.	1. Increase in mangrove biomass.	Assessment of standing Stock and biomass.	No external disasters like oil spill, fire, floods.
	2. Increase in biodiversity of mangrove ecosystem.	Assessment of diversity.	1.No external disasters like oil spill, fire, floods 2.No introduction of exotic species
	3. Increase in numbers and diversity species using mangroves ecosystem as nurseries.	Assessment of abundance and diversity.	1. No external disasters like oil spill, fire, floods. 2. No introduction of exotic species. 3. Cooperation from fishers.

PROJECT IMPACT (OUTCOME)

Project components	Impacts	Objectively verifiable indicators	Means of Verification (Monitoring focus)	Critical Assumption
COMPONENT 1: Socioeconomic studies, updated mangrove inventory and training on mangrove related issues.	Database on mangroves	Expert's report	Seek second opinion	Database dependable for reasonable period of time
	Rate of deforestation established	Expert's report	Seek second opinion	Rates determined dependable for reasonable period of time.
	Personnel associated with mangroves trained	Number and regional diversity of persons trained	Assessment	Persons trained available after training period
COMPONENTS 2: Generation/increase awareness on importance of mangroves among the communities and general public.	Awareness of significance of mangroves	Level of awareness generated, reduction in mangrove exploitation, participation in conservation programs, use of alternative fuel and building materials.	Assessment	Full cooperation from public and communities
COMPONENT 3: Demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.	Projects on mangrove rehabilitation	Number of rehabilitation sites successfully planted -reduced deforestation	Site inspection	Active community participation, availability of land and resources.
COMPONENTS 4: Mangrove forest reserves	Mangrove reserve sites designated	Legal document protecting mangrove sites/reserves	Legal document protecting mangrove sites/reserves	Capacity of regulatory bodies to monitor and enforce the law. Adequate cooperation from the communities.
COMPONENT 5: Sustainable livelihood development	Introduction of sustainable livelihood e.g. integrated aquaculture	Economic well-being of people engaged in the program. Increase or decrease in the number of participants	External assessment using questionnaires, interviews, focal group discussions, e.t.c.	More communities would get involved on realization of the viability of the programmes.

PROJECT RESULTS

Project components	Results	Objectively verifiable indicators	Means of Verification (Monitoring focus)	Critical Assumption
COMPONENT 1: Socioeconomic studies of mangrove related issues	Evaluated taboo and other socio-cultural beliefs associated with mangroves	Expert's report	Expert's report	Willingness of communities to provide relevant information. No current major activity in place affecting ecological values.
	Established rates and extent of deforestation	Expert's report	Changes in mangrove cover over time	No major external factors (e.g. diseases, oil spills, floods, etc) impinging on deforestation.
	Training in mangrove management	Number of persons trained	Number of trained persons involved in mangrove management	All trained personnel would be involved during the project and after. No loss of trained personnel.
COMPONENTS 2: Generation/increase awareness on importance of mangroves among the communities and general public.	Informed public	Various awareness programmes, e.g. workshops, public for a, film shows	Facilitators reports, interviews and questionnaires	Targeted communities would participate in the awareness programmes
COMPONENT 3: Demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.	Implementation of demonstrative projects on mangrove rehabilitation	Various sites under cultivation	Site inspection and monitoring	Communities can sustainably manage and expand plantations when project ends.
COMPONENTS 4: Mangrove forest reserves	Mangrove forest reserves	Number of mangrove habitats designated as reserve	Site inspection and monitoring. Legislative instruments.	Availability of suitable sites. Cooperation of communities
COMPONENT 5: Sustainable livelihood development	Establishment of income enhancing livelihood projects.	Number of projects established.	Inspection and monitoring of change in livelihood leading to reduction on dependency of mangroves	Availability of markets for new activities. Acceptability of the projects by the communities.

PROJECT ACTIVITIES

Project components	Objectively verifiable indicators	Means of Verification (Monitoring focus)	Critical Assumption
COMPONENT/ ACTIVITY 1: Socioeconomic studies and training on mangrove related issues	Information on traditional perceptions of preserving mangroves and ecological values.	An appraisal team to verify evaluation.	Willingness of communities to provide relevant information. No current major activity in place affecting ecological values.
	Matching future changes with determined rates	Changes in mangrove cover over time	No major external factors (e.g. oil spills, diseases, floods etc)
	Number of trained personnel and instances of technical support.		
	Database created on location, social and ecological values of lagoons.	Assessment of Databases	Information available on mangroves. Cooperation of communities
COMPONENT/ ACTIVITY 2: Generation/increase awareness on importance of mangroves among the communities and general public.	Number and variety of awareness creating tools introduced	External assessment using questionnaires, interviews, focal group discussions, etc	Adequate resources for training
COMPONENT/ ACTIVITY 3: Demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.	Number of projects established	Field visit to project sites	Adequate resources for mangrove rehabilitation
COMPONENT/ ACTIVITY 4: Mangrove forest reserves	Legal instruments by the Government or local authority. Designation of reserved area	Field assessment of project	Cooperation of communities and government
COMPONENT/ ACTIVITY 5: Sustainable livelihood development	Number and variety of alternative economic activities. Number of persons/community involved	External assessment using questionnaires, interviews, focal group discussions, etc	Willingness of the communities to adopt the alternative economic activities.

Table 2: Outline Work Plan and Timetable

COMPONENT	Year	1				2				3				4				5			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PROJECT INITIATION ACTIVITIES																					
COMPONENT 1: Socioeconomic studies and training on mangrove related issues																					
Activity1.1: Create national and regional database for participating countries. Database to include information on location of mangrove, state of degradation, belief systems, ecological values, current and future economic benefits associated with it.																					
Activity 1.1: Estimate the past and current states of mangroves and to determine extent of deforestation.																					
Activity 1.2: Organise regional workshops and training sessions for personnel associated with mangrove management.																					
COMPONENTS 2: Generation/increase awareness on importance of mangroves among the communities and general public.																					
Activity 2.1: Organise education of public using inter alia workshops, public for a, film shows, signage and primers.																					
COMPONENT 3: Demonstration projects on mangrove rehabilitation and the creation of alternative sources of energy and building materials.																					
Activity 3.1: Identify suitable localities/communities in each participating country for the implementation of the pilot project.																					
Activity 3.2: Mobilise community, educate, motivate and involve them in reforestation exercise.																					
Activity 3.3: Acquire and prepare land for demonstration project and planting of mangrove propagules																					
Activity 3.4: Accessing of land and the cultivation of suitable plant materials, which may be used as fuelwood (coppicing) and as building material.																					
Activity 3.5: Encourage the use of other sources of fuel (such as natural gas) through education.																					

	1				2				3				4				5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
COMPONENTS 4: Mangrove forest reserves																				
Activity 4.1: Identification of sensitive or near pristine mangrove forests (national and transboundary, e.g. Bakassi Peninsula between Nigeria and Cameroon) and the enactment of appropriate national/bilateral legislation for their protection.																				
COMPONENT 5: Sustainable livelihood development.																				
Activity 5.1.1: Joint regional training programs on ecological-economic modeling for participating countries.																				
Activity 5.1.2: Determine optimal management strategies through ecological-economic modeling of mangrove resources in participating countries.																				
Activity 5.2.1: Establish appropriate income-enhancing alternative livelihoods such as pilot fish farms, vegetable farms and honey harvesting.																				