

**WATER SUPPLY AND SANITATION SECTOR
REFORM PROGRAMME III
(WSSSRP III)**

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**INSTITUTIONAL AND SECTORAL REFORM
OF THE STATE WATER
AND SANITATION SECTOR**

**MINISTRY OF WATER
RESOURCES AND ENERGY**

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FOREWORD

Sustainable water management today is a pillar of social and economic development. Success requires the restructuring of state, legal and institutional frameworks to ensure they are appropriate for a new paradigm in water resources management. State water sector reforms are subject to processes in reaching agreement that requires the active participation of water stakeholders, who increasingly demand accountability from politicians and decision makers in the management of water resources.

Effective legal frameworks are fundamental to achieving Water Sector Reforms, with institutions capable of ensuring compliance with the law. Building water governance capacity should also be a means of improving social equity. Any reform of the law aiming to promote responsible ecosystem management is shaped by these requirements.

It is therefore important to highlight and learn from the efforts the State has made to develop her legal frameworks and to adapt them to environmental requirements. Delivering the institutional structures necessary to implement the reform is an ongoing endeavor. Through modern and flexible legislation and efficient legal and institutional regimes, government can greatly strengthen its water governance capacity, and therefore sustainable water management. The principles of public participation, social equity, the right to water, safeguarding human health and sustainable ecosystem are keys to the construction of new water law.

A legal reform framework has to be comprehensive enough to reach and rule water use in other sectors that need water for their operations like sanitation, irrigation or energy, in order to guarantee good water practice making sustainability a common practice.

This document recommends a process of reform beginning with a 'vision of the future' that results in increased water security. It outlines the necessary steps towards reform of water governance and the enabling environment required for its implementation. Water is fundamental for life and therefore its wise use and regulation, which affects us all, must be seen as a social duty.

Institutions must be encouraged to take all the necessary measures to guarantee access to water for all, whilst also providing for future generations and thus enabling development with a secure water future.

This document suggests a series of steps for reforming water governance. Through the clear guidance outlined in this document, it is hoped that all water professionals, decision makers and users will gain a deeper understanding of legal and institutional solutions needed in the quest for sustainable and equitable water resources management.

Engr. David Jaafaru Wuyep
Honourable Commissioner

EXECUTIVE SUMMARY

There has been a series of interventions by way of aids and financial supports provided by various international organizations, all focused towards making water and sanitation accessible to the teeming population of Plateau State. Unfortunately, these interventions had not yielded any appreciable dividends. It is common in parts of the State to behold a plethora of failed water projects after another. It has been something that is, or has been, becoming a rule rather than an exception to see gigantic water and sanitation structures either abandoned or poorly utilized. This situation begins to beg the question why the State is still bedevilled by inadequate access to water and sanitation in spite of these interventions.

It was in the light of this conundrum and quagmire that observation has placed a finger on the reason for this paradoxical situation. The Technical Assistance (TA) for the implementation of water supply and sanitation sector reform programme III in Adamawa, Ekiti and Plateau States has articulated the driving force behind this paradox and has thus come up with a solution of carrying out an institutional and sectoral reform of the entire water sector in Plateau State (and indeed in all the participating States in this programme). The philosophy behind this move is hinged on the fact that interventions without this kind of reform would continue to post a very bad result at the end of the day. This reform will thus position the entire water and sanitation sector in the State towards toeing the path of progress and an eventual success towards making water and sanitation accessible to all and sundry in Plateau State. The *Plateau State Water Resources and Sanitation Policy 2017* has pointed the way forward towards making a first step in this direction.

The present draft reform is an offshoot or a second step in that direction. Thus, the objectives the reform sets for itself are adumbrated as shown below:

- To provide a restructuring of the water and sanitation institutions in the State;
- To include some other institutions to fill the important gaps, whenever necessary now or in future, that will ensure adequate and efficient link in the whole gamut of relevant institutions;
- To create the necessary background for a subsequent water law that will define the roles and responsibilities of the water, sanitation, wastewater institutions in the State;
- To provide the background for involving all relevant and important stakeholders in the ownership and management of the projects in their respective areas;
- To provide the background for capacity building of the stakeholders in the areas of water resource knowledge and conservation, social understanding and economic empowerment; and
- To establish an interdependent institutional architecture at the water governance and water management

With these on ground, it is envisioned that the following will subsequently occur:

- An improved water and sanitation sector that will be ready to take up the challenges

expected in the Sustainable Development Goals (SDGs) as they relate to: SDGs: **3, 5, 6, 8, 10, 12, and 17**;

- Overly improved water and sanitation that will be available to all citizens of Plateau State;
- Equitable allocation of water resources, entronement of water conservation, improved ecosystem integrity and an increase in the growth of water-related economic pursuits;
- An entronement of gender mainstreaming in affairs related to water and sanitation in Plateau State;
- An entronement of democratic processes and all-inclusiveness in the affairs related to water and sanitation in Plateau State; and
- An entronement of peace and justice in the State.

This draft reform is distributed in PARTS, each part dealing with some particular areas. PART ONE deals with the institutional restructuring which comprises institutional reorganization and proposed institutional model for the water and sanitation institutions.

PART TWO deals with the social dimensions in water and sanitation services. This comprises: community management of water and sanitation services, gender matters related to water and sanitation.

PART THREE deals with the economic dimension of efficient water use. This comprises essentially the efficient use of water resources spanning water for domestic use, agriculture, registration, licensing and water tariffs. This Part includes also the role of water in overall economic growth.

PART FOUR deals with the political empowerment dimension. It comprises essentially the methods of involving stakeholders at the multi-stakeholder level, to take part in making decisions on water and sanitation resources. It emphasizes the democratic stance this process must take to achieve the required goals.

PART FIVE deals with the environmental sustainability dimension. This essentially comprises the sustainable use of water resources, while emphasizing the dire and very important need of avoiding pollution of these resources and protecting the environment to achieve positive ecosystem integrity.

PART SIX deals with the involvement of the private sector in the water and sanitation sector. It comprises essentially how the private sector can play important roles in the water and sanitation sector. Moreover, it recommends government's positive attitude towards the private sector and how the plethora of members of this sector can leverage networking with

the bigger players to become sustainable and effective in the water and sanitation sector. PART SEVEN deals with miscellaneous, albeit important, matters related to the water and sanitation sector. Prominent among these is the recommendation on how the Plateau State Ministry of Water Resources and Energy will still play a parent role in the entire sector. There is a recommendation of what the proposed or nascent water and sanitation institutions would do if approved by Government. Then last, but by no means the least, is the importance of networking and the availability of knowledge base to be provided by the various line ministries. This draft reform has been structured in a recommendation format. The contents of these recommendations would provide materials for an eventual codification in the next line of action, that is, the preparation of water legislation.

PART ONE INSTITUTIONAL RESTRUCTURING

Chapter One: Reorganizing the Water and Sanitation Institutions in Plateau State of Nigeria

1.0 Background

Plateau State, like other States of Nigeria, is constitutionally empowered to engage in the duty of **providing safe water** to its population in the **urban, Small Towns and rural settings**. Added to this is the expected function of **providing sanitation**. However, this State has been bedevilled by serious challenges that have proven quite formidable and intractable, thus making these expectations unachievable. The **social, economic and health** implications resulting from this failure are already acknowledged in the public domain. It is therefore no surprise that the State was enrolled in the *Technical Assistance for the implementation of water supply and sanitation sector reform programme Phase III in Adamawa, Ekiti and Plateau States (Nigeria)* to help address and solve these gargantuan challenges.

One of the requirements of this Assistance Programme is to address the software issues, albeit very important, of the programme, one of which is the **legal and institutional reform** of the **water and sanitation sector** in these participating States. It was in the light of this that the Plateau State Water sector acquiesced to this institutional reform process. Consequently, the State Water Sector, under the auspices of the Plateau State Ministry of Water Resources and Energy, produced a backup water policy titled, *Plateau State Water Resources and Sanitation Policy 2017*. This document has articulated all the challenges and has subsequently designed ways of handling such challenges in an articulated and coordinated manner. Following this would be proposals for reorganization of the entire water and sanitation sector in an **institutional reform** process that would **precede** an eventual **legislative reform**.

1.1 Proposals for institutional reform

Institutional changes within the water and sanitation sector originate from the roles of both endogenous factors (e.g., water scarcity, performance deterioration, and financial non-viability) and exogenous factors (e.g., macro-economic crisis, political reform, natural calamities, and technological progress) (1). These factors act together to raise the opportunity costs of institutional change, reduce the corresponding transaction costs, and create a pro-reform climate. Viewed from a policy perspective the synergy from these factors can be utilized in a sequential reform strategy where water sub-sectors and institutional components are prioritized in terms of their relative performance impact, fiscal significance, facilitative roles for downstream reforms, and political acceptability (1).

At this juncture, we can briefly look at four key institutional reform types as a prelude to settling on the type most appropriate in the present circumstance. And these are:

- a. Water rights and river basin institutions;
- b. Decentralization in the management of water as a resource and as a service;
- c. Private sector participation; and
- d. Regulation of water infrastructure.

a. Water rights and river basin institutions

This reform system (2) determines if people are included or excluded in the control of a vital resource for their lives. Accordingly, well-defined and secured water rights can raise water productivity and thus improve rural livelihoods. Clearly defined and enforceable water rights are important to developing countries faced with the challenges of better management of water resources.

b. Decentralization

Decentralized management of water as a resource and as a service is another major area of institutional reform in the water sector as of recent. It has been applied to river basin and watershed management, wastewater management, urban and rural water supply, and irrigation service, among others. Three general approaches are common here: descriptive, normative and positive political economy (3).

c. Privatization

This third major form of institutional reform in the water sector gained worldwide recognition in the 1990s. This type of reform is driven by two hypotheses: the fiscal hypothesis and the efficiency hypothesis. The **fiscal hypothesis** holds that privatization will relieve governments the burden of investment financing, particularly for many developing countries facing fiscal pressures. On the other hand, the **efficiency hypothesis** states that water utilities performance will improve under private ownership because it is 'obviously' more efficient than the public sector.

d. Regulation

The following concerns usually show up whenever institutional reforms are talked about:

1. Separation of functions regarding policymaking, regulation, asset ownership, corporate oversight, and service delivery (4);
2. Independence of the regulator;
3. Design and enforcement of regulations;
4. Making a choice from an array of regulatory instruments (5);
5. Agency related problems and transaction costs (6);
6. The review and appeals process and stakeholder relations (7);
7. Effects of institutional endowment on regulatory design (8);
8. Quality of regulatory institutions (9).

One of the key problems decipherable in the water and sanitation situation in the geographical areas of Nigeria where this project situates relates to **separation of functions**. For example, it is not uncommon to find a state ministry of water resources acting as the policymaker and a service provider. It is not uncommon to find a state water board overreaching its capability by attempting to supply water to both the urban and to the remotest villages in that State. Attempts have been made to break down and separate these functions but these have not paid much dividend. Such failures have thus informed the embarking on the present exercise of an institutional reform that should precede a backup legislation.

In view of the above, it is the considered opinion that a **mix of decentralization and regulation** as the method of institutional reform would be used in these parts of Nigeria. While bearing this in mind it is equally the considered opinion that the template for institutional reform is going to be cast on **Integrated Water Resources Management (IWRM)**. This concept has been defined holistically by the Global Water Partnership (GWP) to wit: *“a process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”* (10). The **keywords** of this definition are the following:

- a. Promoting the **coordinated development** of water;
- b. Promoting the **coordinated management** of water, land and related resources;
- c. Maximizing resultant **economic and social welfare** in a community;
- d. But **not to compromise** sustainability of **vital ecosystems**.

These keywords have been articulated by Tropp 2005 (11). Here he stated that there were four governance dimensions to wit:

- i. The **social** dimension: this must ensure the equitable use of water resources;
- ii. The **economic** dimension: this must ensure the efficient use of water resources

- and the role of water in overall economic growth;
- iii. The **political** dimension: this must ensure that stakeholders and citizens at large are granted equal democratic opportunities in water use and to monitor the political processes and outcomes;
- iv. The **environmental sustainability** dimension: this must ensure that improved governance allows for more sustainable use of water resources and the preservation of the integrity of the ecosystem.

These four dimensions cut across all aspects of any institutional reform.

An analysis of the water institutions in Plateau State has been carried out. The focus of that analysis was to examine each water and sanitation institution with a view to determining its strengths and weaknesses. This was necessary to help position these institutions on the path of an eventual and overall institutional reform. Nine performance categories were used in this analysis. Unfortunately, none of these institutions met all the requirements of the test criteria applied. A summary of that will be shown below.

1.2: Analyses report of the Plateau State water and sanitation institutions

The report identified 14 putative water and sanitation institutions (see **Annex A**). Four of them, as representative institutions (see **Annex A**), were assessed for internal organization and performance using 9 performance categories (**12**). These categories were:

- a. Organizational autonomy;
- b. Leadership;
- c. Management and administration;
- d. Commercial orientation;
- e. Consumer orientation;
- f. Technical capability;
- g. Developing and maintaining staff;
- h. Organizational culture; and
- I. Interactions with key external institutions.

The assessment scores ranged from 'LOW' through 'MEDIUM' to 'HIGH'. The median score for this exercise stood at 'LOW'. Thus, the following recommendations are suggested to solve this situation.

1.3: Recommendations

1. The Plateau State Ministry of Water Resources and Energy which, *ipso facto*, could have been formed by Executive Order, is an unincorporated entity under the law and notionally owned by government, operates under public law. In view of these, the operations of the Ministry will be aimed at implementing all public laws pertaining to water supply and sanitation in the State. However, its activities should be confined to a general coordinative

role to wit: supervision, monitoring, coordination, planning, research and facilitating development of the sector. The Ministry's previous role of implementing water projects or water service delivery will be removed in line with the principle of accountability and transparency where it would not be fair for the Ministry to monitor itself, or to make itself amenable to monitoring by a subordinate institution. A new monitoring institution under the aegis of a Regulatory Institution, will be established;

Organizational effective autonomy of any institution is impacted by many factors as shown in this diagram as produced by (13).

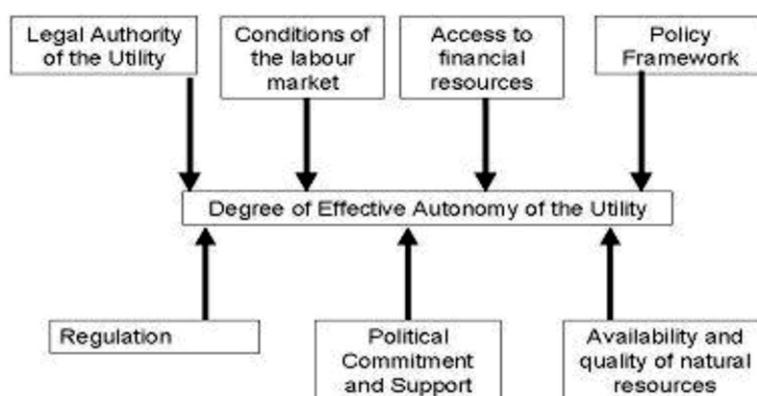


Figure 1: Factors that influence effective autonomy of a utility (see reference 13).

An institution that has a legal foundation of an executive order, statute or a memorandum and articles of association (registered under companies Act) will behave in different modes related to each of these legal statuses. With the exception of the State Ministry of Water Resources and Energy, it is recommended that other water and sanitation institutions in Plateau State be registered under **statute** to form **statutory** bodies or **parastatals**; or **companies Act** to form companies. This recommended situation does not detract from the fact that, whether incorporated or not, these institutions would still be owned by government as the original creator, would be operating under private law with government still retaining some shareholdings should these arise. However, these institutions would benefit from some limited autonomy to function as their legal entities dictate;

3. Another parameter that impacts the effective autonomy is the condition of the labour market. It is general knowledge that the level of unemployment in Nigeria is reeling and has got to a staggering level. This level notwithstanding, it is still important the best among these unemployed be sought after. To that end, it is recommended that each institution be given the authority to hire and fire staff that are of **immediate** need and **relevant** to the operations of the particular institution. It is understood that government feels disturbed about the level of

unemployment. It is equally important that productivity, as a result of getting the right calibre of staff, be made an important consideration, otherwise the institutions would continue to fail as a result of poor calibre of staffing;

4. An institution's outlook with respect to market orientation is very essential to the effectiveness and productivity of such organization. In this wise the State's water and sanitation institutions must have to understand fully their core functions and other activities they would like to perform themselves. This must be in line with the rationale for the organization of modern market-sensitive corporations, as espoused in Oliver E. Williamson's (14) 1975 study of the economics of internal organization in modern corporations found in his book, *Markets and Hierarchies, Analysis and Antitrust Implications*. This rationale states that a modern corporation must retain the production of whatever it can produce at a less expensive cost than what it gets when buying in the market, net of any transaction costs. And in doing this it is imperative to benchmark the price of internal functions or services to determine whether the institution is best suited for carrying out that function or whether it would have to contract it out. It is hereby recommended that institutions adopt this line of thinking.

