

EXECUTIVE SUMMARY

The aims of the climate change thematic needs assessment under the project, National Capacity Self Assessment (NCSA) are to conduct an assessment under the UNFCCC implementation in building the capacity of government institutions, NGO, individual and at the system level, in providing the policy framework for implementing the climate change convention in Liberia.

Liberia ratified the UNFCCC on November 5, 2002, in June 2003; Liberia attended her first scientific meeting in Bonn, Germany and also the National Adaptation of Action (NAPA) participatory training workshops in Addis Ababa, Ethiopia. On May 4, 2004, Liberia launched the initial stage of formulating a National Adaptation Programme for Action (NAPA) in mitigating climate change effect in Liberia.

The institutional framework proposed for implementing the UNFCCC in Liberia consists of a national committee on climate change that will establish a multi-disciplinary task force team comprising of 42 Governmental agencies, Non-governmental organizations and the Private sectors.

The methodology used to assess the country's potential to implement the UNFCCC in Liberia included thematic needs assessment through stocktaking and consultation workshops, seminars with the involvement of relevant stakeholders across the country. The project is to identify, confirm and review priority issues within the three Rio Convention (Biodiversity, climate Change, and Desertification/Land Degradation). Within the context of Liberia, so as to ensure a policy commitment and national ownership and also to identify cross-cutting of these relative to the various thematic areas.

List of Abbreviation and Acronyms

ACL	Alliance for Conservation in Liberia
AEL	Association of Environmental Lawyers
BMA	Bureau of Maritime Affairs
BSAP	Biodiversity Strategy and Action Plan
CARI	Central Agriculture Research Institute
CBO	Community Base Organization
CBD	Convention on Biological Diversity
CDA	Cooperative Development Agency
CEEB	Concerned Environmentalist for the Enhancement of Biodiversity
CI	Conservation International
COP	Conference of Parties
DBP	Don Bosco Polytechnic
DCP	Data Collection Platform
DRP	Data Transformation System
ECHO	European Commission Humanitarian Aid Office
ECOWAS	Economic community of West Africa States
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ERADRO	Environmental Relief and Development Research Organization
EU	European Union
EUMETSAT	European Organization for Exploitation of Meteorological satellites
FACE	Farmer Associated to Serve the Environment
FAO	Food and Agriculture Organization of the United Nations
FDA	Forestry Development Authority
FFI	Fauna and Flora International
GDP	Gross Domestic Production
GECOMSA	Grand Gedeh Community Servant Association
GEF	Global Environmental Facility
GNP	Gross National Product
GOL	Government of Liberia
GPS	Global Position System
IPCC	Intergovernmental Panel on Climate Change
LAC	Liberia Agriculture
LCD	Least Developed Countries
LEC	Liberia Electricity Corporation
LHS	Liberian Hydrological Service
LIFE	Liberia Indigenous Forum for the Environment
LMA	Liberia Marketing Association
LPRC	Liberia Petroleum Refining Corporation
LTC	Liberia Telecommunications Corporation
MCC	Monrovia City Corporation
MDG	Millennium Development Goals

MGS	Metrosat second Generation
MFA	Ministry of International Affairs
MICAT	Ministry of Information Culture and Tourism
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOHSW	Ministry of Health and Social Welfare
MOJ	Ministry of Justice
NCCC	National Climate Change Committee
NCSA	National Capacity Self-Assessment
NGO	Non-governmental Organization
NPA	National Port Authority
POCAL	Pollution Control Association of Liberia
POP	Persistent Organic Pollution
RC	Rio Convention
SAED	Society Against Environmental Degradation
SAMFU	Save My Future Foundation
SBSTA	Subsidiary Body for Scientific and technological advice
SCNL	Society for the Conservation of Nature of Liberia
SNP	SAPO National Park
SOLF	Society of Liberian Foresters
UL	University of Liberia
UMCOR	United Methodist Commission on Relief
UMU	United Methodist University
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children Fund
UNMIL	United Nations Missions in Liberia
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization
YMCA	Young Man Christian Organization

1.0 INTRODUCTION

1. Liberia has conducted the national capacity self-assessment for global environmental management in line with decision 13/cp.1 of the Conference of the Parties (COP) of the United Nations framework convention on climate change (UNFCCC). As a least developing country (LDC), Liberia has a low adaptive capacity, hence needing immediate and urgent support for capacity building to enhance climate change monitoring.
2. Liberia NCSA team on climate change will identify through a country-driven consultative process, priorities and needs for capacity building to protect the global environment.
3. The specific objectives to be accomplished through the NCSA will include
 - to explore related capacity needs within and across the three thematic areas of biodiversity, climate change and desertification/land degradation
 - to link country action to the broader environmental management and sustainable framework
4. It is also important that knowledge about climate issues be disseminated in Liberia and scientists and technicians train to be able to carry out the tasks required under the Convention. These tasks include national inventories on emissions and sinks, the incorporation of climate issues into national development programs and creation of policies to induce the dissemination of technologies that contribute to emission abatement and ultimately , to climate change mitigation.
5. Capacity building is also essential in order for countries in Africa such as Liberia to be better prepared for further negotiation under the convention for fostering the development of technologies that improve conditions of adaptation to climate change in Liberia, and methodologies for carrying out inventories and assessing abatement cost, that are appropriate to Liberia's realities and interests. Building up capacity in one country is essential to narrow down the knowledge gaps

between countries and improve the conditions for a fruitful dialogue towards sustainable development in the future.

6. It was against the foregoing background that the Government of Liberia sought and obtained funds from the Global Environmental Facility (GEF) to identify a National Capacity needs, constraints and opportunities for capacity building to implement its action plans.

BACKGROUND

1. Liberia is lying between 4° 20' and 8° 30' North Latitude, and 7° 20' and 11° 30' West Longitude, bounded on the North by the Republic of Guinea and Ivory Coast, on the South by the Cavalla River and on the West by the Republic of Sierra Leone, the land mass that form Liberia covers an area of 43,000 square miles (111,370 sq. km). The country is divided into fifteen counties namely (Lofa, Bong, Bassa, Nimba, Rivercess, Grand Cape Mount, Grand Gedeh, Maryland, Sinoe, River Gee, Bomi, Margibi, Montserrado and Grand Kru and Gbarpolu). Its population is estimated at 2.9 million with an annual growth rate of 3%.
2. Physiographically, Liberia can be divided into three major geological belts; the coastline, the plateau and steep hill. The rolling hills extend from the coastline to 130 kilometers inland rising gradually in elevation from sea level to 100 meters. The second belt is a plateau that is characterized by escarpments with the elevation varying between 100 to 200 meters. For the last geographical belt, the land is steeper and hilly from 200m to 600m of altitude. These belts correspond to three ecological zones:
 - a. The coastal Mosaic of mangroves, wetlands, and lowland tropical forest
 - b. The upland tropical forest of the escarpments, and
 - c. The Upper Guinea forest on the plateau.

3. The principal factors affecting Liberia climate are atmospheric pressure, wind, air temperature, moisture, and precipitation. There are two climatic seasons in Liberia. The dry season begins in late October and ends in mid April. The annual precipitation decreases from 4000 millimeters in the coastal belt to 800 in the Northern part of the country. In the coastal belt, relative humidity rarely falls below 80% and on the average it is above 90%. The variation in relative humidity is about 60% in February in the upland areas.
4. Liberia emerged from years of devastating civil war and held presidential and legislative elections in 1997; however, the much anticipated peace and tranquility following the elections did not last long. The country again returned to war with itself in 1999. This worsened the humanitarian situation and reversed the gains made in recovery and development since 1997. Liberia remains one of the least developed countries with a Human Development Index of 0.276 (1999) declining from 0.311 (1996). The country has a population of approximately 2.9 million people (projection 2003: MPEA). The Gross Domestic Product (GDP) of current market prices is estimated at US\$43796 million (2003) with a per capita income of US\$151.02 (Millennium Development Goals 2004)
5. Liberia is recovering from 14 years of conflict. During the conflict there was little investment in government and Non-governmental institutions. The country entire infrastructure was destroyed. In term of capacity there is inadequate qualified staff to provide effective management of our environment.
6. Liberia's economy is largely dependent on extractive industries, namely, rubber, timber, diamonds and gold. In the 1970's and 1980 iron ore accounted for more than half of the country's export earning and it was the world's fifth largest exporter of iron ore on the world market. About 75% of the country's population depends on subsistence agriculture for living.

7. The country has many environmental problems ranging from insufficient public awareness and education to acute poverty. The recently ended civil war which lasted for more than 10 years significantly contributed to environmental problems in the country. Increases in deforestation and land degradation are mostly due to internally displaced people clearing land for shelter and local building materials. The absence of public electricity for more than 14 years has led to an increase in charcoal production as the next alternative energy source. Rural to urban migration has created emergency environmental problems such as over fishing in coastal waters and clearing for urban agriculture and shanty homes.

