



THE REPUBLIC OF LIBERIA

NATIONAL INTEGRATED WATER RESOURCES MANAGEMENT POLICY

MINISTRY OF LANDS, MINES AND ENERGY

In Collaboration with the

Ministry of Health and Social Welfare (MOH), Ministry of Rural Development (MRD), Ministry of Planning and Economic Affairs (MPEA), Ministry of Agriculture (MOA), Ministry of Public Works (MPW), Environmental Protection Agency of Liberia (EPA) and Liberia Water and Sewer Corporation (LWSC)

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FOREWORD

Liberia is endowed with abundant rainfall and easily accessible groundwater in most areas. Its fresh water, like everywhere else globally, is a natural resource vital for human survival, socio-economic development and maintenance of the environment. The resource is finite and vulnerable and there are already worrying cases of pollution and degradation of national water resources afflicted by both natural and human factors.

The water resource potential of the country is enormous but lacks adequate and proper management. This situation has been exacerbated by the effects of the civil war just ended. There is, therefore, a compelling need for a well coordinated and integrated approach for the development and management of the nation's water resources (Integrated Water Resources Management). Moreover, a framework is required through which priorities can be established and the protection and optimal use of the water resources planned and implemented.

Along with the poor access to adequate sanitation and the contamination of water bodies by domestic waste, the Government is concerned that most of its population does not have access to clean and safe drinking water. The major challenge is to ensure that this social service is delivered to everyone.

The country's reconstruction program and the need for environmental management demand that attention be paid to the problems of water resources management. These resources can be harnessed to make a significant contribution to the national economy thereby making the benefits accessible to the citizenry of Liberia.

The urgency for an integrated approach to water resources management with full coordination between the water related sectors cannot be over-stated. Unlike in the past, Liberia now has its first comprehensive National Integrated Water Resources Management Policy.

This policy will guide development efforts aimed at achieving the maximum net benefit from these resources in a sustainable manner for the livelihood of present and future generations. It also addresses current water management issues and adopts the objectives and strategies envisaged in the Millennium Development Goals. In addition, the policy and strategies have been set against the Government's overall goals for social and economic development, as well as the democratic, decentralization approach to development.

The sustainable development and national utilization of the water resources are our collective responsibility; it requires commitment, political will and shared vision.

**WATER IS ONE OF THE WORLD'S MOST
VALUABLE RESOURCE-LET US VALUE IT.**

November 2007

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INTRODUCTION

Liberia is endowed with abundant water resources, but the proper management and planning of these remain crucial to meeting the national priorities and goals and reducing conflicts between competitive uses. This problem is further compounded by various administrative, technical and political problems, particularly the poor state of the Liberian economy after 14 years of civil strife.

Water governance in Liberia has been fragmented between several agencies and there is no coordination across these agencies. The absence of a solid framework for water resources management is one of the reasons why significant water issues are occurring. Water quality is considered to be decreasing.

The development of a framework for water resources management in Liberia is starting with this National Integrated Water Resources Management Policy, which comprises of a set of high level political decisions on how water resources shall be managed, how priorities shall be set and which mandates the relevant agencies shall be given. The national Integrated Water Resources Management Policy is needed to expand on the constitutional principles of national water resources management and to provide good water governance. It is part of the enabling environment facilitating efficient public and private sector initiatives and interventions.

The National Integrated Water Resources Management Policy adopts an integrated approach and encourages the participation and support of all stakeholders in the water sector. The effective management of water resources constitutes a key factor in the efforts to improve the economic and social conditions within the country.

The National Integrated Water Resources Management Policy is intended to assist decision-makers and resource users in determining the roles in water resources management, "who does what and how", and in making priorities at the national level as well as at the private sector, local community and individual levels.

The present document starts with a brief on the Liberian policy development context with a focus on the key issues to be addressed by the policy. The brief is followed by a series of policy elements including a vision, policy objectives, guiding principles and strategies. The Water resources management framework is then outlined in sections regarding management functions and structures.

Domestic water supply is a key area for improvement in Liberia and policy decisions in relation to water use, service levels and technologies are given. The chapter is followed by considerations regarding water for agriculture, water for industry and for other purposes.

Policies regarding water allocation and discharges are given next with clear guidance for priority setting. The need for monitoring, assessment and .research to ensure that the policy has the intended impact is outlined. Policy implementation areas and actions are given in the last chapter.

POLICY DEVELOPMENT CONTEXT

Climate and Water Resources

Liberia is situated on the southwestern corner of the West Coast of Africa. It has a surface area of about 111,400 sq. km. out of which 14% is covered by water. Liberia borders Sierra Leone to the west, Guinea to the north, Côte d'Ivoire to the east and the Atlantic Ocean is found to the south.

Liberia has a tropical climate with relatively small variations between day and night and between seasons. Temperatures never exceed 37 degrees C. There are two seasons - the wet season from May to October and the dry season from November to April. The annual rainfall averages 4,320mm inland. The average humidity in the coastal belt is 78% during the wet season, but it is liable to drop to 30% from December to March when the Harmattan winds blow from the Sahara.

There are several important rivers in Liberia. The longest is the Cavalla River shared between Liberia and Cote D'Ivoire while the Mano River is shared between Liberia and Sierra Leone. St. Paul River is the second longest river feeding Mt. Coffee hydro-electric plant and providing the bulk of the raw water for Monrovia.

There are only two major lakes in Liberia – Lake Shepherd in Maryland County and Lake Piso in Grand Cape Mount County, with Piso being larger of the two. Both of them are situated along the Atlantic Ocean, with Lake Piso characterized by a vast expanse of wetlands and lowland forest vegetation.

Generally, groundwater is available and can be exploited in most parts of the country in amounts needed for rural water supply, which relies on dug wells and to some extent on drilled boreholes. Data from the rural water supply program indicate that the depth to the water table in shallow wells can be less than one meter. Drilled boreholes can be as deep as 100 meters. Reliable data on boreholes and yields are, however, scarce.

Data on water quality both from surface and groundwater are scarce. Domestic sewage, however, causes many problems as the only conventional sewerage system, which was already poorly functioning before the civil crisis, is out of operation. Some sewage water is collected by vacuum trucks and disposed of into lagoons and other water bodies. In some areas there are indications that water quality is deteriorating due to mining, logging, farming and industrial activities.

Socio-economics

Liberia's population is approximately 3.3 million people (2003) with an annual growth rate of 1.7%. The 2003 figure corresponds to an average density of 30 persons/sq. km. Monrovia is the largest city with a population of 480,000 (1999 estimate). The distribution of urban to rural population was 45/55 in 2001.

Liberia is presently divided into 15 major administrative subdivisions called counties. Each of these subdivisions is headed by a superintendent who serves as the vice juror to the President of Liberia. An assistant superintendent for development is concerned with the development aspects of the county. There are 16 major ethnic groups in Liberia.

During the 1950s, Liberia was among the highest achievers in terms of economic growth with a real annual growth rate of 12%. This high growth rate was fuelled principally by the buoyant world market prices of the country's principal exports of iron ore, rubber, timber, cocoa and coffee. There was also significant production of food crops. It is notable that Liberia adopted an "open door" policy to external investment, which resulted in considerable success in attracting foreign investment in mineral and rubber production. However, the 1970s and 1980s saw negative growth rates.