To that end institutions must have to outsource non-core functions that are outside the skills of the professional staff, like information technology materials and other specialized engineering. Others include non-recurrent services that could be learned albeit at a higher cost to the institution, specialized maintenance of buildings and equipment, services related to some problem areas like the reading of meters, billing, and collection, which in some cases can be performed far better by private contractors;

5. For any water institution to progress and remain competitive, it must develop and adopt methods of listening to its customers' needs. The institution must have to work assiduously to better these needs, solicit the customers' views regarding standards and level of service and answer promptly or in good time to these customers' complaints. It is hereby recommended that all water institutions adopt a forward-seeking and progressive method of seeking customers' opinions and views, make available options for service delivery and timely information to customers regarding developments in water services.

To that end, water institutions must develop billing and collection systems that best overcome specific constraints faced by various groups of customers. For example, institutions should explore and exploit the services provided by commercial banks and associated electronic banking if this became available. The method of door-to-door collection is drifting into obsolescence and carries the danger of hostility to these collectors with some dangerous consequences.

Other aspects water institutions should adopt is the use of specially designed surveys or point of service surveys to find out the opinions and views of customers; sometimes anonymous opinion polls could be used also. In the area of service delivery, the water institutions should have to allow the customers to choose from the series of options the institution would present to them;

6. A feeling of self-belonging by the staff is a very important tool for moving the water institution forward and thus making it excel in its goal of water and sanitation services. Thus, it is recommended that the Chief Executive and top management of the institution develop a good corporate culture. This culture must involve moral, social and behavioural norms that should inspire staff and managers to excel. A corporate culture is usually established through clear mission statements and performance objectives for service quality and coverage. Such a culture should shape the beliefs, core values, attitudes and ability of the staff to set priorities to achieve their mission. A clear understanding of this culture will be reflected in the members' understanding of the mission statement, whether the institution has put in place criteria for promotion and salary, the level of staff turnover, and the amount of training provided to staff and management;

7. Leadership is the capability to inspire key stakeholders to develop and understand the institution's mission and objectives, to commit themselves to that mission and to work towards its fulfilment. It is recommended here that these aspects must be kept in mind always in appointing heads of these water and sanitation institutions. They must be leaders that would agree to and implement institutional change programmes. Moreover, it is recommended that over-reliance on just one leader could become counter-productive because this leader could suddenly become unavailable and his/her absence would grind projects, at least temporarily, to a halt. It is therefore a considered view that each institution should have 'core groups' plus a steering committee to make any long process of change sustainable;

8. The ability to get the most out of the resources available, including human and other resources, is the hallmark of effective management and administration. Therefore, it is recommended that all the institutions be overhauled to produce crops of good and effective management and administration. These managers, to be led by a Managing Director, must have a clear sense of objectives and priorities. They must know who to rely on to get a job done and how to delegate to these able subordinates the means to do it. The crop of managers and administrators in any institution must operate by teamwork, cooperation, and must provide avenues and the environment for good and efficient communication among staff;

9. Notwithstanding a possible plethora of highly skilled and professional staff in the water and sanitation institution, the dynamics of a fast-changing technological climate

impels upon the management of each institution to view technical capability as *sine qua non* to the development and progress of the institution. It is therefore highly recommended that facilities for on-the-job training and external training be made a normal accompaniment of the institution. Moreover, it is recommended that the use of computers be another important resource centre. These computers will have the latest software that would help in advancing the technical and technological advancements of the technical staff. Contiguous water and sanitation institutions could team up to finance these IT facilities for joint use by their various staff.

Summary

Plateau State of Nigeria has been having a problem of making water supply and sanitation services available to the teeming population of the State. In view of this shortfall, the State has embarked on the pathway to solving this problem under the aegis of the Technical Assistance Programme of the European Union. The first measure taken by the State was the formulation of a water policy titled, *Plateau State Water Resources and Sanitation Policy 2017*. This water policy had articulated all the challenges and had proffered ways of handling them. The next level is the institutional reform. To this end, an analysis of representative water and sanitation institutions had been done using 9 performance categories, as a first step. The results from that analysis have led to a series of recommendations aimed at amending those vital areas the institutions had fallen short. The next steps will involve other reform processes that will have the Integrated Water Resources Management (IWRM) concept as template.

CHAPTER TWO

Proposed Institutional Model for the Water and Sanitation Institutions in Plateau State

2.0: Background

The civil service everywhere in the world is usually bogged down by bureaucracies that could cause bottlenecks, especially in areas where speed of operation would be needed. In Plateau State with the present dire situation of water and sanitation that should call for speed and efficiency, it is the considered view that a paradigm shift be created in consequence. This view is not to suggest that the State Ministry of Water Resources and Energy, an archetypal civil service that inexorably follows all the processes of this kind of administration, be divorced completely from these water and sanitation institutions. Rather, while the State Ministry plays the umpire role as earlier stated, the service providers, typified in the water and sanitation institutions, should be made to run on a different rail line which provides a different structure of a chain of commands.

This consideration thus informs the view of suggesting a legal entity different from the status quo (with regard to most of them) as a way of upping the present ante and positioning these institutions on the path of vigour, productivity and performance. Pursuant to this, two legal entities come into the observational radar.

The first will be to create a statutory body or parastatal by statute. Here the institutions could either be incorporated or unincorporated. And they would be notionally owned by the Government of Plateau State; would operate under public law.

The second option would be to make them companies, using the usual memorandum and articles of association. Then get them registered under the Companies Act. They would be incorporated and thus would have their own legal personalities. They would be owned by the Plateau State Government that would own shares; and operating under private (company) law.

The choice of the particular structural and legal entity for the Plateau State water and sanitation institutions is very important since it would impact on any further activities the institutions would carry out within and outside these bodies. That therefore requires a careful choice of recommendations.

After a careful study of some water institutions round the world a template that would be suggested for Plateau has emerged. The AQUA S.A. Poland, for example, is registered as a Public Limited Company (PLC). It is a mixed joint stock company with the shares divided

among the municipal government, a private company and other stakeholders. This company operates under private corporate law drawing finances from commercial banks, multilaterals like the World Bank, and the European Union. It supplies water to 14 communities and bulk water to 4 others. It collects and treats wastewater for 6 communities. It prices water aggressively and has introduced decreasing block tariffs (see **Annex B** for explanation of this concept). It has a management board that runs the daily affairs of the company; and the supervisory board is responsible for evaluating performance and business proposals; this supervisory board summarises reports for annual shareholders' meetings.

The National Water and Sewerage Corporation (NWSC), Uganda, is a statutory body and is fully government owned. It operates as autonomous water board with separate legal status. It is responsible for water supply in large urban areas. It falls under the Ministry of Water, Lands and Environment. The Ministry appoints the Board of Directors for policy formulation. There have been improvements in water coverage, billed revenue, unaccounted-for-water (UFW) and percentage of metered accounts.

Finally, the HPWSC, Vietnam, is organized as an autonomous water board under the nation's state-owned Enterprise Law. The institution is accountable to its owner, the City Council and its customers. The operational improvements are attributable to the implementation of the '*phuong*' model. This model necessitates a gradual closing of poorly performing public water tanks as the connection rate approaches 100 percent in the improved *phuong*s (wards). With these various institutional models in mind, the following recommendations for Plateau State are as follows:

2.1: Recommendations

1. A mix of the three institutional models adumbrated above is hereby recommended. Accordingly, each water and sanitation institution in Plateau State of Nigeria will become a company with a memorandum and articles of association. It will be registered under the Company Act. Any registered water and sanitation institution previously registered under law would have its status amended to reflect this new outlook. For the avoidance of doubt such institutions include the Plateau State Water Board, Plateau State Rural Water Supply and Sanitation Agency, Plateau State Small Towns Water Supply and Sanitation Agency. This consideration may not include the support agencies like the Civil Society Organizations and other non-water and sanitation agencies;

2. Following from above, each institution will be incorporated, thus making it have its own legal personality;

3. The institution will still be owned by the Government of Plateau State, as the initial creator. And the Government will be a substantial shareholder;
4. Each institution will operate as an autonomous water and sanitation body under the Plateau State Ministry of Water Resources and Energy;
5. Each institution will operate under a private company law;
6. Each water and sanitation institution in Plateau State will be sponsored by the Plateau State Government as major shareholder. Other financiers or sponsors will be drawn from the private sector, including the commercial banks;
7. Each water and sanitation institution in Plateau State will be a mixed joint stock company with the Plateau State Government having 50% of its shares. Private sponsors will be entitled to 30% of the shares, while other stakeholders, comprising staff members of that particular institution, citizens of areas to be served by that institution, will be entitled to the remaining 20% of the shares;
8. Each institution will have a 'Core Management Board' that will be responsible for the day-to-day activities of the company. This Board will be drawn essentially from the institution's staff or, where dearth of capable and qualified hands exists, drawn from outside the institution;
9. Each institution will have a Steering Committee or Board of Directors (see **Annex C** for further explanation) whose membership will be drawn, in proportion to the statutory shares allocated: Plateau State Ministry of Water Resources and Energy, private sector, members of public whose area will be served, and 1 person from a line Ministry. This Board or Steering Committee will interpret the Plateau State Water Resources and Sanitation Policy, and see to the implementation of the section relevant to that institution and to that institution's relations with the public and other water and sanitation institutions;
10. In view of the fact that the Plateau State Government will have major shares in these companies, it should behave well and become an inexorable matter of public importance to Government to source initial seed funds, and veritably succeed in sourcing them, to kick-start each of these water and sanitation institutions. However, with time each water and sanitation institution will fully transform into a for-profit

commercial enterprise with all net income redirected to both business growth and shareholder return.

Summary

The institutional models of 3 water and sanitation institutions round the world have been carefully studied. Subsequently a mix of these models was synthesized to be introduced as a suitable model for the Plateau State water and sanitation institutions. The cardinal point here is a company model. It is therefore recommended that each of the Plateau State water and sanitation institutions be run as a company.

PART THREE

SOCIAL DIMENSION IN WATER AND SANITATION SERVICES

CHAPTER THREE

3.0: Background

Social dimension in this context essentially refers to the equitable use of water and sanitation resources. Equity is a contentious or difficult to define context since its meaning could differ from place to place or under different circumstances. In objective terms, however, and within the context of water and sanitation, equity entails fairness, social justice, acceptability, perception, rights and obligations, benefits, and burdens, advantages and disadvantages. Prescriptively, no one must be denied access to water resources and sanitation services on basis of race, ethnicity, gender, origin or religion. **Water allocation refers to the process of sharing water resources amongst competing needs and demands** in a society; and this is a dynamic process since these needs and demands could change as time, circumstances, and situations change.

However, for the components of an equitable allocation or use of water to take place there must be a presence of **stakeholders**. These are **individuals or groups that may affect or be affected** by water management decisions. Besides being affected by the policies, decision and actions of a particular system, the individuals, communities or groups will have interests, or a stake or claim, in the particular system. This last statement implies **stakeholder participation**.

Participation will mean that these stakeholders, as **beneficiaries** of the project, will be involved in this project's initiation, planning, implementation, management and evaluation, decision-making processes. And participation in this sense must not connote anything symbolic, pseudo or partial, as to lose its essence. Rather **participation must be full and be seen and understood to be full**. Under full participatory situation, every stakeholder will have equal power to determine the outcome of a decision. The local people thus have joint decision-making power together with the water and sanitation institution on ground, or government officials. Even though some elements among the stakeholders could have more clout, politically or socially, and thus have more influence on decisions, full participation will still remain the most viable option.

This situation thus places on the community a strong need to have a strong and improved capacity for management of its water supply systems and sanitation facilities, and to sustainably manage all available water resources.

3.1: Community management of water and sanitation services

Having addressed the important need of stakeholder participation it is now important to progress to the management of the projects that the relevant water and sanitation institution will introduce in that community. **What this implies is that stakeholder participation is a prerequisite for stakeholder or community management.** This is in line with *Agenda 21* of Rio 1992 (15). Therefore all water and sanitation institutions in Plateau are obliged to follow this trend and create the right environment that will facilitate this concept. However, it must be emphasized here that the user community will **not** do everything by itself. An effective community management entails evolving partnership whereby such a community, like a water committee for example, draws resources from inside the community itself, from other communities, and from other agencies. The potential partners of such a community management will be the following:

3.1.1: The community inter se

The community itself is the most important partner of that community. Being a group of people using the same water supply and sanitation system, the community will invariably comprise different parts, which could be delineated along ethnic, socioeconomic, religious and gender-basis. And if there are different stages of development amongst these groups there will be differences in the desire and capacity to manage any improved water supply and sanitation services. But even the poorest groups in that community would be willing and even able to contribute substantial resources to the provision and upkeep of water supply and sanitation improvements.

3.1.2: Other communities

A successful community management will trigger a community-driven replication and sharing of this success, thus stimulating neighbouring communities to follow suit. This knowledge sharing and subsequent pooling of resources would engender faster and more cost-effective implementation of projects and would play a vital role in long-term sustainability. Thus this kind of inter-community networking is a powerful advantage of community management over centrally managed water programmes.

3.1.3: The water and sanitation institution

This is the most common partner and is usually the originator of the project in the community. However, the general attitude of staff in these institutions is that of a **patron-client disposition**. Under the **concept of community management this attitude must have to be abandoned** in order to make such management workable and doable. The **change** that should occur in the water and sanitation institutions should affect the **staffing and training, planning, implementation and financing**. Moreover, the **usual fear of threat to their jobs** prevalent among the staff must be **jettisoned** as this **partnership** in management **would create an opportunity for achieving greater success and a higher respect** from the community and the government. **These institutions must have a balance of technical staff and experienced community workers**. They must see their role as raising community awareness, providing backstopping support, facilitating activities and responding to community needs.

3.1.4: The NGOs

These, by their nature, are **strong partners in community management activities**. They have a very strong capacity for facilitating these activities and can help to increase the outreach capacity of governments and donors. NGOs in Plateau State should be the principal partner of the community, could operate in direct partnership with the communities, in the absence of the water and sanitation institution, or could work with government and the institution in each stage of the project; dialogue with communities and could provide the initial technical support from its own resources if necessary. However, a partner NGO would need official government backing for its activities.

3.2: Strategies for creating an enabling environment for community management

Besides **policy, legislation and decentralization** that are at the heart of this reform, there are **other strategies** that are necessary to create an enabling environment for community management. These are stated in the recommendations shown below.

3.2.1: Recommendations in respect of strategic planning

- a. Government must be prepared to meet the imperatives of **increased competition for diminishing resources**. And this must call for the way water would be shared for various uses. The sharing device must be such that **any diversion of water** to satisfy any need must not rob downstream areas and other areas of water resources to fulfil their own competing needs;

- b. Government and/or its agencies must keep in mind that any **allocations of water** must meet the **concept of both equitable and sustainable** supply;
- c. Any occasion where **guaranteed and protected supplies does not occur** is bound to render community management useless and of no effect;
- d. **Demand-driven development** implies that there must be **flexible timing, sufficient opportunity for local decision making, resource mobilization and capacity building**;
- e. **Rigid scheduling of projects should be avoided** since this could inhibit community participation with a concomitant impairment of long-term sustainability;
- f. Rather, it would be better to **adopt a programmatic approach** where **demand and capacity** would dictate the pace and sequence of development.