1.1 UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AS RELATED TO CAPACITY BUILDING NEEDS

The United Nations Framework Convention on Climate Change as it relate to capacity building needs for which Liberia is a party was ratified November 5 2002. Liberia is also one of the signatories of the Kyoto Protocol.

The objectives of the UNFCCC is to achieve stabilization of the greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system

For the purposes of this convention, UNFCCC describes climate change as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

The convention also embraces the effort for reduction in GHG Emission. The convention thus describes emissions as the release of greenhouse gases and/or their percussions into the atmosphere over a specific area and period of time.

The purpose of the process of conducting and implementing national capacity needs self-assessment is to carry out the commitment under Article 4, Paragraph 1(g) of the parties.

- a. Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;
 - b. Support international and intergovernmental effort to strengthen systematic observation and national scientific and technical research capacities and capabilities particularly in developing countries and to promote access to and the exchange of data and analyses thereof obtained from areas beyond national jurisdiction; and
 - c. Take into account the particular concern and needs of developing countries and cooperate in improving their indigenous capacities and capabilities to participate in the efforts referred to in subparagraphs (a) and (b) above.
- (Article 5)

Since the climate change system describes the totality of the atmosphere, hydrosphere, biosphere and Geosphere and their interaction in carrying out their commitments under Article 4 paragraph 1(i) of the parties shall:

1. Promote and facilitate at the national and as appropriate, sub regional and regional level, and in accordance with national laws and regulations, and within their respective capabilities;
2. The development and implementation of educational and public awareness programmes on climate change and its effects;
3. Public access to information on climate change and its effects;
4. Public participation in addressing climate change and its effects and developing adequate responses; and
5. Training of scientific, technical and managerial personnel.
6. Cooperate in and promote at the international level, and where appropriate using existing bodies;

- a. The development and exchange of educational and public awareness material on climate change and its effects and
- b. The development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in the field, in particular for developing countries. The national capacities self-assessment for global environmental management under the UNFCCC, recalling the relevant provision of chapter 34 of Agenda 21 on “Transfer of Environmentally Sound technology, cooperation and capacity-building”.

Pursuant to the relevant provisions of the UNFCCC in particular. Articles 4.1, 4.5, 4.7, 9.2, and 11.1

Request the Convention Secretariat:

- a. To prepare an itemized progress report (according to the types of activities specified in paragraphs 34.15 to 34.28, inclusive, of chapter 34 of Agenda 21) on concrete measures taken by the parties listed in Annex II to the convention with respect to their commitments related to the transfer of environmentally sound technologies and the know-how necessary to mitigate and facilitate adequate adaptation to climate change, and at the same time,
- b. To collect information from relevant sources, from, inter alia, the commission on sustainable development. United Nations agencies, the intergovernmental panel on climate changes (IPCC) and the subsidiary body for Scientific and Technological Advice (SBSTA), and to prepare an inventory and assessment of Environmentally sound and economically viable technologies and know-how conducive to mitigating and adapting to climate change. This inventory should also include an elaboration of the terms under which transfers of such technologies and know-how could take place.

1.2 IMPLEMENTATION OF THE UNFCCC IN LIBERIA

The Republic of Liberia ratified the United Nations Framework Convention on Climate Change (UNFCCC) on November 5, 2002 and as a signatory to the Kyoto protocol, Liberia is committed to fulfilling its obligation for reducing greenhouse gas emission into the atmosphere. As a small country, Liberia is also a small contributor to global warming, nevertheless, the sensitivity of the country to the impacts of the impending global and regional changes – on the one hand, and its commitment to the protection of the global environment – on the other hand, dictate the integration of national policy with international agreements.

Being a country from civil conflict, Liberia in accordance with Article 12 of the Convention is expected to produce its first national communication “National Strategy on Mitigation of Climate Change and the inventories of Greenhouse Gases, sources and sinks in Liberia by September, 2005.

The National Adaptation Programme for Action (NAPA) project is the first on going environmental Programme related to climate change in Liberia. The initiate National Communication document process has completed the following activities and reports submitted to the UNFCCC Secretariat for comments –the include:

- ❖ Stocktaking on climate change vulnerability and adaptation in Liberia. Multidisciplinary integrated assessment (phase 1).
- ❖ Stocktaking and stakeholders consultation on anthropogenic emissions of greenhouse gases(GHG) in Liberia
- ❖ Identification of Climate Change adaptation needs and Barriers in Liberia.

The National consultants’ reports on the three activities were reviewed through workshops attended by stakeholders NGOs and Government Institutions for their comments and recommendations.

1.3 METHODOLOGY FOR THE NCSA STOCKTAKING

The information and data provided in this section, was obtained through Extensive Stocktaking Consultation with relevant stakeholder groups in the country with the approach that characterizes the implementation of some key activities of the convention including capacity need, policies and assessment of institution framework of all the international environmental agreements in Liberia.

The process of formulating the National Capacity Self-Assessment (NCSA) for Liberia began on 8th April 2004 with consultations at the national and county levels. At the national level, the process was guided by the first national meeting held to formulate the steering committee. A consultative mechanism was then devised to guide the county or regional level consultations

In the planning stage, the National Consultant for Climate Change to the NCSA along with its resource personnel prepared questionnaires in order to obtain information related to capacity needs, policy and regulation and institutional framework in the various sectors of climate change. According to the project, consultations were conducted at the three levels (individual, institution and system level).

1.3.1 National Level Consultation

The Environment in Liberia

The United Nations Development Programme (UNDP), the United Nations Mission in Liberia (UNMIL) and the United Nations Environment Programme (UNEP) jointly convened two-day seminar on the environment in Liberia at the Monrovia city Hall on 12-13 July 2004. This seminar was organized in collaboration with the Environmental Protection Agency (EPA) of Liberia.

The importance of environmental protection during the country's recovery and reconstruction process was highlighted together with vital role that sustainable

natural resources management will play in the country's economic and social development and its ability to reach the Millennium Development Goals.

The seminar further focused on two recent environmental reports, the UNEP Desks Study on the environment in Liberia and the UNDP/EPA/GEF National Biodiversity Strategy and Action Plan. Both documents emphasize the importance of biological diversity and the natural environment for Liberia's reconstruction and future development. This view was supported and endorsed by the seminar participants. Over 100 participants from government, local authorities, non-governmental organizations, academic and research institutions, the business sector and the international community attended the meeting.

The first national meeting on (NCSA) project was held from the 19-20 October 2004 at YMCA Auditorium in Monrovia, Liberia. Participant included stakeholders, government institutions, NGO, CBO, youth, market leaders and women group etc. The participants were to identify issues that give rise to climate change and review priority issues with regards to material, human and institutional capacities.

Some key issues on the impacts and coping strategies that came out of the consultation with the working group on climate change include:

1. Threats identifies as issues that gives rise to climate change in Liberia
 - a. Shifting cultivation
 - b. Unregulated factory pollution
 - c. Uncontrolled logging
 - d. Charcoal burning as a source of energy
 - e. Population density
 - f. Human activity
 - g. Industrial activity
2. Climate change activities are conducted on a low level due to the lack of resources, logistics and technology;
3. Lack of public awareness, education and training, participatory approach;

4. Stakeholder observed that there is no capacity in managing a project under the convention;
5. Stakeholders called for training in climatologic, Meteorology, Hydrometeorology, and Agro meteorology, etc;
6. Need for research in chemical management.

1.3.2 Regional Environmental Workshop

The main purpose of the consultation was to assess in each county the potential on the implementation of the Rio Conventions. Also to review Environmental laws, policies and institutions at the county or regional levels. Those recommendations made by the seminar on the environment in Liberia held at the Monrovia City Hall 12-13 July, 2004.

The first Regional Workshop was held from the 8 – 9 November 2004 in Tubmanburg, Bomi County. Four counties representative attended the workshop (Bomi, Grand Cape Mount, Gbarpolu and Montserrado) with 25 participants from institutions including forestry, Education, County Officials, Agriculture, students, NGO, UNEP Post Conflict Assessment Unit, and UNMIL Environmental Consultant and National Consultant (NCSA) and project staff attended all four regional workshops.

Second Regional workshop was held from the 12-13 November 2005 in Buchanan, Grand Bassa County with 30 participants. The counties that attended the workshop included Bassa, Rivercess and Margibi Counties.

Third Regional Workshop was held in Zwedru, Grand Gedeh County. About 20 participants attended. The counties present at that meeting were Grand Gedeh, River Gee, and Maryland. Two counties did not attend due to bad road condition in these counties.

The last regional workshop was held in Gbarnga City, Bong County with three counties representing Region four. They were Lofa, Bong, and Nimba Counties. 25 participants attended.