The unequal pattern of Liberia's growth and development process and declining livelihood opportunities for an increasing proportion of the population, combined with a prolonged period of poor governance, were the primary underlying causes of the civil war that erupted in late 1989. The dramatic effects of the war aggravated the policy and structural deficiencies of the economy, thereby accelerating the long-term social and economic decline. Foreign trade, which historically served as the main impetus for growth, was disrupted.

Civil war and mismanagement have destroyed much of Liberia's economy, especially the country's infrastructures while international sanctions on diamonds and timber exports limited growth prospects for almost half of a decade (2000 – 2007?). Many businessmen have fled the country, taking capital and expertise with them. The reconstruction of infrastructure and rising of incomes in the ravaged economy will largely depend on financial support and technical assistance from donor countries.

Legal framework

Presently, there is no concrete comprehensive legal framework governing water resources in Liberia. Neither has there been an effective National Integrated Water Resources Management Policy guiding the water resources development, use, protection and conservation. Nevertheless, the Public Health Law of the code of 1956 revised in 1975 into Title 33, the Act Establishing the New Public Health Law of Liberia Chapter 24 contained the Liberia's first Water Pollution Control laws. The key objective of Chapter 24 was to protect the water resources of Liberia.

The Environment Protection and Management Law of the Republic of Liberia was approved November, 2002 with the key objective to ensure a sound management of environmental and natural resources.

International Commitments

Liberia belongs to the Mano River Basin Organization known as the Mano River Union (MRU), comprising Sierra Leone, Liberia, and Guinea. The Mano River Union Agreement was signed by representatives of the three countries in 1973. The Union's secretariat has established a fruitful collaboration with development partners.

The Government is committed to working towards achieving the aims and objectives of the Millennium Development Goals. Liberia's post-war Interim Poverty Reduction Strategy (iPRS) strongly supports 'providing water and sanitation'. The strategy overall objective 'is to increase safe drinking water and improve sanitation (healthy environment) for all in urban and rural areas' (iPRS, 2006 p.78). Furthermore, the Government has endorsed the general objectives of the International Drinking Water Supply and Sanitation Decade (IDWSSD) since its inception in 1980.

In addition, the declarations and guiding principles emanating from international fora on water resources management, which culminated in the UN Conference on Environment and Development (UNCED) in Rio de Janeiro (June 1992), especially Agenda 21 chapter 18 on freshwater resources have been endorsed by the Government.

Institutional framework

General situation

The water resources management responsibilities are fragmented across several government agencies. The absence of a water policy, legal framework and a strong coordination mechanism led to the decreasing water quantity and quality even though Liberia potentially has substantial water resources. With the introduction of Integrated Water Resources Management (IWRM) in Liberia, a comprehensive framework of policy and environmental laws is now a key objective.

COORDINATING BODIES

National Water Resources and Sanitation Board (NWRSB)

A National Water Resources Board was formed in 1980 in recognition of the need to adopt a coordinated approach to water development especially in lieu of the International Drinking Water and Sanitation Decade. The Ministry of Lands, Mines and Energy served as the Chairman while the Liberian Hydrological Services served as the Secretariat. The board worked on coordination of all activities in water resources development, reviewing of sectoral regulations and drafting of Water Legislation and Policy. The board has stopped operating, but is not formally dissolved. This board prepared Liberia's first water and sanitation Action Plan covering 12 years (1985 – 1997) in response to the International Drinking Water and Sanitation Decade.

National Public Health Committee

Established in 1986, the committee coordinated the water and sanitation affairs in the absence of the NWRSB. This committee was an Ad-Hoc committee constituted to spearhead the mitigation of serious garbage problems in the City of Monrovia as the result of the NWRSB inability to function effectively.

WATSAN

Later, the Water and Sanitation Coordinating Committee (WATSAN) was established in 1992 and tasked with coordination of the activities of the water sector institutions in the country. WATSAN produced a working guideline for the institutions. Among others, they were required to present an annual monitoring and evaluation report to the Committee.

International Partners

The following are International Development Partners offer for support to the development of water resources and implementation of sanitation projects:

UNICEF, UNDP, EU, UNEP, USAID, DFID, AFDB (AFW) and WRCU (ECOWAS)

Other key stakeholders

Non- Governmental Organizations (NGOs)

In addition to the government agencies, several Non-Governmental Organizations (NGOs) are involved in the water and sanitation sector in Liberia. Others are Coalition of Environmental NGOs, OXFAM, SCF-UK, etc.

Ministry of Lands, Mines and Energy

Ministry of Lands, Mines and Energy has the overall responsibility for water resources management and granting of water permits with the Liberian Hydrological Service Bureau of the Ministry serving as the Secretariat. The Secretariat also serves as the focal point for hydrological data collection and storage. It provides technical support to other government agencies, and provides basic information on all aspects of water resources development, including water quality issues. The Ministry through the Liberian Hydrological Service had monitored over 40 hydrometric networks prior to the inception of the civil crisis. The hydrometric networks monitored included rain gauges, staff gauges and discharge measuring units.

Ministry of Rural Development

Ministry of Rural Development was charged with the responsibility for providing water supply and sanitation services to the rural population. This ministry provided boreholes, hand dug wells, spring boxes and VIP Latrines thus serving numerous rural inhabitants. This ministry is now paused to be incorporated into the Ministry of Public Works.

Ministry of Health and Social Welfare

Ministry of Health and Social Welfare is concerned primarily with health care delivery and is mandated in the water sector to make water quality assessments, in particular for domestic water supplies. The ministry sets standards of water quality and environmental health.

Ministry of Agriculture

The Ministry of Agriculture has been involved in the provision of safe and adequate water supply to their respective agricultural project localities.

Ministry of Transport

Ministry of Transport regulates the use of inland waterways.

The Liberia Water and Sewage Corporation

The Liberia Water and Sewage Corporation", was established in 1973 and mandated to provide safe drinking water for both the urban and rural population of Liberia. It operates on a commercial basis, although it provides basic water requirements to the urban poor at no cost.

Environmental Protection Agency

The Environmental Protection Agency (EPA) has the mandate to promote environment awareness and develop a national environmental policy for the country. The agency was established in 2003. EPA is responsible for coordinating, integrating and harmonizing the implementation of environmental policy and law under the guidance of the Environmental Council.

Key Issues in Water Resources Management

Water resources are under increased pressure from population growth, uncontrolled disposal of waste, agricultural activities, mining, logging, aquaculture and activities in other economic sectors. Upstream-downstream issues in terms of decreased water quality occur more and more frequently and urbanized areas contribute to the degradation. The degraded water quality leads to health risks as reliable water supply and sewerage infrastructures are lacking and as domestic water often are taken directly from surface water bodies. The vast and valuable productivity of the ecosystems of coastal lagoons, estuaries, deltas and mangroves needs to be maintained, not least because they are a rich source of fish protein.

Urban population ‘explosion’ due to movement of people from rural to urban centers, the lack of human capacities to manage the resources, and other factors impede the achievement of the MDGs.

