Integrated Water Resource Management in Liberia

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OUTLINE OF PRESENTATION

- BACKGROUND & INTRODUCTION
- METHODOLOGY
- RESULTS
- EXISTING COLLABORATION/SUPPORT & POSSIBLE FUTURE COLLABORATION/SUPPORT
- CHALLENGES
- CONCLUSION/RECOMMENDATION/ WAY FORWARD
BACKGROUND & INTRODUCTION

- Description of Country/Study Area/Title
- Problem Definition/Identification
- IWRM Issues
- Assessment of Water Resources (SW & GW)
- Water Resource Utilization
- SWOT Analyses: Human/Environmental/Resource
- Transboundary Issues (SW & GW Management)
Liberia is situated on 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. 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.
The longest river in Liberia is the Cavalla River shared between Liberia and Cote D’Ivoire. St. Paul River is the second longest river feeding Mt. Coffee hydro-electric plant and providing the bulk of the raw water for Monrovia. Mano River is shared between Liberia and Sierra Leone.

Major lakes in Liberia – Lake Shepherd and Lake Piso. Lake Piso is the largest. Both of them are situated along the Atlantic Ocean. Lake Piso is characterized by vast expanse of wetlands and lowland forest vegetation.

Generally, groundwater is available and can be exploited in most parts of the country.
Problem Definition/Identification

Liberia is facing several problems related to its water resources:

- Pollution and deterioration in water quality
- Alteration of the natural hydrological regime, deforestation, urbanization etc.
- Impoundment of water (due to construction of dams, reservoirs and roads),
- Flooding after heavy rains
- Management of water resources to address rural, urban and industrial need
Integrated Management of Water Resources key issues:

- **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.
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.

Low 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
Assessment of Water Resources (SW & GW)

No comprehensive quantification of Liberia’s water resources has been made.

In Liberia surface water and wetlands constitute about 14% of the country’s surface area. There are 15 river basins that constitute the national drainage system.

The occurrence of abundant groundwater across the length and breadth of Liberia is verified by the existence of drilled and hand dug wells. However, no detailed delineation and characterization of the country’s aquifers have been made, nor has the infiltration capacity of the characteristic soils and related spatial variability been studied.
Water Resource Utilization

Domestic water is used primarily for drinking, cooking and hygiene. The infrastructure that presently exists and is operational for domestic water supply in Liberia comprise the Monrovia Water Supply System and 10,000+ hand pump wells (dug and drilled) dispersed across the country. Liberia’s domestic water requirement is, on average, \(~13\) million $m^3$ (i.e. \(0.013\) km$^3$) per year, which gives a per capita requirement of 36 $m^3$/person/yr.
Water Resource Utilization

A variety of means and measures are currently being used and/or applied for the withdrawal of water for domestic uses in Liberia. Various withdrawals are not being systematically measured, recorded and reported, such as to enable aggregation.

- **Monrovia Water Supply System**, the largest reticulated water system in the country, currently produces 3.5 million gallons of water per day.

**Total water withdrawal under the Monrovia water supply system and its ancillary wells is estimated to be 5.028 km³ per year**
Water Resource Utilization

- **Dug wells and boreholes**: (3,750 liters (or 3.75 m\(^3\)) per day during the dry season and 6,250 liters (or 6.25 m\(^3\)) per day during the rainy season)

- **Water for Mines**: The water withdrawn by these systems are unknown.

- **Water for Energy**: 64 megawatt (MW) Mount Coffee hydro dam on the St. Paul River in Harrisburg/Mount Coffee, the 4 MW Firestone mini hydropower dam on the Farmington River in Harbel and the 30 kW Yandohun micro hydropower dam on the Yando River in Yandohun, Lofa County. The water withdrawn by these systems are unknown.
Water Resource Utilization

Water for Agriculture:

The agricultural system of Liberia is dominantly rain-fed; and, except for swamp rice cultivation and vegetable farming and/or gardening, irrigation water withdrawal is generally negligible.

Data available from FAO tells that agricultural water withdrawal in Liberia in the year 2000 was 60 million m$^3$ per year (55% of total withdrawal); and we have discussed that the year 2000 was a time of war, when agricultural activities had practically ceased. Therefore, the 2000 estimate of water withdrawal seems no longer applicable.
### SWOT Analyses: Human/Environmental/Resource

