

## **SIERRA LEONE: NAPA PROJECT PROFILE**

1. Develop an Early Warning System in Sierre Leone	Page 3
2. Rehabilitation & Reconstruction of meteorological/climate monitoring stations throughout the country	Page 6
3. Capacity building of the Meteorological Department through training of personnel for the country's adaptation to climate change	Page 8
4. Sensitization and awareness raising campaigns on climate change impacts on women relating to the three conventions of biodiversity, desertification and UNFCCC	Page 10
5. Development of Inland Valley Swamps for Rice Production in the Moyamba District.	Page 12
6. Development of an Integrated Natural Resources and Environmental Management programme for Sierra Leone.	Page 15
7. Development of Irrigation and drainage systems for agricultural production in the Bombali District.	Page 18
8. Promotion of the use of renewable energy (Solar Energy) in Sierra Leone and improvement of energy efficiency and conservation of energy resources.	Page 21
9. Establishment of new Forest Reserves, Protected Areas and National Parks in Sierra Leone.	Page 24
10. Management and Protection of Forest Reserves and Catchment areas including Wetlands.	Page 27
11. Institutional Strengthening of the Water Resources Sector in Sierra Leone.	Page 30
12. Improvement of The Efficiency of Existing Water Supply Systems in both Urban And Rural Areas of Sierra Leone	Page 33
13. Promotion of Rain Water Harvesting and Development of an Integrated Management System for Fresh Water Bodies	Page 36
14. Establishment of a Permanent Study Programme of the Multi Species Fisheries in Sierra Leone	Page 38
15. Delineation and Restoration of Vulnerable Habitats And Ecosystems in The Western Area of Sierra Leone	Page 40
16. Improve on the Quality on Fisheries Related Data and Research	Page 42
17. Development of an Integrated Coastal Zone Management Plan for Sierra Leone	Page 44

<b>18. Rehabilitation of degraded coastal habitats in the Northern Region of Sierra Leone</b>	<b>Page 46</b>
<b>19. Develop and enact appropriate policies and regulations relevant to the development of coastal communities, urban growth planning, and critical coastal ecosystems preservation</b>	<b>Page 48</b>
<b>20. Establishment of a National Sea-Level Observing System for Sierra Leone</b>	<b>Page 50</b>
<b>21. Monitoring and control of malaria in the Moyamba district of Sierra Leone.</b>	<b>Page 52</b>
<b>22. Monitoring and control of water and sanitation activities in the Koinadugu District of Sierra Leone</b>	<b>Page 54</b>
<b>23. Monitoring and control of HIV/AIDS prevention activities in the Koinadugu district of Sierra Leone</b>	<b>Page 56</b>
<b>24. Monitoring, evaluation and control of water and sanitation activities in slum areas of Freetown, the capital city of Sierra Leone.</b>	<b>Page 59</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 1

### DEVELOP AN EARLY WARNING SYSTEM IN SIERRA LEONE

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#### RATIONAL/JUSTIFICATION

In the recent past, unprecedented and extreme weather and climate hazards have been observed around the world and their effects have been known to be devastating. Such weather and climate hazards have destroyed lives of people, properties and livelihood of large communities. The environment has also been affected by such climate and weather types which include hurricanes (tornadoes, tropical cyclones), thunderstorms, droughts and floods. Now that it has been well established that the climate is changing, hazardous weather types are likely to affect various parts of the world and Sierra Leone is no exception.

It is therefore necessary that the Sierra Leone Meteorological Department be capacitated in order to properly monitor the climate and weather systems in the sub-region and in particular to be in position to give Early Warnings of imminent hazardous weather or climate.

Climate Change is known to have adversely affected the environment, Agriculture, Food Security, and even the lives and livelihood of large communities. Fishermen are known to have lost their lives in storms and passenger boats have encountered weather-related accidents – even though some go unreported. Flooding is known to have affected agriculture and habitats of people in Sierra Leone and their suffering aggravated by the attending health problems of water-borne diseases (typhoid, dysentery, cholera and diarrhea) due to lack of safe drinking water.

In the case of drought agriculture which the mainstay of many people in Sierra Leone will be disrupted, and so also is the early or delayed seasonal rains.

The Meteorological Department should be in position to give timely information on weather events likely to adversely affect the country and its people.

Having fore knowledge on future weather or climate events will help to minimize their negative effects on the people and the country.

#### DESCRIPTION

##### **Objective**

To build the capacity of the Sierra Leone Meteorological Department in order to enable it properly monitor the weather systems and climate and in particular to be in a position to provide Early Warning of Imminent Hazardous Weather or Climate.

To enable the Meteorological Department to give timely information on weather event that are likely to adversely affect the country and its people

##### **Activities**

The activities to be conducted will be geared towards putting back into operation the PUMA (preparation for the use of Meteorological satellite in Africa) station at the Lungi airport.

The PUMA station is the ground receiving station consisting of three dedicated computers with base programs to receive and process satellite cloud pictures, wind fields, water vapour content, ITD and other weather products for the purpose of detecting and monitoring weather systems for forecasting.

Before the installation of the PUMA station, a brief period of training of programme was conducted in South Africa for four operators of the PUMA equipment but due to low knowledge on computers the operation of the station has not been effective. Requests have been made for further training of operators and the upgrading of the system by the PUMA technicians but this exercise is yet to be addressed.

The activities to be conducted include the following:

1. Adequately train the system operators.
2. Invite the PUMA station technician(s) to re-visit the station and upgrade the system.
3. Recruit and train weather observers
4. Recruit and train weather forecasters
5. Procure modern weather observation equipment/instruments.

**Input**

Human, Material and Financial Resources

**Short-term output**

- Rehabilitation of PUMA station at Lungi;
- Improvement in weather reporting for aviation purposes.

**Potential long-term outcomes**

- Establishment of Early Warning System for hazardous weather at the Lungi airport;
- Adequate number of trained and qualified weather observers and forecasters to man the Lungi Meteorological office on 24 – hour basis.

**IMPLEMENTATION**

**Institution Arrangements**

The Sierra Leone Meteorological Department will be the main executing agency. It will collaborate with other agencies such as the Sierra Leone Airport Authority (SLAA) the Sierra Leone Maritime Administration (SLMA), the Sierra Leone Ports Authority (SLPA), the Navy, the Environment and the Water Resources Departments, Sierra Leone roads Authority, the Potential Regional/International partners will include the world Meteorological Organization (WM), Roberts field Flight Information Region (FIR), International Civil Aviation Organization (ICAO) and the European Meteorological Satellite (EUMETSAT) in Africa, Organization of National Security and Civil Aviation.

**Risks and Barriers:**

Another risk is the inability to retain government employees of the Meteorological Department at the airport. They might develop low morale due to low remuneration as compared to parastatal employees who earn higher pay at the airport. The sustainability of the project is certain because after the provision of the various components mentioned in the budget breakdown, the maintenance and daily administrative cost of the Lungi Meteorological Office will be met by the Department’s annual allocation from the central government.

**Monitoring and Evaluation**

The project will be monitored by competent agencies especially the SLAA and Civil Aviation. A set of criteria will be developed to be used as tools for project evaluation.

**COST**

*This project is estimated to cost USD 751,950*

**Budget Breakdown**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Invitation of PUMA technician (s) to upgrade the system	75 600	39 900	25 400
Further training of five (5) system operators	62 450	54 500	34 000

Installation of internet, fax and radio telecomns.equipment	25 000	15 000	15 000
Modern weather observation Equipment/Instruments	40 000	28 000	16 000
Training of six (6) weather forecasters	180 000	45 000	45 000
Training of nine (9) weather observers	34 000	11 400	5 700
<b>Total</b>	<b>417 050</b>	<b>193 800</b>	<b>141 100</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 2

### REHABILITATION & RECONSTRUCTION OF METEOROLOGICAL/CLIMATE MONITORING STATIONS THROUGHOUT THE COUNTRY

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#### RATIONALE/JUSTIFICATION

The Meteorological Department used to have eleven (11) synoptic stations, three (3) Agro Met stations and two (2) upper air stations all over the country for monitoring of the country's weather/climate phenomena. There were plans to open five (5) more synoptic stations in order to get an even distribution of stations in consonance with WMO improved standard of 1994. However, during the war almost all of the existing stations were destroyed. At the moment only five (5) are operational (Lungi Air Port, Bonthe, Bo, Freetown and Makeni), with none of the upper air functional.

In order to fully monitor and contribute to the adaptive capability of the country to climate change, a good network of meteorological stations fully equipped to adequately monitor the parameters responsible for initiating and propagating the change is therefore very imperative. The Sierra Leone government is expected to establish the two upper air stations at Lungi and Daru as local contribution apart from the payment of the salaries of these staffs.

#### DESCRIPTION

##### **Objectives**

The main objective of the Project is to rehabilitate and improve the Meteorological/Climatic data collection, data analysis and storage of the country in order for the department to carry out its obligations towards the NAPA project

To meet this objective, the following specific objectives will be achieved by the end of the project phase of two (2) years:

- The rehabilitation of six (6) meteorological stations at Daru, Sefadu, Yele, Kabala, Njala and Shenge:
- The establishment of five more stations at Nitty, Bakuma, Sulima, Kamakwie and Kailahun in order to give a full coverage of station network representative of WMO standard.
- The provision of adequate equipment and logistics for each of these stations to function properly.
- The provision the necessary tools and office logistics for the collection, analysis, storage and dissemination to end-users of weather/climate data and information.

##### **Activities**

There are three (3) Components to this project viz: (a) Rehabilitation of old Station and opening of new stations to meet WMO standard (b) The provision of tools and equipment for these stations and (c) provision of logistics for the running of the established stations which include those for: data analysis, dissemination to end users and data storage. The components involve are outlined in the detail budget.

##### **Input**

Human, Material and Financial Resources

##### **Short-term output**

Improvement of meteorological/climate data collection, storage and analysis

### Potential long-term outcomes

Rehabilitations of existing meteorological stations and establishment of new ones.

### IMPLEMENTATION

#### Institution Arrangements

The Meteorological Department of the Sierra Leone will be the lead executing agency. It will collaborate with other agencies which include the Water Resource Department, Environment Department, Faculty of Environmental Science, Njala University, Guma Valley Water Company, Sierra Leone Water Company (SLWACO).

The Potential Regional/International Partners will include the World Meteorological Organization (WMO) United Nations Environmental Program (UNEP) and the Mano River Union Basin Organization.

#### Risks and Barriers

Some of the risks involve are the remoteness of some of the stations which make them vulnerable to thieves. The involvement of the local people of the areas in the provision of security for the said stations will clear this risk. The sustainability of the project is certain as after the provision of the various components mentioned the simple task of maintenance and daily administrative cost of these stations could be met from that of the department's annual allocation from the central government.

#### Monitoring and Evaluation

The project will be monitored by competent national agencies. A set of criteria will be developed to be used as tools for project evaluation.

### COST

The Total cost of the project is Five Hundred and fifty-six thousand, one hundred and sixty US Dollars (\$ 556,160.00) only and will last for two (2) years

*This project is estimated to cost USD 1,231,651*

#### Budget Breakdown

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Rehabilitation of 6 stations	111 600	122 760	135 036
Upgrading of existing operational stations	33 800	37 180	40 898
Establishment of 5 new stations	108 000	118 800	130 680
Cost of rainfall station equipments	39 000	42 900	47 190
Cost of office materials/logistics	54 700	60 170	66 187
Workshop instruments	25 000	27 500	30 250
<b>Total</b>	<b>372 100</b>	<b>409 310</b>	<b>450 241</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 3

### CAPACITY BUILDING OF THE METEOROLOGICAL DEPARTMENT THROUGH TRAINING OF PERSONNEL FOR THE COUNTRY'S ADAPTATION TO CLIMATE CHANGE

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#### RATIONALE/JUSTIFICATION

The Meteorological Department used to have five (5) WMO Class I meteorologists, seven (7) Class II Meteorological forecasters, seven (7) Class III and sixty (60) Class IV observers manning the country's Climatic/Meteorological data monitoring and management. The Department lost most of these to the war or thought retirement from the service. At the moment we have only three (3) WMO Class I meteorologists, one (1) Class II forecaster, six (6) Class III MET Assistances/superintendents and Twenty (20) Class IV observers. This leaves the department in a very strenuous position which greatly limits it in meeting its obligations in NAPA. Thus the fast-track training of the various personnel to meet the formal level will therefore greatly enhance the Department. It is hoped that the extra training needs not included here will be provided by the government as local contribution.