The key issues which are to be addressed to conform to the Integrated Management of Water Resources are:

- Population growth In Urban Areas

The population in most urban cities in Liberia is exponentially growing with overwhelming effects on social amenities, such as water supply and safe means of sanitation. The population growth in these cases exerts enormous pressure on the water resources. Addressing this trend is one major key issue to water resources management.

- **Inadequacy of Human Resource Capacities**

The shortage of adequately trained water resources practitioners especially due to ‘brain drain’ in third world countries, with Liberia been no exception, hinders the management of water resources. Training opportunities are readily not available.

- **Uncontrolled disposal of waste**

The indiscriminate disposal of wastes poses serious challenges in to the management of water resources. Most of these wastes are eminent sources of pollution and impairment of drainage systems

- **Water activities fragmented amongst ministries and institutions**

- **Level of Development of Water Resources for various activities (Agricultural, mining, logging, aquaculture and activities in other economic sectors).**

- Human encroachment on ecosystems of coastal lagoons, estuaries, deltas and mangroves
- International cooperation and Riparian (shared) rivers.

INTEGRATED WATER RESOURCES MANAGEMENT POLICY

General

The Integrated Water Resources Management Policy promotes a new integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people. This new approach is based on the continued recognition of the social value of water, while at the same time giving due attention to its economic value. Thus, allocation in water resources development, shall aim at achieving the maximum net benefit to Liberia.

Although the State is the ultimate custodian of the water resources, the aim of the policy is to achieve a public sense of ownership thus mobilizing the people's resources to assist management, protection and conservation of this natural resource. The policy is designed to be a broad-based charter, which must be recognized by all concerned sector institutions, and be taken into account by all projects and programs, both public and private.

The policy covers two broad areas;

- *Water resources management*: Covers the management framework including policy objectives, principles and strategies for the monitoring, assessment, allocation and protection of the resources.

The Ministry of Lands, Mines and Energy shall have the overall responsibility for water resources management, regulation and coordination activities.

- *Water resources use*: Covers the policy objectives, principles and strategies for the development and use of water for people [domestic water supply], water for Food Security [agriculture], water for industry and other water uses such as hydropower, recreation, Non-Revenue-Water (fire hydrants and trucks) and water for maintenance of productive ecosystems.

Water reservoirs should be located in every community for supplementary use.

The water policy shall be a dynamic instrument. It will be re-assessed from time to time to ensure that it is effectively responding to new experiences and changed circumstances.

Vision

It is the vision of the Government and people of Liberia that by the year 2015 the country's water resources will be developed integrally with land and other natural resources and managed in an efficient, environmentally sound, equitable and responsible manner, with due consideration to all varied and conflicting or competing uses at national, county, district, clan and village/community levels, in order to satisfy present societal needs and demands for water, water related goods and services, and to preserve the ecological functions of water resources; without compromising the ability of future generations to satisfy those same needs.

The fundamental component of the Integrated Water Resources Management (IWRM) process is the establishment of a comprehensive water policy, to reform and develop institutions and to put integrated water resources management into practice. Liberia has set its vision, but the crucial aspect is to create both public and political awareness and commitment to *start on the road towards the Vision*.

GOALS

The Goal is to use the principle of Integrated Water Resources Management (IWRM) and adopt a strategy to achieve the vision of development efficiency and effectively manage a system for the sustainable development of water resources in Liberia:

- To ensure full socio-economic benefits for present and future generations
- To ensure access to safe and adequate water for people (i.e. domestic water supply)
- To ensure the availability of adequate quantity and quality of water for the environment and ecology (i.e. nature)
- To ensure the availability of sufficient quantity and quality water for food security (i.e.: food production)
- To ensure availability of water for other uses (i.e.: hydropower generation, industrial use, water transport, recreation and firefighting).

Objectives

The policy is intended to guide Liberia towards the following:

- To foster our vision of efficiently integrating and managing Liberia's water resources for sustainability and development
- To increase access to safe sanitation to meet the MDG by 2015,
- To create a governing body for sustained water and sanitation management in Liberia to ensure full social and economic benefits,
- To ensure capacity building for water resources management and execution of the unified state policy on use and protection of water resources both at the national and international levels;
- To eliminate cross-cutting mandates and ensuring a centralized strategic planning, implementation and monitoring Mechanisms.
- To create Local Water Coordination Units (WACUs) at the county, district, and community levels under the auspices of the Ministry of Lands, Mines and Energy
- To ensure the training and capacity building of the local WACUs
- Empowerment of local WACUs
- To establish National water and ecological Information Center.
- Mitigation of natural disasters and the effects of climate change

Guiding Principles

Liberia has adopted the guiding principles for water resources management that emanated from the International Drinking Water and Sanitation Decade Dublin-Rio de Janeiro (UNCED) process and Agenda 21's Chapter 18 on freshwater resources.

These guiding principles recognize:

- Freshwater as a finite and vulnerable resource, essential to sustain life, development and the environment
- Management of water resources to take place at the lowest appropriate levels
- The role of Government as an enabler in a participatory, demand-driven approach to development
- Water as a social and economic good

- Integration of water and land use management
- The essential role of women in the provision, management and safeguarding of water
- The important role of the private sector in water management.

Strategies

The IWRM strategies, which have evolved from the overall policy objectives, comprise those supporting an enabling environment, those guiding institutional development and those supporting the upgrading of planning, prioritization and management instruments. The main strategies are as follows:

- To ensure proper land resources planning and management
- To decentralize economic incentives
- To ensure efficient and proper disposal of solid and liquid wastes
- To establish appropriate bodies responsible for water resources management
- To develop and enhance human resources and national technological capacities
- To foster international cooperation in the management of shared river basins
- Ensuring the efficient means of Domestic Water supply in Liberia
- Integrated and sustainable development and management of water resources for all sectors to guarantee socio-economic growth
- The protection of all water resources (e.g.: Wetlands)
- Sustainable allocation of water resources and but not limited to
- Prevention of natural disasters and the effects of Climate Chang

The key strategies leading towards the *Enabling Environment* are:

- Government to assume the role as an enabler in a participatory and demand driven approach to development and use of the national water resources
- Legislation and policy to support national and riparian countries initiatives.
- Regulatory controls to be developed in response to needs and at enforceable levels,

- Regulatory controls to be combined with economic incentives,
- Earlier coordinating body, the defunct National Water Resources and Sanitation Board (NWRSB) shall be revitalized and given new mandates in line with IWRM principles.

The key strategies guiding the *institutional roles* are to:

- Establish a coordinating mechanism with NWRSB as the lead coordinating body.
- Delegate management functions to the lowest appropriate level
- Involve the private sector to an appropriate level
- Increase rural gender balanced participation in decision making in water resources management
- Develop water resources management capacities and capabilities at all levels

The key strategies with *planning, prioritization and management instruments* are:

- Water demands to be given priority in the following order and shall be based on economic, social and environmental values of the water determinants :
 1. Drinking Water
 2. Water for Urban and Rural Sanitation
 3. Water for Food security
 4. Water for other uses (industries, hydro-power, beautifications, firefighting, etc...)
- Holistic and sustainable approaches to be used in water resources management, development and use.
- Environmental impact assessment to be used as a planning tool
- The "polluter pays principle" to be enforced.
- Economic incentives to be applied along with regulatory instruments to avoid water wastage and minimize pollution
- International cooperation to be pursued for shared water resources
- Creation of awareness on the protection of wetlands as an integral part of water resources.