Strategies Identified At The Workshops

- Establish well-equipped libraries (to include environmental reading materials in the three thematic areas) in each county.
- Establish Environmental Unit/ Focal Point with the president office and in ministries dealing with environmental issues
- Ensure that gender issues and the promotion of women are prioritized in environmental management programs
- Develop sector specific environmental law and policies
- Ensure that the necessary structures for law enforcement and implementation are in place
- That the environmental laws and policies formulation should be done in consultation with local inhabitants
- That government established research centers for the collection of data on climate change
- That hydroelectricity is made available to reduce the use of energy source such as generator which causes serious air pollution
- That the use of the Eco-stove be promoted to reduce the dependence on firewood and charcoal
- That law is promulgated to avoid the careless burning of places and bushes
- Those institutions be established to create awareness about the environment
- Build capacity of every county in the Rio Conventions
- Encourage tree planting to reduce pressure on the natural forest for fuel production
- Encourage lowland farming to avoid shifting cultivation through training
- Promote public awareness on environmental laws and policies nationwide
- The participants agreed that strategies and recommendations on forest, biological diversity, sustainable energy and environmental laws and policies be accessible and applicable.

2.0 THEMATIC ASSESSMENT

2.1 Situation Analysis

2.1.1 Institutional Framework and Responsibilities of Major Stakeholders

A desk study of Government agencies and Non Governmental Organizations were undertaken prior to the Steering Committee Forum, in order to identify and assess their activities in relation to capacity needs assessment as they relate to climate change were assessed on the following aspects:

- Recent and previous environmental legislations to identify gaps and future needs
- The extent and impact of public education and awareness activities;
- The capacity of the personnel responsible for UNFCCC implementation in Liberia as well as the knowledge and skills of key decision makers;
- The mandates, responsible and effectiveness of all relevant stakeholders

2.1.1 The Proposed National Climate Change Committee

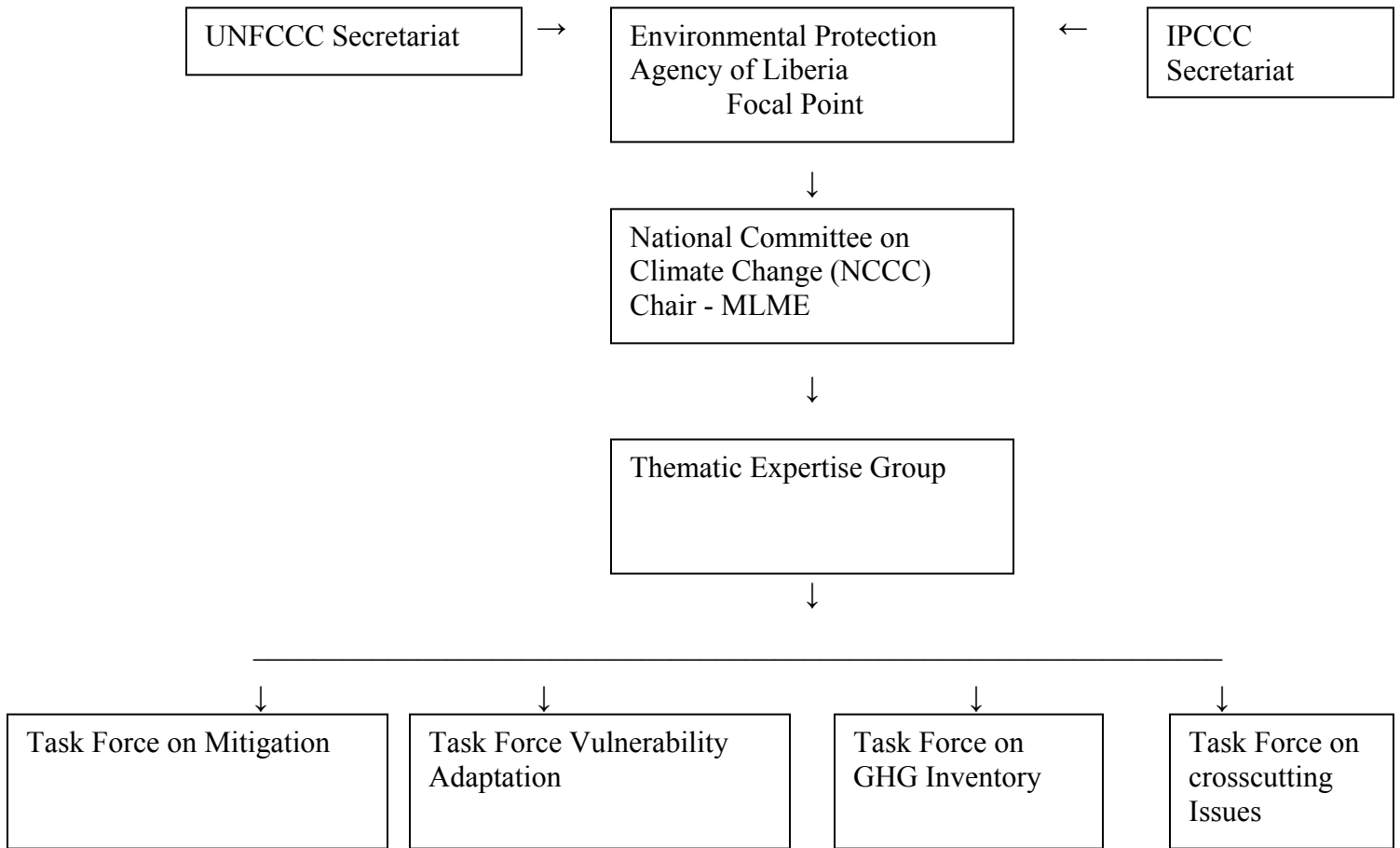
Under the chairmanship of the meteorological section of the Liberia Hydrological services, Department of Mineral Exploration and environmental Research, Ministry of Lands, Mines and Energy is expected to coordinate the implementation of the UNFCCC. In this process a Task Force will be formulated for mitigation, GHG inventory, vulnerability/Adaptation, and Task Force on cross-cutting issues. Each task force group will draw their own guidelines and responsibilities. Their roles and responsibilities will include but not limited to the following.

1. Conduct research on climate vulnerability and climate change
2. Assessment and reporting on the options and measure necessary to adapt to climate change
3. Assessment and reporting on the options and measure to mitigate greenhouse gas emission
4. Assessment and reporting on the impact of climate change on the economy and social development;

5. Creation and enhancement of awareness on climate change and related social economic and environmental issues
6. Inventorization and report on sources and links of greenhouse gas emission
7. Assessment and reporting on the coordination of institutions framework as it relate to climate change

The responsibilities and functions of all the agencies of government, NGOs and private institution involved in the implementation of climate change activities at the national, regional and global level will be coordinated by the National Climate Change Committee (NCCC). To determine the role of each agency during the implementation will require consultations among institutions to identify agencies with the expertise, if not available within the NCCC, then the NCCC will have to hire the services of individual or agencies that have the appropriate expertise.

Figure 1.1 Institutional Framework For The Implementation of UNFCCC in Liberia



2.1.2 List Of Institution Forming Memberships Of The Proposed National Climate Change Committee

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Environmental Protection of Liberia
Ministry of Lands, Mines and Energy
Ministry of Agriculture
Ministry of Commerce and Industry
Ministry of Health and Social Welfare
Ministry of Planning and Economic Affairs
Ministry of Justice
Forestry Development Authority
Ministry of Transport
Robert International Airport
Liberia Domestic Authority Airport
National Port Authority
Bureau of Maritime Affairs
Ministry of Education
Ministry of Gender and Development
Fisheries Companies Association
Liberia Agriculture Company
Firestone Plantations Company
Liberia Petroleum Refining Company
Liberia Electricity corporation
Liberia Telecommunication Corporation
Monrovia City Corporation
University of Liberia
Cuttington University College
United Methodist University
Don Bosco Polytechnic
Cooperative Development Agency
Liberia Marketing Association of Liberia
Ministry of public work;
Ministry of Rural Development
Nicom Distillery
Petroleum Retailers Association
Refrigerators and Air Condition Association
Monrovia Slaughter House
Monrovia Club Brewery
Cemenco
United States Trading Company
Indian bakery
Monrovia Bakery
Liberia Garage union
Ministry of Information
African Episcopal Methodist University

2.1.3 Existing National Policies and Regulation

The regional workshops agreed that there are policies and laws regulation in Liberia, but these laws have not been implemented such existing policies are:

1. An act creating the Forestry Development Authority (1976)

This Act repeals all previous forest related laws in Liberia, in effect, chapter 1-4 of the 24 of the Natural Resource Law of Liberia Section (1); establishes Forestry Development Authority (FDA)

1b. An Act to amend an Act creating the FDA (1988)

This act adds eight new sections to the FDA Act of 1976 that deal mostly with forest utilization agreement, fees. Permits, etc.

2. Timber concession agreement (1973) revised 1988

This is the FDA's detailed and comprehensive document for granting forest utilization concession. It covers among other things the terms of the concession, operations of the concessionaire, rights and obligation of the concessionaire and a forest management plan that governs logging methods, timber harvesting, reforestation, construction of logging road and scaling.

3. Wildlife and national parks act of 1988

This Act provides a legal framework for wildlife conservation and creation and management of national park.