#### DESCRIPTION

##### **Objectives**

The main objective of the Project is to recruit and/or train meteorological personnel at the various levels in order to capacitate the department in its National adaptation program of action of the perceived climate change effects.

To meet this objective, the following specific objectives will be achieved by the end of the project phase:

- The training of two (2) WMO Class I Meteorologists externally within the sub region;
- The training of six (6) Class II Meteorological forecasters;
- The training of two (2) Class III personnel;
- The training of forty (40) meteorological observers;
- The training of four (4) instrument technicians.

##### **Activities:**

- The training of two (2) WMO Class I Meteorologists externally within the sub region;
- The training of six (6) Class II Meteorological forecasters;
- The training of two (2) Class III personnel;
- The training of forty (40) meteorological observers;
- The training of four (4) instrument technicians.

##### **Input**

Human, Material and Financial Resources

##### **Short-term output**

Improvement of meteorological/climate data collection, storage and analysis

##### **Potential long-term outcomes**

Meteorological staff recruited trained and capacitated to deal with climate change related issues. The expected outcome of the project is that by the end of the project phase, which is two (2) years, the department would

have enough meteorological personnel for Climate/Meteorological data collection, analyses, storage or dissemination to end-users.

### **IMPLEMENTATION**

#### **Institution Arrangements**

The Meteorological Department of the Sierra Leone will be the lead executing agency. It will collaborate with other agencies which include the Water Resource Department, Environment Department, Faculty of Environmental Science, Njala University, Guma Valley Water Company, Sierra Leone Water Company (SLWACO).

The Potential Regional/International Partners will include the World Meteorological Organization (WMO) United Nations Environmental Program (UNEP) and the Mano River Union Basin Organization.

#### **Risks and Barriers**

Some of the risks involve are the remoteness of some of the stations where the observers will be based since there is a general drift of young people towards the cities. The recruitment of personnel from the station surroundings will remove this risk. The sustainability of the project is certain as after the provision of the various components mentioned, the simple task of running of these stations, salary payment to staff, maintenance and daily administration cost of these stations could be met from that of the department's annual allocation from the central government.

#### **Monitoring and Evaluation**

The project will be monitored by competent national agencies. A set of criteria will be developed to be used as tools for project evaluation.

### **COST**

The Total cost of the project one hundred and sixty-eight thousand and eighty US dollars (\$168,080.00) only and will last for two (2) years

*This project is estimated to cost USD 152,800*

#### **Budget Breakdown**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
The training of two (2) WMO Class I Meteorologists	16 000	17 600	19 360
The training of six (6) Class II Meteorological forecasters	66 800	73 480	80 828
The training of two (2) Class III personnel	12 000	13 200	14 520
The training of forty (40) meteorological observers	39 000	42 900	47 190
The training of four (4) instrument technicians	19 000	20 900	22 990
<b>Total</b>	<b>152 800</b>	<b>168 080</b>	<b>184 888</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 4

### SENSITIZATION AND AWARENESS RAISING CAMPAIGNS ON CLIMATE CHANGE IMPACTS ON WOMEN RELATING TO THE THREE CONVENTIONS OF BIODIVERSITY, DESERTIFICATION AND UNFCCC.

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#### RATIONALE/ JUSTIFICATION

It is accepted that anthropogenic activities of the last hundred years have greatly contributed to global warming. This trend can be mitigated if the general public and establishments who are the contributors and abettors are sensitized enough on using mitigating/adaptive options. The ignorance of individuals and groups/organizations on the various United Nations Conventions on (a) Climate Change, (b) Desertification, and (c) Biodiversity is also a contributing factor for their undue influence and activities contributing to climate change.

Women who are usually the most vulnerable in time of disasters need special attention during such sensitizations and should be properly educated on adaptive and mitigative options and procedures in the implementation of the above conventions. In achieving this, various organizations/groups involving both governmental and non governmental, will be equally involved in carrying out the project.

#### DESCRIPTION

##### **Objectives**

The main objective of the Project is to make the public, especially the women and children aware of the three conventions on Climate Change, Desertification and Biodiversity and how to work together in meeting our obligation as enshrined in these conventions.

To meet this objective, the following specific objectives will be achieved by the end of the project phase of two (2) years:

- Educating the entire populace on the three conventions through: (a) various grass root organizations (CBOS) and NGOs, (b) Various government institutions and (c) individual in the form of expert advice and knowledge.
- The provision of public learning materials in the form of chart, demonstrations and seminar/workshop logistics etc during the sensitization process.
- The provision of simple information dissemination logistics such as TV/Radio air time, News paper columns etc
- The involvement of the project beneficiaries especially the women and children on appropriate warning signs and signals together with actions required that they need to know or do to either adapt or mitigate the effect of climate change.
- The provision the necessary tools and office logistics for the collection, analysis, storage and dissemination to end-users of weather/climate data and information especially those needing urgent attentions.

##### **Activities**

There are three (3) Components to this project viz: (a) Education of the project beneficiaries on the components of the three conventions (b) Identification (possibly in seminar/workshop) of vulnerable targets for special attention/address by the project. (c) Identification of adaptive procedures and option for the above vulnerable targets. (d) Identification of likely mitigative options with respect to the Provision of logistics for the above

options. (e) Using the various information dissemination tools of radio, TV, News Paper, public Lectures etc to meet the objectives of the project.

**Input**

Human, Material and Financial Resources

**Short-term output**

Improvement of public knowledge and awareness on the conventions of biodiversity, desertification and climate change.

**Potential long-term outcomes**

Public educated on the conventions on biodiversity, desertification and climate change.

**IMPLEMENTATION**

**Institution Arrangements**

The Meteorological Department of the Sierra Leone will be the lead executing agency. It will collaborate with other agencies which include the Water Resource Department, Environment Department, Faculty of Environmental Science, Njala University, Guma Valley Water Company, Sierra Leone Water Company (SLWACO).

The Potential Regional/International Partners will include the World Meteorological Organization (WMO) United Nations Environmental Program (UNEP) and the Mano River Union Basin Organization

**Risks and Barriers**

Some of the risks involve are the remoteness of some of the rural areas especially the sea side and farming villages where most of the country’s women/children are based. Also the high rate of illiteracy especially among the women makes information dissemination a bigger task. The involvement of women and children who are the most vulnerable will make the project sustainable since they make more than 80% of the population. The involvement of the local people of the areas in the identification of either vulnerable target or adaptive procedures will remove the risk of the area’s remoteness. Their involvement of the local communities in executing identified procedures of adaptation and mitigation will foster compliance of accept norm of the project. The sustainability of the project is certain as after the provision of the various components mentioned the simple task of maintenance and daily administrative cost of the various components could be met from that of the department’s annual allocation from the central government which will be accordingly adjusted to reflect the task adaptive and mitigative options of the project.

**COST**

The Total cost of the project Nine hundred and fourteen million ,nine hundred and fifty-six thousand Leones only (Le 914,956,000, { i.e. Three hundred and four thousand nine hundred and eighty-six Dollars (\$304,986) }

*This project is estimated to cost USD 132,000*

**Budget Breakdown**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Educating the entire populace on the three conventions	20 000	22 000	24 200
The provision of public learning materials	60 000	66 000	72 600
Media sensitization	12 000	13 200	14 520
Public meetings, conferences, workshops etc.	40 000	44 000	48 400
<b>Total</b>	<b>132 000</b>	<b>145 200</b>	<b>159 720</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 5

### DEVELOPMENT OF INLAND VALLEY SWAMPS FOR RICE PRODUCTION IN THE MOYAMBA DISTRICT.

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#### RATIONAL/JUSTIFICATION

Of all the rice growing ecologies in Sierra Leone, the Inland Valley Swamps are now believed to have the right potentials for the achievement of self-sufficiency in rice production. According the most recent, agricultural sector Review (FAO, 2003), the IVS have the highest comparative advantage, for increased rice production. The IVS contribute approximately 20% of the food growing area in the country (NCU, 1990). They have an estimated potential of 690,000ha and are found in all the geographical regions of the country. The productivity potential is greater than that of the uplands due to higher organic matter content and a favourable water regime for a longer period during the year. Under improved water management practices, rice yields in the range 2-3.2 tons/ha have been reported. (FAO, 2005). The high organic matter content (fertility) and favourable moisture condition make worth developing to avoid drought conditions caused by adverse climate variability on the uplands.

The Moyamba district has a great potential for the development of inland valley swamp for rice production. These swamps are however under utilized and efforts for effective development can be undermined by climate change.

#### DESCRIPTION

##### **Overall Objectives**

To increase the area under cultivation for increased rice production.

##### **Specific Objectives**

- To ensure all-year-round rice production through improved water management in the inland valley swamps;
- To minimize the negative impacts of climate variability/climate change on rice production.

##### **Activities**

- Selection of inland valleys suitable for development;
- Biophysical and socio-economic surveys of suitable inland valleys;
- Technical designing of water control structures of suitable IVS for development;
- Development of suitable IVS;
- Capacity building training of farmers in operation and maintenance of water control structures;
- Provision of inputs, tools, seeds, chemicals;
- Provision of essential infrastructure (storage processing, marketing).

##### **Inputs**

- Trained engineers and technicians;
- Basic survey equipment and tools and extension staff;
- Stationery and other materials (field note books duplicating papers, drawing pens, tracing papers etc.);
- Camping equipment and other logistics;
- Topographic map sheets of areas concerned;
- Training materials;

- Mobility (pick-up vans and/or motor bikes);
- Fuel and oil;
- Per diems and DSAs.

## Outputs

### Short term outputs

- Data base on suitable inland valleys;
- Well developed swamps with proper water control structures;
- Increased area for rice production;
- Availability of trained self reliant farmers for trouble shooting.

### Medium to long term outputs

- Well established and proper functioning inland valley swamps;
- Increase rice yields ranging from 203 tons/ha;
- High quality finished local rice products available and affordable on the markets.

## IMPLEMENTATION

This should be highly participatory.

## Institutional Arrangements

**Government (Local and Central):** To provide:

- Trained manpower (Engineers, technicians, extension staff);
- Funds for survey equipment and logistic support (mobility, fuel and oil, camping facilities);
- Basic infrastructure: Improved road network, marketing centres, processing and storage facilities.

**Private Sector:** Involvement in the

- Importation of basic tools and equipment under favourable trade conditions;
- Swamp rice production;
- Storage and processing as well as marketing.

**The Community:**

- Individual and farmers association to be directly involved in the formulation and implementation of IVS development projects;
- Provision of labour, and monitoring of all activities.

## Risks and Barriers

- High initial costs involved;
- Low labour availability for the various development operations;
- Low level of funding that might adversely affects the provision of basic tools, machinery and other logistic support;
- The farming calendar: IVS development activities interfering with upland farm operations and annual social and cultural activities.

## Monitoring and Evaluation

Monitoring and evaluation will be undertaken form a participatory approach:

The land and Water Development Division (LWDD) will be responsible for the technical aspects of monitoring while the Project evaluation monitoring and statistics Division (PEMSD) of the Ministry of Agriculture will handle the socio economic aspects. At community level and agricultural unit of the district council, as well as community based organization such as farmer's organizations, agricultural business units (ABU) will also fully involved.

### COST

The development of IVS will be undertaken in all Districts that have resourced number of large inland valleys worth developing. The operations will be spread over a period of five (5) years and will be undertaken in all districts at 5 ha per district, amounting to 65ha per year, and 325ha over 5 years.

*Within the 5 years period, the cost of development is estimated at USD 1,075, 000.*

#### **Budget Breakdown for IVS Development in USD, '000**

<b>Activity/Items</b>	<b>Y1</b>	<b>Y2</b>	<b>Y3</b>	<b>Y4</b>	<b>Y5</b>
Inventory of suitable IVS	40	30	20	10	-
Mobilization of manpower, logistic support, materials base maps, camping equipment.	30	30	20	20	-
Detailed bio-physical and socio-economic surveys of IVS	60	50	50	30	10
Designing of IVS, calculation of costs of development	20	10	10	10	-
Development of IVS	60	30	10	10	10
Capacity building training of technicians farmers and extension staff	20	20	20	20	20
Acquisition of basic survey equipment	50	50	50	-	-
Production input (farm tools, chemicals)	20	10	10	10	5
Monitoring and evaluation	10	10	10	10	10
<b>Total</b>	<b>350 000</b>	<b>280 000</b>	<b>240 000</b>	<b>140 000</b>	<b>65 000</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 6

### DEVELOPMENT OF AN INTEGRATED NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT SYSTEM FOR SIERRA LEONE.

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#### RATIONAL/JUSTIFICATION

A judicious and carefully planned and implemented integrated management of the Natural environment and resources can contribute immensely to reduction of the impacts of climate change on agriculture and food security. It is also an initiative for poverty reduction.

