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Funding and Infrastructure Gaps in Integrated Water Resources Management of the Lake Chad Basin, Nigeria

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Abstract
This paper emerged out of my PhD research titled functional gaps and overlaps in the implementation of integrated water resources management (IWRM) in the Hadejia Jama'are Komadugu Yobe Basin (HJKYB), Nigeria. It concentrates on two of the six functional gas identified in the research - funding and infrastructure gaps. It shows how these gaps hamper effective integrated management of water resources. The research adopts purely qualitative techniques. It combines Semi-Structured Interview (SSI) and Focus Group Discussion (FGD) in data collection. Descriptive method, SWOT analysis, Venn diagram and Force Field Analysis (FFA) are employed in data analysis. The results reveal the persistence of low funding for water resources management, paucity and dilapidation of water infrastructures, and shortage and low capacity of data management staff. It suggests expanding the budget line for IWRM, timely releases and improving water infrastructures through expansion of observation network, innovation and modernizing hydromet services, inclusion of all stakeholders and ensuring sustainability for minimizing the gaps. In the end, the paper proposes the establishment of a permanent basin-wide body responsible for monitoring water infrastructural and data management.

Keywords: *HJKYB, IWRM, FUNDING, WATER-INFRASTRUCTURE, STAFF CAPACITY*

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I. Introduction

The HJKBYB is a unique hydrological unit in northern Nigeria. Its characteristics have been described (Hadejia, 2016). Its hydrology comprises complex and interconnected river systems; principal among which the Hadejia, the Jama'are, the Komadugu-Gana, the Yobe. Two of the rivers were dammed at Tiga and Challawa Gorge respectively (Hollis, Adams and Aminu-Kano1993). See (Hadejia, 2016) for a full description of the basin.

The HJKYB is rich in natural resources and supports a variety of water dependent livelihood systems crop faring, livestock rearing fishing and collection of Non-Timber Forest Products (NTFPs). But for many years now, failure in the management of water resources of the basin has crippled the production systems and the historic livelihoods activities. Flooding has become an annual menace destroying farmlands and settlement. The resultant inundation leads to typha grass infestation. Resource use conflict between farmers and herder has intensified due to limited spaces for farming and livestock grazing.

The key institutions responsible for water resources management in the HJKY basin are Hadejia Jama'are River Basin Development Authority (HJRBDA) and Chad Basin Development Authority (CBDA), the riparian states of Plateau, Bauchi, Kano, Jigawa, Yobe and Borno Hadejia, 2016).

Water management refers to operational, on-the-ground activity to align water resources, water supply, water consumption and recycling. It is the modification of the hydrological cycle for the benefit of mankind as well as the prevention, avoidance or minimization of the effects of flooding or drought. Water resources management is concerned with balancing water use and water demand with water availability. Water should be managed at the lowest appropriate level. (Dublin Principles), (GWP, 2006).

IWRM is a process which promotes coordinated development and management of water, land and related resources, to maximize the resultant economic and social welfare equitably without compromising the sustainability of vital ecosystems. IWRM is a step-by-step process of managing water resources in a harmonious and environmentally sustainable way by gradually uniting stakeholders and involving them in planning and decision-making processes, while accounting for evolving social demands due to such changes as population growth, rising demand for environmental conservation, changes in perspectives of the cultural and economic value of water, and climate change. It is an open-ended process that evolves in a spiral manner over time as one move towards more coordinated water resources management.

IWRM aims to strike a balance between the use of resources for livelihoods and conservation of the resources to sustain its functions for future generations. (GWP, 2003).

II. Literature Review

Freshwater is central to all development efforts. Water is embedded in all aspects of development - food security, health, and poverty reduction - and in sustaining economic growth in agriculture, industry and energy generation (GWP 2012). Yet it faces growing pressures across the world – from urbanization and overconsumption to underinvestment and lack of capacity, poor management and waste, and the demands of agriculture, energy and food production. Water is becoming increasingly scarce due to expanding demand from the ever-increasing world population. Today, water availability is a major social and economic concern to many countries (Deltawerken.Com/DeltaWorks.Org.).

