

AN APPRAISAL OF PUBLIC WATER SUPPLY SYSTEMS FOR
PARTNERSHIP ARRANGEMENT IN LAFIA TOWN, NIGERIA

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JUNE, 2011

**AN APPRAISAL OF PUBLIC WATER SUPPLY SYSTEMS FOR A
PARTNERSHIP ARRANGEMENT IN LAFIA TOWN, NIGERIA**

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**A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, AHMADU BELLO
UNIVERSITY IN PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF
SCIENCE IN URBAN MANAGEMENT DEPARTMENT OF URBAN AND
REGIONAL PLANNING, AHMADU BELLO UNIVERSITY, ZARIA**

JUNE, 2011

DECLARATION

I declare that the work in the thesis entitled “**An Appraisal of public water supply systems for a partnership arrangement in Lafia town, Nigeria**” has been performed by me in the department of Urban and Regional Planning under the supervisions of Mr. Bolaji Arogbonlo Dada and Dr. Ma’aruf Sani. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree or diploma at any university.

Name of Student

Signature

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CERTIFICATION

This thesis entitled AN APPRAISAL OF PUBLIC WATER SUPPLY SYSTEMS FOR A PARTNERSHIP ARRANGEMENT IN LAFIA TOWN, NIGERIA by Bashayi Obadiah meets the regulations governing the award of the degree of master in science urban management of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ACKNOWLEDGEMENT

I will like to thank God who made it possible for me to write this thesis and especially to the Holy Spirit who guided and taught me how to go about the work.

In addition, this work was facilitated by contributions of several persons and organizations that assisted me with information and materials and to whom I would wish to express my gratitude. It will not be possible to mention here all such contributions, but I could like to make specific reference to the following;

I acknowledge with gratitude my thesis supervisors, Mr. Bolaji Arogbonlo Dada and Dr. Ma'aruf Sani of the Department of Urban and Regional Planning, Ahmadu Bello University, Zaria in guiding this research project from its conception to conclusion and for the immense assistance they offered me in the development of the research both on official and personal basis.

I would also like to express my gratitude to the Head of Department, the academic and non-academic staff of the Department of Urban and Regional planning for providing a conducive atmosphere for learning.

I wish to thank my friends and course mates in M.Sc Urban management and M.Sc Tourism and Recreational Planning, Department of Urban and Regional Planning for their constructive criticism and help in obtaining information for this thesis.

I am also grateful to Mr. Daniel Barau, Director of College of Environmental Studies, Mrs Veronica Lami Yamusa, Head of Department Urban and Regional Planning, Nasarawa State Polytechnic, Lafia and other colleagues in Urban and Regional Planning profession who have been helpful as well in various stages of the study.

I wish to thank my field assistants- ND II URP 2008/2009 session of the department of Urban and Regional Planning, Naspoly with whom I also conducted surveys in Lafia and also the entire members of Chapel of Reconciliation, Naspoly for their unceasing prayers for me.

I also wish to express gratitude to the management of the NSWB for the assistance I received in the form of documented information on the operations of the Board and their opinions on how to improve water supply in the State. Mention should be made in this regard to Engr. Mohammed Adara, the General Manager of NSWB, Engr. Simon Ibi, the Ag. Director, water supply department, Mrs. Patience M. Ayaka, Area Manager of Lafia East Area office and Management Staff of the NSWB who have been willing to assist me with relevant information.

I also acknowledge the cooperation from local community in the various neighbourhoods of the Lafia Urban area where the fieldwork for the study has been undertaken for their cooperation in responding to my enquiries.

Finally, my thanks go to my wife Mrs. Linda Obadiah and my Daughter Annabel Obadiah for their love and support, Pastor Adams Gabriel of CPM Church Lafia for his prayers and Professor J.B Kaltho of the Department of Urban and Regional Planning, Ahmadu Bello University who was also involved in the initial conception of the research proposals.

ABSTRACT

As urban areas in Nigeria continue to grow, the need to meet increasing water demand for the population has become a major problem of concern to Urban Managers. The State water agencies who are supposed to provide adequate and potable water supply to urban population have records of poor performance and institutional challenges. To achieve the national and state water supply policy objectives major institutional reforms must be carried out in our water sectors to provide efficient and sustainable water supply for the urban needs.

In view of this, the study first appraised the existing public water supply system and conditions in Lafia town with population of 263,998. The survey investigation was based on a three-stage clustered sampling framework in which a sample of 500 households (representing 2.5% sample size of the 20,308 total households in Lafia) was drawn across the three Water Board area offices (Lafia East, Lafia North and Lafia West) forming about 12 neighbourhoods of the urban areas and a systematic random sampling was used to administer questionnaires. Another sample of 20 questionnaires was administered to source out information among the stakeholders on their opinion about PSP.

These results obtained shows that the water coverage in Lafia urban area was only 33% and 67% of the urban area were not covered by the network. From the 33% of the urban area that was covered with public water supply network out of which 57.3% of the households have their houses connected while 42.7% were not connected to official networks but depend on public taps and other sources. The result also shows that only about 30% of the Lafia urban population have access to potable water supply and others rely on alternative sources of water supply that may be polluted. In addition, the result of enabling environment shows that legal policies, regulatory framework, willingness and ability to pay for water supply, stakeholders and consumers assessment support a conducive environment for private sector participation in public water supply systems in Lafia town, and a lease contract was selected as the best option for water supply in Lafia town.

The study proposed 10 years partnership arrangement based on the selected PSP model and recommend strong political will and commitment from government to promote water supply system, establishment of management regulatory commission for PPP. In view of the fact that there will be increase in tariff due to the new reform which some households may be unable to pay for water supply, measures targeting the poor such as low-cost options of obtaining water supply through the public stand posts and commercial distribution outlets was recommended. Finally, the research has provided useful insights as to the way forward for water supply partnership and commercialization in Nigeria, and that there is no one-model-suits-all approach to water privatization. Each country must therefore design a framework most suitable to its environment.

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ABBREVIATIONS

SWA	State Water Agency
NSWB	Nasarawa State Water Board
L/d	Litre per day
HH	Household
UK	United Kingdom
CSO	Civil Society Organization
NGO	Non Governmental Organization
CBO	Community Based Organization
O & M	Operation and Maintenance
NWRP	National Water Rehabilitation Project
DFID	Department for International development
PSP	Private Sector Participation
PPP	Public-Private Partnership
WSS	Water and Sanitation Services
BOT	Build-Own and Transfer
BOO	Build-Own-Operate
UFW	Unaccounted For Water
WTP	Willingness to Pay
HRD	Human Resources Development

CHAPTER ONE

1.0 INTRODUCTION

Water in adequate quantity and suitable quality is a pre-requisite for maintaining urban life and economic activity, and it serves as the vehicle for drainage of wastes. Numerous activities are dependent on the availability of water supply. In particular, water supply is a critical factor in public health and economic development.