4. Relevant sectoral laws and regulation outside of forestry law that deal with forest related matters

- Ministry of Agriculture (land use, farming, shifting cultivation, farming settlement plantation)
- Ministry of Gender and Development created 2002 (the role of gender in development)

- Ministry of information culture and Tourism (eco-tourism recreational use, culture/heritage sites)
- Ministry of Internal Affairs (Administration of political subdivision from counties to town, native forest reserves)
- Ministry of Land, Mines and Energy (Hydrological services and Geological Services mining rights and licenses.
- Ministry of Planning and Economic Affairs, (long-term national planning, coordination of international and programs, the agriculture and forestry section provides planning for all FDA's including wildlife and natural parks)
- Ministry of Rural Development (integrated rural development including agriculture development and
- Ministry of Public work (road and bridge construction)

5. Laws and regulation of the ministry of lands, mines and energy (2000)

Section 2.1 of the new mineral and mining law, 2000, states that “Minerals on the surface of the ground or in the soil or subsoil, rivers, streams, watercourse of territorial waters, and continental shelf of Liberia are the property of the Republic of Liberia”

Chapter 8 of the Mining Law, 2000 provides the “Environmental Protection” and basically outlines the duties and responsibilities of the “Holder of a Mineral Right” to protect the natural environment in the mining area

6. An Act creating the Environmental Protection and Management Law of the Republic of Liberia, (2002).

7. The Environmental Policy provides the underlying principals for the EPML. Some recommendations to government that are of relevance:

- Section 4.9 **Conservation of Biological Diversity**: Liberia will develop comprehensive and coordinated policies, strategies and actions for biodiversity conservation;
- Section 4.11 **Conservation and Management Wetlands**: Liberia will establish full protection status for wetlands of significant biological diversity;

Section 5.1 **Land Use**: Liberia will conduct and management, evaluation and planning;

Section 5.2 **Forest and Wildlife**: Liberia will conduct forest cover assessment for data. Comprehensive land-use planning strategy; promote the concept of community forests; promote the concept of protected species outside of protected areas;

Section 5.3 **Protected Areas**: Liberia will regulate forestry activities enhance conservation and environmentally sound management practices; establish more protected areas system throughout the country; establish policy for the identification and development of buffer zones in and around protected areas, increase the protected area system to conserve and sustain management of a representative portion of Liberia's rainforest for future generation

8. The draft water resource act and the draft water quality regulation

The National Water Resource and Sanitation Board (NWRSB) since its inception in 1980 have been ineffective principally due to lack of policy and the absence of a legal institutional framework.

2.1.4 Multidisciplinary Integrated Assessment Process Phase 1

The aim of the activities is to initiate multidisciplinary assessment of climate change vulnerability and adaptation strategies in selected areas in Liberia, under the National Adaptation Programme of Action (NAPA) project was held October 2004.

The first stage of the process was a two-week investigation concluded to study the adverse effect of climate change in Liberia. Forty-eight randomly selected areas spread over thirteen accessible counties were located in four regions of the country. The study concentrated on the vulnerability and adaptation of climate change in seven sub sectors consisting of agriculture, energy, fisheries, forestry, gender, meteorology and health.

The study methodology involved the combined vulnerability mapping with participatory appraisal (PRA), and GPS in randomly selected localities in Liberia.

Vulnerability (Impacts Of And Adaptation To Climate Change)

1. The effect of climate change on the forestry sector has not been monitored in Liberia, increased in temperature and precipitation may increase and infestation, resulting in increased damage to natural forests.
2. According to the recent survey, 48 percent of the respondents indicated that fish stocks have been declining over the years. However, this situation needs further investigation in relation to climate change variation as the justification given was a mix of anthropogenic factors and natural occurrences
3. In Liberia, no studies have been conducted to estimate the impacts of climate change on local energy demand. However, for some reason about 82 percent of

- the respondents indicated that climate change has effect on every source but could not further elaborate.
4. During the survey, 19 out of a total of about 40 respondents indicated that their communities had over the years and in recent times experienced flood which resulted into property damage, 33 respondents indicated that they have literally observed change/increase in daily average temperature, and a significant amount located near the coast complained of encroachment by the oceans.
 5. Most vulnerable populations will be those in rural counties which are often unable to respond to natural disasters such as flooding particularly at risk are subsistence farmers in coastal lowland and urban poor in slums and shanty town in Liberia.

Adaptation:

1. The principal food crops grown in Liberia include rice, cassava, sugarcane, banana, plantain, sweet potatoes, among others. Traditionally, domestic production of the country's main staple foods still relies on a traditionally low input /low output, shifting cultivation mixed crop system.
2. In Liberia, most crops are seasonally threatened by pest and diseases, most of which are yet to be identified and documented. However, common adaptive measures for pest such as rodents include the fencing of farms and use of traps. Also, because of insect infestation, farming is delayed for a certain period of time to avoid damage to crops. In many other areas communities have yet to design adaptation measures.
3. Majority of the respondents along the coast indicated that they have experienced flooding. The adaptation measure employed in this case was to migrate to higher elevation. In some cases of West Point border were built to prevent erosion.
4. Energy demands in Liberia are expected to rapidly increase irrespective of climate change, due to population increase and as the country returns to normalcy. However, not enough is currently known about the contribution of climate change requirements through increased seasonal variability and emerging temperature extremes.

Energy infrastructure in Liberia such as the Liberia Electricity Corporation (LEC) power electric dam, etc needs to be restored. The loss of energy infrastructure during the Liberian conflict has had negative social and environmental impacts.

3.0 Major Stakeholder Organizations

3.1 Public Agencies

Agriculture Institutions

- **Ministry of Agriculture: (MOA)** – plan, execute, administer, manage and supervise agricultural program with extension as its major component. Liberia is predominantly an agriculture country. Over 90% of the rural population is engaged in various agricultural activities. Consequently, agricultural products like rubber, coffee, palm oil, etc play a very important role in the export economy of the country.
- **Central Agriculture Research Institute (CARI)**- The Central Agriculture research Institute (CARI) is a national research center for studies in tree crops, rice, animal husbandry plant protection
- **University of Liberia**
The College of Agriculture and Forestry train agriculturist, agronomist and foresters. The Geography Department, Liberia college trained Geographers and the College of Science and Technology trained Biological Chemical, Electrical, Civil Engineer, environmentalist, Geological all at the B.Sc level.

Energy Institutions

- **Ministry of Lands, Mines and Energy (MLME)** is mandated to oversee the development and management of natural resources, moreover in water resources sectors, conducts scientific and technical investigation required for environmental assessment. Also responsible for the development of mineral and energy resources of the country and the administration of its lands, coordinate the activities of miners of gold and diamonds including granting of operation

licenses; regulates beach sand mining and works along with the Ministry of Agriculture and the University of Liberia to conduct training and research on land rehabilitation. Additionally, this ministry is the only institution that had conducted studies related to climate change in Liberia during the past 30 years of dataprocessing.

- Liberia Electricity Corporation (LEC), created by an Act of the National Legislature in 1973 with the mandate to generate, transmit, distribute and sell electricity at an economically reasonable price.
- Liberia Petroleum Refining Company (LPRC), plans executed, administer, manage and process crude oil into finish petroleum products for the Liberian market and also ensure that petroleum products are always available.
- Environmental Protection Agency (EPA) promotes environmental awareness; develops environmental policy; institutes environmental protection mechanism and environmental management laws.

Fisheries Institutions

University of Liberia – Biology Department trains biologist engaged in research
Ministry of Agriculture; - Bureau of Fisheries, monitors the fish stocks in the rivers, streams and oceans; conducts research on fish stock depletion.

Forestry Institutions

- University of Liberia – College of Agriculture and Forestry trained agriculturists, agronomists, and foresters.
- Forestry Development Authority (FDA) – prepares forest policies; supervises adherence to forestry legislations and concession agreement; evaluate investment proposals; carries reforestation and forest research and training; provides long and medium training in the forest sector.
- Environmental Protection Agency (EPA) promotes environmental awareness; develops environmental policy; institutes environmental protection mechanism and environmental management laws.

Gender

- Ministry of Gender and Development plans and manages developmental activities with special emphasis on women.

Health Institutions

- Ministry of Health and Social Welfare (MOHSW) – administers the general health services of the country; ensures the availability of quality drugs; collects health statistics and monitors conditions affecting the public health sector
- Monrovia City Corporation (MCC) manages the collection and disposal of the solid wastes in urban areas
- Liberia Water and Sewer Corporation (LWSC) – supervises liquid waste management and sewer facilities.

3.1.1 Non-Governmental Agencies

Society for the Conservation of Nature of Liberia (SCNL)

The Society for the Conservation of Nature of Liberia founded in 1986, is the oldest and pioneer environmental and conservation NGO in Liberia. SCNL advocates for the conservation of the forest of Liberia and associated resources, especially wildlife. The society has been and socio-economic surveys.

Farmers Associated to Conserve the Environment (FACE).