While it is generally considered that there is enough fresh water on the planet for 7 billion people, it is distributed unevenly and too much of it is wasted, polluted and unsustainably managed. UN-Water Decade Programme on Advocacy and Communication (UNW-DPAC). Water scarcity is forecast to worsen where population growth is still high, as in sub-Saharan Africa, South Asia and some countries in South America and the Middle East. Growing uncertainty regarding water resources – particularly linked to climate change – is expected to exacerbate water scarcity trends.

"The need to improve our management of water resources is becoming more and more urgent as the global water crisis affects more and more countries. Water issues have been raised in local forums and global conferences, including the World Summit on Sustainable Development and the G-8 Meetings. Such high-profile events have raised awareness of the need for better water management, but what is needed now is real action on the ground".(GWP, 2006).

Again GWP (2006) stresses in the case of South Asia "It must be recognized that for the poor in South Asia, 'poverty reduction' means water, food and livelihood security. Community-based platforms for actions are needed to manifest and validate critical needs and priority areas for the promotion of water, food and livelihood security in the region, particularly at the grassroots level. Bottom-up efforts are necessary to generate pressure for change. The case of Area Water Partnerships illustrates how participatory platforms at grassroots level are attempting to tackle the issues of water, food and livelihood security from the bottom up"(GWP, 2006).

Currently, there is a growing vulnerability that is induced by global and local increases in (1) human population (2) climate change and climatic variability (3) socio-economic issues (4) environmental degradation. All these can result in increasing both the frequency and severity of extreme events, such as droughts and floods (UNESCO-IHP, 2009).

As water has no substitute, actual and potential water use conflicts represent another challenge that is likely to escalate as water scarcity increases particularly in already "water stress" countries and regions of the world. Anywhere in the world, actual or potential water use conflicts always constitute serious threats to the security of water use (Moriarty et al 2004).

If water is properly managed, it can be an instrument for economic survival and growth, poverty reduction while at the same time bringing prosperity to all (UN-Water/Africa, undated). However, many factors both environmental and human are threatening water availability in many parts of the world (Donin et al eds. 2012).

There are huge problems associated with funding water resources management in Nigeria. They include lack of budgetary provision, delays in releases and on-implementation of the budget Hadejia (2016). Factors responsible for these range from corruption, nepotism and tribalism, poor public participation InfoGuide, (2016), Others are unrealistic budget consisting of white elephant projects, late budget preparation and approval, lack of adequate monitoring, non involvement of economic and financial experts, lack of transparency, non involvement of civil society in budget preparation and implementation (naijaquest.com, 2018).

Financing instruments (cost recovery mechanisms, subsidies and charges for water resources management) are also expected to play a more significant role in future water resources management. At present, these approaches are being implemented in less than 50% of countries. However, little progress has been made on payment for water resources services and ecosystem services, although there have been some progress raising revenues for water resources management from users and polluters. More is also needed to enhance coherence and consistency in the key areas such as financial and economic policy coordination, illicit financial flows, and tax evasion and avoidance.

Water infrastructure refers to the physical work that is required throughout the water cycle (structures for water control, abstraction, storage, treatment, conveyance, and distribution, sanitation, recycling and disposal) (GWP, 2009). Water infrastructure includes structures for all variety of water uses (industrial, agricultural, urban, rural and the natural environment).

Infrastructure refers to the stock of basic facilities and capital equipment needed for the functioning of a system. Infrastructure gap refers to the difference between available financial resources and the financial resources needed to maintain and improve the infrastructure (ISO 2013). Any community that lacks sufficient capacity to store water usually falls the victims of climate change, such society is heavily affected by floods and

drought (Zaag and Savenji, 2008). For much of the developing world including Nigeria, the need is not just to improve the existing infrastructure, but also to expand it to meet basic water and sanitation needs (ISO, 2013). This is because huge gaps exist between the available financial resources and the financial resources needed to provide, maintain and improve water infrastructures.