The current poor status of the country's natural resources is attributed to the following constraints:

- Lack of financial, technical, institutional and other logistics support to community base organizational intervention. This has led to reduced productivity and consequent environmental degradation.

#### **Some of the causes of land degradation are:**

- Cultivation of steep slopes;
- Bush fallow cultivation with shortened fallow periods;
- Firewood and charcoal harvesting;
- Existence of bare soils, ponds, lakes and grasslands in mining areas previously covered with fertile soil and forests;
- Inadequate extension service and facilities;
- Lack of environment impact assessment in project planning and implementation. Etc.

#### **The strategies of the project in Addressing the above issues will be as follows:**

- Inventory and mapping of degraded lands;
- Participatory rapid Assessment (PRA) of socio-economic issues.

#### **Based on the outcomes of the above strategies the project will:**

- Promote adoption of proper land husbandry and other resource management.

#### **Description of the Project objectives:**

- To promote community based (CBO) approach in agricultural development and environmental management;
- To conduct a natural resources inventory and mapping of degraded areas;
- To promote capacity building;
- To review existing environmental and resource use policies and regulation;
- Off-farm land and natural resource management;
- Promote protected area management activities.

#### **Activities**

- Acquisition of sources of data and other resource materials;
- Acquisition of survey equipment;
- Acquisition of means of mobility;
- Assembly of camping materials;
- Recruitment of specialized staff and non specialized staff;
- Development of natural resource data bank;
- Provision of storage facilities;
- Conducting of capacity building;

- Planning and implementing soil and conservation measure at National, Regional and farm levels;
- Establishments of protected forestry areas, conducting wetland biodiversity assessment and mapping;
- Rehabilitation of degraded areas;
- Conducting environment impact assessment for future development projects;
- Collaborative management and utilization of forest area.

### **Inputs**

- Maps, aerial photos, satellite imagery;
- Survey equipment;
- Vehicles, motor bikes, bicycles;
- Camping materials;
- Specialized staff (consultant), casual labour);
- Storage facilities;
- Training materials and equipment;
- GIS hard and soft ware;
- Trained forest guards;
- Seeds and other planting materials.

### **Outputs**

#### **Short-term outputs**

- Employment for local communities;
- Capacity building;
- Social and economic life for communities improved increased incomes;
- Food self sufficiency and energy production;
- Increased awareness about the importance of natural resource preservation;
- Reduced land degradation.

#### **Long term outputs**

- Increased chance of adaptability to climate change;
- Availability of a data base of Natural resources;
- Well trained and motivated extension and technical staff;
- Appropriate environmental protection policies which are effectively implemented.

## **IMPLEMENTATION**

### **Institutional Arrangement**

- The implementation will require total involvement of the whole nation with special emphasis on participatory approach;
- Total collaboration of researchers with land users; mainly community based organizations;
- Government: to provide generous funding, formulate, enforce the implementation of policies;
- Government to encourage and promote the involvement of the private sector;
- Strengthening all national regional and local institution dealing with natural resource preservation;
- The ministry of Agriculture and NACFF to develop policies.

### **Risks and Barriers**

- The bush fallow systems/shifting cultivation;
- Uncontrolled land use activities e.g. mining, logging, fuel wood and charcoal production;
- Low level of funding;

- Illiteracy amongst the rural population.

### Monitoring and Evaluation

The ministry of agriculture and the national commission on environment and forestry will be lead agencies ensuring monitoring and evaluation of the natural resource development efforts, at all administrative levels.

#### COST

*Estimated at USD 1,265,000*

#### Budget Breakdown for natural resource management project USD, '000

Activity/Items	Y1	Y2	Y3	Y4	Y5
Inventory and survey of natural resource	60	40	30	10	10
Acquisition of resource materials and other logistics	60	20	20	20	-
Creation of data base on natural resources	50	25	25	10	10
Organization of community based organization	20	20	10	10	-
Capacity building training of community members and technicians equipment	50	50	50	25	25
Sensitization and awareness creation activities	10	10	5	5	5
Soil and water conservation activities	100	100	100	25	25
Monitoring and evaluation	210	10	5	5	-
Total	560	275	245	110	75

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 7

### DEVELOPMENT OF IRRIGATION AND DRAINAGE SYSTEMS FOR AGRICULTURAL PRODUCTION IN THE BOMBALI DISTRICT OF SIERRA LEONE:

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#### PROJECT RATIONALE/JUSTIFICATION

Agriculture in Sierra Leone is predominantly rain fed. This is especially so in the Bombali district where frequent dry spells are experienced. It is practiced on two main ecosystems. Low lands and uplands. In the lowlands, poor drainage is a major problem and water control is the key to successful rice and other crops production.

On the uplands, shifting cultivation is the dominant farming system. The uplands accounts for about 84% of the total land under rice production. The shifting cultivation practice under rain fed conditions has numerous problems which limit agricultural production and render the agricultural systems highly vulnerable to climate change.

- A critical analysis of the climate and water resources of Sierra Leone in relation to agriculture suggests that the abundant rainfall, sim-chine, surface and groundwater and carbon dioxide are not being harnessed sufficiently for agricultural production.
- The impacts of climate variability and possible climate change can be minimized and increased food production and food security ensured if irrigation systems are installed on the uplands and viable drainage and water control measures implemented in the lowlands.

#### DESCRIPTION

##### **Objectives**

The overall objective is to develop irrigation and drainage systems in the vulnerable areas of the country for increased food production.

##### **Specific Objectives**

- To increase food production all year round through irrigation and drainage;
- To extend the area under agricultural projection on the uplands;
- To minimize the impacts of climate variability and climate change on food production.

##### **Activities**

- Survey, evaluation, and classification of areas suitable for irrigation on the upland ecology;
- Survey, evaluation and design of irrigation and drainage systems for selected lowlands for crop production;
- Construction of appropriate irrigation and drainage systems;
- Capacity building and/or development within the land and water management institutions;
- Building capacities amongst farmers and extension agents in the operation and management of irrigation and drainage systems.

##### **Inputs**

- Irrigation and drainage equipment, and materials;
- Trained manpower (Engineers, technicians, extension staff and farmers);
- Basic farm tools;
- Other farm inputs (fertilizers, seeds, chemicals, credit, and regular supervision);

- Processing, marketing and storage facilities, transportation;
- Survey equipment (soil, hydrology);
- Camping equipment and other facilities;
- Information on weather and climate.

### **Short Term Outputs**

- Irrigation and drainage system installed in selected areas in the country;
- Availability of well trained technicians extension agents and farmers;
- Improved monitoring and supervision;
- Availability of essential irrigation and drainage equipment and farm tools;
- Increased yields;
- Improved water control;
- Improved processing and storage facilities.

### **Potential Long term outputs**

- Well established and functioning irrigation and drainage systems;
- All year round production of food;
- Gradual establishment of sedentary farming to replace rain fed farming;
- Improved adaptation capacity to climate change;
- Increase in farmers incomes, and poverty alleviation;
- Improved storage processing and marketing of food.

## **IMPLEMENTATION**

The implementation of irrigation projects shall be at small to medium levels on regional basis.

### **Institutional arrangement**

- Central Government: to provide adequate funding from local and foreign sources
- Provide the enabling environment for private sector involvement in irrigation and drainage activities.
- Live ministries: the Land and Water Development Division of the Ministry of Agriculture and Food Security will be the key institution for planning, designing, technical implementation, monitoring and supervision of all irrigation and drainage projects.
- Local Governments, community based organizations will be encouraged to participate in the planning, implementation and monitoring of irrigation and drainage projects
- Farmers Associations shall be encourage to go into irrigation and drainage farming, processing, storage and marketing.
- Research institution shall be encouraged to conduct research in order to identify appropriate irrigation systems, machinery and practices.

### **Risk and Barriers**

- High initial costs involved;
- Increase in water borne diseases;
- Low capital investment by government;
- Difficulties in changing from rain fed agriculture to sunshine based (irrigation) agriculture;
- Low labour availability in the country side where irrigation and drainage will be implemented;
- Poor production infrastructure.

## Monitoring and Evaluation

The land and Water Development Division will take the lead in technical monitoring and evaluation of the project, while project evaluation and monitoring and statistic.

Division (PEMSD) will monitor and evaluate the economic and social impact of the project. The local organizations shall be encouraged to participate in the process.

### COST

The irrigation and drainage projects shall be planned to cover 5-10 year cydes.

*The cost of the project with 5 years periods is estimated at USD 1,055,000 over a 5 year period.*

Implementation of irrigation and drainage projects will be the drier Northern districts (5 Districts). Koinadugu, Bombali, Tonkolili, Port Loko and Kambia.

### Budget Breakdown ('000, USD)

Activity/Items	Y1	Y2	Y3	Y4	Y5
Inventory of Potential irrigation and drainage areas	30	20	10	5	-
Soil survey and land suitability evaluation of potential sites	50	30	20	10	-
Design of irrigation and drainage structures	10	5	5	5	
Acquisition of irrigation and drainage equipment	200	120	40	20	10
Capacity building mainly training and recruitment	60	40	20	10	5
Construction of structures and installation of equipment	40	35	30	20	5
Basic farm tools and other inputs	10	10	5	5	-
Production activities	50	20	10	10	10
Operation and maintenance costs	10	10	10	5	5
Monitoring and evaluation	10	5	5	5	5
<b>Total</b>	<b>465</b>	<b>300</b>	<b>155</b>	<b>95</b>	<b>40</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 8

### PROMOTION OF THE USE OF RENEWABLE ENERGY (SOLAR ENERGY) AND IMPROVEMENT OF ENERGY EFFICIENCY AND CONSERVATION OF ENERGY RESOURCES IN SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

At present direct solar radiation does not constitute a major form of energy in the country. It is only and mostly used in its natural form to dry and preserve several items including agricultural crops, fish, sawn timber, clothing etc.

Several major towns and villages far removed from the district capitals where national grid can be reached, and those outside the mining areas, are without electricity.

For almost twelve (12) years the rebel war had destroyed most of the energy infrastructures in the country. The worst hits are the villages and towns outside the district capitals.

Additionally:

- Nearly 80 - 90 % of the rural population in the country must burn wood to cook their food;
- The same number of people do not have access to clean drinking water and many die because of un-boiled drinking water;
- Wood for cooking purposes contributes to the hundreds of hectares of forest destroyed annually;
- Thousands of people are exposed to indoor air pollution mainly as the result of burning solid fuels for cooking and heating;
- Solar energy is environmentally friendly, economical, healthy, safe and convenient;
- The essence of the proposal is to select at least one town and one village from each of the 12 districts as prototypes for implementation.

#### DESCRIPTION

##### **Objective:**

1. The main objective is for the selected towns and villages to have community owned and controlled centres that will address their needs for. Example improved energy source for cooking and heating, coupled with better health, social, environmental and educational conditions of the community.
2. The main objective of Government is the sustainable exploitation and the efficient use of the country's renewable energy resources and power production in order to improve the quality of life of the people.
3. A further objective is to pursue only environmentally friendly policies and measures as part of Governments efforts to meet its obligations under the Climate Change Convention.

##### **Activities**

The project will consist of three components

- The rehabilitation/renovation of existing buildings or construct new ones for the center;
- Training of local attendants;
- Installation of the Solar-charging equipment.

As their own contribution the local community will provide masons, carpenters, painters and manual labour force that may be required.

## **Inputs**

The project will involve building a solar battery charging centre. Each centre will have one or two charging stations to service the batteries, a demonstration room consisting of one 50pW or 100pW solar panel at village and town levels respectively, controls, batteries, lights, a television, radio cassette recorder and an office/store room

## **Short-term outputs**

- Employment for the local community;
- Training afforded to attendants;
- Direct benefit of improved lighting system for the community;
- Social,, educational and health impact by affording the community the opportunity to view television and /or tune in to radio for general information and educational programmes.

## **Potential long-term outcomes**

- There is a constant source of power in the homes through recharged batteries;
- Extended evening hours to complete tasks that require light for example tailoring, food preparation, washing, etc.;
- Affords extra study hours for students.