For any city, one of the basic and essential services is efficient water supply. Unless and until this demand is met, the health of the community and development activities will be negatively affected. When the organizational structure of any water supply agency does not promote efficient operation then the overall management will function poorly. Management in this regards is the act of giving directions to water activities and channelling resources towards the achievement of better and efficient water supply system. Water supply management comprises of financial management and water demand management such as water pricing system, metering and tariff, financial and cost recovery of water supply, willingness to pay and ability to pay for the services and how various institutions will participate in management of water supply.

In developing countries, however, provision and management of water supply and sanitation systems is generally poor, resulting in interruptions in the services and sometimes the complete collapse of systems, which could oblige users to resort to traditional water sources that may be contaminated. According to the WHO/UNICEF joint monitoring programme, between 1990 and 2004 urban population growth in Nigeria increased from 25 to 48% while at the same time, urban access to improved water sources actually declined during the same period from 80% to 67% coverage. The World Bank also reports that “some 25% of the urban

population in Nigeria at least (50% of the urban population of Africa) are not connected to official networks and rely on alternative sources of water supply.

Urban water supply in Nigeria is deficient mainly due to inadequate data on operation and maintenance, insufficient and inefficient use of funds, lack of coordination among water agencies, poor management of water supply facilities, inappropriate system design, low profile of operation and maintenance, inadequate water policy, legal framework and overlapping responsibilities, and political interference (O and M working Group, 2002).

The provision of adequate water for rural and urban population is the priority of national and state water supply policy and one of the targets of MDGs is to have access to quality water by the year 2015. But this policies will be a mere statement if the management of State water agencies have not been restructure based on current trend of PSP reforms. The concerned to make these Water agencies work efficiently, the Federal Ministry of Water Resources had to source for loan from World Bank on behalf of the SWAs to rehabilitate water works under the National Water Rehabilitation Project (NWRP) rather than allowing the State Water Agencies to embark on construction of new ones which are very expensive. NWRP was aimed at developing the SWAs' institutionally so that they can become efficient, autonomous and viable. The concerned also led to establishment of many policies by the FMWRRD on how to improve water supply, one of which is the National Policy on Water supply and Sanitation, 2000.

To have adequate water supply, there must be sustainability of water supply management which will involve: ensuring the continuous availability of sufficient quantities of water of sufficient quality, within adequate institutional frameworks; and applying sound management practices, appropriate technologies, and full-cost accounting; and effectively maintaining

facilities and equipment. An efficient water management framework is necessary for sustainable urban water supply system.

1.1 STATEMENT OF RESEARCH PROBLEM

Since the creation of Nasarawa State in 1996, the management of public water supply in Lafia, the capital city, has been the responsibility of the Nasarawa State Water Board (NSWB). The NSWB has water supply system for Lafia town with a capacity of 11356.24m³/d (about 3 million gallons a day) which falls short of the current demand level of about 75,640.8m³/d. In addition, the existing system loses approximately 50 percent of its water, including “technical losses” (i.e. leakages) and “commercial losses” (i.e. unbilled and uncollected revenues and theft). The system itself has unreliable data on household water use and losses by households and other entities, and it has insufficient metering. Thus, bills are based on presumed consumption. These situations are not different from other State Water agencies in Nigeria (Greater Lafia master plan, 1998; Sauri Consultants, 2000 and ADB project appraisal, 2005).

As in most other countries, the State Water Corporations in Nigeria, with a mandate based on objectives of providing water as a social service while generating revenue to offset costs and run a sustainable water supply have records of poor performance. Balancing this dual mandate under an institutional and management framework in the public sector has been frequently a source of major problems that have characterized State Water Corporations and made them incapable of achieving any of those objectives effectively (Blunt, 1990; Blunt and Merrit, 1992). Problems like absence of clear institutional objectives, low wages and poor equipment and supplies, have been widely cited as the typical institutional characteristics of such water supply institutions in Nigeria (Ayoade, 1981; Falana, 1991, Yakubu, 1995) and

other countries. The effect of these problems is to entrench a vicious circle that constrains the generation and effective use of finance to improve performance, ineffective delivery systems and poor financial portfolio.

Many studies have revealed that the problem of water supply is attributed to poor management and operational control of water agencies to recover cost through user charges (Fadumila, 1983; Isa, 1992; Ammani, 1995; Abdu, 1998). The usual approach towards performance improvement has been to design projects for urban water supply that feature a package application of more finance, often from foreign development assistance agencies for upgrading of existing plants and development of new ones. These have not yielded the desired results as water institutions remain incapable of improving performance. The water agencies therefore continue to rely on government subventions for much of their operations. Financial assistance of this type without major institutional reforms has been shown to create a contradictory situation of persistent water shortages despite increasing expenditure to reduce them (Swyngedouw, 1995).

These studies focussed on drastic management and policy changes to realising sustainability through full cost recovery in service provision by way of commercialization or outright privatization of water supply in view of government inadequacies to fund water corporations. This was in line with the recent National policy on water supply and sanitation that clearly identifies commercialization and private sector participation as the cornerstones for achieving sustainability in water supply and advocates a shift from public management system to public-private partnership or private sector management. The policy was premised on the apparent failure of the existing water supply and sanitation situation and the need for a review of existing processes and structures for more effective performance. One of the policy's aims were "to provide sufficient potable water and adequate sanitation to all Nigerians in an

affordable and sustainable way through participatory investment by the three tiers of Government, the private sector and the beneficiaries”.

The above researches led to other studies on the feasibility of commercializing and privatizing water supply in Nigeria (Dale and etal, 1989; Sani, 2006). The studies revealed households are willing to pay higher than the present tariff if services were improved which they concluded that commercialization of urban water supply is a feasible and necessary strategy for sustainable urban water supply and also suggested measures for households that will be unable to pay for water supply.

Another research by (Owolabi, 2004, Adepoju and Omonona, 2009) studied the ability to pay as basis for privatization of water supply institutions. The study revealed that apart from willingness to pay higher tariff, households have the ability to pay for higher tariff if increased because they spend higher in buying water from other alternative sources than if public water is commercialized to improve its supply.

These studies rightly suggested that commercialization and private sector participation through partnerships is a necessary strategy for effective and sustainable urban water supply provision. The studies have not however, addressed the kind of partnership arrangement required in the new arrangement of water supply provision. This is necessary in view of the inadequate service provision levels in some partnerships in Nigeria. The arrangement in this study is a partnership framework for good governance based on Lafia condition which is necessary for the functionality, efficiency, responsiveness and accountability in water supply and this can be the basis for other facilities and services provisioning in Nigeria. That is, this needs to be spelt out on city by city basis considering the variations in the state and dynamics of each city. A public-private partnership is one of the important strategies of promoting good governance on water supply management and any of the infrastructural services in Nigeria.