WATER RESOURCES MANAGEMENT FRAMEWORK

Liberia has one of the highest precipitation (4,000 to 5000 mm/year) in the world and its capital supply of water amounts to 71,000km³/year, while the total renewable water amounts to 232km³/year. The Total water withdrawal in 2000 was estimated at 106.8 million m³, of which agriculture took 57%, and followed by the domestic sector with 28 % and industry with 15% (FAO, 2005).

There are six major river basins which are shared and national in nature. Their management requires the establishment of individual management structures.

International shared water resources

A strategy regarding cooperation on international water resources issues shall be developed, in particular related to the utilization of the Mano River Basin and safeguarding of the water quality of the lakes. The Mano River Union was established by Liberia, Sierra Leone and Guinea to coordinate technical cooperation for the management of the Mano River Basin between the three countries. As the need for reconstruction and development is increasing, including the construction of dams, potable water supply and hydro-electric power, the Mano River Union Agreement between the three countries has now become a necessity in particular in relation to trans-boundary pollution and sedimentation.

Similar unions shall be established for other trans-boundary rivers in response to emerging water resources issues.

Management functions

The management of the water resources shall be prioritized as elaborated below:

Assessment and Monitoring

Monitoring and assessment of the amounts of surface- and groundwater and of the inherent water quality shall be done to detect overall trends and possible effects of climate changes. Likewise, identified hotspots will be monitored with the purpose of identifying the effects of interventions and monitoring results shall be used in cooperation with, for instance, industries and others influencing the water quantity or quality. Bio-monitoring shall be one of the monitoring tools. The central authority will be responsible for the monitoring, the assessment of the short and longer term impacts and take initiatives to mitigate negative effects. Monitoring data shall be disseminated to the relevant agencies and the public shall be given an annual status of the water resources of Liberia.

Data and Information

Data and information are keys to the rational and optimal management and use of the water resources. All developers and operators in the water sector shall provide data and information such as abstraction records, discharge records and drilling logs. The Government shall, through Liberian Hydrological Service (LHS), collect, analyze, archive and disseminate such information and data for public use and management of water resources. Data collected by other water sector institutions shall likewise be made available to all stakeholders.

Capacity building

There is a serious lack of skilled manpower and thus a need for a massive training and capacity building programs to be implemented at all levels to upgrade the professional, mid-level, and technician skills. Efficient integrated water resources management now requires skilled and motivated personnel, well managed operations, maintenance funds and the provision of appropriate material, tools and spares for

operation of monitoring networks. The central agency shall motivate and facilitate a continued capacity building starting with orientation training at all levels.

Capacity building will, at the starting point, depend on technical assistance to strengthen the professional capabilities in the water sector, through formal lectures and on-the-job training. The goal is that the central agencies become capable of accomplishing the task of reform and reconstruction of the water sector.

Policy making, planning and coordination

The integrated management of water resources and land-related issues requires policies and plans to be made both at the national and county levels. At the national level, policies will be formulated, regulations prepared, national drinking water quality standards set, and project activities in the sector coordinated.

Based on guidelines from the relevant sector agencies, the counties shall set local priorities, by-laws and annual action plans regarding the use of water resources in aquaculture, irrigation, livestock watering and rural and urban domestic water supplies. Major uses like hydropower generation and other uses with trans-county and or trans-boundary implications shall be dealt with at the national level but with full participation of all the stakeholders. When required, catchments shall be used as planning units.

Local level groups, within the framework of national and county policies, shall manage the use of the resources, through local decision-making bodies such as the Village and Sub-County Committees. The full participation of the communities shall be promoted and ensured.

Regulations

Water abstraction regulation

Regulations which deal with water allocation through water rights and permits shall be developed and issued. The regulations shall set out steps relating to permit applications, the decision criteria for allocation, obligations of the permit holder and the return of excess flow. Monitoring of abstraction and reporting schedules shall be set out. The regulations shall set out a suitable duration of the permit and give circumstances under which reviews can be made. Generic rules for charging for permits or for withdrawal of water shall be part of the regulations, which are supported by other pieces of the legislation. Compliance and enforcement shall also be prescribed in the regulation. Allocation is a decision that has to be made at central level following the regulations, until a point in time where decentralized institutions have the necessary capacity to make such decision in a rational manner.

Waste discharge regulation

Regulations which deal with waste discharge through permits shall be developed and issued. The regulations shall set out the steps relating to discharge permit applications, the criteria for granting of permits, obligations of the permit holder, standards for effluent quality, actions in case of spills or accidental discharge and handling of non-point pollution. Principles for charges for wastewater discharge shall be set out and the regulations shall be supported by other pieces of legislation. Monitoring and recording shall be prescribed as well as compliance and enforcement.

Clearance to undertake water resources management

All institutions accredited and with clearance to undertake development, rehabilitation emergency and relief activities in the water sector shall attend regular and duly called meetings of the stakeholders. They shall present their activities report during said meetings. Any institution failing to attend meetings and to present activities report for a period of three months will result in the withdrawal of the clearance and

accreditation, based on the recommendation of the stakeholders to the Ministry of Lands, Mines and Energy which is the lead agency in the sector.

Enforcement

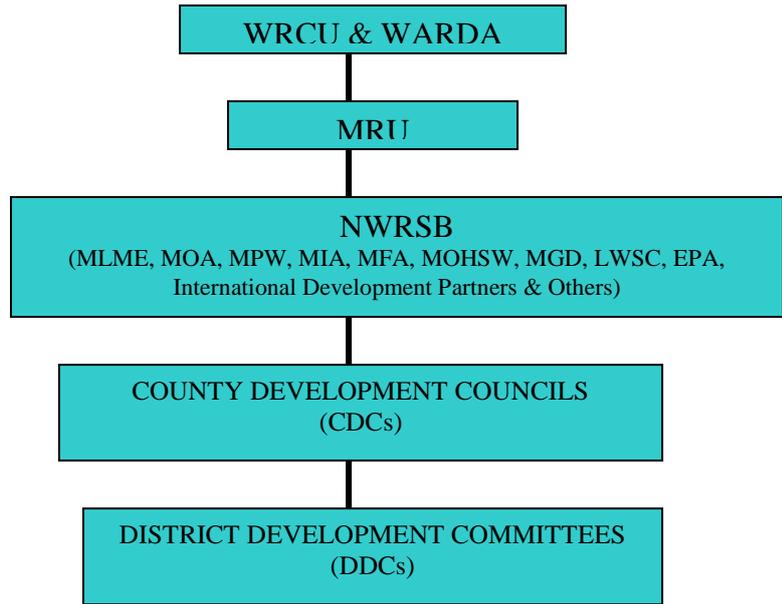
Enforcement of standards, regulations and by-laws shall be undertaken by the (NWRSB). The existing laws such as Public Health Laws, chapter 24 of Title 33 of the revised Public Health Law and relevant sections of the Environmental Protection and Management Law shall strictly be enforced.