3.2.2: Recommendations on training and education for community management of water and sanitation services

- a. Government and/or its agencies should ensure the **existence of a programme of human resources development** that will be based on assessment of needs;
- b. The **human resources development** must **reflect the need for partnership** in sustainable sector development between government, communities, the private sector, and NGOs to build skills at all levels;
- c. The exercise must recognize the **particular needs of women** and people living with disabilities; and must ensure **equal training and employment opportunities**;
- d. The **training** must involve recent **developments** in methods of activities, media and materials;
- e. In dealing with **socio-cultural issues** it is important that a **relevant participatory training technique**, where people learn through group involvement, is adopted;
- f. A **reorganization** or **re-adaptation** of educational background will be necessary. Thus, **prospective** students should be sent to schools where behavioural change through hygiene education is taught; and hygiene education is inculcated and intensified in all school curriculum. Such schools include Schools of Hygiene available all over the country and Schools of Health Technology;
- g. **Aspiring professionals** could avail themselves the opportunities provided by **educational institutions** with the right and updated curricula in sector approaches;
- h. It is important that **strategies** adopted here will have to **focus on people and not necessarily technology**. There should be an aim for a critical mass of appropriately trained people to meet the sector's technical and managerial challenges;

- I. **Responsibility, recognition, opportunities** for promotion and pleasant working conditions will contribute to job satisfaction and will create the right motivation and incentive for sector staff;
- j. **Production bonuses**, inducements on staff to relocate to rural areas should be encouraged.

3.2.3: Recommendations on public education and social marketing

- a. Facilitated by water and sanitation institutions, **new attitudes and behaviour patterns** with communities must be fashioned and adopted to promote the effective use of water;
- b. Such **attitudes** must equally **stimulate demand for hygiene and sanitation improvements**, and to raise **environmental** awareness;
- c. **Women** must be given the chance to play vital roles in **promoting improved hygiene behaviour**;
- d. The **public media**, like the press, radio and television, should be **mobilized** to aid in these efforts;
- e. **Water and sanitation institutions** must play a **vital role** in fostering free flow of information between government and the communities;
- f. Every aspect of **government policy and associated plans** must be presented to the communities in clear, concise and understandable forms and formats; and
- g. People living with disabilities should also play a vital role in promoting sanitation and hygiene.

3.2.4: Recommendations in respect of monitoring and evaluation

- a. **Government and its agencies** should realize that **focusing** too strongly on **coverage targets** could jeopardize sustainability as it places **emphasis** on installation rather than **sustained** utilization;
- b. It is a considered view that **emphasis on sustainability and effective use** should drive monitoring techniques;
- c. Therefore **participatory monitoring and evaluation methods** would be **helpful** to water and sanitation institutions to **respond better to consumers'** needs;
- d. In addition this **participatory approach** would contribute to local **capacity building**.

CHAPTER FOUR

GENDER AND SOCIAL EQUITY IN WATER AND SANITATION SERVICES

4.0: Background

Global water and sanitation practitioners recognize the importance of incorporating a gender perspective in this sector. Many nations have enacted overarching laws where this issue was covered. And this thinking has been articulated adequately in the *Plateau State Water Resources and Sanitation Policy 2017*. The rationale for these understandings stems from the fact that women and girls constitute primary users, providers and managers of household waters, together with being guardians of household hygiene. And on the other end of the scale, women stand to benefit immensely in the event of improved water services. And this benefit could be quantified in terms of the reduction of an avoidably long person hours spent on fetching water. Thus the water and sanitation sector will be obliged to effect redressing this yawning inequality by bringing about a positive trend on the social, political and economic position of women, including women's health and security.

An inclusion of women in water management at all levels can shape programmes and meet sector objectives. Sector studies have shown that equal involvement of men and women has a positive correlation with improved sustainability of water supplies (16). In addition, there is improved transparency and governance in management.

The security of girls and women is highly secure when the female gender is included in the management of sanitation and hygiene resources; and this security pans out across all areas of the female social life. In the area of water for production women find little opportunities, thus endangering their economic standing, all owing to the non-inclusion of women in management of these resources. Thus it is important that these inadequacies were addressed. And the addressing is found in the concept of gender mainstreaming as identified here:

‘Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that

women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality'. (ECOSOC, 1997) (17).

4.1: Gender at policy level: The first step here is an audit to assess practice and gaps. This has been articulated in the *Plateau State Water Resources and Sanitation Policy 2017*. But by way of support, it is still necessary to mention it here. To fulfil the required goals, the following recommendations become pertinent:

4.1.1: Recommendations on gender at policy level

- a. Government and its agencies should ensure that a gender analysis to inform national and state policy reforms to gender issues in water and sanitation sector at the State level be undertaken;
- b. An institutional audit must be carried out to identify gaps in lead ministry capacity and practice in responding to gender issues;
- c. Specific gender objectives aimed at articulating State water and sanitation policies and strategies must be done;
- d. The lead water and sanitation sector ministries and the various institutions must allocate resources for gender main-streaming activities;
- e. Sector policy must address barriers facing both men and women, including people living with disabilities, in making productive use of water; for example, in the areas of household, livestock, drip irrigation and cottage industries;
- f. Policies must address issues in women's participation and representation and target pockets of vulnerability to promote equity;
- g. Institutions must respect gender policies to align and inform their investment and support the State and national governments to fulfil main-streaming policy goals;
- h. State level stakeholders (government, civil society, research agencies, water and sanitation institutions) must regularly incorporate gender considerations in studies, reviews or research enacted to progress sector goals;

I. There must exist the following indicators: gender specific objectives at the State and sector level, existence of gender policies within the water and sanitation institutions, water and sanitation equity distribution ratios, percentage of population on-network versus off-network, and percentage of income spent by women and men in accessing water and sanitation services in different parts of the State.

Summary

The importance of incorporating gender perspectives in water and sanitation has been highlighted and many nations are moving towards that trend. The *Plateau State Water Resources and Sanitation Policy 2017*, has highlighted that need. The reason for inclusion of women and girls has many salutary consequences on members of this gender and in the water and sanitation management as a whole. Mainstreaming in gender perspectives has been recommended at the UN level as this brings about gender equality.

4.2: Gender in the workplace

Water and sanitation institutions in Plateau State are obliged to mainstream gender in order to enhance service quality. To that end they must ensure that the work environment is conducive to all individuals, and women in particular; and no one is subjected to any form of discrimination. To make this possible the following recommendations are presented:

4.2.1: Recommendations on gender in the workplace

- a. Discrimination of all types based on gender, race, age, marital status, pregnancy, parenthood must be avoided. Furthermore, any discrimination related to someone's disability in recruitment, staff promotion and training of staff must always be avoided;
- b. It is imperative that safety at work environment is maintained at all times. And jobs necessitating travels must be done in and under safe travel arrangements;
- c. Employees must be supported in their efforts to balance work and family responsibilities and this should include paid sick leave of absence, flexi-time, lactation spaces, childcare, paternity or maternity leave;
- d. Sexual, psychological, racist, ethnic language and epithet, images or harassment must be prohibited if ever these exist. And strong enforcement of disciplinary action against these must be put in place;

- e. All staff must be made aware that they could directly inform a harasser, irrespective of the latter's rank, that his/her conduct is unwelcome and unwholesome and so must stop;
- f. All staff should be placed on permanent terms of appointment; and if it is necessary to place some on contract, the contract extension must be the same and across board, no matter who is involved. In other words, there must be a measure of transparency in this contract renewal;
- g. Under the present aegis of institutional reform and in future, there should be an increased capacity for gender mainstreaming and an improvement of ratio of men to women in a traditionally male dominated sector.

4.3: Institutional strategies directed at gender matters at the community level

To meet gender mainstreaming goals, the State's water and sanitation institutions must make sure that their staffs are equipped to mainstream gender all through the lifetime and cycles of projects. Therefore, the following recommendations become pertinent:

4.3.1: Recommendations on gender strategies at the community level

- a. Institutions must produce a guide for resource allocation;
- b. The Plateau State Ministry of Water Resources and Energy should ensure that institutions comply with the State's water policy on gender mainstreaming;
- c. Water and sanitation institutions must have to employ adequately trained staff or retrain existing ones to help implement mainstreaming strategies;
- d. It would be important that strategies towards gender mainstreaming go alongside other core sector and institutional goals and get promoted as a collective mandate;
- e. There should be a gender responsive budgeting tool to support the institutions to prepare budgets from the grassroots up, taking gender concerns into consideration.

4.4: Gender in urban water operations

In urban areas there are important challenges created by growth and poverty. And this growth creates informal economy in these settlements. Tackling the subject of gender within

urban water operations will need the application of the usual interventions that address services in informal settlements. One of the big businesses in such informal settlements is water resale. To this end water and sanitation institutions must have to facilitate the role of women in this local enterprise. The following forms the group of recommendations to make this possible:

4.4.1: Recommendations on gender in urban water operations

- a. Plateau State water institutions must inculcate services to the poor informal settlements in the State as a key corporate objective and articulate this within guidelines, strategies and principles in the provision of services to low income areas;
- b. These institutions must establish specialized pro-poor units whose responsibility would be to respond to gender issues;
- c. Water and sanitation institutions should create focal points on the needs of poor men and women by helping to overcome financial barriers to access by establishing flexible connection payment terms, appropriate tariffs and targeted subsidies;
- d. It is important that any service or administrative body differentiate the needs of men and women in order to enable appropriate interventions to both. The participatory urban appraisals (PUA), adopted from the participatory rural appraisal (PRA) is a useful tool in this respect. The PUA differentiates the needs and priorities of men and women, the differences in workload for planning project implementation, and helps to analyse power differentials within the community;
- e. Partnerships between the water institution and community based organizations and private entrepreneurs must be established to penetrate and expand services within the low-income settlements, and reduce household reliance on middlemen.

4.4.2: Recommendations on gender in urban sanitation

The water and sanitation institutions in Plateau State should lead and facilitate the following processes:

- a. Forming of partnerships between local government, local women's groups and the private sector to overcome technical and financial barriers to women accessing urban sanitations;
- b. A sustainability plan should be introduced for the operation and maintenance of

- public-pay-and-use facilities, allowing women to play a vital role in their management;
- c. A working and workable strategy to ensure safety of women and children when using the toilets must be incorporated. Such a strategy will be tailored towards the local norms, beliefs and customs in order not to create local embarrassment and a possible backlash;
 - d. Any decision about payments schemes must include women as opinion makers; and this must also include the needs of children;
 - e. Workable strategies must be put in place in the area of sanitation and hygiene at the lowest level of a formal education. Lack of sanitation access must not be in place to impede school attendance by girls.

4.5: Addressing gender in small town and rural water operations

As stated earlier gender main-streaming implies equitable representation in water management in small towns and in rural water supplies. Therefore, good gender main-streaming practices in small towns and rural water operations must subscribe to the following recommendations:

4.5.1: Recommendations on gender main-streaming in small towns and rural water operations

- a. Water Service Providers must guarantee opportunities for women in decision making and water supply management;
- b. Women must be made to enjoy the benefits and take responsibility arising from the management;
- c. There must be equal opportunities to build capacity at all levels of operations, including equal training opportunities for women and men at district and community levels.

Summary

To make water and sanitation available to men, women and children at all levels of society, gender main-streaming must be implemented at the workplace where mutual respect for every individual must be observed. Institutional strategies to comply with gender main-streaming must be put in place. Business opportunities arising from water resale in the urban

areas must have women in proportionate numbers as managers and decision makers at all levels of management. While this should be the case, it should be ensured that the poor, including men, are not left behind. Urban sanitation must comply with policies aimed at making such available to the female gender while taking their security and that of their children into consideration at all times. Such gender mainstreaming efforts must be extended to small towns and rural areas through established institutions.

4.6: Addressing gender in monitoring and evaluation

One important component of effective gender mainstreaming is in the area of monitoring and evaluation. **The monitoring system is meant to record, analyse and document input, output, process and impact indicators in a sex disaggregated way.** Disaggregated data by sex would make it possible to assess the positive or negative impacts of a programme on women, men, young and old, rich and poor, and make informed decisions on programming in future. These germane issues illustrate this point:

Price adjustments: If a water and sanitation institution should increase its tariffs without monitoring consumers' ability to pay, the effect may affect women than men more negatively, if a system of disaggregated data is absent, since the institution would not notice this negative effect on women.

Capacity building, affirmative action policies, special programmes: An absence of a gender-sensitive indicator would make it impossible to monitor and measure, and so see how these affect both genders.

The following points therefore fall under recommendations:

4.6.1: Recommendations on gender in monitoring and evaluation

- a. Plateau State Ministry of Water Resources and Energy must have to **install procedures for sectoral monitoring of inputs, outputs, and processes, and should undertake special studies to measure impact, using sex disaggregated indicators.** It is equally recommended that a sector gender monitoring should be integrated within the State monitoring framework, rather than only establishing a separate gender monitoring process;
- b. Within sector wide approaches to planning (SWAP), it is recommended that partners should always jointly monitor gender as a key progress and outcome indicator;

- c. It would be a very good idea to undertake special impact assessments that monitor the impact of the established institutional arrangement on men and women, and facilitate learning and replication of good gender mainstreaming practices;
- d. The indicators for these processes are as follows:
 - i. Percentage and geographical coverage of the population using improved water and sanitation services;
 - ii. Time saved by women using improved water and sanitation services;
 - iii. Ratio of toilets and hand-washing facilities per household;
 - iv. Toilet ratios per girl and boy in primary schools;
 - v. Percentage of men and women trained in scheme management;
 - vi. Percentage of men and women represented in the management bodies of water institutions at policy and operational levels;
 - vii. Morbidity and mortality for children under 5.

4.7: Gender matters in citizens' opinions

Facilities that help to increase the ability of men and women to exercise their rights and responsibilities are important for empowerment, in highlighting, and in readdressing gender issues during key phases of the project cycle. Water and sanitation institutions have usually been slow to create channels for effective citizen engagement and receive citizen input to shape their programmes or services. Women and marginalized citizens often lack the necessary experience and tools to ensure they are heard and their voices are acted on.

To reverse this trend, it should be incumbent upon water and sanitation institutions in Plateau State to acquire important tools in this regard. Therefore, social accountability tools like Citizen Report Cards, public hearings, and participatory tools assessments, etc, can assist in strengthening citizens' voices. While doing this, water and sanitation institutions must remember that all social accountability tools are not designed in a way as to distinguish the needs of different societal segments. Thus, special attention must be paid to distinguish issues or concerns faced separately by men and women. Furthermore, all these can be articulated in the following recommendations:

4.7.1: Recommendations on gender matters in citizens' opinions

- a. Water and sanitation institutions must endeavour to organize sector meetings at the community level to overcome cultural barriers to women's participation. Cultural barriers could include cultural norms, seating arrangements, language and meeting times;

- b. Water and sanitation institutions must provide information for decision making on policies, strategies, plans and investments in a format that is user-friendly and accessible to women, marginalized groups and the organizations that represent them;
- c. Policymakers in the State Ministry of Water Resources and Energy, other relevant line ministries and regulatory bodies to be established by legislation should use feedback mechanisms for citizens' complaints and challenges arising from the water and sanitation providers, including those on lower levels of service, such as stand pipes and water kiosks;
- d. Water and sanitation institutions must allow citizens' voices of both women and men to influence their plans, budgets and strategies;
- e. Water and sanitation institutions should cooperate with civil society should the latter hold the former accountable for their performance and behaviour;
- f. The indicators for ascertaining the effects of these measures are itemized below:
 - i. Ratio of contributions in decision making meetings by women and men;
 - ii. Percentage of decisions adopted from women's contributions in water and sanitation committee meetings;
 - iii. Number of policies and strategies published with inputs from non-state actors and marginalized groups.

4.8: Gender matters related to behaviour change

In a typical African family, be it in the urban or rural area, women are easily sold on behaviours that protect the health and well-being of their families. A typical example is the hand-washing procedures to help eliminate diseases like diarrhoea or cholera. Women are more responsive to consumer messages, while men are more interested in the technical aspects of a sanitation facility. Therefore, investing in collecting sex disaggregated information can be used to help the water and sanitation institutions and other development agencies to communicate more effectively and influence the behaviour of sanitation adoption. Men, as heads of households, can play several key roles as gatekeepers, protectors and role models. In these roles men can allow or deny access to new information. They can enable, reinforce, and sustain behaviour change. Therefore, the following recommendations are made:

4.8.1: Recommendations on gender matters related to behaviour change

- a. Water and sanitation institutions should carry out constant studies to understand baseline behaviour, and appropriate communication channels and triggers for change by both men and women;
- b. Men and women should be given equal attention in their role of promoting hygiene and training activities;
- c. Hygiene promotion should be packaged with water and sanitation facilities to ensure support for behaviour change. This will enable facilities to impact positively on women and children less than 5 years of age;
- d. Hygiene promotion interventions must be targeted at primary schools;
- e. Sanitation interventions should be made to maximize the potential of community dynamics and social norms to increase rural sanitation coverage and improve hygiene behaviour;
- f. The indicators to monitor this will be the following: percentage of households hand-washing with soap and the percentage of households investing in sanitation facilities.