## **IMPLEMENTATION**

### **Institutional arrangements**

The role of Government will be on the provision of policy guidelines, strategy formulation and implementation of coordination. The role of private sector will be strengthened in manufacturing and marketing of utilization technologies.

The Ministry of Energy and Power will be responsible for continuous monitoring and data collection in collaboration and corporation with the Electrical Engineering Department of the University of Sierra Leone. Private entrepreneurs and other potential consumer groups will be involved in research and development of energy technologies, participatory and consultative planning and implementation approach, particularly with wider involvement of end users.

### **Risks and barriers**

The following are some of the risks and barriers:

- Needs the sun for effective performance;
- Often slower than conventional lighting and cooking systems;
- May not be suitable for all foods;
- The question of whether it is culturally acceptable and adaptable;
- It does not replace fire as a way of heating homes.

### **Monitoring and evaluation**

The Energy Development Agency of Government will be responsible for continuous monitoring and evaluation of data so collected in collaboration with research bodies i.e. University of Sierra Leone. The information will be dissemination through monthly and annual reports.

## **COST**

*The cost of the project is estimated at one million five hundred thousand dollars  
(USD 1,500,000) over a 4 year period.*

**Budget Breakdown (000 USD)**

<b>Items</b>	<b>Y 1</b>	<b>Y2</b>	<b>Y3</b>	<b>Y4</b>
Rehabilitation/renovation of center	20	20	5	5
Purchase of solar panels and other equipment	500	500	200	-
Installation of equipment	50	30	20	-
Training of attendants and sensitization of community	10	20	10	10
Maintenance spares and repairs	5	20	35	40
<b>Total</b>	<b>585</b>	<b>590</b>	<b>270</b>	<b>55</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 9

### ESTABLISHMENT OF NEW FOREST RESERVES, PROTECTED AREAS AND NATIONAL PARKS/SANCTUARIES IN SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

In Sierra Leone, forests are legally divided into two main categories. The first category is the forests that have been constituted and gazetted for protection/conservation and production purposes under approved management plan. The second category constitutes the forests on un-reserved lands which are not under any form of management and control.

The lack of planned management and control in un-reserved forests has led to illegal felling, shifting cultivation,, frequent wild fires and land degradation with severe erosion problems.

Several ecosystems in Sierra Leone are threatened by deforestation, land and environmental degradation mainly through illegal encroachment, overutilization/ exploitation of some species (both fauna and flora). The rate of such deforestation on un-reserved lands is between 6,000 ha. and 10,000ha per annum (FD records 1992).

Because of its favourable climate, it is necessary for Sierra Leone to achieve a net forest growth to make a positive contribution to the reduction of global CO<sub>2</sub> emissions. Furthermore any reduction in forest cover and degradation of forest land could reinforce the green house effect. Measures to significantly slow down the rate of deforestation through forest reservation will enhance CO<sub>2</sub> sequestration.

#### DESCRIPTION

##### **Objective**

The main objectives are

- To exercise legal and effective control over the un-reserved forest lands by the establishment of Protected Areas, National Parks, Sanctuaries and Forest Reserves;
- The conservation of the country's unique ecosystems and their biological diversity;
- To increase the forest area with the concomitant increase in the uptake of atmospheric CO<sub>2</sub>;
- To stem the rate of wanton destruction of the country's forest resources.

##### **Activities**

- Carry out survey of the lands (about 8 proposed sites amounting to 355,000 ha ) and prepare accurate maps;
- Undertake the reserve constitution process so that these areas are legally acquired and gazetted;
- Re-demarcate existing Reserves, National Parks/sanctuaries and Protected Areas to maintain their integrity;
- Prepare management plans for their effective management and control.

##### **Inputs**

- Survey equipment;
- Vehicles, maintenance and running cost;
- Photo - interpretation and mapping equipment;
- Data processing equipment;
- Field inventory equipment;
- Stationery and supplies.

### Short –term outputs

- Deforestation slowed down;
- Reduction of human pressure on forest lands;
- Employment provided for local population;
- Net addition to the standing inventory of biomass carbon.

### Potential long-term outcomes

- Increased surveillance of the hitherto unreserved forest lands to forestall deforestation and land degradation;
- Protection of the biodiversity (fauna and flora) enhanced;
- There is a net addition to the standing inventory of biomass carbon;
- Effective participation in planning, development, management and subsequent utilization of the forest resources;
- Eco-tourism is enhanced by the protection and effective management of National Parks, Protected Areas and Sanctuaries;
- Provision of alternative livelihood for communities protecting and conserving currently unreserved forests that have now come under reservation/protection.

## IMPLEMENTATION

### Institutional arrangements

The overall responsibility for implementation and coordination will remain with the Government agencies i.e. Forestry Division of NaCEF, Wildlife Conservation Branch, Tourism and Local Government. Private entrepreneurs, external donors, NGOs and potential consumer groups will be involved in the development and protection of National Parks/Sanctuaries and Protected Areas.

### Risks and barriers

- The process of acquisition of communal lands for reservation can be a protracted affair
- Level of compensation in most cases varies from one part of the country to another and can cause delays and friction between land-owners and management Ø Benefit sharing of revenue from Protected Areas and National Parks need to be looked into very carefully and harmonized to avoid conflict.

### Monitoring and evaluation

Monitoring and evaluation will be the responsibility of the Forestry Division of NaCEF. The implementation problems and progress will be made available through reports published monthly, quarterly or annually.

## COST

*The project is estimated to cost about 2,500,000 USD over a 5 year period.*

### Budget breakdown ( 000 USD)

Items	Y 1	Y 2	Y 3	Y 4	Y 5
Survey of 8 potential sites	200	200	100	100	-
Field Inventory	100	100	50	100	100
Re-demarkation of existing Reserves/Parks	100	100	100	-	-

Interpretation, mapping and data processing	100	200	100	100	-
Reservation and Reserve settlement process	-	50	50	-	100
Preparation of Management Plans	-	-	150	200	100
<b>Totals</b>	<b>500</b>	<b>650</b>	<b>550</b>	<b>500</b>	<b>300</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 10

### MANAGEMENT AND PROTECTION OF FOREST RESERVES AND CATCHMENTS AREAS INCLUDING WETLANDS IN SIERRA LEONE.

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#### JUSTIFICATION

In Sierra Leone, forests are legally divided into two main categories. The first category is the Forest Reserves that have been gazetted for protection/conservation and production purposes. The second is Forests on unreserved lands which are not managed and strictly controlled.

The lack of management and control in unreserved forests has led to illegal felling, shifting cultivation, frequent burning and land degradation with erosion problems. However, a reserve status is not a guarantee for protection or proper management. For example many gazetted closed high forest and mangroves are threatened by deforestation, the major causes being encroachment due to high population pressure and overutilization. Wood harvesting in natural forests has concentrated on a few commercial species. Also harvesting in natural forests has opened up large areas for encroachment through road construction. Management of Forests Reserves, for decades, has not been given sufficient attention because of limited funding support. It has been, sometimes, largely restricted to boundary protection and guarding against illegal harvesting. With external funding support there is the feasibility of achieving the objectives of the climate change convention through implementing the protective and management prescriptions.

#### DESCRIPTION

##### **Objectives**

The objectives of the project are:

- To put all catchment forests of national importance under sustainable management for water, soil and ecosystem conservation, and multiple production of forest products and services;
- To place all mangroves and other wetlands of national importance under sustainable management and be substantially developed;
- To ensure that areas under forest management are substantially increased i.e. forest area under un-reserved status be reduced through reservation;
- To ensure that all Forests, both natural and artificial regeneration, are placed under effective protection against fire, pests and diseases;
- To motivate the local communities to participate in the conservation of forests and carry out silvicultural activities with a view to increasing their incomes, restoring biodiversity and increasing the forest vegetation cover;
- To increase forest vegetation cover which is one of the proven ways to effectively increase the up-take of atmospheric CO<sub>2</sub> by the biosphere;
- To reduce the dependence on firewood and charcoal by using liquid fuels ( LPG ) and other bio-fuels ( ethanol/methane/oils).

##### **Activities**

Major activities will include:

- Reservation of un-reserved forest areas of national importance;
- Development and implementation of management plans for watershed of national importance;
- Preparation of management plans for reserves that require urgent attention;
- Training of both Central Government staff and local communities to improve their capacity;

- Establishment of technical support unit for the extension services.

### **Inputs**

- Forest survey and inventory tools;
- Transport and operating cost;
- Natural and artificial regeneration tools;
- Camping equipment;
- Stationery and administrative supplies;
- Liquid fuel (LPG) and other bio-fuels ( ethanol/methane/oils ).

### **Short-term output**

- Increased ground cover maintained;
- Reduced run-off and soil erosion contained;
- Deforestation slowed down by the reservation of un-reserved forest lands catchments areas;
- Net addition to the standing inventory of biomass carbon;
- Provision of alternative livelihood for communities protecting/conserving currently unreserved ecologically sensitive and culturally significant forests.

### **Potential long-term outcomes**

- Reduction of human pressure on both reserved and un-reserved forest lands;
- Improved forest management practices such as low-impact-logging will help to reduce damage to forest reserves, decrease erosion, increase biodiversity protection, and hence reduced forest land degradation;
- The project can help to reduce CO2 emissions significantly;
- Increased surveillance of the protected/managed forests and the involvement of stakeholders, especially local communities in their protection;
- Forest-dependant communities would have direct and effective participation in planning and decision-making in forestry development, management and subsequent utilization of the resource;
- The involvement of major stakeholders, especially the local communities, in the protection of the forest resources;
- Reduced dependence on firewood and charcoal as liquid and bio-fuels become available.

## **IMPLEMENTATION**

### **Institutional arrangements**

The project will be executed principally by the Forestry Division of NaCEF as the lead agency of Central Government and in collaboration with:

- Forest dependant communities, CBOs, NGOs;
- Environmental protection and Donor agencies;
- Energy and power agencies;
- Local Government and Rural Development agencies;
- Decision makers in Water-resources, Environment and Forestry Sectors as well as National Climate Change Committee.

### **Risk and Barriers**

- Past policies completely eliminated community participation in forest management;
- Forest fires area serious threats for the sustainable management of forest without the cooperation of local communities;

- The absence of buffer zones around some forest reserves which have sizeable population in close proximity with these reserves may pose serious threat;
- Lack of capacity for training and sensitization of local communities in woodlot management.

### **Monitoring and Evaluation**

The Forestry Division will supervise, monitor and evaluate the progress of the project through periodic assessment and reports but more particularly in its annual reports on the administration of the Forestry sector.

### **COST**

*The cost of the Project is estimated at 5 million USD over a five year period.*

### **Budget Breakdown): (000 USD)**

<b>Items</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
Intensive Management of (8) eight Forest ,Parks, PAs and Wetland estates	450	500	200	-	200
Preparation of management Plans for 7 (seven) forest Reserves, Parks and PAs	300	50	250	300	95
Management of (6)six major catchments of Hydro Dams and reservoirs	550	200	100	250	250
Training and sensitization of both Government staff and Local Communities	150	50	50	-	5
Establishment of Forest Extension Unit	50	200	300	250	250
<b>Total USD</b>	<b>1 500</b>	<b>1 000</b>	<b>900</b>	<b>800</b>	<b>800</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 11

### INSTITUTIONAL STRENGTHENING OF THE WATER RESOURCES SECTOR IN SIERRA LEONE

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#### RATIONALE/JUSTIFICATION

The Water Resources Sector has played, and continues to play a crucial role in Sierra Leone's Development. Government, in collaboration with its local and international partners has invested huge capital in the water supply sector in the last two decades. Despite this massive injection of capital, the impacts this has created have been minimal, attributable to lack of coordinated research, monitoring, and control. A recent study, based on a multiple cluster indicator survey (UNICEF, 2003), indicates that on average only 22 % of the entire population of Sierra Leone has access to safe drinking water. The situation could deteriorate if changes in the hydrological regime following climate change happen more quickly than anticipated.

Water resources development has been slow and uncoordinated, with only three subsectors active in the implementation of major projects. The water supply sector has many players but too little services products. There has been a proliferation of urban and rural water supply projects, all aimed at reducing the proportion of people without access to safe and sustainable drinking water.