Therefore, in view of the above argument, the study sets out to investigate; first, the conditions and mode of access to water in the study area, second, assess the enabling environment for a partnership model and thirdly to also assess the kind of PSP option that is require in Lafia town. This research shall aim at working out effective partnership arrangement for good governance in water supply provision based on Lafia condition.

The study therefore sets out to answer the following questions:

1. What is the state of public water supply system in Lafia town?
2. What are the conditions of water supply and mode of access to public water supply system in Lafia town?
3. What are the enabling environments for partnership in the study area?
4. What kind of partnership model is requires for Lafia environment?

1.2 AIM AND OBJECTIVES

1.21 AIM:

The aim of this research is to appraise the existing management of public water supply system in Lafia town, and to assess the enabling environment and partnership models with a view of evolving the best partnership arrangement and making recommendations for effective public water supply.

1.22 OBJECTIVES:

The objectives of this research are to:

1. Examine the concepts as well as partnership models for water supply.

2. Appraise the existing management of public water supply systems in order to ascertain its problems
3. Investigate the existing conditions and mode of access to public water supply in the study area.
4. Assess the enabling environment and partnership models for selecting the best option for Lafia town and,
5. Evolve a partnership arrangement based on selected option and to make recommendations for effective public water supply system in Lafia town.

1.3 SCOPE AND LIMITATION OF THE STUDY

The study shall cover public water supply in Lafia urban area. The Water Board has 13 water systems across the State but this study shall focus only on Lafia urban water supply system. The water supply in question does not therefore include other sources of supply like private or community and private owned wells and boreholes that are commonly in use to supplement the public water system but these might only provide brief background information to water supply conditions in Lafia town. The research has been limited to appraisal of the management of public water supply system in Lafia town and also has worked out efficient partnership arrangement for PSP. It will therefore, not covers other aspects of water supply such as water demand management, water treatment, technical and engineering aspects, spatial distributions and consumption of water by various densities and land use, and estimation of water demand.

1.4 SIGNIFICANCE OF THE STUDY

The investigation of these research issues is very expedient in view of the following:

Firstly, adequate understanding about the problems of the management of public water supply system is necessary which will be secured as a basis for policy engenders efficient water supply in Lafia. Also, the current debates of PSP on water supply management will provide the information needed for partnership in any water supply management and the choice of partnership model shall be better guided thereby ensuring satisfactory outcomes.

Secondly, the research will suggest the partnership arrangement for public water supply management that will increase private sectors' involvement, greater transparency and acceptability to the process. Also, findings of the study will contribute much needed information on the effective service provisioning in Lafia and other Nigerian cities.

1.5 DEFINITION OF KEY CONCEPTS

This study utilizes four key terms: public-private partnership, partnership, private sector participation, privatization and service delivery.

1.51 Public-private partnership: PPPs specifically refers to those forms of partnership in which government establishes an arrangement with the private sector in which the private sector provides some form of investment. As such, the terminology PPP tends to exclude service and management contract arrangements, but includes leases and concessions. Heilman and Johnston (1992:197) provide another definition closed to the one given above. Both authors consider that PPPs are a kind of combination between public need and private capability and resources to create a market opportunity through which the public need is met and a profit is made.

1.52 Partnership: describes a spectrum of possible relationships between public and private sectors for the cooperative provision of social services, including infrastructure. In this case parties involved have mutually shared objectives and working arrangements that go beyond the fulfilment of any contractual agreement.

According to Nelson and Zadek (2000), the notion of partnership implies people and organizations from some combination of public, business and civil constituencies who engage in voluntary, mutually beneficial innovative relationships to address common social aims through combining their resources and competencies. As such, partnership could mean government working together with a wide range of social partners at the national and local level to plan, implement and evaluate policy and actions for socio-economic development.

1.53 Private sector participation: ‘PSP’ refers to the involvement of the sector in some form, at some stage in the delivery of services. It is a general term that is used in literature to cover a wide range of arrangements between government agency and non public institution, but usually refers to a contractual agreement involving a public agency and formal private company. However, small-scale and/or informal operators are increasing being recognised and described as private enterprises, as are civil society organizations where they engage in provision of water services on a small-scale to low-income communities (Jessica and Gordon, 2003). It also refers to formal private enterprises operating for or with water utilities.

1.54 Privatization: is sometimes used to refer to increasing private sector involvement, but also specifically to the model of divestiture. For the purpose of this study, “privatization” refers to processes that increase the participation of formal private enterprises in water provision but not necessarily involve the transfer of assets to formal operator.

1.55 Service delivery or service provision. The terminology ‘service delivery’ has generally replaced ‘service provision’ removing the implication that there in a provider and a

recipients. This distinction is not always adhered to and so will not be overly stressed in this work.

1.6 RESEARCH FRAMEWORK

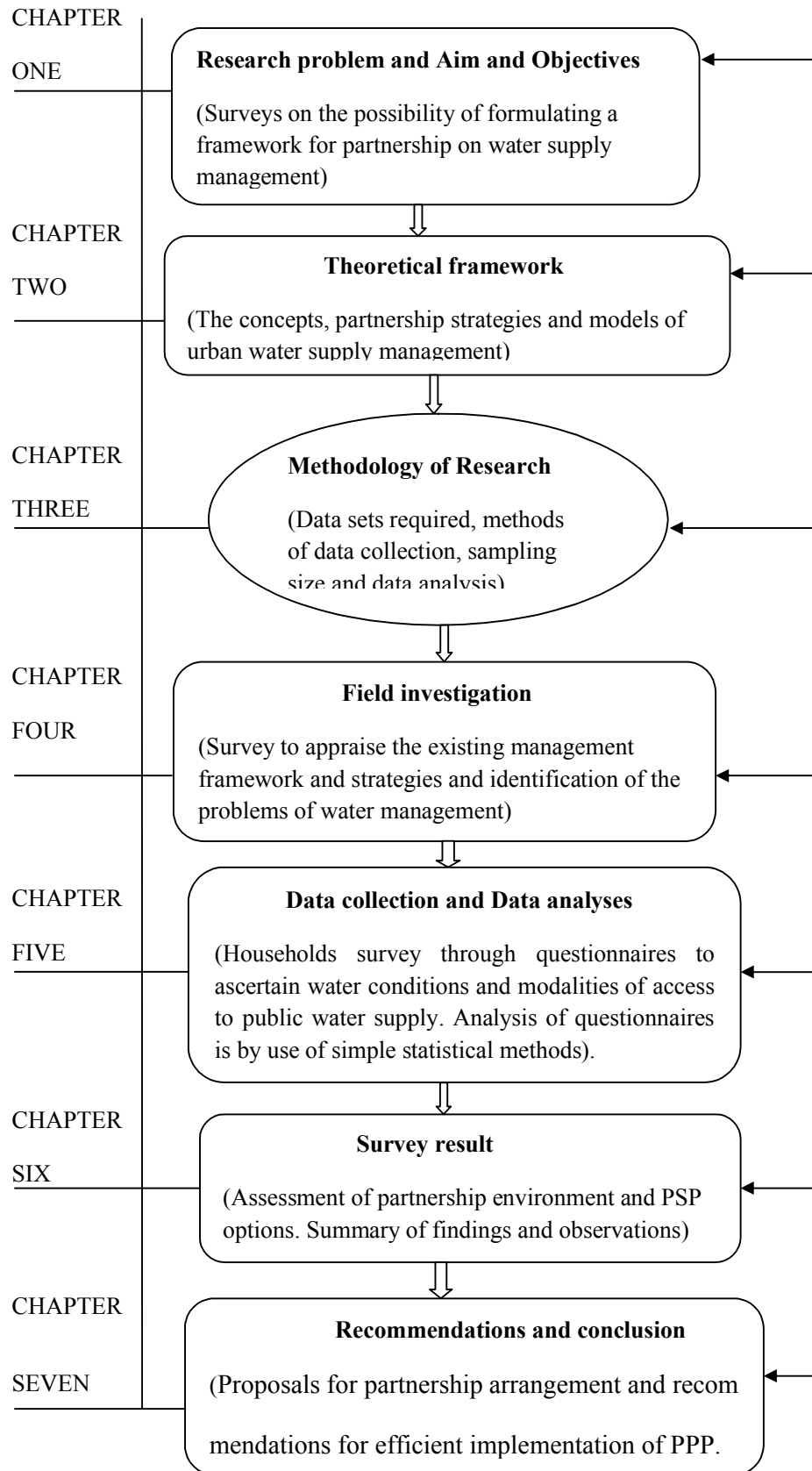
The main issue of discussion in this research consist of generating argument for the appraisal of the existing management framework and potential resources for evolving a partnership framework based on good governance as basis for achieving sustainable water supply in Lafia Town and other part of the country.