Ahmed, at el (2016) note that people depend on the health, social, economic and environmental benefits that clean and safe water provides. But to continue to enjoy these benefits, we must construct a sustainable water infrastructure (Ahmed, at el 2016).

Water infrastructure is a broad term for systems of water supply, treatment, storage, water resources management, flood prevention and hydropower. The term includes water-based transportation system such as canals. Simplicable https:www.enironliteracy.org/water/water infrastructure.

"The 21st Century definition of sustainable water infrastructure includes the traditional man-made or built infrastructure components and the natural infrastructure, such as rivers, lakes, streams, groundwater aquifers, floodplains, floodways, wetlands, and the watersheds that serve or are affected by water and wastewater systems." https://sustwatermgmt.fandom.com/wiki/Sustainable_Water_Infrastructure.

For effective and sustainable infrastructure much investment and more coordination is needed. Some countries are making concerted attempts to consider multiple uses when prioritizing water infrastructure develop but others identify coordination as an on-going challenge (UNEP (2012).

Hydromet infrastructure is central to water resources management. Hydromet is the union of hydrology and meteorology, combining water, weather, and climate studies as a formidable force in a government's ability to accurately understand forecast, and communicate storms and hazards. This means that something as simple as an accurate weather forecast, or the monitoring of river levels could make the difference between a farmer losing his/her entire crop or a fisherman knowing when best to head out to sea.

The first Africa Hydromet Forum at the Africa Union Commission states that "Africa's development must integrate hydromet (weather, water and climate) information in its plans. Hydromet information needs to be readily available to advance social development in Africa", said Fatima Denton, the coordinator for the African Climate Policy Centre of the United Nations Economic Commission for Africa.(Africa Hydromet Forum 2017).

Eighty per cent of disasters in the world are caused by severe hydromet events. The economic cost of such disasters is estimated at USD 10 billion annually in Africa (acknowledged as a very modest estimation) (Africa Hydromet Forum 2017).

According to the World Bank Group's Brief, 2019, Africa has made significant achievements in development over the last few decades, but climate and disaster risks threaten present and future development gains. These risks affect 10 million people annually, yet hydromet services are presently not equipped to meet the needs of society. Weather and climate-related disasters are reversing development gains, setting countries 10 to 20 years back (World Bank Group 2019).

Africa has the least developed weather, climate and hydrology observation networks, with only 1/8 of the required density and less than 300 weather stations that meet the World Meteorological Organization (WMO)'s observation standards. According to a World Bank's research, half of Africa's surface weather stations are not reporting accurate data. Only 10 of the 54 African countries provide sufficient and effective hydromet services to their population. It showed that hydrological and meteorological ("hydromet") hazards are responsible for 90% of total disaster losses all over the world. The ability to understand, predict, and warn citizens about natural hazards and disasters drives the ability of governments to reduce economic risks and save human lives.(Africa Hydromet Forum 2017).

The research shows that annually, countries can save US$13 billion in asset losses alone by investing in hydromet services. Africa's first-ever ministerial-level Meteorology Hydrology Hydromet Forum formally recognizes the role hydromet services play in development (World Bank Indicators 2017).

As climate change exacerbates current weather conditions, sea levels will raise and flood into cities, cyclones and storm surges will hit the coasts, and heat waves and droughts will hamper farming and agriculture, leaving millions food insecure and crippling economies. African countries face a combination of risks, but effective hydromet services can offer a solution to these challenges, (World Bank Group 2019).

The Forum sought to address various issues with a diverse set of recommendations for action on African hydromet services, which include:

i. Expansion of observation network by increase Africa's hydromet observations. The current network's density is poor. Less than 300 of the continent's stations meet the WMO observation standards.

ii. Innovation and modernization of hydromet services by improving capacity and transformation and upgrading, obsolete and outdated equipment and practices.ss.

iii. Partnerships and collaboration by promoting Public-Private Partnerships (PPPs to improve services derived from hydromet data and information.

v. Inclusion of women, and youth in hydromet services, by providing them with opportunities to participate.