The development of water resources for hydroelectric power production is still in its infancy in the country with a single functioning plant located along the Dodo River, in the Kenema District. The Dodo scheme has a power output of 4 Megawatts, and serves the cities of Kenema and Bo in the east and south of the country, respectively. The first of four phases of the Bumbuna Hydroelectric Power project is nearing completion and is supposed to provide a total power output of 308 MW. When completed, this phase of the project would provide 50 Megawatts of electricity to the country's capital, Freetown, and other major towns in the northern region. Although there have been some achievements in this area, more has to be done in terms of research and monitoring.

Irrigation is yet to take off as a major water development activity in the country. However, the potential for irrigation remains high due to the dense network of permanent streams in the country.

The aim of the project is to strengthening existing institutions for effective management and control of water resources for sustainable development. The need to enhance human and institutional capacities is consistent with ensuring that realistic options aimed at minimizing the negative impacts of climate change are considered. The outcomes of the project would provide the impetus for government and other stakeholders to intensify efforts geared towards adapting successfully to climate change through monitoring and research.

#### DESCRIPTION

##### **Objective**

The overarching objective of the project is to build capacity in the water resources sector through institutional strengthening with a view to ensuring the effective delivery of hydrological services, predicated on the realization that workable options for adapting to climate change is consistent with collaborative research, monitoring, and efficient management of our finite resources.

##### **Activities**

The following activities will be undertaken:

- a) The setting up of a hydrological services unit with the express purpose of coordinating all water-related activities,
- b) Establishing regional resource centres for use by water managers and researchers,

- c) The installation of hydrometric and monitoring stations in the major river basins,
- d) Training of professionals on the measurement and monitoring of water-related impacts of climate change.

**Inputs**

The inputs required include financial resources, equipment, and technical expertise.

**Short-term outputs**

- All major rivers in the country will be equipped with gauges for measuring flow;
- Incidences of flooding will be forecast with sufficient accuracy;
- The methods of data collection will be unified;
- Hydrological services products will be effectively utilized by the user communities.

**Potential long-term outputs**

The user communities will benefit immensely from hydrological services products especially early warning signals of impending water-related disasters exacerbated by climate change.

**IMPLEMENTATION**

**Institutional arrangements**

The Ministry of Energy and Power will be the lead implementing agency with oversight provided by local councils, national and international non-governmental organizations, civil society, and other stakeholders in the water resources sector.

**Risks and barriers**

- Vandalisation and accidental destruction of equipment in the river basins;
- Delay in the release of funds;
- Political instability;
- Compatibility of equipment with the local climate.

**Monitoring and evaluation**

The responsibility for monitoring will be borne by the relevant line ministries, while the Local Councils will evaluate the project. Both monitoring and evaluation shall be conducted according to the following schedules:

- Monthly narrative reports;
- Financial reports;
- Evaluation report of the local councils.

**COST**

*The estimated cost of the project is USD 2.25 million*

**Budget Breakdown**

ACTIVITY	COSTS		
	Year 1	Year 2	Year 3
Coordination/Recruitment of personnel	20 000	-	-
Training of managers, professionals, and technicians	200 000	100 000	100 000
Purchase of stream gauges and ancillary equipment	1 500 000	500 000	500 000
Installation and three year maintenance of equipment	50 000	25 000	30 000

Office equipment (Resource centre) and running cost for three years	100 000	50 000	75 000
<b>Total</b>	<b>1 870 000</b>	<b>675 000</b>	<b>705 000</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 12

### IMPROVEMENT OF THE EFFICIENCY OF EXISTING WATER SUPPLY SYSTEMS IN BOTH URBAN AND RURAL AREAS OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Service delivery in the water resources sector in Sierra Leone is fraught with numerous constraints, not least the inefficiency of water supply systems. There is no reliable statistic on the amount of leakage taking place in piped water systems. However, guesstimates put the figure at 40 %, attributable to an ailing system designed in the 1960s.

The Guma Valley Water Company has the corporate responsibility of supplying treated pipe-borne surface water to residents in the capital, Freetown and its environs. Currently, the authority supplies 105 million gallons of water daily, which if accounted for will satisfy the drinking and other domestic requirements of about 90 % of consumers in the municipality. A rationing system now exists in which water is pumped into the distribution system at specific times during the day instead of the 24-hour service that the consumers were used to. Losses may be ascribed to leakage from old and damaged pipes that constitute the almost dilapidated network.

Rural water supply systems utilize groundwater abstracted from dug wells and boreholes distributed throughout Sierra Leone. The wastage experienced in groundwater supply systems is far less, both in frequency and in magnitude than in surface networks. Most public water supply systems that utilize groundwater make use of hand pumps as the water-lifting device.

This project aims at improving the efficiency of both rural and urban water supply systems by introducing measures geared towards reducing losses due to leakage from old and dilapidated networks as well as developing new pump designs for groundwater abstraction.

#### DESCRIPTION

##### **Objectives**

The objective of the project is to maximize the use of water resources for sustainable development by ensuring the efficient functioning of existing urban and rural water supply systems.

##### **Activities**

The activities will include:

- An inventory of existing water supply systems in both urban and rural settings;
- Identifying sources of leakage in piped networks and improving the methods of abstraction of groundwater in rural areas;
- Repair and/or reinstallation of water distribution networks;
- Installation of improved designs of hand pumps in existing protected wells;
- Water quality monitoring of surface and groundwater sources;
- Effective regulation of water supply activities.

##### **Inputs**

The inputs include:

Financial resources, equipment, water supply hardware, and technical expertise.

### Short-term outputs

The short-term outputs include:

- Communities in target areas will receive more water from the systems for drinking and other domestic uses;
- There will be a drastic reduction in the incidences of water-related diseases such as cholera, dysentery and typhoid;
- The time saved by children in fetching water will be better utilized in school;
- Development will go on unhindered as more water will be available for running our industries.

### Potential long-term outputs

The proportion of people without access to safe and sustainable water supply and sanitation will be reduced significantly in line with the Millennium Development Goals.

It will also help water supply institutions generate more revenue needed for sustaining the schemes.

## IMPLEMENTATION

### Institutional Arrangements

The project will be implemented by the Ministry of Energy and Power in collaboration with other line ministries, with oversight being provided by the local councils in partnership with civil society and non-governmental organizations.

### Risks and Barriers

- Poor quality materials may be used;
- Delay in the disbursement of funds;
- Reinstallation of networks could have environmental impacts;
- Uncoordinated work involving different sectors could hinder project implementation.

### Monitoring and Evaluation

Monitoring will be done by the various line ministries while the local councils will evaluate the project through the following:

- Monthly reports;
- Financial reports;
- Evaluation of the project by the local councils and target beneficiaries.

## COST

*The estimated cost of the project is USD 2.95 Million*

### Budget Breakdown

ACTIVITY	COSTS		
	Year 1	Year 2	Year 3
Inventory of existing water supply systems	200 000	-	-
Rehabilitation of dilapidated network	500 000	500 000	500 000
Development of new pump designs	200 000	-	-
Supply of hand pumps	300 000	300 000	300 000
Sensitisation of user communities	50 000	50 000	50 000

<b>Total</b>	<b>1 250 000</b>	<b>850 000</b>	<b>850 000</b>
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# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 13

### PROMOTION OF RAIN WATER HARVESTING AND DEVELOPMENT OF AN INTEGRATED MANAGEMENT SYSTEM FOR FRESH WATER BODIES

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#### RATIONALE/JUSTIFICATION

Sierra Leone is among the countries in the world with mean annual precipitation, in excess of 2000 mm. Despite this higher than global average figure, the timing of the rainfall suggests that water supply for various purposes could only be guaranteed for six months only, unless steps are taken to collect and store the available water. There is increasing realization that surface water systems are too expensive to manage, especially so when treatment is unavoidable. The sustainability of surface water systems is under serious threat due to lack of investment, exacerbated by climate change. There is therefore the need to maximize the collection, storage, and use of available precipitation by adopting more efficient and affordable technologies. Rainwater harvesting can provide a long-term solution to our domestic water needs.

The promotion of rainwater harvesting technology could be justified in light of its seeming simplicity and affordability. In rainwater harvesting, rainfall is captured by the roof of a building and diverted to a gutter from where it is channelled into a storage facility. The expansion of the city has necessitated an increase in the supply of water for commercial and domestic use. Rainwater harvesting would ensure that every household is able to collect and store sufficient water for domestic use.

The management of water resources for sustainable development requires an integrated approach. This project aims at promoting rainwater harvesting within the framework of an integrated water management system for fresh water bodies. Against the backdrop of acute shortage in both the rural and urban areas, users of water in the domestic and commercial sectors will be encouraged to utilize the cheaper option of rainwater harvesting to increase supply and therefore reduces demand.

#### DESCRIPTION

##### **Objectives**

The objective of the project is to increase water availability for domestic and commercial use through sensitization of communities about the possibility of capturing, storing and utilizing rainwater.

##### **Activities**

The activities will include:

- A nationwide sensitization on the need to adapt to a reduction in the availability of water following climate change, by capturing, storing, and utilizing rainwater for domestic and commercial use;
- Executing a pilot project aimed at demonstrating the technology of rainwater harvesting;
- Extension services to peri-urban and rural areas of the country;
- Installation of rainwater harvesting systems in hospitals and other key institutions.

##### **Inputs**

The inputs include:

Financial resources, rainwater harvesting demonstration kit, and technical expertise.

##### **Short-term outputs**

The short-term outputs include:

- Communities in target areas will be encouraged to practice rainwater harvesting, given its immense advantages;
- The practice of rainwater harvesting will see a drastic reduction in the incidences of water-related diseases such as cholera, dysentery and typhoid, much as rainwater is almost pathogen-free;
- The time saved by children in fetching water from public standpipes and wells will be better utilized in school;
- Development will go on unhindered as more water will be available for running our industries.

**Potential long-term outputs**

Users of water will be able to access a variety of fresh water sources including the cheaper option of harvesting rainwater. The number of people without access to safe and sustainable water supply and sanitation will reduce significantly in line with the Millennium Development Goals. It will also help water supply institutions generate more revenue needed for sustaining the schemes.

**IMPLEMENTATION**

**Institutional Arrangements**

The Ministry of Energy and Power will be the key implementing agency in collaboration with other line ministries, with local councils providing oversight, in partnership with civil society and non-governmental organizations.

**Risks and Barriers**

- Installation of the system might be costly and beyond the reach of most people;
- Poor quality materials may be used;
- Delay in the disbursement of funds;
- Utilisation of disused wells for storing rainwater could have environmental impacts;
- Uncoordinated work involving different sectors could hinder project implementation.

**Monitoring and Evaluation**

The relevant line ministries will be in charge of monitoring while the local councils will evaluate the project through the following:

- Monthly narrative reports;
- Financial reports;
- Evaluation.

**COST**

*The estimated cost of the project is USD 2.8 Million*

**Budget Breakdown**

ACTIVITY	COSTS		
	Year 1	Year 2	Year 3
Sensitisation	50 000	-	-
Demonstration	500 000	250 000	100 000
Provision of rainwater harvesting facility in key institutions	1 000 000	500 000	400 000
<b>Total</b>	<b>1 550 000</b>	<b>750 000</b>	<b>500 000</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 14

### ESTABLISHMENT OF A PERMANENT STUDY PROGRAMME OF THE MULTI SPECIES FISHERIES IN SIERRA LEONE

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#### RATIONALE/JUSTIFICATION

In Sierra Leonean waters, there are over two hundred species of fish. Knowledge about the biology of the majority of these species is lacking. The level of exploitation of a good number of species has also not been established.

With climate in this area likely to undergo changes, the species composition of most important species i.e. the clupeids, carangids and scombrids, which are mainly migratory and are easily affected by fluctuations of the environmental conditions within the estuaries and near shore might also undergo changes. In such an event the offshore pelagics and demersal fish species might assume high commercial importance.

Assessment of the effects of environmental conditions on fishing habitats basically employs the species – specific approach which involves the development of Habitat Suitability Index (HSD) modes for individual species of concern.

The impact of climate change on the fishery can take decades, however, the gathering of the information requires and the work of the institutions to manage the fishery would be a slow process. It is therefore necessary that the establishment of the institutional study programmes be initiated now

#### DESCRIPTION

##### **Objective**

- To improve knowledge about the biology of the multi-species;
- To generate species-specific habitat and physiology data;
- To generate data on habitat characteristics;
- To study the abundance, distribution and feeding habits of other fish species that have a high commercial potential value;
- To provide information on growth rates reproductive success and mortality of select species.

