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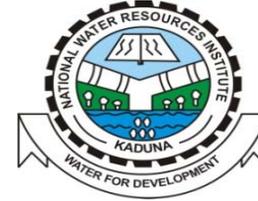
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# Integrated Water Resource Management in Liberia

**Shadrach Toteh Wolo**

**National Water Sanitation and Hygiene  
Secretariat, Ministry of Public Works  
Republic of Liberia**



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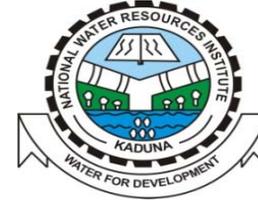
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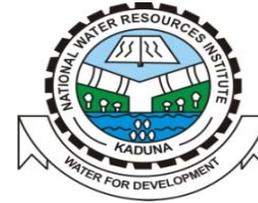
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## OUTLINE OF PRESENTATION

- ❑ 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)



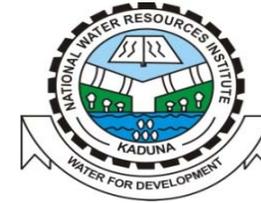
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## Description of Country/Study Area/Title

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.



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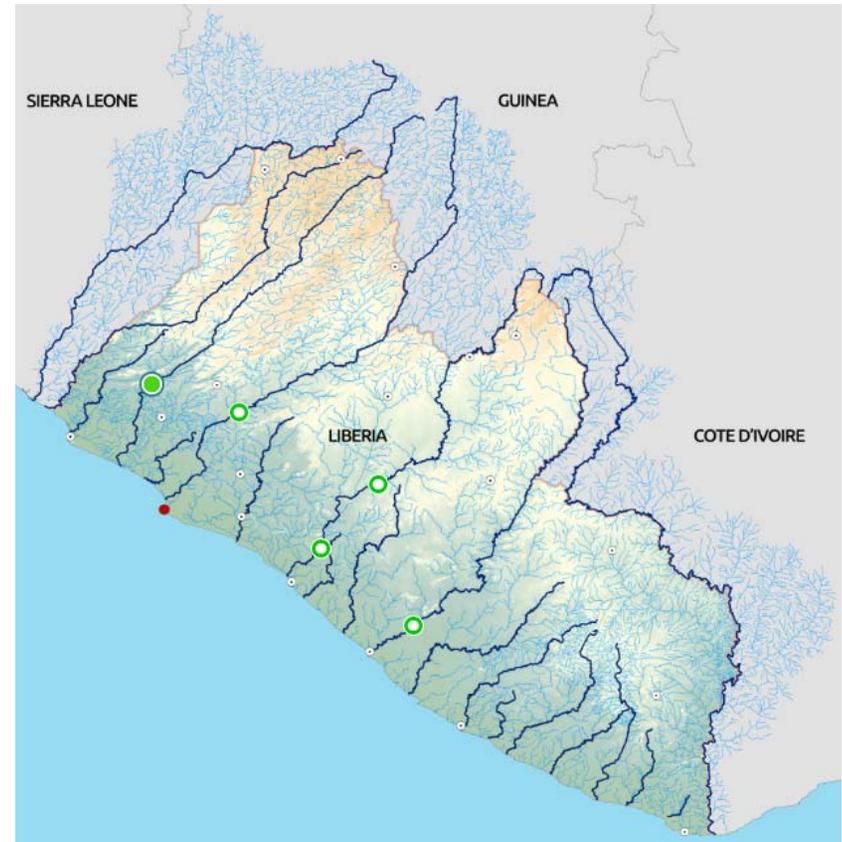
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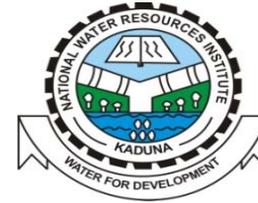


The longest river in Liberia is the Cavalla River shared between Liberia and Cote D'Ivoire. St. Paul River is the second longest river feeding Mt. Coffee hydro-electric plant and providing the bulk of the raw water for Monrovia. Mano River is shared between Liberia and Sierra Leone.