The mission is to help empower local farmers to engage in modern, stable farming practices that sustainable environmental friendly, and has the propensity to yield significant positive net income. FACE is involved in seed rice multiplication and mangrove conservation. The focus is to promote stable, modern farming systems in order to improve food production and enhance the natural environment.

Society for Environmental Degradation (SAED)

Promotes environmental awareness, education and action oriented projects in urban and grass-rooted communities. SAED is involved in working wetlands and water birds management, promoting impact assessment as a decisive making tool for sustainable development.

Center for Environmental Education and Protection (CEEP)

Is the center for Environmental Education and Protection of Liberia (CEEP, has the mission to contribute to poverty reduction through environmental education and public awareness lobby and advocacy in sustainable development. CEEP has been engaged in teaching principles and concepts of environment in schools and the communities through workshops and seminars. There are also ongoing programs in health education population and nutrition mainly for the youth. The organization also provides environmental consultancy.

Environmental Relief and Development Research Organization (ERADRO)

Is involved with the promotion of extension services into identifying the resolve problems arising from environmental factors in basic principles of environmental research, social mobilization, sanitation of health/hygiene education solid/domestic waste programmes in schools and communities

Pollution Control Association of Liberia (POCAL)

Is involved in advocacy for waster management and disposal, organizes nature clubs in schools and supports drama clubs in communities, has establish a botanic garden in Johnsonville, Montserrado County.

Liberia Indigenous Forum for the Environment (LIFE)

Is striving to work with local communities to bring about awareness and empowerment on matters of environment and conservation concerns. One of its thrusts is to ensure that traditional knowledge is respected and maintained in Liberia, and promoted in conservation of biodiversity especially promotion of medicinal plants. LIFE has been concerned about the state of timber species thought to be threatened or vulnerable. LIFE seeks to contribute to sustainable timber management and benefit sharing by local communities in Liberia.

Save My Future Foundation (SAMFU) – Mission is to promote sustainable development of Liberia's natural and human resources. The activities are mostly community-based involving indigenous and local community people. SAMFU's major technique is the participatory rural appraisal method. SAMFU gather and disseminates information on the activities of multinational on the activities of multinational companies operating in Liberia, especially those working in the extractive industries.

Association of Environmental Lawyers (Green Advocates)

Establish in December 2000 by a group of lawyers, strives to create and maintain a multidisciplinary environmental team. Green Advocates Team on the Environment (GATE), comprising not only lawyers but also the professionals with science, engineering and other career background critical to the accomplishment of the groups mission of PROTECTING THE ENVIRONMENT THROUGH LAW. Works with stakeholders in Liberia o promote stakeholders in Liberia to promote environmental protection; provides primarily but not exclusively legal support to green groups and parties who suffer environmentally.

Liberia Community Development Foundation (LCDF)

LCDF implements short and long-term community integrated development projects in conjunction with local community people and secure lasting improvement in their quality of lives. LCDF's aims are to:

1. Organizes basic business management training programmes
2. Effects micro credit programmes
3. Develops intensive agriculture program

Save MY Future Foundation (SAMFU) – Mission is to promote sustainable development of Liberia's natural development of Liberia's 5432.

GECOMSA: In collaboration of the Philadelphia Zoo, is coordinating public awareness and public opinion survey on bush meat in Liberia.

3.1.2 Legal Framework (Policies Regulations) For Natural Resources Management. (The National environment Policy)

- A. The National environment Policy of Liberia provides the underlying principles for environment and Management Law (EPML) under the following section.
 1. Section 4.1 **Conservation Management of Wetland:** Liberia will establish full protection status for wetland of significantly biological diversity.
 2. Section 5.1 **Land use:** Liberia will conduct land assessment evaluation and planning.
 3. Section 5.2 **Forest and Wildlife:** Liberia will conduct forest cover assessment for data. Comprehensive land use planning strategy; promote the concept of community forest; promote the concept of protected species outside of protected area.

4. Section 5.3 **Protected Areas**: Liberia will regulate forestry activities to enhance conservation and environmentally sound management practices establish policy for identification and development of buffer zones in and around protected areas; increase the area system to conserve and sustain management of a representative portion for future generation.

The Natural Resource Law of Liberia Code of Law of 1956.

Chapter 1-4 of Title 24 of the Natural Resources Law of the Liberian Code of Law of 1956 are the modification of the forest Act of 1953 entitled “an Act for the Conservation of forests of Liberia” and the 1957 Supplementary Act for the conservation of the forest of Liberia that incorporated some of the forest and wildlife rules and regulations of 1954.

The 1953 Act established the Bureau of Forest Conservation whose program’s initial policies and primary objectives included the establishment of “a permanent forest estate, made up of reserved area, upon which scientific forestry could be practiced.” The function of the Bureau was to create and administer Government Forest Reserves, Native Authority, Communal Forest, Communal Forests and National Parks; to enforce all laws and regulations for the conservation of forests and the development of their resources; and to carry out a program for wise use and perpetuation of the forest, recreational, fish and wildlife resources of the country (Chapter 1, Section 3)

Forest Resource Management

Forest is fundamental to the Liberian society. Forestry related activities have contributed immensely to the Liberian economy. There are three types of forests; the high forest composed mainly of primary and mature; the secondary forest having a broken and open canopy with a few primary trees; and the low forest, composed mainly of secondary trees and under growth.

The Forestry Development Authority (FDA) and the Ministry of Agriculture (MOA) play a major role in managing the forest resource sector. Forest

cultivation is one of the principal factors leading to increase of wind speed, storm and CO₂ emission. On April 6, 2000, a new forestry law was approved.

The law and related policy addresses several issues, to include;

1. Implementation of existing forest management plan
2. Establish protected area
3. Making environmental impact studies and audits integral part of forest resource management
4. Conduction of education and awareness program on forest resource conservation and management
5. Involvement of local population in the management of forest and associated resources
6. Undertakes reforestation and afforestation program
7. Assessment and inventory of forest resources
8. Regular revision and updating of forest management plan
9. Conducting research in the conservation of forest resources

Sustainable Management of the Fisheries Sector

In this sub-sectors; (Bureau of Fisheries, Ministry of Agriculture 1999) provide about eighty percent (80%) of the needed protein diet for Liberia.

Liberia's fisheries comprise of three main components namely, Marine fisheries involving industrial and **artisan** activities; Inland Fisheries; artisans and agriculture, which is concern fish farming.

Strategies:

The Government will undertake the following as part of sustainable management of the fisheries sector:

- Formulate and enforce fisheries rules and regulations so as to maintain a sustainable yield of fish stock of economic value and importance.
- Encouraging investors to take advantage of the investment code of import appropriate equipment for the fishing industry.
- Ensure the enforcement of established rules and regulations governing the national fisheries of Liberia.
- Effective monitoring marine and coastal zone so as to curtail over exploitation of fish stock and other resource in this zone by foreign vessels
- Conduct breeding ground surveys and study periodic migration habits and other biological activities including their action to various methods of fishing, existing temperature, salinity, marine traffic and for artificial and natural disturbances.
- Building the capacity of the Bureau National Fisheries sector and increase government revenue from fisheries.
- Provide for the regulation and control of injurious species of marine predator.

3.2 Past and Present Capacity Development InitiativePast Capacity Development Initiative

Liberia's First National Communication under Article 4 and 12 of the UNFCCC is not due until September 2005, but Liberia has already initiated the groundwork for its communication by completing three consultancy activities toward NAPA Project; they include the stocktaking and stakeholders consultation on anthropogenic Emissions of Greenhouse Gases (GHGs) in Liberia in September 2004; climate change Vulnerability and Adaptation Stocktaking under NAPA multidisciplinary integrated assessment on November 25, 2004; lastly but not the least the

identification of climate change Adaptation needs and Barriers was concluded in March 2005. It is currently assessing on the economic impact and cost assessment in the various sectors. The main chapters of the communication will include among other the greenhouse gas inventory; vulnerability to the coastal area; vulnerability of agriculture to climate change, etc.

3.3 The Thematic Profile for Climate Change

Views on Climate Change Issue

On November 5, 2002, Liberia became party to the United Nation framework Convention on Climate Change and a signatory to the Kyoto Protocol. Liberia is committed to fulfilling its obligation for reducing greenhouse gas emission into the atmosphere.

As Liberia recover, from 14 years of war, the science and policies of climate change progress, the function at the proposed National climate change committee becomes more challenging to its scientific and technical capacity needs. For effective implementation of the climate change convention and its protocol, Liberia view to enhance, as appropriate technology transfer such as improving access to technology information; creating enabling environment; strengthening local capacity and instituting capacity building mechanism through:

1. Supporting education and training in, and public awareness of climate change related issues
2. Identification of priority sectors, barriers and policy needs;
3. Strengthening the appropriate legal and institutional framework to
 - a. National policy development
 - b. Strengthen and enhance environmental regulatory framework and legal systems by creating supportive backup for their enactment and implementation
4. Strengthening existing and where needed, establishing

- a. Research programmes on climate change variability and climate change, orientated towards improving knowledge of the climate system and scientific capability
- b. System observation and monitoring network (hydrometric monitoring station, climate, fire hazards, land degradation and flood area)
- c. Provide centers and institutions for the provision of research training education and scientific and technical support in specialized field; relevant to climate change, utilizing information technology as much as possible

3.3.1 Liberia Initial National Communication

National Greenhouse Gas Inventory

The stocktaking and stakeholder consultation on Anthropogenic Emission of Greenhouse gas (GHG) was held in September 2004, Liberia provides the opportunity to address the issue of Article II of the UNFCCC. Thus the issue of climate change level of greenhouse gases in the atmosphere, preventing dangerous anthropogenic interference with the climate system has scientific and political components. Both are important for ultimate decision whether given the level is hazardous (dangerous) or tolerable.