##### **Activities**

- Train researchers;
- Provide equipments;
- Provide logistics;
- Conduct field works;
- Analyse acquired/collected data;
- Develop HIS models.

##### **Inputs**

- Human, Financial and physical resources.

##### **Short-term outputs**

- Researchers trained equipments and logistics provided, field work conducted, and data analysed.

### Potential Long-term outcome

- Research capacity of Institute of Marine Biology and Oceanography built.

### IMPLEMENTATION

#### Institutional Arrangements

Following the work of various fishery experts under various programmes etc. It is suggested that the Institute of Marine Biology and Oceanography (IMBO), USL should be adequately staffed and equipped to carry out studies on the fishery of Sierra Leone. The Board of IMBO which comprises of members from various government ministries, university and NGOs will supervise the project.

#### Risks and Barriers

- Inadequate human resources;
- Insufficient financial resources;
- Beaucratic barriers.

#### Monitoring and evaluation

The Board of The Institute of Marine Biology (IMBO) will monitor and evaluate the project.

### COST

*USD 395,000*

#### Budget Breakdown

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Train researchers	30 000	30 000	20 000
Provide equipments	80 000	40 000	20 000
Provide logistics	30 000	15 000	10 000
Conduct field works	30 000	15 000	15 000
Analyse acquired/collected data	20 000	10 000	10 000
Develop HIS models	-	-	20 000

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 15

### DELINEATION AND RESTORATION OF VULNERABLE HABITATS AND ECOSYSTEMS IN THE WESTERN AREA OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Managing the fisheries sector of Sierra Leone in the environment of climate change will pose a great challenge. The rational utilization of the fish resources is essential. In order to reduce the possibility of decline in fishery productivity, strict monitoring of vulnerable habitats is essential. The level of destruction of coastal habitats in the Western Area of Sierra Leone is high and these habitats will need to be restored to enable them perform their basic ecological functions.

Ponds and other inland water bodies for spawning are indispensable components of a balanced aquatic environment. During prolonged dry seasons, many of these ponds and inland waters dry out, leading to reductions in fish populations. Those that survive the dry periods are threatened with pollution (pesticide run-offs and plant discharges). In view of the importance of these ponds and water bodies in enhancing fish population, measures should be taken to safeguard the spawning sites, and stop the destruction of mangroves (fish nursery areas), and pollution along the coastline and the riverbanks. A study of the state of the mangroves will help facilitate these measures. Raising public awareness on the importance of the mangroves is also important.

Efficient management of the fisheries can only be achieved through the gathering of data to enable delineation of vulnerable habitats. Areas and fish species that could be affected by climate change would be included.

The ecosystems (water resources) affected by climate change need to be determined accurately to assist management process. There is need to produce accurate information on ecosystems that could be affected by climate change. These areas have to be delineated based on scenarios of climate change and historical data to determine future scenarios.

#### DESCRIPTION

##### **Objectives**

- To prevent or reduce the destruction of vulnerable fishing habitats;
- To reduce the possibility of the decline of fishery productivity.

##### **Activities**

- Identify and delineate vulnerable fishery habitats;
- Sensitize local communities on the benefits of preserving vulnerable habitats;
- Study livelihood patterns of local communities associated with these habitats;
- Assess the potential for conservation of critical habitats;
- Propose measures to minimize the degradation of vulnerable/critical habitats;
- Assess the impact of Climate Change on vulnerable ecosystems;
- Train researchers on ecosystems approach in biodiversity studies;
- Provide equipments and logistics to facilitate field work;
- Develop management plans for vulnerable/critical habitats.

##### **Inputs**

- Human, Financial and physical resources.

### Short-term outputs

- Researchers trained equipments and logistics provided, field work conducted, and data analysed.

### Potential Long-term outcome

- Research capacity of Institute of Marine Biology and Oceanography built.

## IMPLEMENTATION

### Institutional Arrangements

Following the work of various fishery experts under various programmes etc. It is suggested that the Institute of Marine Biology and Oceanography (IMBO), USL should be adequately staffed and equipped to carry out studies on the fishery of Sierra Leone. The Board of IMBO which comprises of members from various government ministries, university and NGOs will supervise the project.

### Risks and Barriers

- Inadequate human resources;
- Insufficient financial resources;
- Beaucratic barriers.

### Monitoring and evaluation

The Board of The Institute of Marine Biology (IMBO) will monitor and evaluate the project.

## COST

*USD 420,000*

### Budget Breakdown

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Identify and delineate vulnerable fishery habitats	20 000	-	-
Sensitize local communities on the benefits of preserving vulnerable habitats.	10 000	10 000	5 000
Study livelihood patterns of local communities associated with these habitats.	10 000	10 000	10 000
Assess the potential for conservation of critical habitats	20 000	-	-
Workshops on the degradation of vulnerable/critical habitats.	15 000	15 000	15 000
Assess the impact of Climate Change on vulnerable ecosystems.	30 000	30 000	30 000
Train researchers on ecosystems approach in biodiversity studies	20 000	20 000	20 000
Provide equipments and logistics to facilitate field work	30 000	30 000	30 000
Develop management plans for vulnerable/critical habitats	20 000	20 000	20 000

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 16

### IMPROVE ON THE QUALITY ON FISHERIES RELATED DATA AND RESEARCH

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#### RATIONALE/JUSTIFICATION

Others conservation and protection of the resources; promotion of the development of a national fishing fleet; promotion of aquaculture and inland fisheries development; research, extension and training etc. Production can be substantial. The artisanal fishing sector if expanded can employ more than 100,000 people. Inland fishery can be developed if adequate storage and transport systems are improved. Capacity is low in terms of scientific research which at the moment is carried out at different levels both at the ministry and the Institute of Marine Biology Oceanography, Fourah Bay College, University of Sierra Leone. The Ministry is basically concerned with the compilation and collation of data from surveys, catch data, and observer reports. Outputs are in the form of summaries and reports. The IMBO carries out basic research through student research supervised by research fellows/lecturers using mainly information from the statistical unit of ministry.

#### DESCRIPTION

##### **Objectives**

To improve on the quality of data and research for better understanding of the different types of ecosystems.

##### **Activities**

Data and research are required to improve the basic understanding of different types of ecosystems. Emphasis needs to be placed on studies of:

- Water movements;
- Seasonal cycles;
- Nutrient cycling;
- Sedimentology, geomorphology and cartography;
- Biological productivity;
- Physiology and behaviour of important organisms.

##### **Inputs**

- Human, Financial and physical resources

##### **Short-term outputs**

- Researchers trained, equipments and logistics provided, field work conducted, and data analysed.

##### **Potential Long-term outcome**

- Research capacity of Institute of Marine Biology and Oceanography built.

#### IMPLEMENTATION

##### **Institutional Arrangements**

Following the work of various fishery experts under various programmes etc. It is suggested that the Institute of Marine Biology and Oceanography (IMBO), USL should be adequately staffed and equipped to carry out

studies on the fishery of Sierra Leone. The Board of IMBO which comprises of members from various government ministries, university and NGOs will supervise the project.

**Risks and Barriers**

- Inadequate human resources;
- Insufficient financial resources;
- Beaucratic barriers.

**Monitoring and evaluation**

The Board of The Institute of Marine Biology (IMBO) will monitor and evaluate the project.

**COST**

*USD 455,000*

**Budget Breakdown**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Studies on water movements	30 000	20 000	15 000
Studies on Seasonal cycles	30 000	20 000	15 000
Studies on nutrient cycling	30 000	20 000	15 000
Studies on Sedimentology, geomorphology	30 000	20 000	15 000
Studies on Biological productivity	30 000	20 000	15 000
Studies on Physiology and behaviour of important organisms	30 000	20 000	15 000
Update on cartographic information	30 000	20 000	15 000

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 17

### DEVELOPMENT OF AN INTEGRATED COASTAL ZONE MANAGEMENT PLAN FOR SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Coastal zones are among the most resourceful areas on earth as regards production both from human and from natural biological activity. However, human activities and natural processes also exert major pressures. These zones provide a home to a large and increasing part of the global population. This gives rise to a deterioration of ecosystems, e.g. by pollution or infrastructural changes. On the other hand, natural physical factors such as waves, currents and floods put these areas under continuous pressure. An increase of this pressure as a result of global climate change has a huge potential impact.

In order to cope with these pressures, Sound Coastal Zone Management Planning, which takes full account of long term developments, is indispensable. The many issues involved and the complex links demand an integrated approach. This is the only way to ensure that the coastal zone will sustain both the economic development of the population and the preservation of ecosystems.

Institutional arrangements are of particular importance to the achievement of integrated coastal zone managements. Not only must the coordination of all agencies concerned be organized, it is also for vital importance to ensure that the local population is involved. In addition, a proper financing structure has to be established, particularly in those cases where costs are large compared to national regionally generated income.

Integrated Coastal Zone Management (ICZM) has been identified as the most appropriate approach to managing the resources and their coastal environment.

#### DESCRIPTION

##### **Objectives**

To develop an Integrated Coastal Zone Management Plan for Sierra Leone.

##### **Activities**

The most important issues to be addressed in the management of the coastal zone in Sierra Leone are presented below as well as recommendations for addressing these issues. The issues involve

- Delineation of flood and erosion hazard areas;
- Improvement of the quality of topographic data;
- Identify and assemble stakeholders;
- Assemble data and information on current understanding of coastal processes in the country;
- Assemble data and information on current understanding of institutional arrangements for coastal zone management in the country;
- Hold stakeholder consultative meetings;
- Conduct inception to establish institutional arrangements;
- Conduct workshop on ICZM plan development;
- Conduct regional stakeholders workshops;
- Conduct national validation workshop;
- Carryout print and electronic media aided public education and sensitization;
- Report writing and production.

## Inputs

Human, financial and physical resources will be required

## Short term outputs

- Institutional framework for ICZM established;
- Stakeholders sensitized.

## IMPLEMENTATION

### Institutional Arrangements

An interdisciplinary approach will be adopted.

Research, Collection and analysis of data and information on coastal processes and institutional arrangement will be undertaken by the Institute of Marine Biology and Oceanography (IMBO).

National Project Steering Committee will oversee the project. A project coordinator will be appointed to guide and implement the project. A project Director from government implementing agency will also be appointed to ensure government's commitment and mainstreaming activities. A project consultant will be appointed to provide technical guidance to the project.

### Risks and Barriers

- Funds are expected to be adequate and released in timely manner.

### Monitoring and Evaluation

Monitoring and evaluation will be carried out by the National Focal Point of the Interim Guinea current Commission, National Focal Point Institution or any other competent independent agency.

## COST

*The estimated cost of the project is USD 90,000*

### Budget Breakdown

	Year 1	Year 2	Year 3
Delineation of flood and erosion hazard areas	10 000	-	-
Update of topographic data	20 000	-	-
Assemble data and information on coastal processes in the country	10 000	-	-
Assemble information on current coastal zone management practices and institutional arrangements nationally.	10 000	-	-
Sensitization and Awareness raising	10 000	-	-
Technical workshops/meetings	20 000	-	-
Reporting	10 000	-	-

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 18

### REHABILITATION OF DEGRADED COASTAL HABITATS IN THE NORTHERN REGION OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Physical alteration of the coastal and marine environments can lead to changes in the ecosystem and hence the community structure. In some cases some species may be eliminated. Activities such as logging and construction of facilities and agriculture may affect the ecosystem.

Removing mangroves for fuel, salt rice production particularly in the Northern Region of the country makes the coast more vulnerable to erosion leading to siltation. FAO tree planting exercise at Orugu bridge in 1988 is an attempt to redress that situation. Sustainable utilization of mangrove swamps is possible up to 50% of the original area (Fomba, Pers. Com) (Plate Fig. 4.6)

In Sierra Leone, and elsewhere, shoreline structures are often constructed out of necessity without reference to current flow patterns, erosion and siltation. Shoreline structures may alter flow patterns of currents and may cause sediment accumulation. Both the Queen Elizabeth II Quay and Nitti harbours have to be constantly dredged to minimize siltation. At Bonthe navigation is only possible at hightide. Siltation can affect ecological productivity of the environment and foul the filtration systems of sessile organism including bivalves thereby causing mass mortalities among the latter.

Sand mining resuspends sediments and stresses the ecosystem. Digging deep holes on the beach can alter patterns of wave refraction thus contributing toward erosion. Some of the organism get dislodged or buried. Indiscriminate sand mining at Lakka and Hamilton has been of grave concern to Government. Dredging destroys both topography and the biota especially of suspension feeders and fish.