The study wills involve field surveys of households, the general population, in addition to secondary data from the State Water Board, the public water supply agency in Lafia. The field surveys of households as user of the services with respect to access to the public water supply system.

The research framework was divided based on seven chapters namely:

- ✓ Research conception
- ✓ Literature review
- ✓ Methodology of research
- ✓ Appraisal of existing management of public water supply system
- ✓ Analysis of existing water condition and mode of access to public water supply system
- ✓ Assessment of enabling environment for PSP reform options and PSP models
- ✓ Proposals for partnership arrangement and recommendations for efficient implementation of PPP.

Fig. 1.1 Conceptual framework for the research



The figure 1.1 above shows various chapters of this research: Chapter one; this chapter gives an overview on the conception of the research problem and the aim and objectives of achieving the research study. Chapters two; this basically focused on the theoretical background on issues concerning research work and also justified the research proposal. Chapter three; this chapter provided the ways and techniques in which the research was carried out. Chapter four; this was concerned with the field investigations to appraise the existing management framework to ascertain its problems. Chapter five; this focused on the data collection and analysis of households' questionnaires to ascertain their conditions and mode of access to public water supply. Chapter six; this was concerned with the assessment of partnership environment and summary of findings from the research conducted. Chapter seven; this essentially covers the recommendations and conclusion based on findings from survey results investigated.

1.7 BACKGROUND OF THE STUDY AREA.

Nasarawa State was created in 1996 with Lafia as the capital town. Within the former structure of Plateau State, Lafia was the second largest town in population size. For the reasons of its size and status as State capital, as well as the location near the Federal Capital Territory (FCT), Lafia is now the First Order town in Nasarawa State.

1.7.1 LOCATION

Nasarawa State is bordered by Kaduna, Kogi, Benue, Taraba and Plateau States as well as the Federal Capital Territory (FCT) Abuja. The State consists of Thirteen (13) Local Governments (see Fig.1.1) and has an estimated land area of 27,107.8 sq. Km with Longitude $8^{\circ} 08' 38''$ East and Latitude $8^{\circ} 24' 17''$ North. Lafia town is the Headquarter of Lafia Local Government which is the fourth largest with a land area of 2,797.5 sq. Km. Nassarawa Local Government (5.743.8 sq. Km), Karu (2810.4 sq. Km) and Awe (2,800.0 sq. Km) are the first second and third largest LGs in that order.

As shown in Fig.1.2, Lafia town is situated on Longitudes $08^{\circ} 30'$ East and Latitude $08^{\circ} 31'$ north. The area is located in the middle climatic belt that is generally very warm and humid with dry and rainy seasons. It has a mean temperature range of 26°C to 30°C , a mean rainfall of 1120mm to 1500mm relative humidity of 60-80% and falls within the guinea savannah kind of vegetation; (Meteorological dept, 2009). The Lafia region is the State's close settled cell with intensive land use in a corridor of development. That is, Makurdi Road passes through Lafia area where the corridor of urban development is most intense by the standard of the Northern and middle belts of Nigeria; (Greater Lafia master plan 1998).