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 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



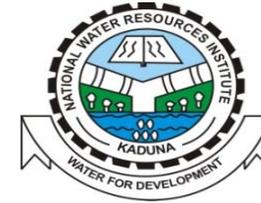
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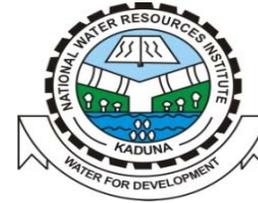
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- ❑ **Water activities fragmented amongst ministries and institutions (Ministry of Lands, Mines and Energy , Ministry of Public Works, Ministry of Health, Ministry of Agriculture, Ministry of Transport, Liberia Water and Sewage Corporation , Environmental Protection Agency**
- ❑ **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 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



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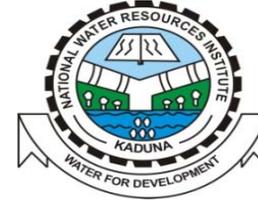
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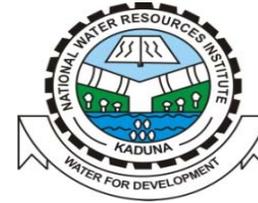
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## Water Resource Utilization

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<sup>3</sup> (i.e. 0.013 km<sup>3</sup>) per year, which gives a per capita requirement of 36 m<sup>3</sup>/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 5.028km<sup>3</sup> per year**



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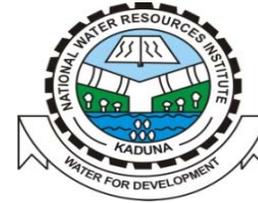
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## Water Resource Utilization

- ❑ **Dug wells and boreholes** ( 3,750 liters (or 3.75m<sup>3</sup>) per day during the dry season and 6,250 liters (or 6.25m<sup>3</sup>) 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.



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## 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<sup>3</sup> 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



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## SWOT Analyses: Human/Environmental/Resource

Strengths	Weaknesses
<b>Government's commitment to reform in policy and governance; as per the PRS and drive for results, incl. documentary evidence of new policies</b>	Lack of sub-sectoral coordination & 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
<b>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)</b>	Poorly defined institutional objectives; with no comprehensive water law; mandates being too generalized and over-lapping; and inadequate institutional and organizational structures
	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
	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
	Lack of or inadequacy of analysis; because water resources issues are poorly studied and known



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## SWOT Analyses: Human/Environmental/Resource

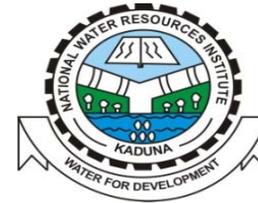
Opportunities	Threats
<b>MDG on environmental sustainability and related increasing good will and funding support from donor partners and international aid organizations</b>	Loss of staff and skills (brain drain) due to lateral moves to better paying NGOs, the private sector or international civil service agencies; and/or retirement
<b>Ongoing National Civil Service reform efforts and gradually improving remuneration to civil servants</b>	Decline in donors' good will and funding support for the water sector, esp. IWRM
<b>A pending new political term of government; and related affinity for visible renewal and reinvigoration of the various economic sectors</b>	Political instability; not only in terms of civil conflict, but also frequently changing policy priorities coming with changing political regimes



## Transboundary Issues (SW & GW Management)

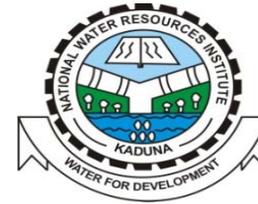
Liberia shares several international rivers with its neighbours. Management of these trans-boundary waters have been more or less non-existent.

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.



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# Institutional tools for implementation of IWRM and

**Table 15: Generic List of Water Resources Management Instruments**

Water resources assessment guidelines, procedures or protocol
IWRM Plans
River basin and watershed management plans
Groundwater management plans
Land resources management plans( MMLE & LRC)
Coastal zone management plans( EPA & MMLE)
Environmental sustainability promotions schemes
Aquatic ecosystems conservation and management plans
Environmental flow maintenance guidelines
Water demand management plans
Social change instruments
Participatory planning guidelines
Program communication and behavioural change promotion plans
Conflict resolution mechanisms
Mediation guidelines and procedures
Arbitration procedures and protocols
Regulatory Instruments
Social and participation guidelines and regulations
Technical (i.e. facility design, siting and operations) guidelines and regulations
Economic and commercial (i.e. trading) guidelines and regulation
Information management and sharing
Database and Information Management System
Knowledge management plan



## ○ 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 nstruments are usually regulatory in nature and meant to specifically target the valuation and pricing of water such as to ensure efficiency, equity and sustainability.