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Government’s commitment to reform in policy and governance; as per the PRS and drive for results, incl. documentary evidence of new policies</td>
<td>Lack of sub-sectoral coordination &amp; leadership in Water for Food, Water for Nature, and Water for Industries and other uses; and Lack of cross-sectoral integration (IWRM), incl. the lack of leadership</td>
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<td>Good, exemplary organizational quality of WASH (i.e. Water for People) sub-sector; incl. coordination experience and nurtured synergy (at national professional and organizational levels)</td>
<td>Poorly defined institutional objectives; with no comprehensive water law; mandates being too generalized and over-lapping; and inadequate institutional and organizational structures</td>
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<td>Very low and/or non-existent capacity in the line ministries; this being multi-dimensional in terms of financial, logistical, technological and human, and is closely linked to low budget allocation</td>
<td>Low attractiveness of water sector professional jobs in the civil service (i.e. line ministries); which is linked to comparatively poor remuneration and related conditions of service</td>
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<td>Lack of or inadequacy of analysis; because water resources issues are poorly studied and known</td>
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<tr>
<td>Opportunities</td>
<td>Threats</td>
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<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>**MDG on environmental sustainability and related increasing good will and</td>
<td>Loss of staff and skills (brain drain) due to lateral moves to better paying NGOs, the</td>
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<td>funding support from donor partners and international aid organizations</td>
<td>private sector or international civil service agencies; and/or retirement</td>
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<tr>
<td>**Ongoing National Civil Service reform efforts and gradually improving</td>
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<td>remuneration to civil servants</td>
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<td>**A pending new political term of government; and related affinity for</td>
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Transboundary Issues (SW & GW Management)

Liberia shares several international rivers with its neighbours. Management of these trans-boundary waters have been more or less non-existent. Liberia is a member of the Mano River Union (MRU); which is a trans-boundary organization comprising Guinea, Sierra Leone and Liberia.
METHODOLOGY

- Institutional tools for implementation of IWRM and Ecohydrology
- Sensitization/Awareness/Mobilization
- Synergy between the government and other stakeholders in IWRM & Ecohydrology Implementation
- Adequacy of the mechanisms for IWRM & Ecohydrology implementation
Institutional tools for implementation of IWRM and Ecohydrology

Generic list of some common instruments that are internationally accepted in WR management. None of these instruments are meaningfully in place (or being used) in Liberia; this being primarily because there are no institutionally defined custodians that are being held accountable for them.
Institutional tools for implementation of IWRM and Ecohydrology

Table 15: Generic List of Water Resources Management Instruments

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>Water resources assessment guidelines, procedures or protocol</td>
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<tr>
<td>IWRM Plans</td>
<td>IWRM Plans</td>
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<tr>
<td>River basin and watershed management plans</td>
<td>River basin and watershed management plans</td>
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<td>Groundwater management plans</td>
<td>Groundwater management plans</td>
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<tr>
<td>Land resources management plans( MMLE &amp; LRC)</td>
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<tr>
<td>Coastal zone management plans( EPA &amp; MMLE)</td>
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<td>Environmental sustainability promotions schemes</td>
<td>Environmental sustainability promotions schemes</td>
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<td>Aquatic ecosystems conservation and management plans</td>
<td>Aquatic ecosystems conservation and management plans</td>
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<td>Environmental flow maintenance guidelines</td>
<td>Environmental flow maintenance guidelines</td>
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<td>Water demand management plans</td>
<td>Water demand management plans</td>
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<td>Social change instruments</td>
<td>Social change instruments</td>
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<tr>
<td>Participatory planning guidelines</td>
<td>Participatory planning guidelines</td>
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<tr>
<td>Program communication and behavioural change promotion plans</td>
<td>Program communication and behavioural change promotion plans</td>
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<tr>
<td>Conflict resolution mechanisms</td>
<td>Conflict resolution mechanisms</td>
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<tr>
<td>Mediation guidelines and procedures</td>
<td>Mediation guidelines and procedures</td>
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<tr>
<td>Arbitration procedures and protocols</td>
<td>Arbitration procedures and protocols</td>
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<tr>
<td>Regulatory Instruments</td>
<td>Regulatory Instruments</td>
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<tr>
<td>Social and participation guidelines and regulations</td>
<td>Social and participation guidelines and regulations</td>
</tr>
<tr>
<td>Technical (i.e. facility design, siting and operations) guidelines and regulations</td>
<td>Technical (i.e. facility design, siting and operations) guidelines and regulations</td>
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<tr>
<td>Economic and commercial (i.e. trading) guidelines and regulation</td>
<td>Economic and commercial (i.e. trading) guidelines and regulation</td>
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<tr>
<td>Information management and sharing</td>
<td>Information management and sharing</td>
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<tr>
<td>Database and Information Management System</td>
<td>Database and Information Management System</td>
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<tr>
<td>Knowledge management plan</td>
<td>Knowledge management plan</td>
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</table>
Institutional tools for implementation of IWRM and Ecohydrology

HUMAN CAPACITY
A wide range of human skills and capabilities are required to ensure that the governance of the water resources and sanitation sector is responsive to the needs and aspirations of various stakeholders. Minimum human capacity exist.