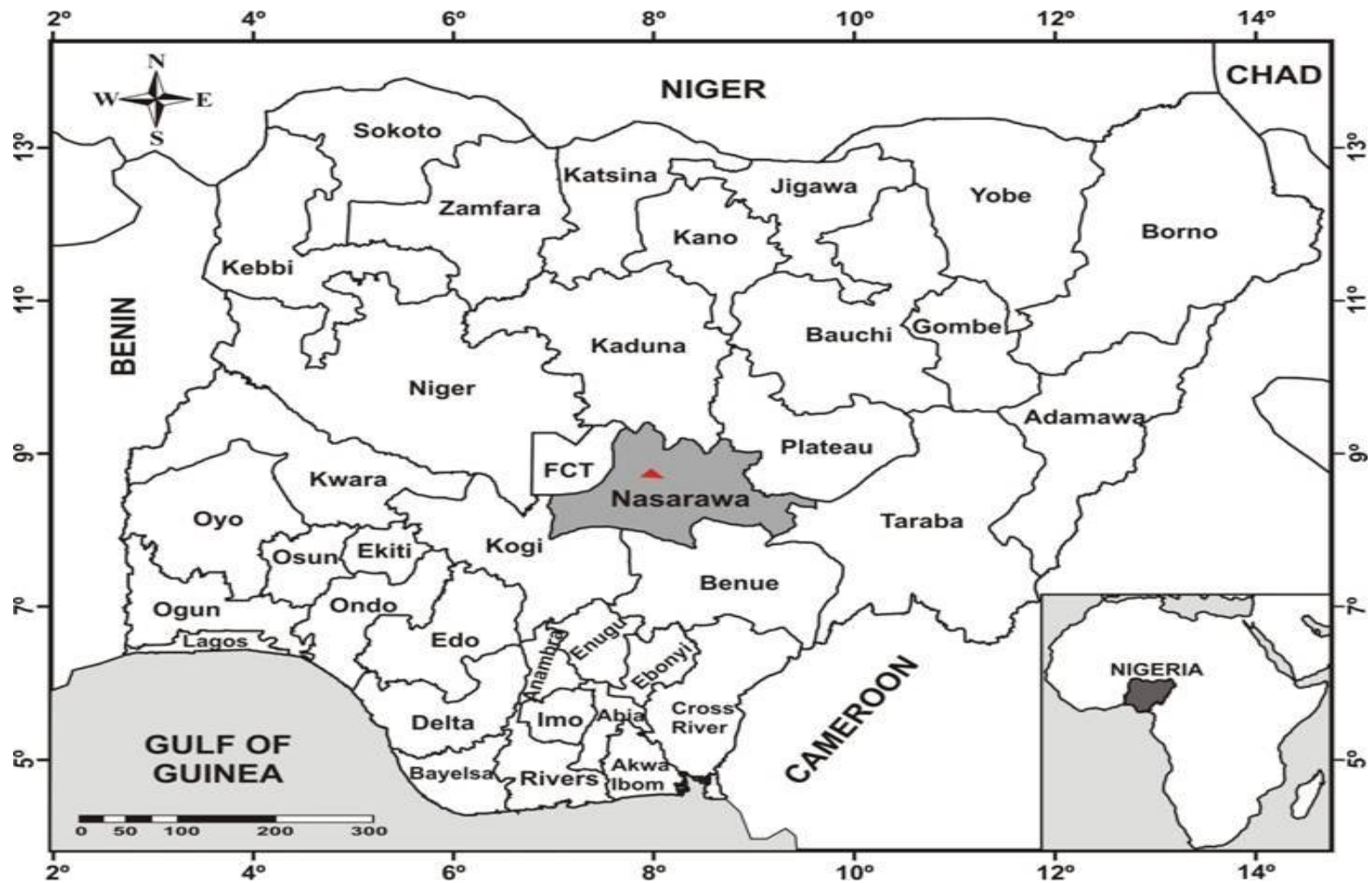


Figure 1.2: Map of Nigeria showing Nasarawa State

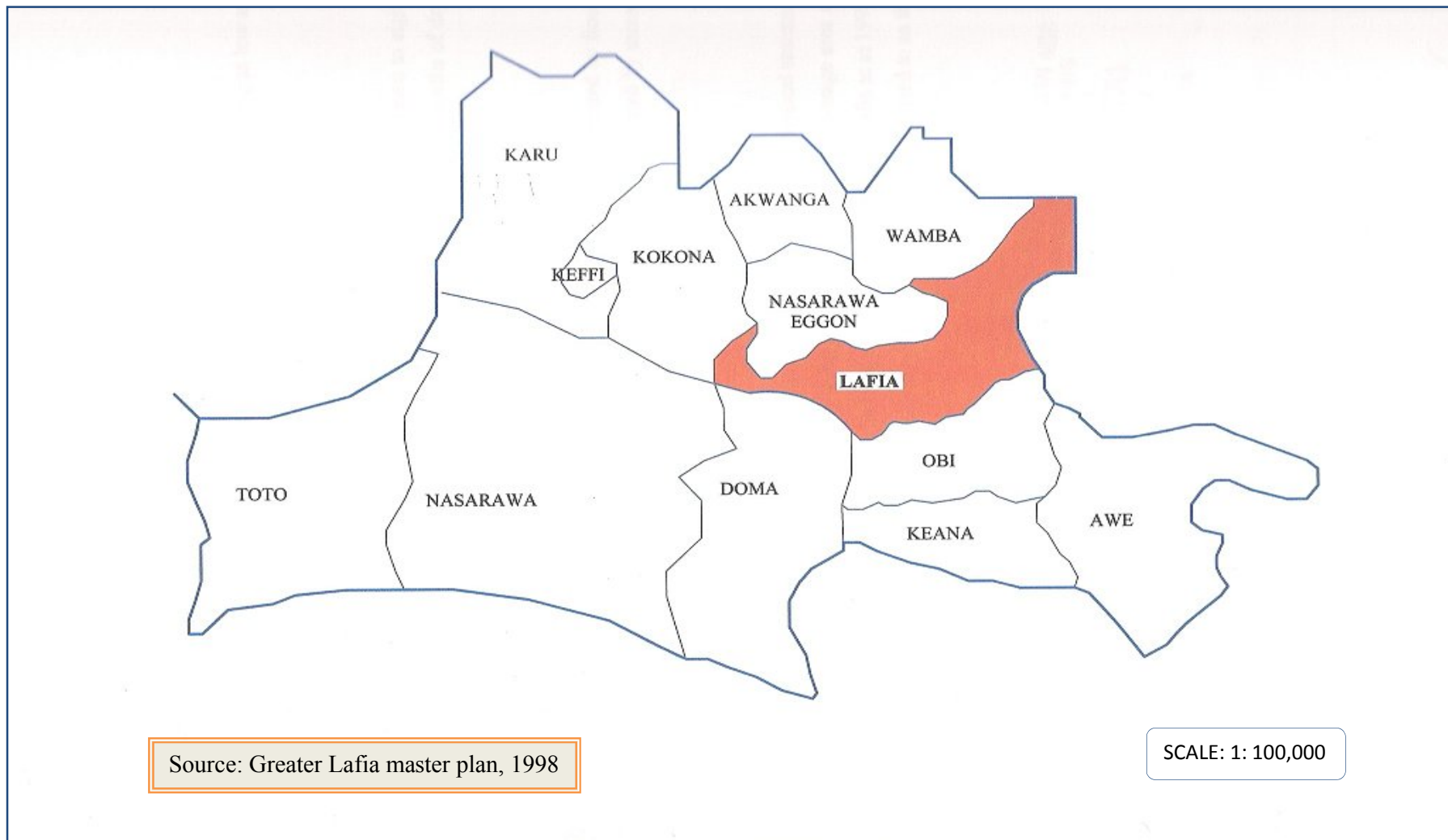


Figure 1.3 Map of Nasarawa State Showing Lafia local Government

1.7.2 TOPOGRAPHY AND DRAINAGE

Lafia town and its surrounding settlements are within the Mada River Basin of the Benue valley platform. The area is largely an undulating plain which is drained by River Mada and its tributaries and by some tributaries of Guma and Ankwe Rivers emptying into the Benue River.

1.7.3 LAFIA TOWN STRUCTURE

Lafia town consists of three (3) structural units distinguished in terms of age of building as well as density of physical development and population. These sectors (see fig. 1.3) are the old town, Sabon pegi area, and Millionaires/Bukan sisi/ Tudun Gwandara Area.

The eastern bank of River Amba and railway enclose the old town which was walled. It is southwest of the railway and on the North edge of the river Amba. The central elements of the sector are the Emir's palace and central mosque as the initial koro settlement which has indeed been swallowed up and did not have such monumental structures.