The Greenhouse Gases Emission are usually estimated according to international methodologies on the basis on national statistics on energy balances industrial and agricultural production, waste management and land use, forest resources; quality of the environment from the perspective of human health, security of settlement, and safety of transport communication.

Results of the stocktaking on anthropogenic emission of Greenhouse gases.

1. Ministry of Transport, Bureau of Lands Transport vehicle import statistics for the 2001 to 2004 into the country estimated 29,700 vehicles. (10450 sedans, 7100 Jeeps, 4950 Pick-ups, 310 Trailer, 3830 Truck, 3060 Buses)
2. Five year comprehensive analysis of log production estimated 2,502, 068.603M³
3. The quantities of solid waste received at Fiamah disposal site between December 2003 to August 2004 estimated 17,965.856 cubic meters.

4. Gross energy production increased by about 10.3 percent from 520,614 KWH in 2003 to 574,129 KWH in June 2004. A total gross energy production is estimated 119,291.22 KWH. (LEC Input Data June 2004)

Assessment and Implementation of Adaptation Measures:

To adapt to the strategies of climate change the following are some of the measures identified:

1. Encourage the planting of resistant varieties of crops and animal breeding;
2. Encourage irrigation/drainage system
3. Provide trial on exotic tree species;
4. Awareness/participation of local dwellers in forest conservation;
5. Encourage integration in fish culture;
6. Rehabilitation and development of ponds and other inland water bodies used for spewing;
7. Regulate the destruction of mangrove (fish nursery areas) and other fish habitats;
8. Rehabilitation and development of hydro dam system in Monrovia and major cities of the country;
9. Provide water supply to major cities of Liberia
10. Construction (i.e. adequate ventilation in the energy sector)
11. Construction of break water in major coastal cities

4.0.0 IDENTIFICATION AND/OR CONFIRMATION OF PRIORITY ISSUES

In Liberia, climate change is view as a new born child, hence the UNFCCC is being implemented guiding all future activities and programmes based on the identified mitigation and adaptation measures in the on-going national communication NAPA project and (NCSA) project the following sectoral issues were identified for future implementation of the UNFCCC in Liberia.

Energy Sector

1. National Energy Policy Development Programme
2. Promotion and use of the renewable energy resources development
3. Promotion of national transport policy

Agriculture Sector

1. Intercropping system
2. Mechanized farming
3. Proper land use management
4. Ensuring that the necessary ecological infrastructure exists
5. Encourage the planting of resistant varieties of crops and animal breeding
6. Encourage irrigation/drainages system

Fisheries Sector

1. Encourage regulatory policy
2. Fish ponds/inland fish culture
3. Encourage integration in fish culture
4. Modify and strengthen fisheries management policies and institutions
5. Strength and expand catch monitoring

Forestry Sector

1. Providence trial on exotic trees species;
2. Increase in forest cover
 - h. Reforestation;
 - i. Afforestation;
 - j. Community forest;
3. Establishment of plantation; national parks and protected areas in all counties or region of Liberia
4. Introduction and promotion of incentive program; and
5. Promotion of effective management practices and flexible criteria for intervention

Water Resources Sector

1. Support the national rural water Programme
2. Strengthen the professional capabilities of the water sector
3. Assist in the creation of the water and sanitation board and national water policy
4. Evaluate existing hydrological data for multipurpose use and plan an adequate hydrometric network in Liberia
5. Site water resources and hydro geological aspects related to well drilling, well digging and spring development.

Meteorological Sector

1. Establishment of Agro meteorological services
2. Dissemination of meteorological forecast
3. Collection, processing and publication of applied meteorological data to end user such as:
 - Actual evapotranspiration from crops
 - Net radiation over crops
 - Measurement of potential evapotranspiration
 - Measurement of climatological, Hydrological, data.

Marine and coastal Ecosystems

1. Reducing the anthropogenic stresses on coral reefs
2. An integrated approach to fisheries management plan
3. Development of Mari culture and aquaculture management
4. Research needs and information gaps
 - i. The relationship between elevated levels of CO₂ and plant growth
 - ii. Gathering of data for modeling relationship between climate change, ecosystem function

Waste Management Sector

1. Enactment and enforcement of bye-laws
2. Promotion and implementation
3. Promotion and implementation of community-based schemes
4. Promotion of recycling initiative
5. Landfill/Dumps site management
6. Alternative waste-management strategies
7. Wastewater treatment

Forest and Wetland Ecosystem

1. Forest protection through avoided deforestation
2. Encourage forest regeneration
3. Establishment of plantation, national parks
4. Promotion of effective management practices and flexible criteria practices and flexible intervention

The health sector

1. Assessment of past impacts and effectiveness of warning;
2. Climate related diseases transmission dynamic, improved surveillance;
3. Climate, land-use impacts on water quality and health;
4. Health and agriculture adaptation strategies;

4.1.0 Cross-Sect Oral Issues:

Cross-sectoral measures such as research, public awareness, technology development and transfer and capacity building are vital in addressing climate change issues of any nation or region.

The cross-cutting issues on Task Force (CITF) of the proposed National Climate Change Committee (NCCC) to be setup will undertake outreach activities, which included public meeting to solicit support and comment on the measures, educational campaigns and media events. This will strengthen the capacities, with the view of integrating issues related to climate change in national planning.

A. Research and Systematic Observations, including Meteorological, hydrological and Climatological Services

Research Issues and Constraints.

In Liberia, research activity is very low in the economic analysis of mitigation and adaptation measures. The hydrological/meteorological network and the improvement of existing network for providing the fundamental data needed in research activities is a serious constraint.

The national climate change committee on Task force mitigation of greenhouse gases and adaptation to climate change capacity needs, are to be enhanced through training in economic assessment of measure and projects. Another serious deficiency is that, stations have not been in existence for fourteen or more years and needs to be rehabilitated. In view of the constraints of resources, however, the peace of development

has been gradual. There is an urgent need of rapid expansion of data collection network on priority sectors. This could be achieved by international cooperation and technical assistance.

. Systematic Observation

Meteorological phenomena have been observed in Liberia since 1945 under the supervision of the United States of America (USA) Air Force during War World II and later named as Roberts International Airport. The hydrological phenomena have observed since 1972 with a small staff and particularly no usable equipment, under the supervision of the Ministry of Public Works, later transfer to Ministry of Lands and Mines and Energy, the Liberian Hydrological Services Bureau.

Hydrological and meteorological services in Liberia had two synoptic stations eighty hydro meteorological stations, thirty-six rainfall stations and eight climatologically stations operational before the outbreak of country civil crisis 1990.

By the end of 1989, Liberia government received from the World Meteorological Organization (WMO) a satellite ground receiver for weather forecasting, three set of microcomputer for climate data management, data collection platform (DCP); data retransmission system (DRS); micro-computer for weather data transmission and a radar system for weather observation. All of these equipment were installed except the DRS. Presently with the help of United Nations Mission in Liberia (UNMIL) the airport is gaining its pre-war status.

The Ukrainian weather squadron is deployed in Liberia as apart of UNMIL. They are producing similar products from Sierra Leone. UNMIL do not currently make their forecast publicly available. They have deployed weather radar at Roberts International Airport (RIA). The UNMIL aviation section has expressed a desire to see project specification for redevelopment of aviation meteorology through out Liberia.

The water quality laboratory before the civil war had conducted considerable programs under the Liberian Hydrological Services at the Ministry of Lands, Mines and Energy. During the pre-war status, the LHS water lab tested 30 parameters surface and ground water from 400 points on their quality. About 150 observed boreholes, under EEC in the southern region, now 20 boreholes, were done by AICF in the Monrovia area and about 20 boreholes in other areas of the country.

Presently the water quality laboratories of LHS through the financial support from UNICEF/ECHO, the following laboratory equipment are available at LHS to perform quality and chemical analysis.

The Deluge testing kits for determining kits for determining (Bacteriological analysis, Turbidity, Temperature, PH, Chlorine test) 2 calorimeter, 3 conductivity and 4 photometer

C: Regional Systematic Observational Network

Liberia is to benefit from the European Organization for Exploitation of Metrological Satellite (EUM-SAT) meteosat second generation – MSG satellite by the end of the year 2005. The PUMA project is to ensure that up to 41 national meteorological centers in Africa sustain the delivery of the product. The overall objective of the PUMA project is to improve the standards of living and environmental Management in Africa and to provide information useful for development, environmental security and poverty elimination on the continent, through the satellite transition process.