Conflict prevention and resolution

For the purpose of mediation, the community structures, county authorities and the (NWRSB) shall be used to settle disputes between individuals and groups pertaining to the use, conservation and protection of the available water resources. Water disputes at the local and national levels shall be settled by the (NWRSB) and the county development councils in collaboration with the water sector stakeholders

Management structure

The existing institutional structure and management arrangements are not adequate to address the water resources issues in the country given its trans-boundary nature, the demand on the resources for development activities, the increasing pollution threats and the need for decentralization and devolution of powers to lower levels of Government. Therefore arrangements for water resources management shall have a multi-level structure as follows:



National level

A National Water Resources and Sanitation Board with a broad representation from key stakeholders will advise on the above functions and coordinate sector ministries’ plans, programs and projects affecting water resources.

The board shall comprise representatives from relevant government ministries and agencies, the private sector, water users, women groups and NGOs; with International

organizations and external support agencies as observers. The board shall be chaired by the national institution in charge of water resources management.

County level

County Water Resources and Sanitation Committees shall be created as sub-committees of the existing County Development Committees. The committees shall comprise representatives from relevant government ministries and agencies, chieftaincy, the private sector, water users, women groups and NGOs; the committees shall be chaired by the national institution in charge of water resources management.

The functions of Government ministries and agencies shall be decentralized to ensure operational presence at the county levels.

District level and Municipalities

District Water Resources and Sanitation Committees shall be created as sub-committees of the existing District Development Committees.

The committees shall comprise representatives from relevant government ministries and agencies, chieftaincy, the private sector, water users, women groups and NGOs; The committees shall be chaired by the national institution in charge of water resources management.

Clan Level

Clan Water Resources and Sanitation Committees shall be created as sub-committees of the existing District Development Committees. The committees shall comprise representatives from relevant government ministries and agencies, chieftaincy, the private sector, water users, women groups and NGOs; the committees shall be chaired by the national institution in charge of water resources management.

The functions of Government ministries and agencies shall be decentralized to ensure operational presence at the clan levels.

Village/Community level

Village/Community 'WATSAN' Committees shall be created to manage community water resources and maintain a healthy sanitary environment.

The Watsan committees shall comprise members selected by the communities; with technical support from the committees from the Clan, district and County levels.

River Basin Level

At this level, there shall be two-tier management structures: 1. International level and 2. National Level

International Level

International River Basin Authorities (IRBA) shall be created jointly with the neighboring country (ies) and agreements regarding cooperation and the resolution of conflicts in the use of shared river basins shall be developed.

The International River Basin Authorities shall comprise members as shall be stipulated in the respective agreements and Liberia's representation thereto shall be determined by NWRSB.

National Level

National River Basin Management Units shall be created as decentralized functionaries of the national institution in charge of water resources. Additionally, national river basin management committees (RBMC) shall be established to ensure local participation at the county, district and clan levels.

The RBMC shall comprise representatives from relevant government ministries and agencies, the county, district and clan water resources and sanitation committees. The chairmanship of the RBMC shall be determined by its members but limited to entities other than the Government institution in charge of water resources.

WATER FOR PEOPLE

Context

Water is essential to sustain life. Water is vital for human survival, health and dignity and the fundamental resource for human development. Without safe and adequate drinking water cases of cholera and diarrhea which are already endemic will be on the rise. Therefore water of the highest quality and in sufficient quantity shall be provided for drinking. Presently, it is estimated that only 28 % of the population of Liberia has access to safe drinking water [state reference as footnote].

Additionally, water is also needed for effective disposal system for both the urban and rural sanitation. At present the Monrovia Sewerage System is chronically clogged with sewage, insufficient water for about 10 – 15 years, being one of the contributing factors. Consequently, the system is not functioning properly and sewage is overflowing at many places within the city. Presently, it is estimated that 17% of the urban population of Monrovia has access to safe means of excreta disposal while the exact sanitation coverage of other urban centers is known to be critically low.

Thus, Liberia has one of the lowest access to safe water and sanitation facilities in the world. Meeting the Millennium Development Goals and targets requires substantial investments.

Policy Objective

The Republic of Liberia has ratified and adopted all international conventions on the provision of safe water supply and adequate sanitation for the people. This policy with respect to water supply and sanitation is to enable the government to meet the target set in the Liberian Poverty Reduction Strategy (2008 – 2010) and the Millennium Development Goals (MDGs) for 2015: “To halve the proportion of people who are

unable to reach or afford safe drinking water by 2015 and increase the access significantly from the present 28% to 64%.”

PRIORITY ACTIONS

The key priority actions for water for people shall be:

- Health impacts for urban resource management
- Institutional reform to improve the efficiency of personnel in relevant Government Ministries and Agencies, partners-in-progress and communities
- Development of institutional framework which brings water utilities, partners-in-progress, the private sector, and community groups to exchange views, contribute skills and take decisions on water supply and sanitation projects.
- Supportive of inter-sectoral planning at administrative levels
- Availability of affordable high quality and adequate domestic supplies to meet the needs of the very poor
- Protection against depletion and degradation of water resources
- Empowering local Community-Based Organizations (CBOs)
- Enhance access to water, sanitation and waste disposal
- Resource mobilization
- Efficient and equitable allocation of water resources

The multi-level management structure mentioned above shall be the basis for this institutional reform process. Specific actions to be taken shall include but not limited to:

- a) Initiating capacity building programmes to establish institutional and legislative frameworks for water management and pollution protection, especially for integrated water resources planning and land use management; developing and applying regulatory and economic instruments; and undertaking monitoring and surveillance,
- b) Developing institutional frameworks which bring together water utilities, NGOs, the private sector and community groups to exchange views, contribute skills and take decisions on water supply and sanitation projects.
- c) Training and retaining staff at all levels with skills in community involvement, low cost technologies, and financial management and for undertaking hygiene education programmes, with a focus on women and children;
- d) Undertaking international collaboration and information exchange in support of institutional reforms

As demand grows and resources diminish, priorities shall be established which balance health improvements, desires for food security, environmental protection and economic growth. The economic social and environmental priorities shall take into account the availability and long-term sustainability of water resources, ensuring, as a top priority, the availability of sufficient, affordable domestic supplies and providing for meeting the needs of the very poor.

The specific actions shall include but not be limited to:

- a) Providing technical and financial support at all levels for assessment and monitoring to help safeguard the availability and quality of surface and ground water resources and reduce pollution load by sector

- b) Informing public opinion and encouraging the development of priorities according to economic criteria for the allocation of water resources to achieve long-term sustainability
- c) Strengthening institutional capacity, especially at the local level, and providing technical support for the introduction and application of water charges and pollution penalties which reflect the marginal and opportunity cost of water
- d) Foster water conservation and recycling through all available means, including economic and regulatory incentives and technical devices. Providing incentives for efficient use of water, recycling and pollution prevention
- e) Making available affordable supplies for meeting the basic needs of the poor who lacks services at present

The protection of health and the environment and to make the most economic use of available water resources, present pollution trends should be reversed to progressively improve water quality.