To achieve this, national governments will need to show commitment through dependable and progressive leadership, providing access to financial resources, investing in human capital, creating an enabling environment for private sector participation, and improving sectoral coordination.

Ekeu-Wei, (2018) reveals the challenges facing hydrological data in Nigeria to include capacity and institutional gaps; lack of maintenance of hydrological infrastructure and surrounding landscape; poor data management architecture; and floods events that destroy hydrological equipment and inundate roads thereby restricting access to collected data during peak floods. These conditions, he continues result in gaps and shortened length of annual maximum hydrological time series required for flood frequency estimation, consequently leading to under or overestimation of low and high flood (Ekeu-Wei, 2018).

Farouk, 2014 maintains that in Kano Catchment Area there are poor water resources database and poor data recording, poor pollution control and public apathy towards water infrastructures and above all, there is poor coordination among water management agencies (Farouk, 2014). He recommends passing of the national water bill into law, improving coordination among water management agencies and enforcement of the pollution law (Farouk, 2014).

III. Method Of The Study

The qualitative method of inquiry, in particular, Participatory Rapid Appraisal (PRA) techniques and tools were used. The approach encompasses Semi-Structured Interview (SSI), Focus Group Discussion (FGD), SWOT Analysis, Venn diagram and Force Field Analysis (FFA). This enables a deep understanding and insight into the behaviour and attitudes of the people.

The respondents for this research were divided into three categories for ease of data collection and for what is called triangulation (cross-checking findings). These categories are: primary respondents (those respondents within the sampled institutions of the sampled states and RBDAs); secondary respondents (those respondents within the riparian states line ministries, SIWRMCs, CBOs and NGOs but outside the sampled organizations) and tertiary respondents (those respondents from organizations and individuals experts outside the riparian states with responsibilities and/or stake in the water resource management of the HJKY basin).

The research is built on purely primary qualitative data which was collected from responses of the primary respondents. Supplementary data were collected from the secondary and tertiary respondents. While secondary information was obtained from libraries that stock direct research materials from consultants on the HJKYB such libraries include those of HJKYB-TF, Damaturu; KYB-WDI, Hadejia; IUCN KYB Project, Kano; Hadejia-Nguru Wetlands, Nguru; HJRBDA, Kano and CBDA, Maiduguri as well as LCBC Headquarters, Ndjamena, Chad Republic.

The sample is made up of the RBDAs (HJRBDA and CBDA) and three Riparian States' Ministries of Water Resources one each from upstream (Kano), midstream (Bauchi), and downstream (Borno) areas of the basin respectively.

The study used a multi-stage purposive sampling technique (Adamu, 2009) and snowball sampling techniques. A purposive sampling technique was used in the selection of the two RBDAs and within each RBDA the Director Planning Research and Statistics (PRS) and headquarters' staffs and project managers of Tiga dam and Hadejia Valley irrigation Project identified by the Director were selected. At the state level, three states Kano, Bauchi and Borno were selected. Kano was chosen from upstream, Bauchi from midstream and Borno from downstream of the basin respectively. The three are judged to adequately represent others because the institutional setting in Kano is similar to Jigawa while that of Borno is similar to Yobe possibly on account of history as the peers were organized together as one state. Plateau State where both Hadejia and Katagum rivers take their sources, the state is not included in the sampling as it is not a major user of the basin's water resources but a contributor. Bauchi state is sampled as it stands unique with distinct institutional setting from the other states in the basin.

In each of the sampled states, the ministry of water resources was the focal point and the Director Planning Research and Statistics (PRS) and other key staff identified by the Director PRS were taken as the respondents.

Semi-Structured Interview (SSI) and Focus Group Discussions (FGD) techniques were used in data collection. The tools used were Plain SWOT Matrix, Plain Venn diagram and Plain Force Field Analysis (FFA) Matrix. Checklists for SSI and FGD, cardboard paper, Zopp cards and pens were used as auxiliary tools. The SWOT and Venn diagram was used in both data collection and presentation while the FFA was used in data presentation and analysis.