Priority activities related to systematic observation

1. Re-establishment of hydrological and metrological stations throughout the county;
2. Generation of vital data for the planning of sustainable program in Agriculture, water resources management and hydropower supply;
3. Strengthening the human resources and capacity of the institutions involved in collection, processing and maintenance of data and information related to meteorology, hydrology and climatology

4. Link the various climate change institutions to the MSG satellite to provide a bigger capacity data processing and storage expansion for the upgrading. Networking and interconnectivity of the various data base systems of the departments and other collaborating institutions.
5. The replacement and upgrading of the convention equipment to digital equipment to minimize human interaction and also to provide continuous recording of the meteorological, hydrological and climatologically element and other atmospheric phenomena.

D. Capacity Building and Technology Transfer

Recalling the relevant provision of chapter 34 of Agenda 21 on transfer of environmentally sound technology, cooperation and capacity building, Liberia is committed to mitigate and facilitate adequate adaptation to climate change.

The biggest tragedy in the Liberia civil conflict was the mass exodus of many professionals and highly trained technicians. This resulted into a serious brain drained situation.

United Nations agencies and other international organization should train professional staff of sector involved in climate change activities. Such technology should shift from fossil to renewable (solar and wind) energy.

Solar energy technology will go along way in the health, communication, water resources, and commercial and Residential sector of the economy. Liberia is already aware and reception of clean technologies. The needed technologies are determined by the mitigation and adaptation options and capacity development activities identified in the National Communication documentation developed by Liberia in collaboration with multilateral and bilateral development partners.

E.. Education, Training and Public Awareness

Education:

Climate and climate change is very new in Liberia educational system. The subject like climatology is offered for two semesters by the Department of Geography at the University of Liberia. There is no institution in the country that offers degree Programme in Meteorology, Environmental studies and Hydrology. Liberia is for the first time to offer a degree Programme in Environmental studies as of the next academic school year (2006) at the University of Liberia. There is a need to build both the physical and human resources capacities of the University of Liberia and the Environmental Protection Agency to better handle climate change curriculum.

Training

1. Training and Climate Change Vulnerability and Adaptation

Participants to the two weeks workshop on the identification (mapping) of vulnerability with participatory appraisals randomly selected localities within the four regions of the county. The technical team comprising of resource persons was formulated and trained in techniques of participatory Assessment (PA) and the use of Geographic Positioning System (GPS) for vulnerability mapping purpose

2. (Wagtech International Water Quality Testing Seminar)

Participants to the one-day seminar were trained by and international expert from England on Wagtech Equipment (Water quality Kit). 20 participants from government, NGO and UNICEF attended the seminar.

3. NAPA (workshops and seminars)

For every National Consultant's report, workshop were held for two days each. 100 participants attended each workshop to review the consultants reports and make recommendations. The participants included NGOs, Government Institutions and the private sector.

Public Awareness

Public awareness and knowledge of climate variability issue should be promoted especially through media and seminars, it is particularly important to target decision-makers with accurate information on the causes and consequences of climate change..

4.1.1 Capacity Constraint and Opportunities for Capacity Building

Institutional Capacity:

1. The development of a comprehensive climate change action plan and integrated implementation strategy that takes into account the capacity building needs of the various institution participating in climate change activities particularly in research and training.
2. Lack of education and training programmes, and specialized skills or expertise in scientific institutions with the necessary background.
3. Enhancement of public awareness at all levels with the ultimate objective of improving decision and policy-making, through reorientation and development of appropriate policies.
4. Lack of synoptic or upper air station in monitoring the atmospheric phenomena at county airport or airstrip

Individual Capacity

- 1 Inadequate qualified staff to provide effective services and effectively manage climate change sectors.
- 2 Climate change issues are absent in the educational system.
- 3 .The curriculum used in schools and universities should be expanded to cover climate change issues.
- 4.Mass media techniques such as video, radio, print media and traditional communicators could be used in well-designed campaigns aimed at achieving the campaigns aimed at achieving the desired results in climate change by using local vernacular.

Capacity Constraints at the System Level

At the system level the current global, regional and national policies; strategies and regularity measures do not adequately take climate change into consideration.

Develop national policies and programmes to take fully into account climate change as a sustainable development path. The policies should lead to reduced pressure on resources and enhance adaptive capacity.

At stakeholder consultation and various workshops on climate change have contributed to increasing the public awareness in Liberia on climate change issues.

4.2.0 Prioritization Of Issues

The UNFCCC obliges every contracting party to prepare the COP. As part of the on-going national communication project and the National Capacity Self-Assessment, the level of achievement in building the capacity to implement climate change convention in Liberia is very low.

The level of capacity building can be achieved through training, workshops and provision of data processing equipment to undertake the following priority under the UNFCCC.

1. Inventory of GHG effect:

- a. Sectoral inventories of principal greenhouse gas effect;
- b. Creating a national database of GHG emission;
- c. A system for regular updating of data on GHGs report from training workshops and corrective measures put forward.

2. National Strategies for Reducing GHG Emission

- a. Thematic sectoral studies on option for reducing emission
- b. National strategies to limit and correct effort of GHG emission;
- c. Measures to limit GHG emission and implementation measure;
- d. Report of workshops conducted in the process;

3. Study and Analysis of Climate Evolution and Climate Change;

- a. Data to facilitate the measurement of future climate change phenomenon readily available;
- b. Climate change resources for response models developed;
- c. Importance of the vulnerability of resources, the ecosystem and species;
- d. Stakeholder information on climate change risks

4. Adaptation Measures, Policies of Implementation and Action Plan.

- a. Identification of adaptation in various sectors and selected ecosystem;
- b. Stakeholder information choice of priority adaptation measures on economic and technical basis;
- c. Strategies and action programs for implementation of adaptation options;
- d. Establish rapid intervention plan in the event of national disaster and medical preparation
- e. Two pilot projects to support NAPA strategy;

5. Communication of Information

- a. Identification of needs and constraints in area of research, technical and financial requirement for providing climate change data in Liberia and to reduce the error margin.

6. Strengthen of Capacity, Education and Training with the view of Integrating Issue Related to Climate Change National Planning

- a. Strengthen of capacity for planners, decision maker and research and specialized institution
- b. Integrating of climate change components into education materials

7. Programmes Link to sustainable Development, resource, Public Sensitization

- a. Launching of community projects;
- b. Information kits, audio-visual aids, publication

PRIORITIZATION AND CAPACITY NEEDS – CLIMATE CHANGE TABLE 2

Issue	Scale of Problem	Level of Concern	Ability to Adequately Address Issue	Priority Ranking
Inventory of GHG Effects				
Various Sectors				
• Energy	High	High	Low	1
• Agriculture	High	High	Medium	2
• Forestry	Medium	High	Medium	3
• Waste Management	High	Low	Low	4
• Transport	Low		Low	5
National Strategies for Reducing GHG Emission	Local	Global	National	1
Study and Analysis of Scenario of Climate Evolution and climate change	High	Low	Low	1
Public Awareness of Climate Change	High	Low	Medium	2
Program Link to sustainable Development	Medium	Medium	Low	3
Resource, Public Sensitization	Medium	Medium		
Vulnerability to Current Climate Variability and climate change	High	Low	Low	1
Key Adaptation Measures	High	Low	Low	1
Review available/Existing institution, Policy and Legislative measure in each Sector	High	Low	Low	1
Education, Research and Training	High	Low	Low	1
Environmental Sound Technology	High	Low	Low	1

Enter: Local, Regional, National of global

Enter: Low, Medium of high

Ranking from 1 to 5 of the problem being faced by the county

(1 = most severe problem(s))

Z = Second most severe problem, etc.

CAPACITY CONSTRAINTS MATRIX TABLE 3

Priority Issues	Individual Capacity Constrained	Institutional Capacity Constraints	Systemic Capacity Constraints
Rehabilitation of climate change institutions with needed scientific technology to implement UNFCCC in Liberia	Individual members of climate change committee are constrained by the poor working environment	The national climate change committee, expertise Task Force proposed and its collaborating institutions are constrained by financial resources with the appropriate scientific and technical assistant.	Limited or non-existence of an enabling environment is a constrain
National or regional strategies for improving and updating the inventory of GHG Emission	Individual member of the proposed NCCC are constraint by the lack of training on climate change issue.	The proposed NCCC and its collaborating institutions are constraint by the lack of appropriate training on climate change issues.	Limited non-existent environmental technology is a constraint
Limited technology, technician, professional at the national level in the assessment of adaptation and mitigation option	Individual members of NCCC are constraint by lack of training to handle climate change issues.	The National climate change committee, to be set up by NAPA Project and its collaborating institution are constraint by financial resources with the appropriate scientific and technical expertise	Limited or non-existence of an enabling environment is an constraints.
Current policies, strategies and regulatory mechanism have limited in or no consideration of climate change issues.		NCCC and its collaborating institutions are constrained by human resources with the appropriate scientific and technical expertise.	Limited or non-existence technical infrastructure and depleted expertise is a constraint.