Summary

A good system for monitoring and evaluation should present data in a disaggregated form detailing gender differences in a particular circumstance. This would help in seeing the different effects, like price adjustments in water use and capacity building, would have on people of different genders. Related to this is the allowance to be given to people's voices and opinions in matters that should show how men and women's contributions are distributed in the area of decision making, for example. Matters on gender related to behaviour change are equally important since they help highlight how the man and woman in a family react to an outside influence on sanitation, for example. While the woman easily embraces this message, the man accepts it through a prism of being the protector and role model of the family. Targeting these disaggregated characteristics will be important in effecting a behavioural change.

PART THREE

THE ECONOMIC DIMENSION OF EFFICIENT WATER USE

CHAPTER FIVE

This Part will include the following:

- i. Efficient use of water resources;
- ii. The role of water and sanitation in overall economic growth.

5.0: Efficient use of water resources

Water **use is efficient** when the **added costs of supplying water just equal the added benefits** to water users. This is a **concept of benefit measurement**. The overarching benefit of efficient water use is to make a scarce resource go further and to create the least possible disruption to the environment for the greatest gain.

5.1: Efficiency in the use of domestic water supply

5.1.1: Metering requirement

Metering domestic water use (18) with **production** and **consumption** meters is fundamental to helping in the development of successful water use efficiency (WUE) programme. Meters provide the information necessary to calculate accurate distribution system leakage. They also provide useful information to evaluate the effectiveness of the WUE programme. See **Annex B** for some data calculation methods.

A water services provider that installs **service meters and billing the customers based on the amount of water** they use is the most effective water efficiency measure that could be implemented. **Once customers get to realize how much water they are using, water demand tends to decrease.**

On the other hand, in the absence of consumption meters, installation of **zone meters** will help **identify and prioritize areas** with the **most leaks** and evaluate how to **proceed with a water loss control action plan**. **Lost water has a value**; and when you consider the cost to pump, treat, store, and distribute the water and you add up these factors it would be found that fixing leaks makes much economic sense.

5.1.2: Recommendations

- a. Water and sanitation institutions will be required to install **consumption** meters, also **referred to as service or customer meters**, to **provide information to the provider and the customer** regarding this customer's water usage. This meter will **also provide** the most accurate **assessment** of **distribution system leakage**;
- b. **Service meters** will be required on all **existing** and **new direct service connections and clustered entities**. This requirement could allow clustering of certain customers using a single meter. This would be at the discretion of the water services provider provided it would be fair, transparent and objective;
- c. New connections **must be metered** at the time water is provided to the customer. Service meters do not need to be installed until customer requests water from the distribution system. However, a public health consideration of piping water to all potential consumers could override the potential customer's option of piping refusal;
- d. Meters must be installed on all interties used as permanent or seasonal sources. You may need to install intertie meters at an earlier date in order to calculate accurate distribution system leakage;
- e. Exceptions to the service meter requirement include the following:
 - i. Campgrounds;
 - ii. Recreational vehicle parks;
 - iii. Property designated as a mobile home park;
 - iv. A building with multiple units, for example, an apartment building;
 - v. Complexes with multiple buildings served as a single connection, for example, a business park.

The above constitute clustered entities whose volume of water can be measured through a single meter.

- f. Service providers must ensure that only qualified professionals install the various service meters. Care must be taken not to disturb the distribution system. Contamination to the distribution system can occur when the water lines are disrupted, thus compromising the ability to provide safe and reliable water;

- g. Meters must be installed and calibrated correctly to be accurate. The accuracy of meters diminishes over time, and older meters may require calibration or replacement. Inaccurate meters result in lost revenue. Even a few percentage points of inaccurate measurement on a larger meter can cost hundreds or thousands of Naira every month;
- h. It is recognized that some households might not afford to pay for these meters. Therefore, water meter installation could form part of any water development project and the **money allocated** to this could be disbursed as **revolving funds** (loans) to needy households;
- I. Good information is needed to develop a successful WUE programme. By understanding how much is used by the provider and the customers, the two can make informed choices about how best to conserve water;
- j. It will be important to collect production and consumption data on a regular basis and report the information in the provider's planning document and annual WUE report. Water production and consumption data are critical for calculating distribution system leakage. These data are needed for the following:
 - 1. Calculating leakage;
 - 2. Forecasting demand for future water needs;
 - 3. Identifying areas for more efficient use of water;
 - 4. Evaluating the success of the WUE programme;
 - 5. Describing the water supply characteristics;
 - 6. Aiding in decision-making about water management;
- k. Quality of the meters must be standardized;
 - 1. Customers must be sensitized as to their rights and responsibilities;
- m. Attention must be paid to meter calibration, its life span and the impediments of wear and tear on the device;
- m. Due consideration must always be given to subsidizing the cost of meters.

5.1.3: Data Collection

Within a water system plan or small water system management programme the following must be included:

- I. Monthly and annual totals of water produced;
- ii. Monthly and annual totals of water purchased from another water system;
- iii. Annual totals of water supplied to other water systems through interties.

Data from water produced: Water produced is the amount of water used from the provider's source. The provider must collect the accruing data monthly and then calculate annual totals from each source. This information will come in handy when submitting the annual WUE.

Data from intertie: Interties provide consumption and production data. If a provider supplies water through an intertie, this should be considered as authorized consumption (AC). If the provider receives water through an intertie, this should be considered as total produced and purchased (TP).

Water supplied: Is the amount of water the provider makes available to another water system through an intertie. This must be included in the AC data when calculating leakage. This information must be collected annually from each intertie.

Water received: otherwise usually called **purchased water**, is the amount of water the provider gets from another water system through an intertie. The information obtained here must be included in the TP data when calculating leakage. This information must be collected each month from each intertie.

Wheeled Water: This is a term that identifies an originating water supplier that uses another water supplier's pipes (wheeling water system) to supply water to a receiving water system or end user. This water is not directly used by the wheeling water system or its customers. Leakage must be tracked for each water system (originator, wheeling water system and end user).

Water consumed: Obtaining consumption data from service meters is the most accurate method to know how much water is used and to determine leakage within the water system. Service providers must collect annual consumption data on how much water is being used by the customers. These data are useful in forecasting demand and determining leakage.

To determine leakage, estimate and record any authorized uses such as water system flushing, street washing, and firefighting.

Customer Class: It is important to include in the annual water consumption data the planning document for each customer class. Examples of class types are residential, non-residential, commercial, industrial, single family and multi-family.

Seasonal Variations in Customer Class for Water Systems with 1000 or More Connections: Consumption data for customer classes may change from season to season particularly in the months of high temperature and greater water needs. For water systems with 1000 or more connections, the provider must collect seasonal data to describe the variations in water consumption trends. These data could be collected monthly, every other month, quarterly, or seasonally.

Summary

Metering water use with production and consumption meters is fundamental to helping in the development of successful water use efficiency (WUE) programme. Meters provide the information necessary to calculate accurate distribution system leakage. They also provide useful information to evaluate the effectiveness of the WUE programme. These meters provide data that help in the overall management and sustenance of an efficient use of domestic water supplies.

5.2: Efficiency in the use of irrigation water for agriculture

Water efficiency must be considered from the initial irrigation system design phase through installation to ensure optimal performance. Consistent management and maintenance are also essential; and failure to do so can result in significant losses in system efficiency from poor management, improper system design, installation, or maintenance.

Documenting irrigation water efficiency and filling out a prepared schedule for water conservation measures will allow irrigators to record the water efficiency and conservation measures and practices currently undertaken or scheduled to be undertaken in the next years, for example, 3-5 years hence. The following recommendations will become handy in this direction:

5.2.1: Recommendations on efficiency in the use of irrigation water for agriculture

The PADP and ASTC will have to be reformed, strengthened and revamped to begin or intensify the following functions:

- a. Water use must be monitored. This is a mandatory requirement for all holders of permits and licences to take water. Accordingly, meter and log all water used or calibrate, monitor and log water used;
- b. It must be ensured that water supply meets the need of the operation in every year;
- c. Measure and log water application depth (mm) and evenness, for example, with a series of rain gauges in the field, at least once per growing season;
- d. Operate and monitor water system to ensure that irrigation water seldom ponds and does not run off the field;
- e. Operate water systems and monitor drainage system to ensure that drainage tile systems do not flow during or after irrigation sessions;
- f. It must be ensured that the irrigation system applies water to the plant rooting area only, as in drip system, for example;
- g. It is important to centre pivot or lateral move system with low pressure spray nozzles or drop tubes;
- h. It is important to use a low-level sprinkler system;
- I. A good knowledge of crop water needs is important for scheduling irrigation; this should apply for each stage of development from seedling to mature crop;
- j. Irrigation must be scheduled according to rainfall; and rainfall to be monitored with a rain gauge;
- k. Schedule irrigation according to evapotranspiration (the transport of water into the

atmosphere from surfaces, including soil (soil evaporation), and from vegetation (transpiration). Monitor evapotranspiration from weather service or on-farm weather station;

- l. Develop a good knowledge of soil moisture-holding limitations (laboratory test for soil moisture-holding ability or texture analysis);
- m. Measure soil moisture by hand-feel method or with a soil moisture gauge;
- n. Maintain and increase soil organic matter, as measured by a soil test;
- o. Avoid and reduce soil compaction by staying out of wet fields, use a good crop rotation, leave residues on soil surface, plant cover crops;
- p. Be prepared for low water condition. Accordingly, it is necessary to have a written contingency plan in place to deal with possible periods of low water; consider how to deal with periods of low water, acquire knowledge of and ensure participation in the Low Water Response Programme;
- q. Conduct regular maintenance checks for leaks and fix them immediately when they occur. Check sprinkler nozzles yearly and replace worn parts;
- r. These institutions must organize workshop or conference on improving irrigation efficiencies using best management practices. In addition, they must organize an environmental farm plan workshop to help farmers increase awareness and evaluate current water conservation and efficiency best management practices.

Summary

Just like in domestic water efficiency, there is a very strong need for irrigation water efficiency in agriculture. The latter takes a very sizeable amount of available water for food production. However, for water resources and these services to remain sustainable and go round to other competing needs, water conservation is very important in agriculture. The two proposed water and sanitation institutions will take the lead in implementing the efficiency and, subsequently, water conservation.

5.3: Registration, Licensing and Water Tariffs

This task will fall under the purview of the proposed Plateau State Water and Sanitation Regulatory Agency.

Plateau State may be endowed with abundant water resources but these are not inexhaustible. If used carelessly and unsustainably will in the nearest future result in serious water scarcity, not even at the delivery level but at the very sources. Therefore, using these resources **efficiently**, **effectively** and **wisely** would be the prerequisite for building a **sustainable** future. To make this possible, it is incumbent on all to know how much water is used, by whom and where. Knowledge of this will help inform accurate measurement of the amount of water that is actually available for use. The proposed water legislation will position this concept that will empower the proposed Plateau State Water and Sanitation Regulatory Agency with the need to be informed about the correct data for optimal management of the State's water resources. The registration of water use will be one of the tools required in this context.

5.3.1: Water use registration

A typical registration will comprise a demand for the following information:

- I. Applicant's identity;
- ii. Where is he/she located; in other words; contact address, and other related data;
- iii. Quantity of water currently being used and how much waste loads are being currently discharged;
- iv. Current use of the water; or source of the generated wastewater;
- v. Where the water in use is located;
- vi. Source of this water or where the water is discharged.

This proposed registration of water use will be a **compulsory** exercise for all the authorization types, comprising: general authorizations, license, and existing lawful water use. Registration will be necessary for the following reasons:

- a. To help in the management of water resources;
- b. To ensure fair share in water allocations;
- c. To protect the environment;
- d. To enable the State Water and Sanitation Agency charge for water.

5.3.2: Water uses to be registered

Every water use meant for the following activities must be registered and they are:

- I. Aquaculture;
- ii. Agriculture which comprises: irrigation, livestock watering;
- iii. Industrial;
- iv. Mining;
- v. Power generation;
- vi. Recreation;
- vii. Urban and rural water supply services.
- viii. Diversion of rivers and streams;
- ix. Storage. This implies any natural or legal persons storing water for any purpose that will include but not limited to: irrigation, domestic supply, industrial use, mining, aquaculture, fishing, water sport, aesthetic values, gardening, landscaping, golfing, etc. Such water could have been extracted from surface runoff, groundwater, or fountain flow; and the storage will be in excess of 20,000 cubic metres;
- x. Stream flow reduction activities (afforestation). All afforestation (tree planting) for commercial purposes, including communal forestry for commercial gain;
- xi. Local authorities and other bulk suppliers (like water boards);
- xii. Controlled activities, such as irrigating with waste, power generation, atmospheric modification or recharging an aquifer;
- xiii. Discharges of waste or water containing waste and this will include the following:
 - a. Engaging in a controlled activity to be explicitly defined by the water legislation that will have specific reference to irrigation of any land with waste or water containing waste generated through any industrial activity or by a water utility;
 - b. Discharging waste or water containing waste into a water resource through a pipe, canal, or any other conduit;
 - c. Disposing of waste in a manner which may be detrimental to a water resource;
 - d. Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
 - e. Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the activity of people;
 - f. Disposal of effluent to land or to a facility, such as a tailings dam, irrigated effluent or evaporation ponds treatments;

- g. Disposal of effluent to land or to a facility such as a landfill, waste rock dumps, fly ash disposal or solid waste disposal;
 - h. Land use activities such as confined animal facilities or dirty water systems.
- xiv. The recommendations dealing with waste management are without prejudice to existing laws by PEPSA and JMDB. However, in any event of a conflict, such conflict would be dealt with at the legislation level.

5.3.3: Exemptions from registering

The following water users who **receive** water from these sources are exempt from registration:

- a. Water from a local authority;
- b. Water from a water board;
- c. Water from an irrigation board;
- d. Water from another bulk water supplier.

But this **exemption** will be at the **discretion** of the proposed Plateau State Water and Sanitation Regulatory Agency that might, with changing conditions, decide to impose registration requirements.

5.3.4: Proposed legal sanctions for violating water use registration requirements

A proposed legal sanction will view this matter from the perspective of prohibiting any person (natural and legal) from using water outside the Act. Furthermore, any persons that will fail or refuse to supply data or information, or will give false or misleading data or information, or will fail to register any existing water use when required by the proposed State Water and Sanitation Regulation Agency, or will fail to register a dam with a safety risk, will face a prescribed form of legal sanctions.

Moreover, a person who engages in the following activities must inform the Regulatory Agency:

- a. Trade or transfer water use to another person, except when a glaring emergency situation occurs;
- b. Bought water from another person;
- c. Asked to register water use within a specified period.

Any person who contravenes a provision of this proposed legislation will be charged for an offence and will be liable, on first conviction, to a fine or imprisonment for a period not

exceeding 3 years. A combined fine and imprisonment not exceeding 7 years will be imposed on second and subsequent offences.

Important note for attention: The water use registration process is different from the water use authorization process. A registration simply means the process of officially notifying the State Water and Sanitation Regulatory Agency of a water use. You register an existing water use, General Authorization (GA) and/or a licensed water use. Therefore, registration is the first step in establishing the person as a water user with the State Water and Sanitation Regulatory Agency. Registration should precede authorization.

It is recommended that registration and issuing of registration certificates be free of charge.

5.3.5: Water Use Authorization

Since water is a natural resource that belongs to all, the Plateau State Commissioner of Water Resources and Energy will act as custodian of this commodity. Accordingly, no person will use water if not authorized to do so. Conditions for authorization to use water include the following:

- a. If the water use will be made permissible under the appropriate Schedule of a proposed water legislation;
- b. If the water use will be a continuation of an existing lawful use;
- c. If it will be authorized by a General Authorization (GA);
- d. If licensed to do so in terms of the proposed water legislation.

The proposed water legislation will contain a Schedule that will entitle a person to take water for reasonable domestic use in the person's household, for small gardening not for commercial purposes, for watering of animals grazing on the land, or for firefighting purposes. It will also entitle a person to use water for reasonable recreational purposes. The Schedule will permit also a person to store and use run-off from a roof. It will permit a person to discharge waste or water containing waste into a conduit controlled by another person who is authorized to accept it and dispose of it.