Specific actions which are essential in this direction shall be but not limited to:

- (a) Using scientifically established guidelines and setting objectives for the protection of all river systems and groundwater resources; translating the objectives into discharge quality and reusing standards for upstream municipal and industrial effluents.
- (b) Decentralization of the water sector responsibilities
- (c) Liberalizing the water sector for broader participation of the public and private sectors

Strategies

Against a background of guiding principles, strategies for implementation, provision and management of water supply, sanitation and sewerage services are discussed under the following headings:

- Water supply – service levels, technologies and standards
- Financing, Subsidies and Tariffs
- Management and Sustainability Aspects
- Private Sector Participation
- Coordination and Collaboration

Water Supply Service Levels

In *primary urban centers* criteria for domestic water supply service levels vary between 75 l/capita/day and upwards, depending on living standards in the area, while the criteria for the service level in *secondary urban centers* starts at a minimum of 38 l/capita/day. The preferred sources of domestic water supply are groundwater (shallow wells and boreholes) and treated surface water (rivers, springs and creeks...) and rainwater.

In *rural areas* the criteria for domestic water supply service levels is minimum 19 l/capita/day and the preferred sources are protected springs, shallow wells and boreholes. A demand – driven balanced approach should in each case lead to a specific level of service chosen with due consideration of walking distance, number of users per outlet, access to alternative water sources, cost as well as social practices. A shallow well or spring box should generally not serve more than 150 persons and a borehole not more than 300 people. A 200 meter walking distance from household to a water point is a maximum and the difference in elevation from a household to a water point should not exceed 100 meters.

Water Supply Technology

Technologies selected for acceptable quality water supply should be low cost, appropriate technology offering good opportunities for participation of the community in all aspects of planning and physical implementation of the project. This also involves operation and maintenance of the facilities.

In *urban areas*, only submersible pumps should be used for household and community-piped water supply systems in areas with availability of regular power and trained manpower for operation and maintenance.

In *rural and sparsely populated peri-urban areas*, technologies shall include spring boxes, shallow wells equipped with hand pumps, boreholes and gravity – fed piped systems. All water supply source construction must follow the Technical Guideline for the Construction of Wells and Latrines. According to the findings from the Technical Guideline Workshop, 2004 the following hand pumps were selected to be used in Liberia Afridev, Consallen, Vergret and Kardia. A spare_part organization should be in place at all times for community maintenance. Maintenance costs should be recovered through an efficient and transparent mechanism.

Drinking Water Quality Standards

WHO drinking water standards (guidelines) should be used until one is produced according to section 35 of the Environmental Protection and Management Law of the Republic of Liberia Due consideration shall be given to specific local conditions and water use habits which may dictate a local relaxation of these standards.

Sanitation and Sewage Treatment Technology

Assessment of the need for sanitation facilities and drainage of excess water should be made in connection with provision of water supply. When found necessary such facilities should be part of water supply programs. The appropriate sanitation and sewage facilities shall be planned and implemented with community participation to meet the needs of the people and ensure cultural and financial acceptability. In rural areas technology options and construction methods shall follow the recommendations in the technical Guidelines for the Construction of Wells and Latrines. Construction of septic tanks should follow the Liberian Building Codes.

Solid waste management and storm water drainage systems and their link to sanitation shall be taken into account in densely populated areas.

Health and Hygiene Education

Health and hygiene education shall be integrated in all water and sanitation projects in order to draw out the clear correlation between safe drinking water, water related diseases and improved sanitation.

Financing, Tariffs and Subsidies

Financial viability of public utilities should be assured. In urban areas, sustainable services for the poorest sections of the community shall be ensured. Tariff structures with cross-subsidies where appropriate, shall guarantee that services can be reliably maintained including public stand posts or other facilities for the urban poor. However, subsidies should only be regarded as temporary measures and targeted for either behavioral changes or to give the disadvantaged sections of the community access to basic services and improvements in their quality of life.

The tariff structure in larger urban schemes (utility-operated water supplies) shall be designed to cover repayment of construction loans, depreciation of technical installations i.e. replacement costs, and full cost of operation and maintenance. Water tariffs should ensure a basic minimum consumption at reduced rates, and larger consumption at increased rates, in order to discourage wastage and excessive consumption especially in densely populated communities and industrial zones.

In rural and small town water supplies, the communities shall contribute (cash or kind) towards investment cost, for instance an agreed percentage of construction cost. The funds shall be raised by the community before construction starts. In these areas, operation and maintenance costs shall be fully covered by the consumers, unless unreasonably high cost of supply, necessitate an outside subsidy.

Subsidies to low-cost latrines to the poorest communities shall be considered at the same time; while still encouraging commercial latrine construction.

Role of the private sector

The concept of public control and private management of water utilities is adopted, but needs to be clearly described in each case. Private management of water supply and sewerage systems has been successful in some cases.

In some cases, when profits and lack of regulations or control become the operating principles, marginalization of the poor is prominent. The role of the government is to oversee the process and protect the right of these poorer populations through legislation and decentralized governance with appropriate participation.

Private resources should be brought in for capital resource mobilization and improved management of the water resources. The private sector cannot and should not be expected to subsidize and provide water for the poor. The responsibility of control on bulk water, its distribution, control and ownership should remain with the government. The private sector should concentrate on effectively meeting demand.

It is very important to encourage the active participation of the private sector and other major groups to strengthen partnerships within the water sector. The encouragement is needed to provide targeted investments to address water education, research, skills training and information dissemination services in a holistic and integrated manner.

Water for Food Security

Context

Water is essential for the production of crops, livestock and fishery (marine, aquaculture and inland). For Liberia, crops are generally grown under rain-fed condition. However, rainfall is unevenly distributed with the least rainfall in the central belt and the most along the coast.

The total water withdrawal in 2000 was estimated at 106.8 million m³, of which agriculture took 57% (60.9million m³) (FAO, 2005).

Irrigation is sometimes applied to supplement rainfall, to improve crop yields and quality especially in upland crops production. This provides the total water needs of the crops.

Other major land resources base for agriculture includes the following: 9.8 million ha of land of which 4.6 million ha are arable. 600,000 ha of inland valley swamps are suitable for crop production and 40,000 ha of mangrove swamps suitable for food and aquaculture production,

Liberian agriculture is mainly subsistence, relying predominantly on rain-fed and rudimentary tools and implements. This does not provide adequate food to meet current population growth as well as poverty reduction, which is one of the Ministry of Agriculture objectives. The farming system is shifting cultivation, with reported fallow period of between 9-10 years. The farming method is slash, burn and plant. Post war population increase could put pressure on the land & water resources, requiring more water & farmlands and hence leading to the reduction of the fallow period if this is not managed well. Agriculture contributes between 10 and 50 % to the GDP, providing jobs to nearly 70 % of the labour force.

Irrigation potential is estimated at about 600,000 ha but only about 1,000 ha can be described as a surface irrigation facility. Total water managed area in 1987, including swamp rice water control, is estimated at about 20,100 ha (FAO, 2005). These include equipped lowlands (2,000 ha) and non-equipped cultivated swamps (18,000 ha). Irrigation infrastructure is limited because of abundant water resources (about 4,000 mm/annual) in the country. Water control structures for swamp rice production

are extensive. Areas with good water control and having the possibility of 2 crops per year are also limited. There are also peri-urban irrigation activities around Monrovia but the method of irrigation is predominantly by hand.