4.3.0 Cross-Cutting Issues (Education, Training And Public Awareness, Research And Systematic Observation)

1. Adequately strengthen the capability of National Meteorological and Hydrological Services and improve the network for the measurement of climate and environmental elements.
2. Public awareness and knowledge of climate variability and climate change issue should be promoted especially through the use of mass media techniques such as television video, radio, print media, traditional communicator and extensive campaigns.
3. Strengthen the human resources and capacity of the various institutions involved in collection, processing and maintenance of data and information related to Meteorology, Hydrology and Climatology.
4. Renovation and refurbishing of Governmental institution housing meteorological, hydrological water resources and environmental activities.
5. Improve the capacity of the members of the NCCC through training scientific assessment of mitigation and adaptation measures and projects.
6. Introduce climate change study in institution curricular and develop educational and sensitization material to enhance public awareness

Stakeholder Engagement And Barrier

1. Identify Stakeholders
2. Integrate Stakeholder involvement across capacity building process

BARRIER:

- Policy based barrier (regulation and standards that may preclude new technologies ,institution and legal obstacles);
- Market Structure: This involves monopoly powers or dominant.
- Consumer Framework;
- Social and cultural acceptability;

Implementation: Actions And Opportunities

1. Assess adequacy of Financial Resources;
2. Ensure Transparency;
3. Identify potential synergies ;
4. Identify ways to Reduce Barriers;
5. Continue Stakeholder involvement and
6. Revise Plans , as needed

5.0.0 GAPS AND GAP ANALYSIS

The major recommendation and way forward from the NCSA project, among many others, are the lack of trained human resources, public awareness, reliable update of data, and financial support from international, regional and national communities in implementing the United Nations Framework Convention on Climate Change (UNFCCC) in Liberia.

Lack of Expertise

The following gaps were identified as being responsible for trained human resources:

- Many trained Liberian personnel were killed or left the country during the civil conflict 14 years ago.
- Inadequate training on the impacts of climate change and variability (Extreme events) on Health, Forestry, Agriculture, Meteorology/Hydrology, Energy Sector, etc.
- Insufficient financial resources for facilitation of human resources development on climate change institutions.

Strategies:

- Engage national metrological/Hydrological and environmental institutions representative in a multi-disciplinary team and charge them with the assembling of data, and the interpretation of data analysis;

- Integrate relevant training needs in the curriculum of the relevant existing training institutions;
- Research needs and information gaps on the influence of climate in priority sectors.

Lack of Public Awareness

- Poor or inadequate content and focus of information contained in interlink ages between biological diversity, land degradation and climate change considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto Protocol.

Strategy:

- Repackage the information coupled with effective communication at the regional national and local level.
- Target decision-makers with accurate information on the causes and consequences of climate change.

Lack of Reliable Update of Data

- Adequate strengthen the capabilities of national meteorological and hydrological services to improve monitoring system.
- Exchange data sharing among departments or establish national climate database center with climate change unit at EPA.

Strategy:

- Gathering of data modeling relationship between climate change, ecosystem function, and biodiversity relative response of individual species to climate change and predicating community structures under climate change scenarios.
- Establish information sharing and networking of the Emission of GHGs from industrial processes, Agriculture Forestry and land use, etc.

SUMMARY OF CAPACITY BUILDING NEEDS FOR LIBERIA TABLE 4

	Capacity Needs	Activities	Quantification of Resources
<p>a. Improved national policy and decision-making process on climate change</p> <p>b. change</p> <p>c. Research and systematic observation</p>	<p>Training more Technician and Scientists.</p> <p>Improved or rehabilitate the deterioration of network and improve data and information availability. Improve the various research institution such as (CARI, Liberian Hydrological services and EPA)</p>	<p>Develop the scientific and technical capacities of the scientist and technicians for effective and efficient participation in negotiating involving climate change issues such as those the COP and its subsidiary bodies</p> <p>II. Participation in scientific and socio-economic assessments of climate change conducted by the (IPCC) Intergovernmental panel on climate change and other scientific bodies</p> <p>Rehabilitate the existing data collection network.</p> <p>Provide transportation</p>	<p>4 Automatic weather stations one in each region. 25 hydrometric stations, 2 discharge measurement equipment 2 motor boats refurbishing of water quality laboratory and acquisition of geophysical equipment; data processing center; office equipment and furniture; water and sanitation resources center. Two (2) standard Toyota land cruiser station wagon. Maintenance cost.</p>
<p>d. Vulnerability and adaptation assessment</p>	<p>Enabling activities for integrated vulnerability and Adaptation assessment into national sustainable development programs of action. Specialized fields relevant to vulnerability assessment and implementation of adoption activities</p>	<p>I. Implement the enabling activity;</p> <p>II. Develop and submit a detailed proposal for an enabling activity</p> <p>III. Identify sectors that need in-depth integrated vulnerability and adaptation study.</p> <p>IV. Develop plans and provide the human, material and financial resources to assessment on a sustainable manner. Providing training in specialized fields such as climate change. GHG modelers, climate change impact analysts, Geographical information system, environmental impact assessment hydrology.</p>	<p>Enabling activity on vulnerability and adaptation study as part of the national communication document.</p> <p>2 training on GIS</p> <p>2 trainee on EIA</p> <p>2 trainee on Hydrology</p> <p>2 trainee on climate impact analysts</p> <p>2 trainee on GHG model</p> <p>2 trainee on Land degradation</p>

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APPENDIX –ONE

Listing of Stakeholders

1. Ministry of Lands, Mines and Energy
2. Ministry of Agriculture
3. Ministry Commerce and Industry
4. Ministry of Transport
5. Ministry of Health and Social Welfare
6. Ministry of Public Works
7. Liberia Electricity Corporation (LEC)
8. National Port Authority (NPA)
9. Ministry of Planning and Economic Affairs
10. Ministry of Rural Development
11. Liberia Water and Sewer Corporation
12. NICOM Distillery
13. Liberia Marketing Association
14. Petroleum Retailer Association
15. Refrigerator and Air- condition Service Association
16. Monrovia Slaughter House
17. Cuttington University Liberia
18. University of L Iberia
19. United Methodist Episcopal University
20. United Methodist University
21. Monrovia Club Breweries
22. CEMENCO
23. United States Trading Company
24. Firestone Rubber Plantation Company
25. Forestry Development Authority
26. Liberia Agriculture Company
27. Monrovia Bakery
28. Monrovia City CORPORATION
29. Italian Bakery
30. Liberia Garage Union
31. Ministry of Education
32. Ministry of Information
33. Ministry of Justice

APPENDIX-TWO

Priority Area For Action(Field Level Indicator on Climate Change)

Indicator Category	Methods of Measurement
Climate Indicators	<p>Rainfall : Rainfall variability during the wet season : Rainfall intensity as measured by daily, monthly and annual rainfall total : Statistical analysis of daily depth of point precipitation including estimation of probability distribution of Maximum annual value of daily rainfall depth : The Spatial field of rainfall with area rainfall estimation by mean of deterministic model</p> <p>Rainfall : Cloud type</p> <p>Wind Pattern : Wind direction and speed</p> <p>Upper Air : Normal and actual daily maximum Meteorological parameter (daily mean)</p>
Ecological Indicator	<p>Water Status : Estimation of evaporation and evapotranspiration (daily, weekly, monthly or yearly)</p> <p>Vegetation : Vegetation characteristics as measured by its quality, growth form, rate of regeneration and succession in formerly cultivated</p>
Social-Cultural Indicators	<p>Vegetation : and distributed fields or grazing lands, change in perennial and annual composition, prevalence of key species and vegetation yield and productivity</p>
Hydrological indicators	<p>Water Resources : Measurement of peak discharge : Flood study : Techniques of Hydrological investigation NETWORK : Water Quality</p>
Economic indicators	<p>Population : Population estimates and fertility rates</p> <p>Raising Awareness : Extend of local NGOs training schemes Local incentives programmes for abatement of climate change</p>

APPENDIX-THREE

STATUS OF ON-GOING PROJECT ACTIVITIES UNEP/GEF FUNDED PROJECTS

Previous Selected Activities	Executing Agency	Status	Response Strategy Relevant to NCSA
National Biodiversity Strategy and Action Plan (NBSAP) under CBO	EPA	Completed	Environment and Protection management laws approved
GEF funded enabling activity under Biosafety	EPA	Completed	Biotechnology transfer for safe use/public awareess
GEF funded POPs enabling activity	EPA	On-going	: Regional Planers : Chemist : Biologist Consultants
GEF funded: Climate Change enabling activity	EPA	On-going	Biological Scientist Consultants
GEF funded Ozone enabling activity	EPA	On-going	Chemist, electrical engineer Consultants
GEF funded : Guinea Current Large Marine Ecosystem	EPA	Approved	To commence June 2005