#### DESCRIPTION

##### **Objectives**

- Restore the ecological integrity and productivity of Coastal habitants;
- Restore source of livelihood for coastal dwellers;
- Ensure proper management of coastal habitats.

##### **Activities**

- Identify degraded sites;
- Map degraded coastal habitat sites;
- Conduct a survey on livelihoods activities of coastal dwellers;
- Conduct a survey on the environmental and socio-economic;
- Impacts of degraded habitats;
- Creation of tree nurseries;
- Train youth from the local communities in tree nursery development and management;
- Carryout restorative activities in partnership with local communities;
- Review government plans and policies on restorative activities;
- Investigate the role of central, local and traditional governments in the management of coastal habitats.

## Inputs

The project will require human, financial and physical resources.

## Short term outputs

- Youths trained in the creation and maintenance of tree nurseries;
- Degraded coastal habitat sites identified and mapped. ;
- Survey on livelihood activities conducted;
- Survey on the environmental and socio-economic impacts of coastal habitat degradation conducted;
- Some degraded coastal habitats rehabilitated;
- Livelihood for coastal communities restored;

## IMPLEMENTATION

### Institutional arrangements

The project will be executed by the various stakeholders with government playing a leading role (National Coastal Area Management Board).

### Risks and Barriers

- Inadequate financial resources;
- Inadequate trained personnel;
- Inadequate institutional capacity.

### Monitoring and evaluation

Monitoring will be done by private institutions or by NGOs

## COST

*The project is estimated to cost USD 317,000*

### Budget Breakdown

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Mapping of degraded coastal sites	100 000	50 000	50 000
Training on tree nurseries development	20 000	10 000	10 000
Creation of tree nurseries	10 000	10 000	10 000
Conduct survey on the environmental and socioeconomic impacts of degraded coastal habitats.	10 000	5 000	5 000
Technical workshops/Presentations on results	5 000	5 000	5 000
Reporting	4 000	4 000	4 000

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 19

### DEVELOP AND ENACT APPROPRIATE POLICIES AND REGULATIONS RELEVANT TO THE DEVELOPMENT OF COASTAL COMMUNITIES, URBAN GROWTH PLANNING, AND CRITICAL COASTAL ECOSYSTEMS PRESERVATION.

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#### RATIONALE/JUSTIFICATION

Regarding national coastal maritime legislation, Sierra Leone has a number of Acts. The fisheries Management and Development Act (1988) provides the framework for the regulation of fishing activities both coastal and marine.

There are also other legislations (Acts) which contains some elements relating to the management and protection of coastal resources. The Forestry Act Provides for the managements and development of all forest resources including coastal forests e.g. mangroves. The wildlife Conservation Act (1982) sets a legal framework for the protection of wildlife and creation of protected areas in the country. The Mining Act controls all land-based mining activities. The Environment Protection Act (2000) makes reference to the coastal environment. An Environmental Impact Assessments (EIA) is mandatory for any scheduled development project falling within a certain category of projects in the zone.

The activities in the coastal zone of Sierra Leone are controlled by policies, legislations and institutions of the various sectors of the economy. There is no framework for coordination, planning and management of these activities on an integrated basis. This sectorally planned approach to the management and exploitation of coastal resources has created conflict in a number of instances. For example, mangrove forests fall under the jurisdiction of the Ministry of Agriculture, Forestry and the Environment. Agricultural and forestry activities are therefore carried out without taking cognizance of the effect of these activities on the fishing industry as mangroves play a vital role in supporting health stocks of coastal fisheries. There are numerous other such examples of conflict. It is therefore obvious that as developmental activities in the coastal zone continue to increase a policy and legislative framework will be necessary for effective management of the coastal resources as well as the coastal environment. However, for policies and legislations to be effective, a sound institutional framework to implement government policies is essential, Government needs the capacity not only to articulate clear policy and to set priorities, but also to coordinate and resolve conflicts. There is also the need to develop the capacity to regulate the exploitation of the resources and to enforce laws.

#### DESCRIPTION

##### **Objectives**

To development appropriate policies and regulations for planning growth and development of coastal community's critical coastal ecosystems preservation.

##### **Activities**

- Collect and compile information on the present situation regarding planning growth and development of coastal communities;
- Organize workshops to:
  - Present information on planning of coastal communities;
  - Identity national goals on settlement planning;
  - Outline the rational for the development of appropriate plans, policies and the enactment of relevant regulations for the preservation of critical coastal ecosystems;
  - To review present plans, policies and legislations.

### Short Term Outputs

- Information on present policies and plans relating to the development of the coastal zone collected and compiled;
- Present plans, policies and legislations reviewed.

### IMPLEMENTATION

The project will be executed by the various stakeholders with government playing a leading role (National Coastal Area Management Board).

### Risks and Barriers

- Inadequate financial resources;
- Inadequate trained personnel;
- Inadequate institutional capacity.

### Monitoring and Evaluation

Monitoring and evaluation will be carried out by any competent independent agency.

### COST

*USD 60,000*

### Budget Breakdown

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Stock taking, Inventory of available information, field visits, interviews	10 000	-	-
Regional and National Workshops, Stakeholder consultations	30 000	-	-
Review of present plans, policies and legislations	10 000	-	-
Services of meetings (Technical and steering committees)	10 000	-	-
Report preparation and dissemination of policy document	10 000	-	-

# SIERRA LEONE

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## NAPA PRIORITY PROJECT NO 20

### ESTABLISHMENT OF A NATIONAL SEA-LEVEL OBSERVING SYSTEM FOR SIERRA LEONE

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#### RATIONALE/JUSTIFICATION

Sierra Leone is highly vulnerable to any rise in sea-level because of its low-lying coastal areas. Some of these areas are presently being lost to the sea.

Local people will be vulnerable to accelerated sea-level rise. Their livelihoods and socioeconomic situation will be affected. Sea-level change will be an additional factor to the already scarce resources regime and environmental degradation and can increase the competition in resource use of the coastal area. Competition health will also be vulnerable as such a change will be reflected in the hydrological pattern of the area.

The establishment of a national permanent sea-level observing system is of immense environmental importance. It is even now urgent to establish such a system considering the threats to our coastal and marine environment posed by accelerated sea-level rise which is the result of global climate and human induced changes.

The installation of an operational, permanent sea-level observing station in Sierra Leone will make possible the observation of long-term sea-level fluctuations to provide data for practical scientific purposes. It will support educational programmes, national research and part operational activities. It will also create employment for youth as well as facilitating development for national research capacity in climate change and reduce poverty. It will also help to provide scientific data to ensure meaningful management practices of the country's coastal and marine environment.

Information about sea-level will assist safe navigation of vessels in and out of the country's main ports unloading and offloading activities; planning and implementation of coastline associated projects; design and construction of hydro-technical structures, marine resources exploration and exploitation etc.

#### DESCRIPTION

##### **Objectives**

- To have an operational permanent sea-level observing station for reporting monthly mean averages to the national marine meteorological service;
- To collect, analyze and make available data products for practical and/or scientific applications.

##### **Activities**

- Survey of construction site;
- Construction of support structure (pier or jetty) ;
- Construction of stilling well;
- Installation of tide gauge;
- Operation of the station;
- Training of personnel (workshops on managing of tide gauges) ;
- Training personnel on data collecting and analysis.

##### **Short-Term output**

- Tools for forecasting change in the coastal environment and socio-economic feedback;

- Mitigating measures for socio-economic problems arising from coastal ecosystem malfunctioning resulting from accelerated sea-level rise.

**IMPLEMENTATION**

Project will be overseen by a National Liaison (Project Management) Committee. Data collection and analysis will be undertaken by the University of Sierra Leone. Site station management will be the responsibility of the Ministry of Transport and Communications.

**Risks and Barriers**

- Inadequate financial resources;
- Inadequate trained personnel;
- Inadequate institutional capacity.

**Monitoring and Evaluation**

Monitoring and evaluation will be carried out by a competent independent agency.

**COST**

*USD 180,000 (One hundred and Thirty Thousand Dollars)*

**Budget Breakdown**

	Year 1	Year 2	Year 3
Site survey (bathymetry)	20 000	-	-
Building of support structure	30 000	-	-
Purchase of tide gauge	10 000	-	-
Purchase and construction of stilling well	20 000	-	-
Installation of the tide gauge	10 000	-	-
Operational costs for at least one year	60 000	-	-
Purchase of computer and accessories	20 000	-	-
Recruitment and training of a technician	10 000	-	-

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 21

### MONITORING AND CONTROL OF MALARIA PREVALENCE IN THE MOYAMBA DISTRICT OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Global malaria control strategies include early diagnosis and prompt treatment, selective and sustainable preventive measures; including vector control, early detection, and containment or prevention of epidemics. There is poor knowledge of the disease and its method of cure among members of the local communities in Sierra Leone. However, according to the national malaria control programme manager, Moyamba District has the least usage of insecticide treated bed-nets in Sierra Leone.

Local capacity building for basic and applied research is essential to allow the regular assessment of the malaria situation, particularly the ecological, social and economic determinants of the disease. However, because of poverty and poor economic performance, Sierra Leone lacks the capacity to effectively control malaria and provide prompt treatment to victims particularly in the rural areas due to poor road network, inadequate human resources and poor financial resources.

Poor urban and rural communities can be protected from vector-borne diseases by cost-effective interventions. Many poor people lack the financial resources to purchase antimalaria drugs. They also lack access to prompt treatment in case of malaria infection. Traditional herbal sources treatment are been handicapped by deforestation and biodiversity loss. Communication in terms of road networks with the rural areas is poor. The capacity to control malaria epidemic nationally is weak. Therefore provisional accesses to insecticide treated materials such as bed-nets can be relatively effective in reducing the incidence of malaria amongst vulnerable groups in both the urban and rural communities in Moyamba District of Sierra Leone.

#### DESCRIPTION

##### **Objective**

1. To prevent and/or reduce malaria infection of vulnerable groups of Moyamba District's population;
2. To increase the access of the population to insecticide treated bed-nets.

##### **Activities**

1. Promote the use of insecticide treated mosquito bed-nets;
2. Conduct awareness raising programmes on sanitation issues;
3. Expand the distribution of insecticide treated bed-net in the entire Moyamba District;
4. Improve rural community infrastructures; e.g. feeder roads;
5. Provide anti-malaria drugs at affordable costs for the population;
6. Improve community involvement in planning and implementation of malaria control programme;
7. Monitor and evaluate project activities.

##### **Inputs**

- Human, financial and physical resources

##### **Short-term outputs**

- Malaria infection of the Moyamba population reduced;
- Increased access of the population to Insecticide Treated Bed-nets.

## Potential long-term outcomes

- Population better equipped to control malaria;
- Healthier nation with increased productive potential.

## IMPLEMENTATION

### Institutional Arrangements

- Malaria Control Programme is under the recently created Directorate of Disease Control and Prevention in the Ministry of health and Sanitation,
- The District Medical Officer (**DMO**) heads the District Health Management Team (**DHMT**) to ensure effective health care delivery and service development,
- Various Programme Managers have been appointed who with the **DMOs** will focus on particular aspects of health promotion and disease prevention and control,
- Bed-net committees have been established within local area development committees.

### Risks and Barriers

- Inadequate human resources;
- Insufficient financial resources;
- Poor rural infrastructure (feeder roads) ;
- In Sierra Leone, and cultural barriers to the use of seasonal forecast information remains a problem, decision makers should be educated or encouraged to use scientific information that may lead to reductions in losses from natural disasters.

### Monitoring and Evaluation

This will be carried out by a competent independent agency.

### COST

*USD 520,000*

### Budget Breakdown

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
1. Promote the use of insecticide treated mosquito bed-nets	20 000	10 000	10 000
2. Conduct awareness raising programmes on sanitation issues	20 000	10 000	10 000
3. Expand the distribution of ITMs in the entire District	20 000	10 000	10 000
4. Improve rural community infrastructures; e.g. feeder roads	50 000	50 000	50 000
5. Provide anti-malaria drugs at affordable costs for rural poor	20 000	20 000	20 000
6. Improve community involvement in planning and implementation of malaria control programme.	20 000	10 000	10 000
7. Monitor and evaluate project activities	50 000	50 000	50 000
<b>ANNUAL TOTALS</b>	<b>200 000</b>	<b>160 000</b>	<b>160 000</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 22

### MONITORING AND CONTROL WATER AND SANITATION ACTIVITIES IN THE KOIDADUGU DISTRICT OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Climate Change is expected to have wide-range consequences for human health as a consequence of existing poor sanitation in Sierra Leone. These could include but not limited to the reduction of available water for drinking and washing, lowering of the efficiency of local sewer systems, leading to higher concentrations of bacteria and other micro-organisms in raw water supplies. The water scarcity may force people to use poorer quality sources of fresh water, such as rivers, which are often contaminated. Inadequate facilities for waste collection and disposal could also contribute to the incidence of communicable diseases. All of these factors could result in an increased incidence of diarrhoeal diseases.