General Authorization: General Authorizations will apply, subject to some prescribed limits, to the following activities:

- a. Taking and storing of water;
- b. Irrigating with waste or water containing waste;

- c. Discharging waste or water containing waste into a water resource through a conduit;
- d. Disposing of water containing waste or water which has been heated in an industrial process;
- e. Disposing of waste in a manner which may not be detrimental to a water resource;
- f. Impeding or diverting the flow of water in a watercourse;
- g. Altering the bed, banks or characteristics of a watercourse;
- h. Removing water found underground for continuation of an activity or for the safety of people.

5.3.6: Licensing Water Use

In the absence of any encumbrances, licences may be issued by the Plateau State Water and Sanitation Regulatory Agency if it is established that such water use will not create any untoward impact. With the **exception** of uses already authorized as shown under **General Authorization**, other water uses may be subjected to water licensing.

Summary

Using water resources efficiently, effectively and wisely would be a prerequisite for building a sustainable future. And this is only possible if stakeholders understand how much water is used, by whom and where. The tools for carrying out these activities and their implementation comprise: water use registration, together with the appropriate legal sanctions for violators, water use authorization, and the licensing of water use. All these functions will fall under the purview of a proposed Plateau State Water and Sanitation Regulatory Agency.

5.3.7: Water Tariffs

The UN Conundrum has added some measure of controversy to the idea of water pricing and tariffs. In July 2010 the UN General Assembly declared access to safe drinking water and sanitation as a human right, while recognizing that water and sanitation are also economic goods. However, it is important to state that pricing water in a fair manner is very necessary to sustain and keep water and sanitation institutions going, the human rights aspect notwithstanding. At the moment, revenues from water charges in Nigeria do not cover even the operation and maintenance of these service utilities, let alone any consideration on infrastructure reinvestment. Water pricing and tariff must be looked upon as an important economic instrument for improving water use efficiency, enhancing social equity and securing financial sustainability of water and sanitation institutions.

A water tariff is the price associated with water supplied by a water institution; and is generally for both freshwater and wastewater treatment. In Plateau State tariffs setting will become the responsibility of the Plateau State Water and Sanitation Regulatory Agency. It will set tariff in respect of the appropriate catchment, for purification and distribution of freshwater, and the subsequent collection, treatment and discharge of wastewater.

The recommendations associated with this are as follows:

5.3.8: Recommendations on Water Tariffs

- I. Tariffs must generate revenues to recover specific costs like operation and maintenance costs;
- ii. Tariffs must generate funds for necessary infrastructure development and expansion as well as for wastewater treatment, accordingly, assuring water quality protection;
- iii. Tariffs should be made to send the appropriate price signals to users regarding the relationship between water use and water scarcity;
- iv. While setting these tariffs, consumers should be made aware that paying for water would mean an inducement to reduce water wastage;
- v. The social aspect of subsidizing tariffs for low income groups would mean guaranteeing poor households sufficient and affordable water services. But this should not encourage water wastage on the part of these households.

5.4: Water and Wastewater Tariff Design

It will be the responsibility of the Plateau State Water and Sanitation Regulatory Agency to design the appropriate tariff schedule, since this will depend on the locality. To that end the Agency could choose from the following (19):

Fixed charge design: here the monthly water bill is independent of the volume consumed;

Uniform volumetric tariff: this is a volumetric charge with a rate proportional to water consumption and metering will be needed here. All units (in cubic metres) will be priced the same rate, independent of total consumption;

Increasing block tariff: this is a stepwise volumetric charge (and metering is needed here). With this kind of tariff structure, the unit charge is constant over a specific range of water use block and then increases as the consumption increases;

Decreasing block tariff: this has an opposite effect to the increasing block tariff. The rate per unit of water is high for the initial (lower) block of consumption and decreases as the volume of consumption increases. [See Annex B]

Summary

The setting of water tariffs is very important to help water and sanitation institutions remain sustainable in their functions. In addition, tariff setting and water pricing set out the goal for efficient, effective and sustainable use of water resources.

CHAPTER SIX

6.0: The role of water and sanitation in overall economic growth

6.1: The health and socio-economic benefits of improved access to safe water and adequate sanitation

It is now trite knowledge that reducing the proportion of people without sustainable access to improved water supply will result in concomitant economic benefits. Going furthermore to reduce the proportion of people without sustainable access to both improved water supply and improved sanitation will result even more in concomitant economic benefits. In terms of quantitative analysis, it is estimated that, for every US\$1 invested in this project would give an economic return of between US\$3 and US\$34 (20), depending on the region. And achieving these benefits would include an average global reduction of diarrhoeal episodes of 10% and a total annual economic benefit of US\$84 billion. Accordingly, the following intervention options are open to water and sanitation institutions in Plateau State:

- a. Halving the proportion of people without sustainable access to improved water supply in phases until zero proportion is attained;
- b. Halving the proportion of people without sustainable access to both improved water and sanitation and continuous until zero proportion is attained;
- c. Access for all to improved water and sanitation services;
- d. Household water treatment using chlorine and safe storage;
- e. Access for all to regulated in-house piped water supply with quality monitoring and in-house sewerage connection with partial treatment of sewage.

6.1.1: Recommendation

It is hereby recommended that Option (e) will turn out the best option and should be adopted in this direction by all water and sanitation institutions.

6.1.2: The role of sanitation in overall economic benefits

The health benefits of improved sanitation are already some known facts. However, the other benefits are enormous and will be highlighted in the following recommendations:

6.1.3: Recommendations

Water and sanitation institutions embarking on the sanitation aspect of their mandate are to note the following:

- i. Closer latrine access and improved latrine-population ratio should be introduced to produce the following beneficial effects:
 - a. Less use of public latrines with a lot of money saved on paying to use these public toilets if ever they exist;
 - b. Less open defaecation with the benefits of improved property price across board, increased school participation, better living standards, high aesthetics and increase in health-related quality of life;
 - c. Less latrine access time with increased school participation, better living standards.

- ii. The latrine system should be improved in order to provide the following benefits:
 - a. Improve the property prices, increase the school participation and enhance the living standard;
 - b. Improve the health status due to less pathogens exposure and thus increase productivity in labour, increased health-related quality of life, saving in healthcare cost and increased value of saved lives.

- iii. The hygiene practices should be improved and thus provide the following:
 - a. Improved health status and thus cause various status improvements as have been stated above;

- iv. The isolation, conveyance and treatment of human excreta must be improved in order to produce the following:
 - a. Improved quality of ground and surface water and this will produce enormous savings in water treatment procedures;
 - b. Will produce increased venture into cottage industry and the concomitant rise in incomes;
 - c. Will produce savings in treating domestic water supply;
 - d. Will improve the quality of land and external living area that will attract tourism ventures with their attendant economic gains;
 - e. Will improve foreign direct and local investments
 - f. Will improve fish production;
 - g. Will improve agricultural production;
 - h. Will improve the aesthetics and therefore increase property prices.

6.1.4: The role of water institutions in improving the economic base of the communities

A. Job opportunities in the area of water tax collection: The water and sanitation institutions can organize the local residents to form cooperatives that will collectively take responsibility for community water connection and metering schemes. To make this possible the following recommendations are made:

6.1.5: Recommendations on creating job opportunities

- I. Each community cooperative will elect a leader who will become an employee of the institution;
- ii. The water and sanitation institution should install a main meter or 'Grand Meter' for the entire community and individual sub-meters that will serve 4 or 5 households each;
- iii. With this setting the entire community will be held accountable for paying the gross water consumption obtained from the 'Grand Meter';
- iv. Then each family will settle its bill with the community representative in accordance with the reading of the sub-meters;
- v. This arrangement will reduce any illegal connection and lower maintenance costs with a provision of clean water at a lower cost;
- vi. Introduce a community life-line programme to provide increased means of livelihood for the communities;
- vii. This life-line programme could be done in conjunction with a local commercial bank to offer microfinance loans to low-income entrepreneurs;
- viii. Such entrepreneurs could be pipe re-threading cooperative that will supply meter protectors and other piping components directly to the water and sanitation institution;
- ix. In addition the water and sanitation institution could offer economic opportunity for its own local employees in the area of technical and management capacity they will need to advance within the institution. An example could be an exchange programme with some international training institutions or, sometimes, local training institutions.

B. Use of shareholding to indirectly create economic opportunities for the communities: If the proposal to make water and sanitation institutions adopt a company status gains acceptance, then the recommendations on upholding the above proposal will be the following:

6.1.6: Recommendations on shareholding

- i. The communities served by a water and sanitation institution will be allocated 20% shares of this institution;
- ii. 40% of the allocation will be used to empower local male entrepreneurs to boost their various enterprises, including creating employment for other locals;
- iii. For equality in gender mainstreaming another 40% will be used to empower local female entrepreneurs to boost their various enterprises, including creating employment for other locals, preferably female employees;
- iv. The remaining 20% of the allocation will be used as capacity building for youths who would like to start any agro-allied venture.

C. Involving the local communities in the technical aspects of projects: It is trite knowledge that project contracts cost a lot of money to execute. Water institutions can leverage on the abundant physical person-powers available in their communities to get some water constructions either functioning or to build new ones. This practice will create economic opportunities for the institution and for members of the local communities. Accordingly, the following recommendations are proposed:

6.1.7: Recommendations on local involvement in technical aspects

- I. The community can be organized by way of appointing representatives and drawing the person-power to undertake such water infrastructure installation;
- ii. This person-power will be responsible for laying pipe and making connections to local homes and businesses;
- iii. The relevant local government will have to distribute tools to these neighbourhood builders and provide heavy equipment services like earthmovers, bulldozers, and other related materials;
- iv. The local government will have to pay stipends per month to heads of households participating in the building projects;

- v. All the technical and financial feasibility studies, provision of certain building materials and offering technical training to community members will be the responsibility of the water and sanitation institution;
- vi. The water and sanitation institution will be organizing weekly stakeholder meetings to update residents, NGOs and government officials on progress and issues, and to listen to community concerns;
- vii. The results of all these will be a contribution to the economic and social development through technical, health and hygiene training, temporary direct employment during construction and new businesses that will exist throughout the life of the construction works;
- viii. Moreover, the water institution will benefit from higher bill collection rates.

6.1.8: Internal management reform of institutions to ensure financial viability

A water and sanitation's ability to deliver reliable services and ensure financial viability is one way of improving its economic base, thereby attracting the ability to tap into access to market finance. Even though some of these measures have been highlighted under another different heading mentioning them again is an underlining of their importance.

Moreover, these measures will encourage the external organizations that have entered into partnership with Nigeria in the area of water and sanitation improvements. Furthermore, the increased involvement of these partners would attract other partners who had dithered or remained phlegmatic with respect to getting involved in partnering with Nigeria in this regard. Some of the present partners are:

- I. The United States Agency for International Development (USAID);
- ii. The European Union;
- iii. United Nations International Children's Emergency Fund (UNICEF);
- iv. The World Bank;
- v. The African Development Bank (AfDB);

- vi. China;
- vii. Water Aid; and
- viii. Japan International Cooperation Agency (JICA).

Accordingly, the ways to go about improving the institutions to meet the above-mentioned aspirations is shown in the following recommendations. The recommendations are hinged on strong internal management capacity of these institutions:

6.1.9: Recommendations on internal management reform of institutions

- I. The institutions must inculcate an array of skilled human resources;
- ii. The institutions must have an effective business planning cycle which should link policy with financial reality;
- iii. The institutions must have an effective management backed by well-functioning and transparent Management Information Systems (MISs);
- iv. The institutions must have strong revenue management to handle the phenomenon of Unaccounted-for-Water (UFW);
- v. The institutions must adopt a good customer relation and service approach that is efficient and responsive to complaints and concerns. This will subsequently improve public perceptions of the institution, thereby leading to increased cost recovery;
- vi. The institutions must adopt before the public eyes, the fashion of promoting the existence and availability of timely audited accounts, demonstrated compliance with environmental regulations, and the ability to manage and plan for change.

6.1.10: Water trading

It is trite knowledge that water is important for economic development. In Plateau State, it is necessary that this commodity get to all nook and cranny of the State. Basically, the water and sanitation institutions have this onerous task of sourcing and distributing water to the communities. Additionally, these institutions could enter into partnerships with private water operators to provide water to designated areas as an ancillary to these institution's efforts. The private water operators would engage in water trading to sell water to needy areas of the community. Moreover, this practice will ensure that ecosystems are allocated sufficient water while also maximizing the efficiency of water allocation within sustainability boundaries. The modality for accomplishing this is itemized in these recommendations:

6.1.11: Recommendations for water trading

- I. Markets where farmers and other private operators will trade water should be developed;
- ii. Such markets will host selling or buying of irrigation licences; or
- iii. Trade seasonal water allocations;
- iv. However, this trading would be possible if only a water user can access more water and if he/she could find someone who agrees to take less;
- v. Moreover, government must understand the hydrological reality of the area so that the amount of water set aside to sustain ecosystem functions must be known and must never be encroached upon;
- vi. In addition such private water licence holders could sell their water allocation licences to community cooperatives that will in turn make the resulting water available to households at a stipulated water price;
- vii. Communities and Co-operatives should be encouraged to obtain licences.

Summary

Improved water and sanitation, coupled with improved accesses to them, are *sine qua non* for improved health with its economic connotations. Moreover, these vital services rub off positively on other economic aspects ranging from the creation of employment for the communities, through improved living and housing conditions, increased value in property, increased local and international investments, tourism and improved agriculture.

PART FOUR

THE POLITICAL EMPOWERMENT DIMENSION

CHAPTER SEVEN

This Part will include the following:

The granting of water stakeholders and citizen's equal democratic opportunities to influence and monitor political processes and outcomes

7.0: Background

The idea is that there must be the opportunity and forum granted to all persons, natural and legal, to have a say in any water and sanitation programme from its inception to completion. This concept therefore supposes the admission of multi-stakeholders into such a forum. And their participation is a multi-stakeholder process.

A multi-stakeholder process is an **activity** that brings together a **diverse range of organizations and individuals to address a specific matter**. Members could **comprise**: national and/or local government, public sector, private sector, trade unions or disaggregated workers' associations, academia, civil society groups that will comprise: NGOs, women's groups, consumer groups, environmental groups, faith groups, students' groups, youth organizations, retirees, etc.

Even though a multi-stakeholder process cannot be dubbed a panacea for every problem related to water and sanitation it is, all the same, a very good approach to solving these problems if found applicable. Thus, a multi-stakeholder process has the following characteristics that make it very useful:

- a. Accommodates a wide range of perspectives with more creative approaches to problem solving;
- b. Addresses complex and interdependent problems in a more integrated and comprehensive manner;
- c. Shifts away from the obnoxious 'command and control' to a more pleasant joint goal-setting;
- d. Acquires the acceptance of beneficiaries and potential local owners of proposed solutions and thus ensures greater sustainability of outcomes;
- e. Speeds the development and implementation of innovative solutions;
- f. Acts as catalyst for policy innovation;
- g. Can increase trust and respect between participants, like between governments and communities;

- h. It produces unbiased information and assessments always seen as independent of government.

Based on these it is important to highlight these recommendations as they affect government.

7.1: Recommendations on government's attitude to multi-stakeholder participation

- i. Government should not despise the idea of sharing and delegating power to what is usually called 'non-public' actors that is, people outside government. A multi-stakeholder process must embrace the principles of democracy;
- ii. It is true that some government-initiated projects may involve large sums of money; and it is also true that it is the responsibility of government to ensure such monies are used wisely and prudently. However, government must always weigh the benefits of carrying all the stakeholders along and thereby ensuring sustainability of the project and this protection of public money. So, it is the candid view that **government should welcome society's ideas** at all stages of the project, while **ensuring financial prudence**;
- iii. Related to the above, government should **develop the idea** of believing in the **ability of local people within that community** to manage resources well and **only apportion blames objectively** when there is an obvious violation by the local people of some set rules for example, environmental degradation;
- I. Government should **expand the horizon** of its participation in stakeholder processes and **not limit such to only information and consultation stages** where it usually adopts a 'selling approach' in order to keep under wraps the control of the issue on ground;

7.1.1: Recommendations on stakeholder participation

- I. It is understood that participation carries its own opportunity costs which might turn a participant from protecting his/her own constituency to a policy elite thereby making such a person lose the erstwhile power to rally such constituency against some issues. Recognizing that participation is a voluntary matter, it should behove on any potential participant to decide *ab initio* whether he/she would remain with the constituents or get swayed toward the opposing side, for example;

- ii. Some participants must not exclude themselves on account of poor capacity building; this is a process that should need the participation of everyone;
- iii. Government authorities, water and sanitation institutions should make every effort to involve all relevant stakeholders in any planned intervention (infrastructural and institutional) and endeavour to keep communication channels open to those who differ from the concept on ground;
- iv. All relevant stakeholders should come to understand that this process is a field not dominated by a single actor; and also to bear in mind that there is always a basic willingness to communicate;
- v. Multi-stakeholder processes should not be construed as another name for politics or that one is better than the other. However, multi-stakeholder processes necessarily involve politics because people do not come to the table with blank minds. It is agreed that this could have either a beneficial or damaging effect but the avoidance of the latter would be predicated on good facilitation.