IV. Result

The research revealed the prevalence of low funding, delay in budgetary releases and corruption in the water sector. There are also scarcity and dilapidation of water infrastructures, devastation by unidentified persons as well as limited number and low capacity of data management personnel in the HJKYB.

Low Funding

Funding is a central issue in water resources management, but it is generally insufficient and sporadic in the HJKYB. Research findings indicate poor funding for water resources development and management in all key institutions in the basin. Funding for effective water responsibilities is either unstable or insufficient at both national and states' levels of government. It is reported that due to under-funding of the RBDAs their influence in managing the water resources in the basin has been minimal (Chiroma, Kazaure, Karaye and Gashua, 2006). There is also inadequate financing for watershed protection and data management (Bashir and Abdulmumin, 2005).

Delays in Budgetary Releases

Even where there are budgetary provisions for water resources management, accessing the budgets constitutes huge difficulties. Releases of funds meant for water resources development and management are delayed to times when they cannot serve the intended purposes. Budget covered is always low due to delays in project approval and release of fund.

Official Corruption

Official corruption as found in the literature represents a huge drain to water development and management finances. Collaboration and conspiracy surrounds contract allocation and execution. In some cases, projects' specifications were altered to give room for corruption drain. Other times excessive delays are created to allow for claim for cost variation. Some projects are started and abandoned after the collection of a substantial part of the cost. In other cases, the contractors use low-quality materials and haphazard finishing.

Water infrastructure in the HJKYB

Traditionally farmers used shaduf and calabash systems of irrigation in the basin while ditch irrigation system is still practiced. There was a sprinkler irrigation scheme for HJRBDA in Wudil which has been abandoned. Pressure irrigation is found all over KRIP, HVIP and Chad Basin Irrigation Schemes. In 2017 Lake Chad Basin Commission has introduced small scale drip irrigation scheme in parts of Bauchi, Kano, Jigawa and Yobe States. This scheme is aimed to assist smallholder farmers and popularize water conservation farming.

The HJKYB has 25 dams (Hollis, et al 1993), major among which are Tiga and Challawa Gorge dams. There is also the Hadejia Barrage downstream near Hadejia which collects releases from the major dams for irrigation and helps to control flooding. In 2008-2009 the HJKYB Trust Fund constructed and rehabilitated several water infrastructures in the basin. These include flood control dykes and gates at Warawa near Wudil in Kano state and Arki and Jiyan in Jigawa state. The HJKYB-TF constructed flood retention gates two in Dagona, Karage, Kalgeri in Yobe State. Concrete Wall and gate in Damasak, trapezium spillway in Chari Kari and a gate in Malam Fatori all in Borno state, (Hadejia, et al, 2014).

Now there is widespread laxity in hydrological data collection among all actors. For instance there a programme of comprehensive hydrological data collection by Kano State Water Resources and Engineering Construction Agency (WRECA) which extended from Kano up to Yau on the shores of the Lake Chad. During the 1980s and 1990s, the Hadejia-Nguru Wetlands Conservation Project (HNWCP) initiated Well Deeping and River Gauging in the Hadejia-Nguru Wetlands, an area that covers parts of Bauchi, Jigawa and Yobe states in Northern Nigeria.

State and federal ministries provide some water management infrastructure but there is paucity, lack of maintenance and poor data reading and recording. These render the infrastructure unproductive.