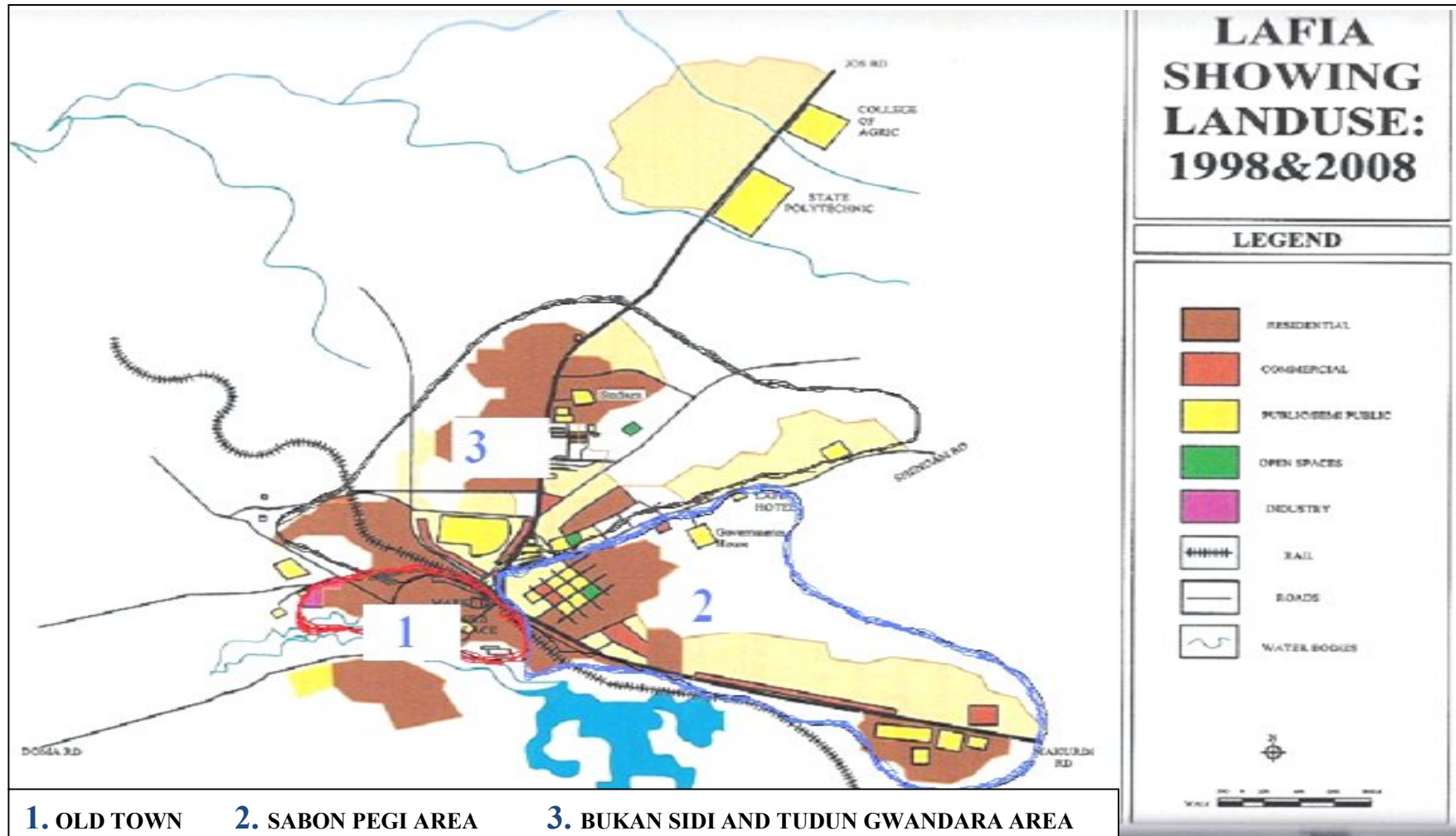
Additionally, the old town is characterized by narrow streets which are winding and irregular in width. This is in line with the non-motorized transport technology of the time of establishment of the settlement and the indigenous cultural values of the dominant inhabitants (Kambari, Hausa-fulani and other Muslim communities). The boundary streets have however been tarred. The old town is a high density residential area with the building largely constructed of mud walls with sand-cement plastering and zinc roofing. The net population density is highest in this part of Lafia, estimated at a value of between 200-250 persons per hectare. The density gradient then sharply declines to the outskirts on to the other sectors of the town.

The second sector is the Sabon pegi area covering the Tudun Kawari, low cost housing, government house area, NADP quarters and Sabon pegi extension which is at the Northeast of the railway and demarcated by railway and the old town wall. The sector emerged during the latter part of 1950s up to early 1960s. It is associated with land demand unmet within the old town, establishment of the railway and growth in the population of Lafia town. Modern buildings, mostly rooming type are constructed of cement blocks with zinc roofs, dominate this area of medium development and population densities. The net population density in the sector is about 180 persons per hectare. The area is distinct in having rectangular grid network of streets arising from the layout designs by local government and zonal technical staff. A tarred main street (Abuja street) linking Makurdi and Shendam roads forms major loop truncating the area.

The third sector is the Bukan sisi/Millionaire quarters/GRA/Tudun Gwandara which constitutes the newest areas in the north and northwest of the town as well as the outlying government housing areas. This sector houses most of the major government institutions with their staff. These are built of modern materials and design, and in spacious setting. Most streets in the sector are however, not tarred except the part of Kwandare road in the Alhamis area up to the State security service office opposite the solar water pump station.

The sector encloses old settlement like Bukan sisi, Ombi I and II. The sector therefore, has a generally new outlook. The net population density in the sector is about 150 persons per hectare.

Figure 1.4 Existing Structure of Lafia town



CHAPTER TWO

2.0 CONCEPTS OF URBAN WATER SUPPLY

The primary purpose of water supply is to provide a reliable supply of water in sufficient quantity and of adequate quality which is readily accessible to the consumers. However, it was difficult to define exactly what constitutes an appropriate level of service to achieve the purpose of water supply. Whilst the principal benefits are improvements to health and reduction in time spent collecting water, there has been a mistaken tendency to regard the high level of service which most developed western countries enjoy as an objective in its own right. The question of adequate quality drinking water supply has probably been one of the main issues in the struggle to achieve better living standard and economic development. That is why several efforts were made at different levels to contribute to understanding and achieving adequate supply and management of water in the country as well as other places.

Agbaeze (2003) says that “the supply of potable water in adequate quantity and quality is a vital factor in the determination of the good health, welfare and productivity of the population”. Helana (2005), defined public water supply as essential services for communities, part of the so called “services of general interest”, is being vital to general welfare, public health and the collective security of populations, as well as to economic activities and environmental preservation. Michael and etal (2001) cited in Nyam (1999), says that “urban water supply consists of those activities necessary to secure, treat, transport, store, and distribute water for various human uses”. Lundin (1999) cited in Ammani (1995) observed that urban water systems in the industrial world were primarily designed to protect the health and safety of citizens and in these respects they function.