7.2: Key principles and strategies of multi-stakeholder processes (21)

These are highlighted below:

- I. The first pertinent consideration is whether the participant would be willing to become amenable to learning and to change when it is necessary. Moreover, a participant must not have the propensity to be intolerant of other people's ideas while projecting his as the only plausible ones;
- ii. An initiator of this process must have to recruit the best people to help in the design of the process. Related to this would be an assemblage of the right core group of representatives reflecting all relevant stakeholders. This should not be exhaustive in the sense that a continuous consultation should be done with stakeholders to find more participants;
- iii. The coordinating group to be formed must be able to develop suggestions regarding issues, objectives, scope, and time lines. In addition, this group should be able to develop procedures of preparation, dialogue, decision-making, rapporteurship, documentation, relating to the wider public and fund-raising;

- iv. Issues bordering on confidentiality must be fully addressed otherwise many prospective participants could drop out of the process;
- v. The planners or initiators of this process must be proactive and be able to have a sense of possible conflicts during the process. Accordingly, every effort should be made to study and develop methods of resolving these possible conflicts;
- vi. Even in the face of conflicts and conflicting ideas around, the planners must endeavour to contain and provide possible solutions that should make the proposed process to go on;
- vii. There must include in this preparation the development of a Memorandum of Understanding (MOU) or Terms of Reference (TOR) for the process;
- viii. In the interest of effective communication, planners must test-drive and eventually decide on the type and level of language to be adopted throughout the process. This is quite necessary since participants would comprise people of different levels of language skills and understanding;
- ix. If the planners are an institution, they must develop a process of establishing a link with any official decision-making and maintain continuous link with these officials;
- x. This institution must issue a document that clearly states the purpose, the expected outcomes, deadlines, and status of the outcome in the official process;
- xi. The planners must look beyond just the stage of informing and include implementation, monitoring, and reporting back;
- xii. It is equally important to include all relevant officials whose input and suggestions could add value to the deliberations; and these must include government officials drawn from relevant line ministries;
- xiii. Decisions on issues and agenda must be made among a coordinating group of stakeholder representatives;
- xiv. Every issue on ground must be decided in a transparent manner;

- xv. Related to this, the conducting of the process of issue identification must be done according to an agreed timetable;
- xvi. Planners must ensure that every representative is apprised of every bit of information and must transmit these to their respective groups;
- xvii. Stakeholders must be supported to engage in the process of issue identification at all times;
- xviii. It should behove on the planners to spot areas of information gap and design or device methods of filling those gaps;
- xix. While all the issues have been identified, it is incumbent upon the planners to design a clear agenda and precise nature and definitions of these issues;
- xx. All agenda and issues must be understood and agreed by everybody;
- xxi. Mechanisms for sharing information and a common knowledge base within the process must be established. In addition, all participants must have equitable access to such information;
- xxii. The call for participation must be open and transparent. Any public means of invitation could be used, depending on the part of the country, that is, whether rural, semi-urban or urban;
- xxiii. It would be a good idea if high-impact groups were identified; and this could be done by studying the issue area and consulting with stakeholders;
- xxiv. Ensure that all those who have a stake in the issues are invited. If peradventure they don't honour the invitation, then something could be wrong with the planning or its concept. Consider revising;
- xxv. While inviting stakeholders, ensure that some measure of diversity amongst them is adhered to;
- xxvi. Again, if the process requires government action, it should behove on the planners to involve government officials;

- xxvii. If government or intergovernmental institutions will be involved, make sure it is high level;
- xxviii. It is important to ascertain that any organizational backup is acceptable to all participants; and such backups could be a UN agency or a multi-stakeholder organization;
- xxix. It is important to create a facilitating body, having in mind the by-laws and necessary time lines and funding;
- xxx. A realistic budget for the process must be developed; and this is very important;
- xxxi. If necessary, a provision for external communications, translations, capacity-building and follow-up activities should be included;
- xxxii. Participants should be informed about the funding situation, sources of funding and similar activities;
- xxxiii. It is important to ascertain that any funding body would not hijack the process;
- xxxiv. The goals of the process must be clear, understandable and achievable;
- xxxv. The capacities, skills and knowledge necessary to participate effectively in the process must be fully identified. Equally important is to know how many participants have them;
- xxxvi. Related to this is the ascertainment of capacity-building measures on ground for those receiving and offering them;
- xxxvii. All options of communication channels must be considered. Some of these will comprise: face-to-face, email, telephone, letters, and interactive websites;
- xxxviii. These various means of communications must be accessible to all participants. The participants must be aware of the type of communication to be used at each stage of the process;

- xxxix. It is very essential that whoever is a facilitator must be committed, flexible, responsive, balancing, inclusive, encouraging, respectful, neutral, problem-solving oriented, disciplined, culturally sensitive, and comfortable with the role;
- xi. Rapporteurs to take the minutes should be identified and informed as early as possible;
- xii. The rapporteur and the person to draft outcome documents must be acceptable to everybody;
- xiii. It is important to decide whether decisions will be taken on consensus, unanimity, compromise, majority voting, while minority voting should be recorded;
- xiv. It is equally important to decide the extent of influence decisions reached will have. For example, will such decisions have influence outside the space covered by participants?
- xv. It is important to decide also whether the outcome documents will be disseminated to other stakeholder groups and general public;
- xvi. The planners will have to factor in an action plan following the conclusion of the process and this should include implementation of decisions reached;
- xvii. There should be provision for regular feedback mechanisms so that everybody can raise concerns and suggestions. And this feedback should be extended to non-participating stakeholders;
- xviii. It is important that the general public know about the process, including an effective communication of its objectives and outcomes.

Summary

A multi-stakeholder process grants political empowerment to citizens and apportions equal democratic opportunities to influence and monitor political processes and outcomes as these relate to water and sanitation. The issues of water and sanitation must be those that should impact on the people or have influence on people's lives. Such a process should comprise people of all professions, social and economic statuses, gender, ethnic and religious groups and age. Some important characteristics of this process are tolerance to others' views, communications, and decisions that will come through an agreed method.

PART FIVE

THE ENVIRONMENTAL SUSTAINABILITY DIMENSION

CHAPTER EIGHT

This Part says that improved governance allows for the following:

More sustainable use of water resources with the accompanying ecosystem integrity

8.0: Sustainable use of water resources

8.1: Background

This concept implies that water resources use must **comply with all the development** in these water resources to **meet the needs of the present generation** without compromising the **ability of future generations to meet their own needs**. It relates to **resiliency or robustness of systems** to **adapt** to and thrive in the **face of change**. This document will restrict itself to freshwater that is overly useful to animals and plants. And for clarity sake it is important to know the sources of freshwater; this is very important for anyone formulating water legislation. At the global level three-quarters of all freshwater on earth is frozen in polar icecaps and glaciers and this is inaccessible as a practical matter. Out of the remainder, about 13 per cent is found in deep aquifers located between 800 and 4,000 metres below the earth's surface. An additional 10 percent is located within 800 metres of ground level; soil moisture makes up about 0.18 percent of the total. Surface water accounts for a paltry contribution. **Lakes hold 0.33 per cent, rivers 0.004 per cent of the world's freshwater.** Excluding icecaps and glaciers, **groundwater accounts for approximately 97 per cent of the freshwater on earth.** And it is instructive to know that about **one-third of the world population (2 billion people) depends on groundwater** that is usually accessed via shallow aquifers. **And rural dwellers invariably rely entirely on groundwater.**

This small amount of freshwater is subjected to potentially conflicting uses and different approaches to conservation. Some of the uses are itemized below:

- a. Domestic;
- b. Industrial;
- c. Agricultural;
- d. Recreational;
- e. Navigational;
- f. Instream

And some indices of conservation include: pollution and overexploiting the existing water resources.

8.1.1: Sustainable use of water in agriculture

Agriculture is considered to be a significant contributor of water pollution by nonpoint sources (Contamination arising from land use activities that is dispersed across a catchment or sub-catchment). Diffuse pollution arises from various activities on the farm comprising: leaching of fertilizers or soil erosion which is spread out over a wide area and hence difficult to locate and control. Fertilizers, pesticides, manure and slurry can cause water pollution. The following recommendations become important in protecting the water resources:

8.1.2: Recommendations for protecting water resources in agriculture

- I. Be aware of the farm's characteristics (including surrounding watercourses, the level of water stress, availability and quality of water resources, soil type). Based on these, choose the best location for crop production;
- ii. Set a management plan for potential pollutants that is, nutrient and pesticide management, erosion, animal feeding operations, grazing management and irrigation water management;
- iii. To control diffuse pollution it will be necessary to conduct conservation practices to minimize pollutants in the following manner: slow the transport and/or delivery of pollutants by reducing water transported and so the amount of the pollutant transported; or through redirection of the pollutant; remediate or intercept the pollutant before or after it is delivered to the water resource through chemical or biological transformation;

8.1.3: Economic sustainability

A good management of water resources will help farmers cut costs while maintaining and improving the productivity of the land and reducing the risk of pollution. Therefore, the following recommendations become available:

8.1.4: Recommendations on economic sustainability

- I. It is important to ascertain that any water saving device actually reduces demand for water. And if it is necessary to pay for irrigation water price, shop for the one with benefits or subsidies;

- ii. Have a plan of the farm pipelines. This will quickly help detection of burst pipes and facilitate speedy repairs and cost reduction in water use;
- iii. Following closely the monthly recording of water meters will help know water use and any leaks;
- iv. An adoption of sound accountability will help in more water efficiency, cost-saving and reduction of consumption;
- v. Promote water efficiency and avoid water pollution;
- vi. It is important to understand how the amount and source of water withdrawals and the quantity and quality of wastewater discharges impact local communities and ecosystems;
- vii. Understand how to respond to water risks such as supply disruptions, price increases and more stringent regulations.

8.1.5: Social sustainability

To achieve success in water conservation a mix of engagement and collaboration throughout the entire food sector and its stakeholders is required. This will help improve water use at the farm level and enthrone good practices. The following recommendations are pertinent:

8.1.6: Recommendations on social sustainability

- I. Access to potable water and toilets must be guaranteed all employees and workers while on the farm;
- ii. It is important to introduce environmental education on developing awareness to sound water use that is properly focused on the farm, in order to conserve water and avoid pollution of watercourses;
- iii. In addition it is important to provide support to the workers to adopt adequate irrigation monitoring and scheduling; and provide training on integrated pesticide and nutrient management and other relevant conservation practices;

- iv. It is important to understand any conflicting water use demands and the communities' reliance on water resources, and/or conservation requirements that may exist in the area;
- v. Have an idea about the impact of water use by local communities.

8.1.7: Environmental sustainability

A sound mix of good agricultural practices impacting the quality and availability of water resource will help maintain a very good effect on the existing water resources in the short and long run. To achieve this, the following recommendations are available:

8.1.8: Recommendations on environmental sustainability

- I. An adequate plan to tailor the available irrigation methods should be adopted to the soil profile. This would help maximise the intended irrigation of plants without contaminated effluent getting into contact with communities' water resources;
- ii. It is important to check constantly the condition of the irrigation system, pumps, mains and hydrants and repair worn items, such as seals;
- iii. Ensure that all potential pollutants like pesticides and chemicals are stored properly. And water/flooding must be prevented from entering areas storing these potential pollutants;
- iv. Reduce as much as possible any negative impacts on the ecosystem. Therefore, have a control on integrated pest management;
- v. Endeavour to prevent as much as possible any infiltration or wastewater flow to surrounding areas of ecological importance;
- vi. Control groundwater extraction in marginal areas.

8.1.9: Sustainability of groundwater resources

Background information for a discussion of groundwater sustainability

- Groundwater occurs almost everywhere beneath the land surface. This informs its reason for use as a source of water supply;
- Natural sources of freshwater that become groundwater are: (1) areal recharge from

precipitation that percolates through the unsaturated zone to the water table; and (2) losses of water from streams and other bodies of surface water such as lakes and wetlands.

- The top of the subsurface groundwater body, that is, the water table, is an area generally below the land surface; it fluctuates seasonally and yearly in response to changes in recharge from precipitation and surface-water bodies;
- Groundwater essentially is an important source of surface water.
- Groundwater serves as a large subsurface water reservoir;
- Velocities of groundwater flow are generally low and are in orders of magnitude less than velocities of streamflow. And these low velocities can have important implications particularly in relation to the movement of contaminants;
- Under natural conditions groundwater moves along flow paths from areas of recharge to areas of discharge at springs or along streams, lakes and wetlands;
- The areal extent of groundwater water flow systems varies from a few square kilometres or less to tens of thousands of square kilometres;
- Pumping groundwater from a well always causes (1) a decline in groundwater levels at and near the well, and (2) a diversion to the pumping well of groundwater that was moving slowly to its natural area of discharge, which might be distant;
- Human activities, such as groundwater withdrawals and irrigation, change the natural flow patterns and these changes must be accounted for in the calculation of the water budget which can be used to calculate the amount of water available for consumption (or the safe yield). In this case, the development of a groundwater system is considered safe if the rate of groundwater withdrawal does not exceed the rate of natural recharge. However, this might not be the entire picture.

The above background will now provide recommendations on groundwater sustainability.

8.1.10: Recommendations on groundwater sustainability

- I. Vulnerability of groundwater to sources of contamination must be taken seriously into consideration. Contamination at and near a land surface could be dangerous to the groundwater. Groundwater has a generally low velocity. Thus, any contaminant seeping into it has a long staying capability and thus will persist for a long time. Accordingly, when an aquifer is contaminated the time required for a return to better water quality conditions as a result of natural processes is long, even after the original sources of contamination are no longer active. And groundwater quality remediation is very expensive. It will become a serious assignment for the regulatory agency. Thus, a proactive measure must be put in place at all times to prevent this happening;

- ii. It is important to prevent and regulate effectively human activities in agriculture and other industries since these are potential sources of groundwater contamination. Fertilizers, manure, pesticides applied to agricultural land are examples. Activities at landfills, industrial-discharge, lagoons, leaking gasoline storage tanks, cesspools and septic tanks, and domestically used chemicals are other examples. Industrial lagoons, leakage storage tanks, and landfills are considered as point sources of contamination. Others are nonpoint sources. Gasoline and other manufactured organic chemicals, even at very low concentrations, render the contaminated groundwater highly undesirable or useless as a source of domestic or public water supply;
- iii. It is important to recognize the area occupied by urban land with the diverse activities therein for these can provide point sources of contamination of the groundwater resources. Therefore, serious regulation of urban activities related to the environment must be embarked upon if society is to have sustainable groundwater resources;
- iv. The potential for contamination of groundwater by surface streams is quite high because streams act as recharge for the groundwater. Therefore, it is highly essential to monitor regularly the integrity of these streams to avoid this ugly occurrence. Dumping of household and industrial refuse and other undesirables, including pumping of human refuse, in streams can create serious potentials for groundwater contamination;
- v. The foundation of any good groundwater analysis, including those analyses whose objective is to propose and evaluate alternative management strategies, forms the basis for the source and availability of high-quality data. Thus it is recommended that the development of Geographic Information Systems (GIS), typically, is an integral part of the database systems in organizing, storing, and displaying the substantial array of the needed information;
- vi. Basic laws of physics, chemistry and biology can describe groundwater flow and transport. These laws are embedded in groundwater computer models to simulate and analyse flow and solute transport in groundwater and surface water systems. They are an attempt to represent the essential features of the actual groundwater systems by means of a mathematical counterpart. Thus it is recommended that this system should be used as an alternative approach to groundwater development and management;
- vii. If a model is used to address questions about the future responses of a groundwater

system that are of continuing significance to society, then field monitoring of the groundwater system should continue and the model should be re-evaluated periodically to incorporate new information or new insights;

- viii. Other measures could be to decrease the discharge from groundwater system. And this would comprise: to design a pumping method that will decrease discharge (1) to streams, lakes or springs or (2) device that will reduce discharge from groundwater evapotranspiration. Both of these possibilities can, however, have undesirable effects on surface water bodies or on existing biological resources. It is therefore a measure to be left to the discretion of the relevant authorities;
- ix. Innovative approaches that have been undertaken to enhance the sustainability of groundwater resources typically involve some combination of use of aquifers as storage devices, conjunctive use of surface water and groundwater, artificial recharge of water through wells or surface spreading, and the use of recycled or reclaimed water. However, these are deceptively simple but are, all the same, very doable if serious water stress threatens the sustainability of groundwater resources;
- x. Codes of Practice for groundwater exploration and exploitation are another very important aspect to be considered here. There is a putative regulatory committee that this reform has promoted to the position of an institution. It will behove on this regulatory body to do the following, after empowerment by forthcoming water legislation:
 - I) Code of Practice for borehole siting;
 - ii) Code of Practice for borehole construction;
 - iii) Code of Practice for test pumping of boreholes;
 - iv) Code of Practice for supervision of borehole construction;
 - v) There will be a need to look at the national code of practice and see where Plateau State would further link up to domesticate the provisions.