According to the Sierra Leone Water Company (SLAWCO) sources, Koinadugu District is the least covered district in terms of water and sanitation facilities.

#### DESCRIPTION

##### **Objective:**

- To improve the existing unsanitary conditions and develop appropriate water and sanitation projects.

##### **Activities**

1. Improve housing conditions and toilet facilities;
2. Increase access to safe drinking water;
3. Construct appropriate low cost water supply systems;
4. Intensify sanitary inspections;
5. Intensify vector control measures;
6. Rehabilitate roads and bridges and improve Urban-Rural communication;
7. Promote environmental health and community participation and involvement in sanitation issues;
8. Improve waste collection and disposal facilities.

##### **Inputs**

- Human, financial and physical resources

##### **Short-term output**

- Improved wastewater drainage and toilet facilities;
- Improved access to safe drinking water.

##### **Potential long-term outcomes**

- Improved national health and sanitation conditions;
- Improved communication infrastructure;
- Reduction in the incidence and transmission of communicable diseases.

## IMPLEMENTATION

### **Institutional Arrangement**

- There is a Directorate of Disease Control and Prevention in the Ministry of Health and Sanitation;
- District Council have also established sanitation unit;
- Each district has a District medical Officer (DMO) who heads a District health Team to ensure effective health care delivery and service development;
- Various Programme Managers have been appointed who with the DMOs will focus on particular aspects of health promotion and disease prevention and control;
- New manpower training schools have been established and the old ones have been strengthened;
- In-service training has been continuing to update the skills of serving personnel in all areas of the medical service;
- Rehabilitation of the health facilities is now a priority.

### **Risks and Barriers**

- Inadequate human resources;
- Insufficient financial resources;
- Poor rural infrastructure (feeder roads) ;
- In Sierra Leone, and cultural barriers to the use of seasonal forecast information remains, decision makers should be educated or encouraged to use scientific information that may lead to reductions in losses from natural disasters.

### COST

*USD 1,680,000*

### **Budget Breakdown**

<b>Activity</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
1. Improve housing conditions and toilet facilities	100 000	100 000	100 000
2. Construct low cost wells and water supply systems	200 000	200 000	200 000
3. Intensify sanitary inspections	20 000	20 000	20 000
4. Intensify vector control measures	20 000	20 000	20 000
5. Rehabilitate roads and bridges and improve Urban-Rural communication	100 000	100 000	100 000
6. Promote community involvement and active participation in water and sanitation issues.	20 000	20 000	20 000
7. Improve waste collection and disposal facilities	50 000	50 000	50 000
8. Monitor and evaluate project activities	50 000	50 000	50 000
<b>Annual Totals</b>	<b>560 000</b>	<b>560 000</b>	<b>560 000</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 23

### MONITORING AND CONTROL OF HIV/AIDS PREVALENCE IN KOINADUGU DISTRICT OF SIERRA LEONE

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#### RATIONALE/JUSTIFICATION

The ten-year old conflict (1991 to 2001) has been accompanied by a deterioration of the health status of majority of Sierra Leoneans. The Human Development Report, July 2000, estimates a life expectancy of 37.9 years. Sierra Leone ranks last in the world in quality of life with a per capita income of US\$448.

The healthcare delivery system is divided into National, District, and Chiefdom levels. The epidemiological picture is characterized by a high prevalence of communicable diseases like malaria, respiratory tract and skin infections. There is an explosion of sexually transmitted infections, and data trends suggest an emerging epidemic of HIV/AIDS. According to Ministry of Health and Sanitation sources, over half the healthcare facilities country-wide do not function fully due to a variety of reasons that include damaged infrastructure, lack of staff, lack of drugs, and medical supplies. Large and small healthcare facilities, home healthcare, drug users, as well as research will need to be improved.

The Sierra Leone HIV/AIDS Response Project (SHARP) is design to assist the Government of Sierra Leone organise a response to the growing Human Immunodeficiency Virus (HIV) which causes the Acquired Immune Deficiency Syndrome (AIDS), in short HIV/AIDS. In accordance with the main goal of the SHARP the development objectives of this four-year project in Sierra Leone are to (a) contribute to reducing HIV/AIDS prevalence and (b) mitigate the impact of HIV/AIDS on persons infected or affected by HIV/AIDS. It will do so through a multi-sector approach, facilitating activities undertaken in various sectors by public and private organisations, and by communities in the fight against HIV/AIDS. Project-supported activities will complement government, donor, and private sector initiatives. These activities will vary by sector and the specific partner, but will be consistent with the national policy against HIV/AIDS, and premised on the development and expansion of local responses to the epidemic.

In collaboration with other members of the International Partnership against AIDS in Africa (IPAA), the project will help step up and mainstream the national response against HIV/AIDS, and an array of related infections, including sexually transmitted infections (STIs), Tuberculosis (TB), and other opportunistic infections. The Government of Sierra Leone (Ministry of Development and Economic Planning), UN Theme Group on HIV/AIDS and regional officials of UNAIDS worked closely in the development of this effort and see it as an integral part of the common effort. Thus the project will address HIV/AIDS prevention, care, and support, as well as impact mitigation at the national and sub-national levels. Emphasis will be on prevention among youth, women of childbearing age, orphans and other vulnerable children, and groups that are particularly vulnerable to HIV/AIDS, including sex workers, the military and ex-combatants, internally displaced people, and refugees.

The proposed project will finance the full spectrum of HIV/AIDS activities including prevention, care, support, and impact mitigation over a four-year period. It will have four components: (1) capacity building, policy coordination and refugee activities; (2) multisector responses to HIV/AIDS prevention and care; (3) health-sector responses to HIV/AIDS, STI/TB and other opportunistic infection management, including prevention, care, and support; and (4) civil society initiatives (including communities, NGOs, religious groups and the private sector). These activities will take into account the existing conditions and level of capacity at each administrative structure (national, regional, district, and chiefdoms).

However, information about HIV/AIDS has still not reached people living mainly in the rural areas of the country. Regional offices have not been established due to lack of funding, trained personnel to educate the communities on the issue are lacking. Counselling and guidance institutions and their activities are limited to

the Capital Freetown and perhaps to some district headquarter towns. The availability and access to drugs are restricted. Stigmatization is restricting control and prevention programmes. Climate Change and its attendant negative impacts will hinder the nation's effort to control and prevent HIV/AIDS by destabilizing and weakening existing services.

According to the Director of the National AIDS Secretariat, Koinadugu District has the highest prevalence of HIV/AIDS in Sierra Leone.

### **DESCRIPTION**

#### **Objective**

- To galvanise support for HIV/AIDS prevention activities;
- To improve the community's capability to control and prevent HIV/AIDS;
- To reduce climate change related stress on HIV/AIDS control and prevention activities.

#### **Activities**

1. Promote awareness raising programmes on HIV/AIDS;
2. Expand the access and availability of drugs to infected persons;
3. Promote de-stigmatisation programmes;
4. Improve community involvement in the planning and implementation of HIV/AIDS control programmes;
5. Establish guidance and counselling centres;
6. Improve health and sanitation facilities as well as community infrastructure to reduce climate change negative impacts.

#### **Inputs**

- Human, Financial and Physical resources

#### **Short-term outputs**

- The community sensitised on the prevention and control HIV/AIDS;
- Voluntary Counselling and Testing Centres established.

#### **Potential long-term outcomes**

- Voluntary Cancellling and Testing Centres on HIV/AIDS established and functions;
- The prevalence of HIV/AIDS reduced;
- HIV/AIDS stigmatisation eliminated/reduced.

### **IMPLEMENTATION**

#### **Risks and Barriers**

- Inadequate trained personnel to tackle HIV/AIDS related issues;
- Inadequate financial resources;
- Inadequate physical resources;
- Poor knowledge about HIV/AIDS.

### **COSTS**

*USD 1,200,000*

### Budget Breakdown

<b>Activity</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
1. Promote awareness raising programmes on HIV/AIDS	50 000	50 000	50 000
2. Expand the access and availability of drugs to infected persons	100 000	100 000	100 000
3. Promote de-stigmatisation programmes	50 000	50 000	50 000
4. Improve community involvement in the planning and implementation of HIV/AIDS control programmes	50 000	50 000	50 000
5. Establish guidance and counselling centers	50 000	50 000	50 000
6. Improve health and sanitation facilities as well as community infrastructure to reduce climate change negative impacts.	100 000 100 000	100 000	
<b>Annual Totals</b>	<b>400 000</b>	<b>400 000</b>	<b>400 000</b>

# SIERRE LEONE

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## NAPA PRIORITY PROJECT NO 24

### MONITORING, EVALUATION AND CONTROL OF WATER AND SANITATION ACTIVITIES IN SLUM AREAS OF FREETOWN, THE CAPITAL CITY OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Climate Change is expected to have wide-range consequences for human health as a consequence of existing poor sanitation in Sierra Leone. These could include but not limited to the reduction of available water for drinking and washing, lowering of the efficiency of local sewer systems, leading to higher concentrations of bacteria and other micro-organisms in raw water supplies. The water scarcity may force people to use poorer quality sources of fresh water, such as rivers, which are often contaminated. Inadequate facilities for waste collection and disposal could also contribute to the incidence of communicable diseases. All of these factors could result in an increased incidence of diarrhoeal diseases.

According to the Environmental Health Manager, urban slum within the city require urgent attention to improve human health particularly in the areas of water and sanitation activities.

#### DESCRIPTION

##### **Objective:**

- To improve the existing unsanitary conditions and develop appropriate water and sanitation projects for urban slums in Freetown.

##### **Activities**

1. Improve housing conditions and toilet facilities;
2. Increase access to safe drinking water and sanitation;
3. Construct appropriate low cost water supply and sanitary systems;
4. Intensify sanitary inspections;
5. Intensify vector control measures;
6. Rehabilitate roads and bridges and improve communication;
7. Promote community involvement and active participation project activities;
8. Improve waste collection and disposal facilities;
9. Monitor and evaluate project activities.

##### **Inputs**

- Human, financial and physical resources

##### **Short-term output**

- Improved wastewater drainage and toilet facilities;
- Improved access to safe drinking water.

##### **Potential long-term outcomes**

- Improved national health and sanitation conditions;
- Improved communication infrastructure;
- Reduction in the incidence and transmission of communicable diseases.

### Institutional Arrangement

- There is an Environmental Health Programme in the Ministry of Health and Sanitation;
- The Freetown City Council has also established a sanitation unit;
- The District medical Officer (DMO) heads a District health Team to ensure effective health care delivery and service development;
- The Freetown City Council, the Environmental Health Programme Manager and The DMO collaborate on particular aspects of health promotion and disease prevention and control;
- Area Development Committees are established.

### Risks and Barriers

- Inadequate human resources;
- Insufficient financial resources;
- Poor rural infrastructure (feeder roads) ;
- In Sierra Leone, cultural barriers to the use of seasonal forecast information remains; decision makers should be educated or encouraged to used scientific information that may lead to reductions in losses from natural disasters.

### COST

*USD 2,070,000*

### Budget Breakdown

Activity	Year 1	Year 2	Year 3
1. Improve housing conditions and toilet facilities	100 000	100 000	100 000
2. Increase access to safe drinking water and sanitation	200 000	200 000	200 000
3. Construct appropriate low cost water supply and sanitary systems	20 000	20 000	20 000
4. Intensify sanitary inspections	20 000	20 000	20 000
5. Intensify vector control measures	30 000	30 000	30 000
6. Rehabilitate roads and bridges and improve communication	150 000 150 000	150 000	
7. Promote community involvement and active participation project activities	50 000	50 000	50 000
8. Improve waste collection and disposal facilities	70 000	70 000	70 000
9. Monitor and evaluate project activities	50 000	50 000	50 000
<b>Annual Totals</b>	<b>690 000</b>	<b>690 000</b>	<b>690 000</b>