It was also observed that a sustainable urban water system should over a long time perspective provide required services while protecting human health and environment, with a minimum use of scarce resources (ASCE, 1998 and MALMGVIST, 1999) cited in Yakubu (1995). Akintola and Areola (1980), noted the incidence of water scarcity in Ibadan city are attributed it to low capital investment by government to water corporation as well as poor distribution network. This situation created disproportionate and inadequate water supply in the town. Owolabi (2004) observed that historically in Lagos State and throughout Nigeria, the government or public sector was solely responsible for water supply provision to the populace. The strategy adopted was based on an almost total dependence on large scale water supply schemes which are very expensive to install and maintain. Hamidu (1988), in a study of Yola metropolis discovered spatial inequalities in domestic water supply, which he attributed to the distribution system, technical disabilities, lack of adequate financial commitment as well as skilled manpower as major management deficiencies.

While the researchers rightly attributed the problem of urban water shortage to lack of proper planning, management and inadequate budgetary allocation by government at all levels to water sector and corporations in the country. One peculiar omission from the above has been the failure to appraise and address squarely the important issue of partnership for good governance in water supply. That is, the participation of the private sector in the policies and programme of Water Agencies such as water quality control, water allocation process, pricing and cost recovery mechanism because water supply utilities owned and operated by the public sector were neither efficient in service delivery nor able to remain solvent financially; a position which forms part of this study.

2.1 CONCEPTS OF URBAN WATER SUPPLY MANAGEMENT

Water supply management is basically concerned with the control or direction of water supply and channelling resources towards the achievement of better and efficient water supply system. The direction will entail collaboration and coordination of water activities and use of resources to achieve adequate water supply. It represents the actual decision concerning policy or practice as to how water is allocated and under circumstances in which water may be developed. Ayoade 1988, defines water supply management as a process of decision making where by water supply is allocated over space and time according to the need, aspirations of man within the framework of his technological inventiveness, his political and social institutions and legal and administrative arrangements.

The management of water supply is made up of other process. These are water resource analysis, water development and planning. The water resource analyst seeks to understand the fundamental characteristics of the resources as well as the process through which the resources allocated and utilised (Mitchell, 1979). Water resources analysis is the appraisal of the resource process of finding out or deciding the amount or value of a resource for a particular purpose.

Water supply management and planning are closely related. There can be no proper management without planning. Water resource planning in turn depends on proper resource analysis. Thus analysis, planning and management of water resource are interrelated. Water resource management revolves around the estimation of water demand and the valuation of water and utilisation. This is the basic consideration in the management and planning of water resources.

2.2 IMPORTANCE OF URBAN WATER SUPPLY

The importance of water supply as one of the components of the city development process in day to day human activities cannot be overemphasized considering the numerous support activities which are dependent on the availability of water supply. Not only does water remain an indispensable element of life, water supply is a critical factor in public health and economic development in most parts of the world. Columbia Encyclopaedia, (2008), defined water supply as a process or activity by which water is provided for some use, e.g. to a home, factory, or business. Wikipedia, (2009), defined water supply as the process of self-provision or provision by third parties in the water industry commonly a public utility, or water resources of various qualities to different users.

Water is a multi-purpose liquid essential to commercial, industrial and domestic uses. It is require for human consumption, sanitation and production of energy, food and industrial goods while a variety of recreational activities are known to be water based (Ayoade, 1981). Access to water supply is therefore regarded as a fundamental need and a human right as well. It is essential for dignity and health of all people. It has been demonstrated variously, that there are substantial health and economic benefits of improved water supply for households and individuals (WHO/UNICEF, 2000). This makes improvements in water supply perhaps the single most important of all urban services provision. By extension, the health and economic benefits of water supply in the urban milieu and in the context of overall national development are arguably the most significant of all infrastructures.

2.3 INSTITUTIONAL FRAMEWORK FOR WATER RESOURCES AND URBAN WATER SUPPLY MANAGEMENT

The institutional framework for water resources and water supply management in Nigeria consists of a number of organizations at three tiers of Government. These include federal, State and Local Government organizations, concerned with different aspects of water supply and water resources management including rural water supply, urban water supply, irrigation schemes, etc.

The three levels of government in Nigeria share responsibility for the delivery of water supply and sanitation services.

2.3.1 Federal Government Level

The Federal Ministry of Water Resources (FMWR), initially created in 1976, is responsible for formulating and coordinating national water policies, management of water resources including allocation between states, and approving development projects. The River Basin Development Authorities (RBDA), now 12 in total, were also created in 1976 for planning and developing water resources, irrigation work and the collection of hydrological, hydro-geological and meteorological data. Their main involvement in potable water supply has been the provision of multi-purpose dams and the supply of water in bulk, some to urban water systems. The National Water Resources Institute (NWRI) was legally established in 1985 and is responsible to the FMWR for engineering research functions related to major water resources projects and training sector professionals and technicians. A Utilities Charges Commission was established in 1992 to monitor and regulate utility tariffs, including those of State Water Agencies; however it appears in practice to have not been functional.

2.3.2 State Government Level

Responsibility for potable water supply was traditionally entrusted to departments of the state governments (now 36 in number). As the importance of drinking water supply grew during

the 1970s, most water departments were gradually transformed into State Water Agencies (SWA) to provide urban, semi-urban and, in some cases, rural water supply. Each SWA has, in general, been established under an edict to develop and manage water supply facilities within its respective state and to meet sound financial objectives. The SWAs are responsible to their state governments, generally through a State Ministry of Water Resources (SMWR) though in some cases under alternative arrangements. In some states, responsibilities for rural water supply remain with or have been transferred back to a state government department; additionally, in several states (22 currently), state rural water and sanitation agencies have been set up largely to implement the FGN/UNICEF RWSS program.

2.3.3 Local Government Level

The Local Government Authorities (LGAs), of which there are 774, are responsible for the provision of rural water supplies and sanitation facilities in their areas although only a few have the resources and skills to address the problem. Only few LGAs have rural water supply divisions able to construct small water systems such as open wells and small impoundments of surface water. The Government of Nigeria has agreed to strengthen community participation in rural water developments, and the policy agreed in principle by the Government in 1993 reflects a priority on community ownership and management. The policy needs to be adopted, disseminated and implemented in all government or donor financed programs. Strengthening coordination between the three layers of government is also required.

2.4 FINANCING OF URBAN WATER SUPPLY INSTITUTIONS

2.4.1 State financing

State Governments has been one of the major financing institutions of the various State Water Agencies in Nigeria. The urban sector has experienced a steady decline in financing since the

heydays of the 1970s, which to a good extent explains the decline in performance as shown earlier. In most of the states, capital expenditure has steadily dwindled and with the lack of autonomy on the part of the Boards and other necessary management initiatives this entails, the Boards could only generate revenue that meets needs of daily operations.