8.1.11: Water quality and pollution control

As has been said earlier, the numerous human activities through various sectors have contributed in no small way in compromising the water quality by causing various levels of pollution. Some of these activities comprise: raw effluent disposal from moribund urban water sewer system, industrial activities, farming, informal settlements typified by attached slums to urban areas, deforestation, solid waste disposal, wetland and riparian encroachment.

Addressing this issue will require inputs from various sources, forming a multi-stakeholder approach. Some of the relevant, but not exhaustive, list of stakeholders will be drawn from: Water Users Associations, the private sector, local governments, NGOs, the academia, etc. What this group will focus on will be found in the following recommendations:

8.1.12: Recommendations on water quality and pollution control

- I. Ensure at all times the existence of adequate water quality and quantity for all basic human needs and ecological functions, that should include good health of the ecosystem;
- ii. Protect the water resources against pollution. This should involve the activities of stakeholders who should be co-participants in the management of the community's water resources;
- iii. Ensure that multi-stakeholders are raised to co-manage issues on sanitation and solid waste management;
- iv. All water and sanitation institutions must have to mobilize stakeholders, civil society organizations, NGOs to lend a hand in the protection of water resources in their areas;
- v. Enforce compliance of the water resources regulations as deterrent against continuous and further violations. Sanctions could range from custodial sentences to communal labour or a fine, or a combination of both;

Summary

The concept of sustainable water resources implies that water resources use must comply with all the development in these resources to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Thus, all human activities must be tailored to achieve this goal. Agriculture, with its irrigation and fertilizer-use activities, can minimize pollution of the surrounding water resources if some checks are put in place to avoid the mixture of farm effluents with these resources. On the efficiency side farmers could develop modalities for water use that would just be sufficient for the farms. Groundwater resources should be guarded such that contaminants do not infiltrate through the recharge areas into these freshwater resources. And using codes of practice will help regulate indiscriminate siting of boreholes and would maximise use of groundwater without compromising its quality and quantity.

PART SIX

INVOLVEMENT OF THE PRIVATE SECTOR

CHAPTER NINE

9.0: Background

On 21 March 2013, the Deputy Secretary General (DSG) of the United Nations (UN) launched the *Call to Action on Sanitation* where he said this: '*Tackling sanitation challenges is key to advancing human development. The DSG is aiming to bring together key partners from government, civil society, business and international organizations to commit to action. The aim is to mobilize resources to rapidly increase access to basic sanitation, with a focus on improving hygiene, social norms and better managing human waste and wastewater and ending open defaecation. By 2025, the practice of open defaecation must be totally eliminated.*'

Going further than the above, 2015 had come and gone, leaving the Sustainable Development Goals (SDGs) in its wake. The SDG 6 is framed around water and sanitation, including hygiene, and the SDG 17 is framed around means of implementing and the global partnership for sustainable development. To achieve SDG 6 would require the commitment of the private sector, and this is a fact recognized at the core of the concept of 'global partnership', and promoted under SDG 17. Therefore, this consideration is at the heart of the matter of private sector participation in water, sanitation and hygiene. And the private sectors come with different business outlooks that are as follows:

- a. Social enterprises that run as a business, charging for products and services, but supplement revenue with grant-based finance;
- b. Social enterprises that are entirely reliant on sale of products and services but operate on a not-for-profit basis;
- c. For-profit commercial enterprises with some net income reinvested to social purposes;
- d. For-profit commercial enterprises with all net income redirected to business growth or shareholder return;
- e. For-profit commercial enterprises with all net income redirected to business growth but not legally constituted (informal business).

This background now positions the private sector in the business of water, sanitation and hygiene.

9.1: The private sector opportunities in sanitation (22)

- I. Sole traders and other small enterprises comprise masons, construction enterprises, micro-franchises, prefabricated cement manufacturers, hardware stores, faecal sludge emptying operators. These could produce and cast sanitation slabs, chamber boxes and lids, toilet installations, full toilet sets according to customers' specifications, build and sell toilets, casting cement platforms and rings, constructing latrines, retailing toilet components, truck-based septic tank emptying and disposal enterprises;
- ii. Medium-size enterprises: these produce and sell plastic latrine slabs, build full toilet sets according to customers' specifications and connect them to sewage network, if existent or to septic tanks, stock relatively larger array of materials and pre-fab items, produce low-cost toilet units, engage in rental/or portable toilets, provide waterless, portable toilet units, engage in waste treatment activities;
- iii. These are toilet fixtures manufacturers, chemical suppliers, cement companies, wastewater/sewage operators;
- iv. These produce fast-moving consumer goods, engage in wastewater/sewage operation and chemical suppliers. They develop sanitation-related products and engage in creating demand, they treat wastewater and research/develop sanitation technologies.

9.1.1: The private sector opportunities in water

- I. This category comprises sole traders and micro/small enterprises. Their handles comprise: capturing, storing and distribution of water through their own water network; extract water directly from water sources and sell it to water truck owners; collect water from pumps and sell to water tankers; resell water sold by water tankers to end users; reselling water from local service providers or institutions to end users; engage in manufacture of filtration components and systems; fix water pumps; sell water system components.
- ii. The next category is drilling companies and water purification entrepreneurs. They drill boreholes and build water infrastructure; build water facilities and sell water system components.
- iii. The next category comprises large companies like utilities, chemical suppliers, water filter manufacturers and suppliers. They provide an integrated water system, manufacture and supply water treatment materials, produce bottled water, manufacture water filtration components and systems.

- iv. The next category comprises foreign-based companies/multinationals. They also engage in drilling, supply of chemicals, utility; and make bottled water. Thus, they drill boreholes and build water infrastructure; manufacture and supply water treatment chemicals; provide an integrated water system; produce bottled water.

9.1.2: Private sector opportunities in hygiene

- I. The first category comprises sole traders and micro/small enterprises. They manufacture pads that they sell to local retail chains; sell sanitary pads, soap and other hygiene related products.
- ii. The next category comprises companies that deal on pads. They supply raw materials for the manufacture of sanitary pads; produce biodegradable pads; produce pads from papyrus and paper waste.

9.1.3: Recommendations to improve opportunities provided to these private enterprises

- I. Marketing capacity to link product manufacturing and technology uptake by users need to be improved probably by providing capacity building by government agencies;
- ii. The informal nature of some smaller companies need to be changed in order to make them attractive to creditors;
- iii. The high registration and licensing costs and bureaucratic complexity need to ease in order to make government recognize the water providers and possibly subsidize water prices paid by customers;
- iv. All service providers must be registered accordingly in order to enable them obtain finance;
- v. Other infrastructure, like roads, have to be developed to facilitate faster distribution, especially of hygiene products;
- vi. Since hygiene depends on sanitation and water to be effective, it is important that the latter be made available to create an effective interdependence;
- vii. It is very important for government to introduce mechanisms and incentives that will promote private sector entry into the market. In addition, government should promote the entry of enterprises capable of undertaking transformative research and

development on new technologies and materials. Finally, government must address market imperfections related to understanding of improved sanitation benefits and the nature of on-site solutions. Prioritising plans for sanitation service delivery should be government's strategy here;

- viii. It will be important to explore the use of public resources to broker and leverage access to commercial finance; this will involve partnerships comprising large businesses, donor agencies and foundations which will potentially offer a spectrum of financing opportunities to the domestic private sector. These will help domestic WASH enterprises to progressively transit to more commercial forms of finance, deploying concessional public finance smartly to crowd-in, rather than displace private finance. The spectrum includes conventional project grants, social venture capital, equity investment, and other related forms;
- ix. There is no doubt that involvement of larger multinational business access to domestic markets will benefit poorer customers, domestic entrepreneurs, shareholders in developing countries on one hand, and the multinational businesses on the other hand. This is why businesses thrive in any case. However, there must exist a carefully crafted process which would balance between the competing needs of transparency and commercial confidentiality and the power differential between large and small businesses. Participating WASH agencies should, however, seek the expertise of legal professionals to advise on the structuring of deals and contracts which arise from such potential partnerships in order to protect less powerful interests.

Summary

With a dwindling economic base of Nigeria taking centre stage in the nation, it is imperative and overly important for government at all levels to consider the aphorism that government cannot do it all alone. This is where it should behave on governments at all levels of governance, including the Plateau State Government, to begin planning for an all-time inclusion of the private sector in the delivery of water and sanitation to the teeming masses of Plateau State. To that end it is necessary for government to create the conducive atmosphere as recommended to see to joint partnerships between all members of the private sector dealing on matters related to water, sanitation and hygiene.

PART SEVEN

OTHER IMPORTANT MATTERS REGARDING THE WATER AND SANITATION SECTOR IN PLATEAU STATE OF NIGERIA

CHAPTER TEN

10.0: Proposed new institutions

This reform has identified some potential institutions in the water and sanitation sector in Plateau State of Nigeria. They are as shown below:

1. Groundwater Extractors (Private Sector and Government Agencies);
2. Federal Government-backed Agencies (MDGs, UNICEF, and other international donors, etc.);
3. Plateau State Sanitation Coordinating Agency;
4. Plateau State Agro-allied Agency (Irrigation, fisheries nursery farms, etc.);
5. Dams, Water Conservation, and Flood Prevention Agency;
6. Catchment Management Agency (CMA);
7. Plateau State Water and Sanitation Regulatory Agency;
8. Water, Sanitation and Hygiene (WASH) Units/Departments at the LGAs, WASHCOM and Community Led Total Sanitation (CLTS).

Groundwater Extractors (Private Sector and Government Agencies)

The essence of bringing together all members of the private sector and government agencies having the business of water services is to ensure and foster better coordination of activities. This move is not meant to stop each actor from performance of their activities. However, it is intended to stop the chaos observed in the activities.

Therefore, this new institution will be a full-fledged one like the older ones and will have all the administrative capabilities other institutions are vested with. Its main function will be to liaise with any agency, private or public, intending to commit activities to water and sanitation and to advise such agency adequately and accordingly on the need or otherwise of siting the project in a particular area. Where there is any danger of duplication or even triplication of similar projects in an area, as has happened sometimes, this new institution will have to advise against it. It is recognized that political considerations might want to play out in this kind of brazen siting of projects.

However, in such situations, this new institution will be empowered to make a case for the siting or otherwise of any such project at a particular place and forward the findings and

recommendations to the Plateau State Ministry of Water Resources and Energy for adjudication.

Federal Government-backed Agencies (SDGs, UNICEF, and other international donors, etc)

This is another proposed composite institution that would comprise all the agencies noted above. Again, placing them together into one institution will bring about better coordination of their activities.

It is recognized and is a matter highly appreciated that actors in this institution have been doing well enough to help Nigeria attain sustainability in the area of improved water and sanitation. It is equally to be recognized that such activities should be widespread and affect all nook and cranny of the nation to become effective, sustainable and representative. For example, in an area where one international institution has cited a project, it would be a better idea if another international organization moved to another site to provide similar service. This would provide a better spread of aid and equitability in the provision of water and sanitation.

The proposed institution, like the one mentioned above, will have a duty of advising government in this direction. The institution will be charged with doing all the necessary studies and come up with a report, devoid of political or social pressure, that will be presented to the Plateau State Ministry of Water Resources and Energy for adjudication.

Plateau State Sanitation Coordinating Agency

This new coordinating agency will be established to help all the other agencies and institutions charged with sanitation in stepping up and sustaining sanitation all over the State. This institution will coordinate, along with a proposed extra-sectoral agency to be formed from a group of line ministries/departments, create a sustainable sanitation profile all over the State. Like other institutions it will be a full-fledged institution with all the appurtenances, staffing and management necessary to carry out these functions.

On the other hand, the existing institution, The PEPSA, will have to be strengthened in a reform process in order to carry out any added functions, as stipulated here. In that case, a call for a new institution would be unnecessary.

Plateau State Agro-allied Agency (Irrigation, fisheries nursery farms, etc)

As its name implies, its handle will focus more on water resources for irrigation and fisheries in the agricultural sector. This institution will always liaise with farmers, the agricultural

ministry and a proposed regulatory agency to ensure adequate water allocation to farmers. Moreover, this institution will ensure that equity is followed in these allocations. Finally, it will ensure that, while these resources are made available, a respect for sustainability of these resources is maintained and consideration for the integrity of the environment is adhered to.

For practical purposes, and in line with the spirit of the present times, this putative institution may devolve to the status of an irrigation department.

Dams, Water Conservation, and Flood Prevention Agency

This is an important potential institution that will have administrative functions aimed at coordinating the activities of bodies charged with the above functions. This institution, in liaising with a proposed regulatory institution, ensure that all factors of water conservation are applied in water use by various actors in the water and sanitation sector. Secondly, this potential institution will be on continuous monitoring of the various dams and liaise with the dam authorities to regulate and prevent the siting of settlements very close to the dams; especially in areas that could be flooded should a dam accident occur.

Catchment Management Agency (CMA)

The idea informing the proposal of this institution is founded on the concept of public participation within the relevant water management areas. It is aimed at delegating water resources management to a zone or catchment level and to involve local communities. This will have all the appurtenances of a water and sanitation institution. The major functions to be performed by the CMA will be to: i. Ensure equitable access of water resources to all stakeholders, while maintaining efficiency and sustainability of the resource; ii. Coordinate organizations and facilitate the participation of stakeholders.

Plateau State Water and Sanitation Regulatory Commission

This, also, has been explained in the Plateau State Water Resources and Sanitation Policy (2017)\

Water, Sanitation and Hygiene (WASH) Departments at the LGAs, WASHCOM, WCA.

This is actually not a new institution. The note here is to recognize that these various sanitation agencies have been combined into one institution to form a unique flagship of sanitation in the rural areas. Each of the composite units will continue to perform its functions as usual. The only difference is that a coordinating institution is being proposed to provide overall administrative functions for them. These administrative functions will provide a package that should give more bite to the combined activities of the composite units.

The WASH unit could be upgraded into a department to obviate any need for another agency.

10.1: The Plateau State Ministry of Water Resources and Energy

It is being proposed an establishment of a State Council on Water and Sanitation. The purpose of this Council will be to provide guidance to the State Government on any proposed water-related legislation, State water resources policy and strategy and all issues of coordination in the State water sector.

This Council will comprise the following officials:

- a. The Plateau State Commissioner for Water Resources and Energy who will be the chairperson;
- b. The Permanent Secretary in the Plateau State Ministry of Water Resources and Energy who will be the secretary;
- c. The Directors of Planning, Finance and other water and sanitation matters in Plateau State (see the water policy document);
- d. The Heads of the Water and Sanitation Institutions in the Plateau State Water Sector.

The Secretariat, under the direction of the Permanent Secretary, will perform the usual functions of that body, including the convening of meetings.

Other aspects of functions of the Ministry will be articulated in the water and sanitation legislation.