Livestock has been the least developed sub-sector. According to UASID (1999), the 1980 estimated animal census figures stood at: cattle (39,000), sheep (400,000), pig (103,000) and poultry (2,620,000). Prior to the war, many Liberians were engaged in livestock farming to provide alternative sources of income and protein but the civil conflict led to the entire stock of livestock (cattle, goats, sheep, pigs) being looted.

Fisheries and aquaculture are an important sub-sector of the economy, accounting for 3.2% of GDP. This sub-sector has an estimated potential of 800,000mt of marine fishery yield, 7,000mt of inland waters yield and an average annual fish yield of 15,000mt of aquaculture production.

Liberia has a coastline of 570 km, a continental shelf averaging about 34 km in width, affording an area of about 20,000 km² of fishing ground extending to 200 nautical miles into the deep sea,

If coastal surveillance system is developed and monitored well, fish catch in the marine fishery can be enormous.

Policy Objective

The policy objectives of water resources for food security are to:

- Put in place an efficient utilization and conservation of the water resources;
- Foster the vision of efficiently integrating and managing water resources for sustainable agriculture development and
- To ensure food security to meet current and future population growth as well as poverty reduction, and bring new land under cultivation through farm mechanization and value addition.

Guiding Principles (Priority actions)

The key priority actions for water for agriculture shall be:

- The allocation of water for rain-fed crop production, irrigated crop production, livestock production, aquaculture as well as water for crop processing and value addition. All aspects of water allocation shall be done considering the economic, social and environmental value of the water as well as other demands from other sectors.
- To sustain through the full participation of the users who should manage, operate and maintain the infrastructure and services for irrigation, fishery (inland and aquaculture) and livestock developments.

- The design, construction and maintenance irrigation schemes and water systems for livestock and aquaculture production should be planned in such a manner so as to mitigate water borne diseases. Irrigation practices and livestock production under water management systems shall be addressed at the planning and construction stages to mitigate water borne diseases such as schistosomiasis- a disease transmitted by snails living in stagnant or slow flowing water, onchocerciasis or river blindness which is transmitted by simulium flies (buffalo-gnats), these breed in rapidly flowing water. Others include bilharzias, malaria and guinea worm,
- To consider upland and slopes water managements as critical issues in the farming community. The upland soils are generally acidic, with low fertility, low water holding capacity and prone to soil erosion. Rain-fed agriculture has seen, in recent years, lateness of the onset of the rains. Rainfall patterns maybe changing due to general landuse practices. Soil and water conservation practices on upland, slopes and as well as lowland agriculture production should be encouraged so as to preserve and protect the environment.
- To encourage private sector participation in Capacity building, Feasibility study, scheme design & construction, farmer training, Geophysical study and well design, Well construction; pump and accessories procurement; Farmers Development Association (FDA) or Farmer Base Organizations (FOBs) shall strongly be encouraged to handle operation and maintenance of infrastructure for irrigation schemes and hydraulic structures, livestock, water supplies and aquaculture development
- To consider water as a limited and costly resource and shall be used with great care to avoid wastage and long-term problems such as soil erosion and salinity by applying the right amount of water to the right plant at the right time

Strategies

In order to achieve the objectives of agricultural water resources management, Government shall:

- Ensure that water remains a fundamental human right, essential to human life to which every person, rich or poor, man or woman, child or adult is entitled;
- Ensure private sector participation in capacity building, feasibility study, scheme design & construction of irrigation, livestock water supplies and aquaculture development;
- Ensure that water conservation practices on uplands slopes and as well as in lowland crops production are prioritized to preserve and protect the environment for future generation;
 - Ensure efficient and proper use of agricultural chemicals to prevent pollution of water bodies;
 - Ensure proper land and water resources planning and management;
 - Ensure the protection of watersheds and Wetlands;
 - Ensure that irrigation costs are affordable by poor and vulnerable farmers;

- Ensure full participation of women in irrigation and promote their meaningful roles in Decision-making processes;
- Ensure equity within irrigation systems to support poverty reduction and efficiency through sustainable and equitable cost-sharing mechanisms;
- Ensure regulatory controls in response to needs and at enforceable levels;
- Enforce the “polluter- pay principle”
- Ensure the training and capacity building of the water users association (WUA) and
- To establish National water and ecological Information Center.

WATER FOR INDUSTRY

Context

The industrial growth of Liberia in the manufacturing, mining and processing industries shall undoubtedly play a key part in the sustainable development of the nation. It is therefore necessary to institutionalize policies and regulations that will guide the achievement of this goal.

Best management practices shall be employed throughout the life of an industrial activity to reduce water pollutants generated by the industrial sector. Relevant agencies of Government shall ensure that all environmental, health, safety and sanitation laws of the nation are applied in the industry.

Policy Objective

The objective is to develop water resources for sustainable industrial use and to limit waste discharges to acceptable levels with the ultimate goal of supporting national development.

Guiding Principles

The fundamental principles guiding the planning and allocation of water resources for water for industry are:

- After the first priority allocations for domestic use have been made, allocation of water for industry shall be done considering the economic, social and environmental value of the water as well as other demands from other sectors.
- The ‘Polluter Pays Principle’ shall be followed and any violator who illegally dumps or discharges industrial waste shall be held responsible
- The roles of all line agencies and ministries involved with water quality management, monitoring and enforcement shall be designated, and water quality sub-agencies shall be established in the rural areas.
- The assimilative capacity of surface water shall be taken into account and stream standards shall be defined according to Environmental Protection Agency guidelines. Guidelines will set out effluent standards and monitoring requirements.
- A National Pollutant Discharge Elimination System Permitting Process shall be established by the appropriate agency in accordance with EPA guidelines on point source pollution. All significant point discharges must have a permit
- Industries implement self-monitoring and notify the Environmental Protection Agency of effluents discharge
- a register of pollutants and their effects on human health and the environment shall be established in collaboration with relevant agencies and private research institutions

Other water resource uses

While water for domestic purposes, for agriculture and for industry are off-stream uses there are also in-stream use such as hydropower and fisheries and on-stream use such as river and lake transport.

The overall policy is to keep flows, water levels and water quality within ranges that respond to a holistic, integrated approach to development of water for human activities and water for nature, taking into account equitable use and protection of the available water resource. At the same time international obligations regarding use of shared water shall be honored.

WATER ALLOCATION PRINCIPLES

Key Aspects

The allocation of water in Liberia shall be controlled by the Government through the Ministry of Lands, Mines and Energy. Waste discharge permits are within the responsibilities of the Environmental Protection Agency (EPA), but the Ministry of Lands, Mines and Energy shall control the technical aspects in order to better coordinate and monitor the abstraction and the discharge permits

Water is vested in the state for protection and for management of its use as a common good. There shall be no permanent water rights but these should be renewable at selected intervals.