But the HJKYB-TF in 2009 took drastic steps at revamping hydromet station in the HJKYB. It constructed flood control and flood retention gates, concrete spillways and flood protection walls. It also established nine new hydrological stations and rehabilitated 24. In the same period, it established 27 new meteorological stations rehabilitated 22 dilapidated ones. These were in an attempt to reach the minimum density of observation stations in the basin asset the World Meteorological Organization, (WMO). Some of the infrastructure constructed and activities for water resources management by the HJKYB-TF are shown below:

Plate. 1: HJKYB-TFs Double Valve Flood Retention Gate at Kalgeri, Geidam LGA, Yobe State

Fig. 2a: Channel Clearance in Progress at Kirenowa Marte LGA, Borno State

Fig. 3: Concrete Lined Channel at Kanamma, Geidam LGA, Yobe State

Fig.4a: Channel Clearance in Progress at Kisingin, Kafin Hausa LGA, Jigawa State

River Flow Measurement using ADCP flow meter at Gwaram Bridge, Jigawa State

River Gauging Stage Board at Jama'are Bridge Bauchi State

Typical Weather Station rehabilitated by HJKYB-TF in the Basin

Sample Weather Station established in Secondary Schools by HJKYB-TF in the Basin

New Weather Station established by HJKYB-TF in the HJKYB

Yet there is paucity of water infrastructure in the HJKYB. The minimum standard was not met. The Federal and states agencies do not give the required priority to data collection and other water resources management infrastructure in the basin. As if that is not enough the available infrastructures are subjected to destruction by unidentified persons. Since 2013 the insurgency in the northeast has forced the abandonment and accelerated damage to water infrastructure over areas along the shores of the Lake Chad. The situation escalated the deficiency of water infrastructure in the basin.

Closely linked with the paucity of water infrastructure is the shortage and low capacity of data collectors and data processors. There is insufficiency of middle level personnel capable of processing hydromet data. Data collection is sporadic in many institutions. Data storage is haphazard and uncoordinated.

Obvious results of the gaps include siltation of reservoirs, and river beds and inefficiency of intake structure No. 6 for Kano City Water Supply at Tamburawa. This intake is higher than the water level in the river, so to enable take water, many times more than it can take has to pumped, the excess water flows down the river system and causes unwanted flooding of settlements, farmlands, orchards and fish ponds in parts of Kano and Jigawa states. Downstream in Yobe State, the excess water causes inundation in some parts, giving rise to invasive weeds infestation, which in turn blocks channel and divert water from where it is needed to places where it is not needed. Consequently, little water flows to parts of Borno state, where extreme desiccation is observed. In recent years this river system, contributes very little to the Lake Chad, and thus the continuous shrinking of the Lake.

There is paucity of funding for disilting of the reservoirs and river beds and improvement of the intake structure of Kano water supply. There are limited and usually inefficient flood control structures. There are limited forecast structures for predicting hydrological hazards and for signaling early warning. There are very few water proportioning structures that can distribute water to different uses and users in the basin. There are also limited flood retention structures in the downstream. These gaps have serious negative effects the livelihoods systems of the communities that survive in the basin.

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V. Discussion of Findings

Tackling Funding Problems

In order to tackle these problems it is necessary for the Federal, the riparian states and the concerned local governments to expand the budget lines for IWRM. It is advisable that the riparian states should undertake reform of water tariff in order to improve cost recovery. They should introduce and intensify collection of payment for bulk water uses. There is also need for the key institutions to develop economic and funding tool for the HJKYB. These should include taking inventory of private water vendors, enforcing water licensing, and effective water rates collection. Enforcement of polluter pays principle is necessary so that polluters of water resources are compelled to pay for the damage caused to water resources by their actions. Details of economic and financing tools for IWRM are given (Afremedev 2006). This is to improve internal revenue generation for water resources development and management in the states.

The federal ministry of water resources should work closely with the Nigerian National Planning Commission to prioritize water projects and sell them to donors for funding.

Federal Government should embark on identification of local donors and initiate national donor conference for IWRM. But any efforts to attract donor funding to the water sector must be accompanied by governance reform; this is to convince donors that the funds can be efficiently used for the intended purpose and that the financial flow can be maintained. Accountability and transparency must be the watch words for IWRM mangers in order to attract more funds for IWRM. It is shown that with appropriate governance, private finance can flow to public authorities (GWP, 2009). The federal and states governments need to take deliberate measures that can demonstrate apparent transparency in order to attract funding for water resources development and management of the HJKYB.