ECONOMIC AND FINANCIAL TOOL
Economic instruments are not meaningfully in place or being used in the water sector of Liberia. These instruments are usually regulatory in nature and meant to specifically target the valuation and pricing of water such as to ensure efficiency, equity and sustainability.
Sensitization/Awareness/Mobilization

- Sensitization is ongoing in high profile administration to ensure the establishment of Water resources entity that will reduce fragmentation and promote sector coordination.
Synergy between the government and other stakeholders in IWRM & Ecohydrology Implementation

Water resources management responsibilities are fragmented across several government agencies. The collaboration between government and other stakeholder is weak. Only one sector, Water for People is partially on course. In term of intervention, government and partner participate. There are sectoral meetings and coordination.
Adequacy of the mechanisms for IWRM & Ecohydrology implementation

- Capacity building (the national water resources management system requires expertise-Water resources engineers, hydrologists, hydrogeologists and meteorologists, Hydraulic engineers, sanitary engineers and environmental engineers Water and environmental economists, policy analysts and resources managers, Hydro-chemists, microbiologists, ecologists, and social anthropologists, Information technology (IT) specialists, GIS specialists, and statisticians
- Limited Fund
- Water resource governance is fragmented
RESULTS

Monitoring and Evaluation Tools

A country-Led Monitoring framework is being rolled out for improved water sources (i.e. wells – hand dug and drilled).

Measurable Outputs

Real time data that could be use for planning and intervention
EXISTING COLLABORATION/SUPPORT & POSSIBLE FUTURE COLLABORATION/SUPPORT

- Existing collaboration – research and professional training
- Interventions/support by External Support Agencies
- Other interventions/support
- Future collaboration and support needed
Existing collaboration – research and professional training

- Government of Norway thru the Water Resources and Energy Directorate (NVE) and Ministry of Land Mines and Energy organized institution professional capacity building and programs
Interventions/support by External Support Agencies

Supportive leadership from UNICEF and funding from the European Commission, preparation of the National Integrated Water Resources Management Policy was started in 2004, completed in 2007, and published in 2009. This was followed by the preparation of the Water Supply and Sanitation Policy of 2009 that was a precursor to the preparation of the Water, Sanitation and Hygiene (WASH) Compact and ultimately the Water Supply and Sanitation (WSS) Sector Strategic Plan, which was launched in 2012. Preparation of Liberia’s Roadmap for adoption of the IWRM framework; with the Water and Environment Centre of the United Nations Environment Program (UNEP-DHI) assuming a supportive technical assistance role, under the auspices of ECOWAS Water Resources Coordination Centre.
Other interventions/support
Future collaboration and support needed

- Liberia needs active participation in regional and international Water Resource Management scheme
- Increment in professional human capacity
CHALLENGES

- Institutional Framework
- Legal & Administrative
- Capacity (Human and Infrastructural)
- Economic Considerations & Funding
- Political Constraints
Institutional Framework

The water resources management responsibilities are fragmented across several government agencies. With the introduction of Integrated Water Resources Management (IWRM) in Liberia, a comprehensive framework of policy and environmental laws is now a key objective.

National Water Resources and Sanitation Board (NWRSB)
National Public Health Committee
WATSAN
International Partners Non-Governmental Organizations (NGOs)
Legal & Administrative

Presently, there is disintegrated legal framework governing water resources in Liberia. National Integrated Water Resources Management Policy guide the water resources development, use, protection and conservation. Public Health Law 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.
Legal & Administrative

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 Government is committed to working towards achieving the aims and objectives of the SDG. 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.
Capacity (Human and Infrastructural)

Very low and/or non-existent capacity in the line ministries; this being multi-dimensional in terms of financial, logistical, technological and human, and is closely linked to low budget allocation.
Economic Considerations & Funding

Getting the prices right is at the very core of improving water resources management. In the process of establishing appropriate fees and tariff structures, economic, environmental, financial and social considerations play a crucial role. There is no National budget allocation for IWRM.
Political Constraints

For effective water resources management it is necessary to separate the development and regulatory aspects from water supply and sanitation delivery functions.

In order to provide an effective service and regulations in IWRM sector, there should be an authority established. Government has not yet find the political will.
CONCLUSION/RECOMMENDATION/ WAY FORWARD

- Realizing that sector is fragmented with roles and responsibilities split amongst key line ministries and agencies; there is a need to have a “single public entity” for efficient, sustainable and accountable Water resource management and Sanitation Service delivery to the public.

- Support and strengthen IWRM Secretariat.

- National Water Resources and Sanitation Board NWRSB need an executive arm to effectively, sustainably and accountably carry out its function of Water resources management and Sanitation Service provision for all within the Republic of Liberia.
CONCLUSION/RECOMMENDATION/ WAY FORWARD

- Invest in capacity building (specialist, policy makers, environmental lawyers, hydro-geophysics, hydro-geologist, water resources specialist etc.)
A long milestone…… (7 years of strategic planning)

- Water Supply, Sanitation & Hygiene Policy (April 2009)
- Water, Sanitation & Hygiene Sector Strategic Plan (2012 – 2017)
- Liberia WASH Compact (May 2011)
- Board named in May 2014
ACKNOWLEDGEMENTS

UNEP-DHI – introducing IWRM processes to Liberia
UNICEF/USAID/Liberia WASH Consortium / Global Communities / other WASH partners - Support to the process (WASH)
WASH Secretariat / Ministry of Public Works
Stakeholders – At all level
United Nationals Educational, Scientific and Cultural Organization, Malaysia Funds-in Trust, Regional Centre for Integrated River Basin Management,
To host Country of this Meeting - Nigeria
THANK YOU FOR LISTENING