A socio-economic approach to water allocation shall be applied. This will be a practical application of the principle of "water as a social and economic good". The water available to be allocated in this manner is determined based on understanding of the available yield in a catchment and allocations reserved for domestic needs and for ecosystem maintenance. The various steps in this approach will be taken with stakeholder involvement, emphasizing the continued security of existing allocations.

Provisions for Domestic Needs

First priority in water allocation is to meet the domestic water demand. Therefore water allocation for the domestic needs of the society shall be reserved within the total amount available from each water resource.

Provisions for Resource Management and Environment

Allocations shall be reserved to ensure the continued viability of the resource and for the conservation of the environment. Some water bodies (such as wetlands, creeks, rivers, etc.) shall maintain a minimum flow to protect water quality and aquatic ecosystem.

Provisions for Production and Other Uses

Allocations for productive use shall consider the socio-economic value of the use and an optimized development of the potentials (e.g. hydropower schemes) as well as the impact on the water resource. Provisions for production and other uses can be made from the remaining water resource when water for domestic needs and for the environmental needs has been reserved.

Response to Emergencies (droughts and floods)

A detailed strategy for response to emergency situations, such as floods and droughts shall be formulated. In the case of droughts such a strategy may involve limiting total allocations or reducing the allocations to selected categories of users during the critical period in consultation with the relevant sectors. In the case of floods that strategy may involve controlled inundations, evacuations and other emergency measures.

Crises such as drought and floods shall be managed and coordinated on an interdepartmental basis because multiple efforts are needed to support affected communities. The Government, through the Disaster Relief Commission, shall disseminate information and data on threatening emergency situations and public safety awareness.

MONITORING, ASSESSMENT AND RESEARCH

Monitoring, assessment and research activities are important for understanding the occurrence and availability of water resources (surface and underground) and the impact on the resource caused by either natural phenomena or human activities. Monitoring and assessment shall be continuous activities, and the data generated shall be quality assured and made available for water resources management and development activities. The data covering quantity and quality shall be made available for users.

Many of the conventional technologies need to be examined critically and selection made of those most appropriate to Liberian needs. Also through research feasible technological alternatives shall be identified to suit the future needs and the ability/capability of both Government agencies and communities in different parts of the country.

The research and development activities shall be sanctioned by the appropriate authority. Measures shall be put in place to strengthen the existing water research related institutions both public and private, to carry out the necessary research and water resources assessment activities to foster sound management, protection and utilization of the nation's water resources.

The meteorology section within the Liberian Hydrological Service Bureau of the Ministry of Lands, Mines and Energy shall be adequately funded to play its vital role in monitoring, assessment and research in order to provide timely and accurate data. The Department of Meteorology shall be adequately funded to play its vital role in monitoring, assessment and research in order to provide timely and accurate data.

POLICY IMPLEMENTATION

Water Legislation

To support implementation of the National Integrated Water Resources Management Policy appropriate legislation and regulations shall be enacted. Legislation comprises the legal instruments that govern the management, use, protection and conservation of the nation's water resources.

The state is the custodian of the nation's water resources and has the power to investigate, manage, allocate, control and use the water resources of Liberia. More specifically, the objectives of a new water legislation are to ensure:

- Rational management and use of the water resources of Liberia
- Provision of a clean, safe and sufficient supply of water for domestic purposes to all persons
- A sustained aquatic ecology
- Devolution of water supply and sewerage undertakings
- Orderly development and use of water resources for purposes other than domestic use, such as the watering of livestock, irrigation for agriculture, industrial, commercial and mining uses, the generation of hydroelectric energy, navigation, fishing, preservation of flora and fauna, and recreation in ways which minimize harmful effects to the environment, and
- Control of pollution and safe storage, treatment, discharge and disposal of waste, which may pollute waters or otherwise harm the environment and human health.

The Water Law shall be accompanied by a set of supporting regulations, which makes the legislation operational. These will include as a minimum a Water Resources Regulation, a Water Supply Regulation, a sewerage regulation and a wastewater discharge regulation.

Priority Action Programs and Plans

Water Resources Management

Three main components are needed to achieve the policy goal of sustainable water resources management:

- *An enabling environment*, which is a framework of national legislation, regulations and local by-laws for promoting sound management of the water resources and constraining potentially harmful practices,
- An institutional framework that allows for close interaction between national, county, district and village-community levels, cross-sectoral coordination and stakeholder involvement.
- *Planning and prioritization capabilities* that will enable decision-makers to make choices between alternative actions based on agreed policies, available resources, environmental impacts, and the social and economic consequences.

Water Supply and Sanitation

The Ministry of Lands, Mines and Energy in close co-operation with other line ministries and relevant donor agencies, NGOs and the local authorities, shall develop a comprehensive strategy and action plan for a sustainable provision of water and sanitation services, incorporating on-going programmes and correcting existing imbalances and gaps. The plan,

which shall be dynamic and regularly updated, shall provide a broad water sector vision and shall have institutional capacity building and human resource development as its cornerstones.

Sectoral Water Use Policies and Plans

The concerned ministries of Government will develop specific and detailed policies e.g. for agricultural production, energy (hydropower generation) and forestry, which must be consistent and compatible with this policy.

Monitoring of Policy Implementation

An important function of the Ministry of Lands, Mines and Energy, shall be the implementation of Water Resources Management to the lowest appropriate levels and further to ensure that what happens at these levels meet the required standards and are in conformity with stated objectives and strategies.

The policy is aimed at opening up the arena for a large number of stakeholders to engage in the tasks of managing water resources and developing basic water and sanitation services. For this to be effective, it will be necessary to monitor and regulate their actions and performance.

Furthermore, to know and assess the impact of the policies and strategies, it is important that a monitoring and evaluation mechanisms are established and well functioning. The key monitoring agent shall be the Liberian Hydrological Service within the Ministry of Lands, Mines and Energy.

The objective of monitoring and performance auditing shall be supportive and ensure that goals are met through assistance and cooperation. To fulfill its monitoring and evaluation role the Liberian Hydrological Service must define a set of performance indicators to be able to gauge progress and effectiveness of the various policies and strategies.

REFERENCES

1. Alemdom, Astier M, Blementhal, Ursula, and Manderson, Lenore,

Hygiene Evaluation Procedures, International Nutrition Foundation for Developing Countries (INFDC), UK 1997

2. Hall, Jr., Caesar A., Country Report on Water resources Assessment and Development Plan, 1988
3. National Action For Development of Water Supply and Sanitation prepared by the National Resources and Sanitation Board, 1985
4. Bunadin, James Sei, Water Resources Development Activities In Liberia, 1987
5. Annual report 1998, Liberia Water and Sewer Corporation
6. Annual report 1999, Liberia Water and Sewer Corporation
7. Annual report 1998, Ministry of Rural Development
8. Outstation Water System in Liberia prepared by Geoscience Sri, 1989
9. Transactions Vol. XXIII, No. 60 – 63, Yugoslavia Institute for Water Resources Development.
10. William H. Muller and Co., 1971, Exploration Liberia July 1967: Ministry of Lands, Mines and Energy Annual Report, 1981.
11. The Interim Poverty Reduction strategy (iPRS) of Liberia, 2006