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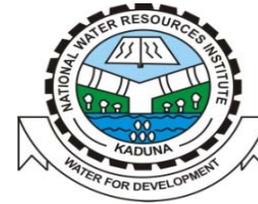
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## Sensitization/Awareness/Mobilization

- 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



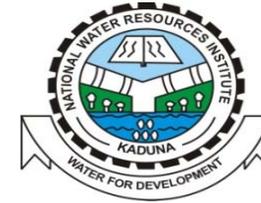
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## Adequacy of the mechanisms for IWRM & Ecohydrology implementation

- ❑ 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



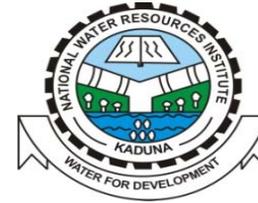
## RESULTS

### Monitoring and Evaluation Tools

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

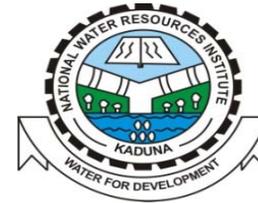
### Measurable Outputs

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



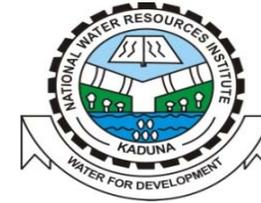
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## Interventions/support by External Support Agencies

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



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## Other interventions/support



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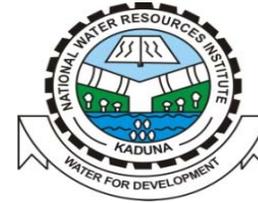
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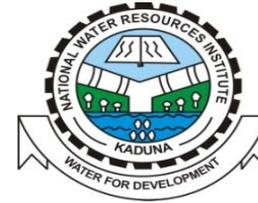
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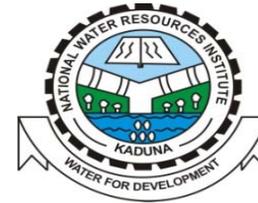
## Future collaboration and support needed

- ❑ 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)***

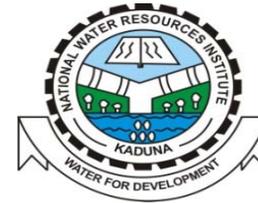
**National Public Health Committee  
WATSAN**

**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

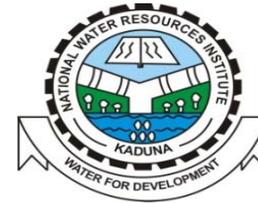
The Environment Protection and Management Law of the Republic of Liberia was approved November, 2002 with the key objective to ensure a sound management of environmental and natural resources.

### 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..

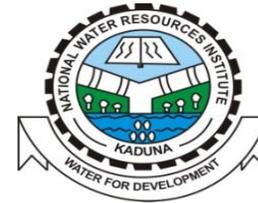
The Government is committed to working towards achieving the aims and objectives of the SDG. Liberia's post-war Interim Poverty Reduction Strategy (iPRS) strongly supports 'providing water and sanitation'. The strategy overall objective 'is to increase safe drinking water and improve sanitation (healthy 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.



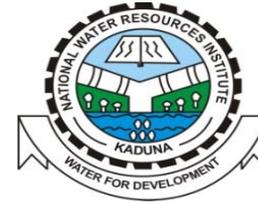
## Capacity (Human and Infrastructural)

**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 establish. Government has not yet find the political will



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## 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.



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## CONCLUSION/RECOMMENDATION/ WAY FORWARD

- ❑ Invest in capacity building( specialist , policy makers, environmental lawyers, hydro-geophysics, hydro- geologist, water resources specialist etc.)



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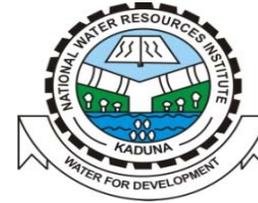
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## A long milestone... (7 years of strategic planning)

**Liberia WASH  
Compact (May  
2011)**

**Water Supply,  
Sanitation & Hygiene  
Policy (April 2009)**

**Board named  
in May 2014**

**Water, Sanitation & Hygiene  
Sector Strategic Plan (2012 –  
2017)**

**Integrated Water  
Resources Management  
Policy (2007)**



## 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

Line Ministries (Ministry of Health , Ministry of Land Mines  
and Energy, Ministry of Education , Environmental Protection  
Agency , Monrovia City Corpoation , Liberia Water an Sewage  
Corporation , Ministry of Internal Affairs)

Stakeholders –At all level

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To host Country of this Meeting- Nigeria



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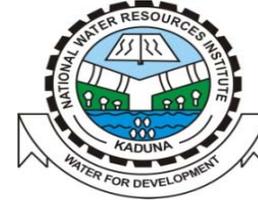
Malaysia  
Funds-in-Trust



United Nations  
Educational, Scientific and  
Cultural Organization

RC-IRBM

Regional Centre for  
Integrated River Basin Management  
under the auspices of UNESCO



THANK YOU FOR LISTENING