NGOs and CBOs in the basin need to be empowered through training to start writing and submitting funding proposals to national and international development agencies on areas such as mitigation and adaptation to climate change, flood and erosion control, resource use conflicts management, women empowerment and poverty reduction in the basin. These can be another sources of funding for water resources management for the HJKYB.

Fostering Timely Fund Releases

Water resources activities are extremely time specific, timely release of fund is as vital to the achievement of IWRM goals as the availability of funding. Federal and states' government should realize this fact and evolve systems of timely releases for water resources development and management. The dry season (December to April) is the best time for most water projects in the HJKYB. Federal and states' ministries of finance should be made aware of the contributions of IWRM to the achievement of SDGs and broader national socio-economic development objectives so that they can release more funds in time for IWRM (Hadejia, 2016).

Improving Water Infrastructure

Provision of adequate water infrastructure creates a means for achieving water security, effective service delivery and meeting human needs (GWP, 2009). Federal government has to commit adequate financial resources for the rehabilitation and provision of adequate water infrastructures (hydrological and meteorological monitoring, irrigation, hydropower, rain harvesting, flood control, flood retention, water storage facilities, water proportioning structures, etc) for the HJKYB in order to meet the minimum standard as set by WMO. This will speed up and sustain the implementation of IWRM.

To achieve the above, it is necessary to expansion of observation networks, modernizing hydromet services. At this point inclusion of all relevant stakeholders is important to ensure sustainability.

Public-private partnership (PPP) in the provision and maintenance of water infrastructures has to be initiated and encouraged in the HJKYB. The construction of small dams and rain water harvesting structures should be promoted through PPP. Similarly informal irrigation sector should be transformed by government in such a way that it can be able to attract private sector investment in irrigation infrastructure.

Use of supportive Media

The second Dublin principle requires that water resources development and management should be on a participatory approach, involving users, planers and policy-makers at all levels (GWP, 1999). Therefore educating the public through the use of supportive local and international media to popularize the need for IWRM can encourage understand on the benefits of IWRM (NNWGI, C4C, 2009a and NNWGI, C4C, 2000b). Local, national and international radio houses and print media played active roles in popularizing water resources management problems of the HJKYB during the 1990s and early 2000. These radio houses still have greater listenership in the basin; therefore re-bringing them on board, this will go a long way in attracting sympathy and promoting funding and sustainable water management of the basin. When people understand the benefits of IWRM it is then that they can contribute their quotas to its development and management. In this

way public-private partnership for water resources development and management can also be achieved and encouraged. The mechanism should also be designed to educate and encourage communities to demand for services and for good governance from their elected representatives (Hadejia, 2016).

Federal, states and local governments should recruit additional staff for infrastructure and data management and prioritize training and re-training for both existing and new staff.

Federal ministry of water resources should create a central data bank for hydromet data storage and sharing.

VI. Conclusion

Based on the findings one can conclude that the HJKYB is a unique hydrological unit in Nigeria with well-structured organizations. It is a wetland in a dryland, very rich in land and water resources quite untypical of its geographical location. The overall consequences of gaps in funding and infrastructure in the basin are inefficiency of water intake structure, flooding, invasive weeds infestation and extreme desiccation. In these ways, funding and infrastructure gaps dwindle all production systems and livelihood activities of the basin. The paper calls for rethink towards adequate funding and provision of sustainable water infrastructure.

VII. Recommendations

- Federal ministry of water resources should work closely with the Nigerian National Planning Commission to prioritize water projects and sell them to donors for funding.
- Federal Government should identify local donors and initiate national donor conference for IWRM.
- Federal and states governments need to take deliberate measures that can demonstrate apparent transparency in order to attract funding for water resources development and management of the HJKYB.
- Federal government has to commit adequate financial resources for the rehabilitation of existing water infrastructures (hydrological and meteorological) and provision of new ones in the HJKYB in order to meet the minimum standard as set by WMO.

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