10.1.1: The non-water-related agencies

This is a potpourri of agencies or stakeholders that I have dubbed *Facultative Water Resources and Sanitation Agents*. In the proposed institutional reform and the resulting legislation, it would be pertinent to place them in groups called *extra-sectoral institutions* with special designations. For example, The Ministry of Health, The Primary Healthcare Development Agency, will be placed under an '*Extra-sectoral Institution (Health)*'. Its role will be directed towards the actual sectoral institution, Water, Sanitation and Hygiene (WASH) Units/Departments at the LGAs, WASHCOM and Community Led Total Sanitation [CLTS]. The former would provide regular and constant trainings for the latter and the strength of this latter with regard to interactions with key external institutions (one of the indices for a strong institution) would be sharpened and tilted appropriately toward a better reception of these trainings and other didactic materials.

10.1.2: Knowledge base and networking

All water and sanitation institutions must understand that none of them can go it alone. In fact, the relationship among them is likened to a link chain with each institution making up a

link in the chain. And the strength of the entire chain is as strong as the strength of each link. In view of these, no institution should consider itself an island in the centre of other activities. The activities of each institution must be linked to those of others. To make this achievable the possible structure of the entire water and sanitation sector is recommended to have the following format:

a. The Plateau State Ministry of Water Resources and Energy versus other institutions:

It is hereby recommended as follows:

- i. The Ministry is advised to establish an institutional liaison office under the direct supervision of the Permanent Secretary;
- ii. This liaison office will be in direct contact with all the water and sanitation institutions and collect weekly reports of their activities, including problems and other concerns;
- iii. These will be forwarded by the liaison office to the Permanent Secretary;
- iv. The office will provide all the institutions possible avenues and opportunities for help or any other administrative improvement in the institution, if necessary.

b. Institution versus Institution interactions:

- i. All the water and sanitation institutions will have a common platform for interaction;
- ii. The frequency of this formal interaction will be determined by them;
- iii. The platform will create avenues to discuss technical, field and other problems during which members can provide suggestions and solutions to such problems;
- iv. In the same vein, successes can be shared among them; and this will provide a source of data and inspiration to other institutions when implementing similar measures;

c. Institutions versus relevant line ministries:

15 putative water and sanitation institutions have been so far identified. Similarly, there are many line ministries that come with various lines of knowledge that will be very useful in the

water and sanitation sector. These ministries and the knowledge they will provide are shown in the following Table:

MINISTRY	KNOWLEDGE BASE
Ministry of Justice	Will advise the water and sanitation sector on various legal issues, including interpreting legislation. Will help the sector in ascertaining the practice of equity in all aspects required in the sector
Ministry of Health/Primary Healthcare Development Agency	Will be very useful in contributing immense knowledge in the area of disease and control, hygiene and in the training of officers to understand fully the terrain of WASH
Ministry of Education/Plateau State UBE Board	A veritable resource centre where actors in the water and sanitation sector could draw inspiration from the fountain of knowledge as it applies to many aspects of capacity building; a situation which can equally trickle down to participants in a multi-stakeholder process
Ministry of Commerce and Industry	Will provide inspiration to all staff of the various water and sanitation institutions with regard to knowing how to position their institutions to embrace the commercial stance necessary for progress, sustainability and recognition. These will encourage financial institutions to provide loans for project implementations
Ministry of Agriculture	Will be very useful to the sector in the areas of irrigation and water efficiency. The proposed Plateau State Agro-allied Agency will find liaison with this Ministry very useful and invigorating
Ministry of Environment/ Waste Management and Environmental Agency	A link between this and the proposed Plateau State Sanitation Coordinating Agency will really be invigorating to the latter. Moreover, this line ministry will provide knowledge base and technology to the various water and sanitation institutions to combat water pollution produced by solid and liquid wastes
Ministry of Local Government Affairs/Community and Social Development Agency	This will provide important knowledge base for the Plateau-RUWASSA. The input of this line ministry to the preparation of any multi-stakeholder process will be of immense benefit. Moreover, this line ministry can facilitate a loan/use of heavy equipment if the RUWASSA should want to carry out some of the economic components required of it, as described in this reform package

MINISTRY	KNOWLEDGE BASE
Ministry of Finance	Professionals in this Ministry would be of immense benefits to all water and sanitation institutions, especially in the area of positioning their institutions to embrace the commercial orientation required of the proposed status this reform recommends
Ministry of Women Affairs	Gender mainstreaming and the push for increased women participation in all aspects of activities in the sector have been given consideration in this reform. Continuous inputs from this line ministry will be of immense value and benefit towards realizing this goal
Emergency Management Agency	While proposing for progress in the water sector to make water and sanitation accessible to every citizen of the State, we should always hedge against any occasion of accidents. The proposed Dams, Water Conservation, and Flood Prevention Agency will find this line ministry very useful. Other actors in the water and sanitation sector will equally find this line ministry very useful
Planning Commission	This line ministry is at the hub of all developments in the State, including the water and sanitation sector. It contains a knowledge base for every actor.
Academia	This is another fountain of knowledge whose researches in the water and sanitation sector are of immense benefits. In addition, mobilization of this group of individuals in Plateau State will produce lots of social, health and economic advantages to the citizens of Plateau State. We are aware of the waste to wealth programme under the aegis of an academic institution in the State. This is a very important segment of the society. It is recommended that Government pay serious attention to them

Table 1: Knowledge Base provided by Line Ministries in the Plateau State Water Sector

All the above go to the signify the need for an effective networking and knowledge system that should assist in driving forward all activities of the Plateau Water and Sanitation sector.

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ANNEXES

Annex A

A. List of putative water and sanitation institutions in Plateau State of Nigeria

1. Plateau State Ministry of Water Resources;
2. Plateau State Rural Water Supply and Sanitation Agency (Plateau RUWASSA);
3. Plateau State Water Board;
4. Plateau State Small Towns Water Supply and Sanitation Agency (STWSSA);
5. Water, Sanitation and Hygiene (WASH) Units/Departments at the LGAs, WASHCOM and the process associated with Community Led Total Sanitation (CLTS);
6. Water Consumers Association, Community Representatives;
7. Groundwater Extractors (Private Sector and Government Agencies);
8. Federal Government-backed Agencies (MDGs, UNICEF, and other international donors, etc.);
9. Civil Society Organizations (CSOs, NGOs);
10. Plateau State Sanitation Coordinating Agency;
11. Plateau State Agro-allied Agency (Irrigation, fisheries nursery farms, etc.);
12. Dams, Water Conservation, and Flood prevention Agency;
13. Catchment Management Agency (CMA);
14. Plateau State Water and Sanitation Regulatory Agency.

B. The following water institutions were the assumed representative institutions for the assessment of Plateau State institutions:

- a. Plateau State Ministry of Water Resources and Energy;
- b. Plateau State Rural Water Supply and Sanitation Agency (Plateau-RUWASSA);
- c. Plateau State Water Board;
- d. Plateau State Small Towns Water Supply and Sanitation Agency (STWSSA).

C. Results of the assessment are as follows:

1. Performance Profile for the Plateau State Ministry of Water Resources

Evaluation of Performance

PERFORMANCE CATEGORY	HIGH	MEDIUM	LOW
Autonomy			X
Leadership		X	
Management and Administration		X	
Commercial Orientation			X
Consumer Orientation			X
Technical Capability		X	
Developing and Maintaining Staff			X
Organizational Culture		X	
Interactions with Key External Institutions		X	

2. Performance Profile for the Plateau State Rural Water Supply and Sanitation Agency [Plateau-RUWASSA]

Evaluation of Performance

PERFORMANCE CATEGORY	HIGH	MEDIUM	LOW
Autonomy			X
Leadership			X
Management and Administration			X
Commercial Orientation			X
Consumer Orientation			X
Technical Capability			X
Developing and Managing Staff			X
Organizational Culture		X	
Interactions with Key External Institutions		X	

Performance Profile for the Plateau State Rural Water Supply and Sanitation Agency [Plateau-RUWASSA]

Evaluation of Performance

PERFORMANCE CATEGORY	HIGH	MEDIUM	LOW
Autonomy			X
Leadership			X
Management and Administration			X
Commercial Orientation			X
Consumer Orientation			X
Technical Capability			X
Developing and Managing Staff			X
Organizational Culture		X	
Interactions with Key External Institutions		X	

3. Performance Profile of the Plateau State Water Board

Evaluation of Performance

PERFORMANCE CATEGORY	HIGH	MEDIUM	LOW
Autonomy			X
Leadership		X	
Management and Administration			X
Commercial Orientation			X
Consumer Orientation			X
Technical Capability		X	
Developing and Maintaining Staff		X	
Organizational Culture		X	
Interactions with Key External Institutions			X

4. Performance Profile of the Plateau State Small Towns Water Supply and Sanitation Agency [STWSSA]

Evaluation of Performance

PERFORMANCE CATEGORY	HIGH	MEDIUM	LOW
Autonomy			X
Leadership			X
Management and Administration			X
Commercial Orientation			X
Consumer Orientation			X
Technical Capability		X	
Developing and Maintaining Staff			X
Organizational Culture			X
Interactions with Key External Institutions			X

ANNEX B

Distribution System Leakage (18)

All water that is **not authorized consumption** is considered **Distribution System Leakage (DSL)**. **DSL** is defined as the **water lost from the distribution system** and includes **apparent** losses and **real** losses. Apparent losses include theft, meter inaccuracies, data collection errors. Real losses are the physical losses from the distribution system and include reservoir overflows, leaky valves, and water main breaks. Neither apparent nor real losses are authorized uses of water; and therefore are considered leakage even if they are not actual 'leaks'. Some examples of water loss that should be included in the DSL category include:

1. Theft;
2. Meter inaccuracies;
3. Meter reading errors;
4. Data collection errors;
5. Calculation errors;
6. Water main breaks.

Transmission Line Leakage

Some water systems have extensive transmission lines. Transmission line losses may be excluded from the DSL calculation when there is a production meter located upstream of the entry to the distribution system. If an additional production meter is not installed upstream of the distribution system, the entire transmission line losses are considered DSL.

If transmission line leakage is to be excluded from DSL, it would be necessary to describe transmission line leakage and the efforts taken to minimize leakage in the planning document.

Calculating Distribution System Leakage

Annual DSL is calculated in both percentage and volume. At a minimum, collect:

- The amount of water produced from the source(s);
- The amount of water purchased from another supplier;
- The amount of water consumed by the metered customers and any other estimated authorized use.

Volume Distribution System Leakage

This is calculated as the following equation shows: $\text{Volume DSL} = \text{TP} - \text{AC}$

Where: DSL is in litres.

Calculating Percent Distribution System Leakage

$$\text{Percent DSL} = \left[\frac{\text{TP} - \text{AC}}{\text{TP}} \right] \times 100$$

Where: DSL = Percent of distribution system leakage;

TP = Total water produced and purchased

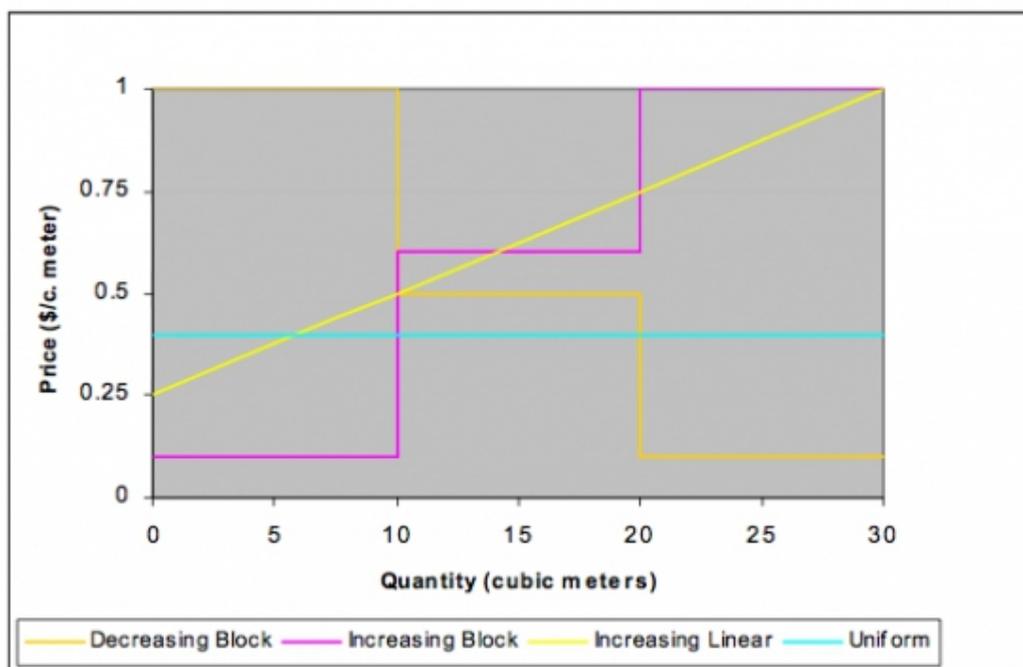
AC = Authorized consumption

Water System Distribution System Leakage Calculation Example

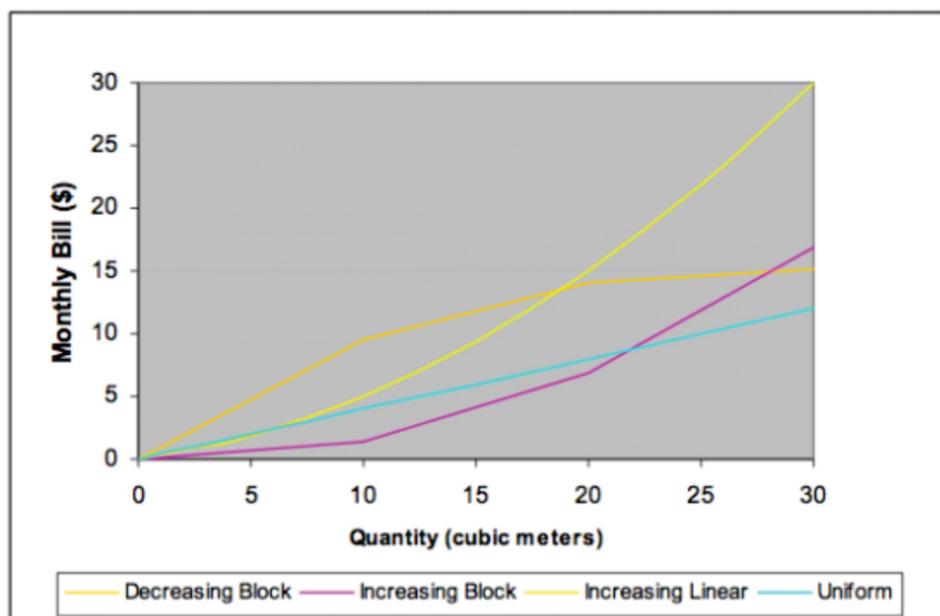
Add up the amount of water produced from all sources	In Litres
Add any water purchased from other water suppliers	In Litres
TOTAL PRODUCTION AND PURCHASED (TP)	In Litres
Add up the annual amount of water delivered to customers from your service meters	In Litres
Add any water sold to another water system	In Litres
Add all estimated authorized uses (fire flow, flushing of mains, and other authorized uses):	
Flushing	In Litres
Fire flow	In Litres
TOTAL AUTHORIZED CONSUMPTION (AC)	In Litres

Then calculate Volume DSL and Percent DSL.

Tariff structures illustrated



Price of water versus the quantity of water used for selected tariffs. The Graph shows how the price of water to the consumer changes as the quantity of water used increases for some of these tariff structures. Source: WHITTINGTON (2006) (19).



Monthly water bill versus the quantity of water used for selected tariff structures. The Figure illustrates how the customer's monthly water bill varies as the quantity of water used increases for selected tariff structures. Source: WHITTINGTON (2006) (19).

ANNEX C

The Steering Committee or Board of Directors of each water and sanitation institution will comprise the following membership:

The Permanent Secretary, Plateau State Ministry of Water Resources and Energy- the chairperson;

The Managing Director of the water and sanitation institution;

The Administrative Officer in that water and sanitation institution- will be the secretary of this Board;

Representatives of the relevant private sector. Number to be determined according to the strength of shareholding;

Representatives of the stakeholders in the areas covered by the water and sanitation institution; Number to be determined by strength of shareholding;

The remaining membership is to be drawn from a line Ministry and Plateau State Ministry of Water Resources and Energy.