Looking at annual budgetary expenditure by State governments across the country over the last thirty years, the trends reveal a steady decline in the share of capital allocation to water supply (Ayoade, 1981). The situation in the 1975 to 1980 period is noteworthy in a number of respects particularly as the period when the largest expenditure was made throughout the States and at the Federal level. This expenditure has been for the expansion of existing schemes and establishing of new ones.

2.4.2 Internally generating revenue by State Water Agencies (SWA)

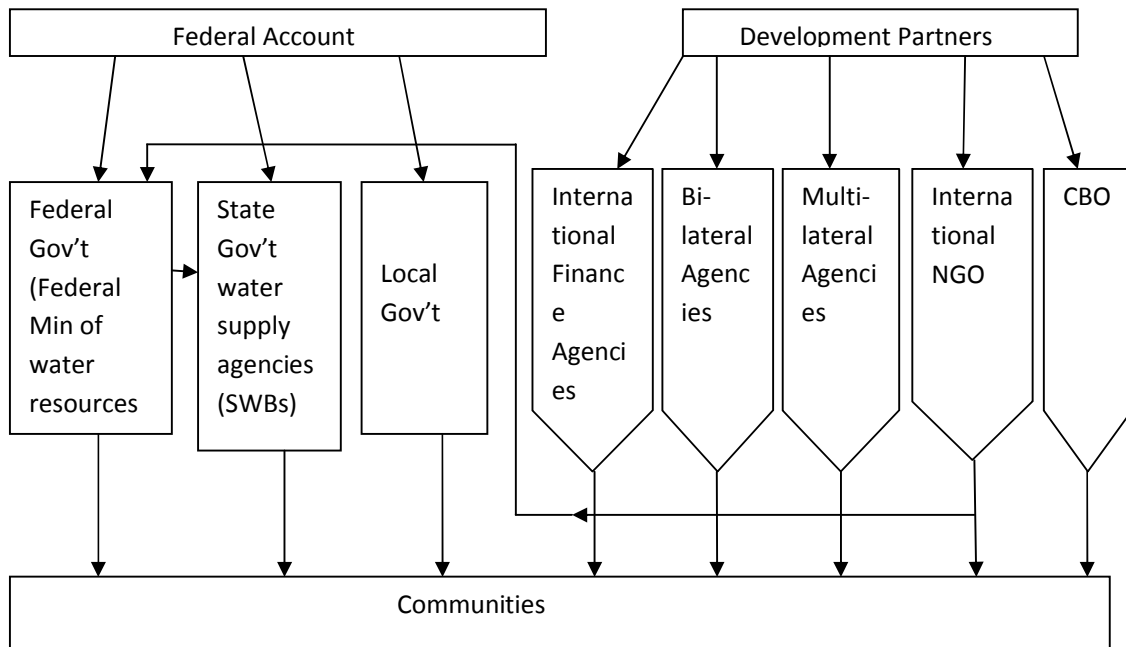
The State Water agencies also provide funds for the provision and maintenance of urban water supply in their respective State. The SWAs in Nigeria have a history of being established on the principle of some degree of cost recovery (Nigeria, 2000). However, in practical terms, most SWAs are yet to develop adequate full cost recovery system to enhance internal revenue generation on a sustained basis to offset all categories of cost. Therefore, a key aspect of financing in the urban water supply sector is the reliance on state financing, commercial loans and development assistance. The SWAs are in principle expected to generate enough revenue to enable them cover at least operation and maintenance costs (Nigeria, 2000).

2.4.3 Commercial loans and development assistance

Loans from internal and external sources play a significant role in the financing of urban water supply especially in recent years. Most of these have been secured by the SWAs through the Federal Government from the World Bank which is presently the main source, the Africa Development Bank, Africa Development Fund and several other sources from

Foreign Governments and financial institutions, notably the Department for International Development (DFID) of the UK.

Fig. 2.1 Water sector funding route



Source: World Bank, 2003, WaterAid (2006)

2.5 PROBLEMS OF WATER SUPPLY INSTITUTIONS

Inadequate water supply is a universal phenomenon among Nigerian urban centres; the situation is increasingly deteriorating and being compounded by rapid growth. This is despite the availability of vast surface and underground water resources. The growth of system for urban water supply has however been impressive at some stages especially during the oil boom years of the 1970 only for the momentum to be lost later.

The problems militating against effective performance among urban water institutions in Nigeria have been investigated in various studies. It will suffice to indicate that both the poor performance and the causes are common phenomenon and comparable with what has been reported in several developing countries. As reviewed in some literature, a variety of factors constrain urban water supply and these manifest in poor financial, Inadequate data on

operation and maintenance; Insufficient and inefficient use of funds; Poor management of water supply facilities; Inappropriate system design; Low profile of operation and maintenance; Inadequate policies, legal frameworks and overlapping responsibilities Political interference and technical standing of the agencies. The result is the near incapacitation of the SWAs. The factors include corruption and absence of clear institutional objectives. This has been widely cited as the bane of the situation in Nigeria (Falana, 1991; Yakubu, 1995; O&M Working Group, 2002) and in other developing countries (World Bank, 2004).

2.5.1 Obstacles to Sustainable Water Supply Management

1. Supply-side and demand-side
2. Financial
3. Governance

Table 2.1 Obstacles to water supply management

Supply-side and demand-side	Financial	Governance
<ul style="list-style-type: none"> • aging infrastructure • declining quantity and/or quality of water resources • increasing unpredictability of water resource availability (related to climate change) • restricted access to water sources stemming from environmental protection measures • growing per capita demand • growing population • consumer expectations for higher levels of service • increasingly stringent water quality standards • high percentage of ‘unaccounted for water’ (primarily leaks) 	<ul style="list-style-type: none"> • lack of funding for infrastructure renewals and replacement • past under-investment in infrastructure renewals and maintenance • water prices set below sustainable levels (do not support full lifecycle cost recovery) • lack of reliable funding sources • dependence upon ad hoc government funding 	<ul style="list-style-type: none"> • inefficient management • low transparency • poor accountability • absence of input mechanism for consumers into decision-making • lack of managerial autonomy of utility

Source: Bakker, 2004.

2.6 STRATEGIES FOR WATER SUPPLY MANAGEMENT

The management of water is usually based on three strategies or approaches. These are the public, the private sector and the partnership management strategies.

2.6.1 Public sector management

These are government parastatals set up mainly to provide essential utilities and services. They include government at all National, Regional and State levels. They exist in many parts of the world as social welfare institution that provide utilities and services to the population at subsidized rates.

In Britain and United States for example even though the private sector pioneer the supply of utilities, like water, the public sector became actively involved so as to increase quantities, control operations and a safe guard public interest as well as ensure equity in distribution to the populace.

2.6.2 Private sector management

Private sector is profit-oriented companies that operate on the free market mechanism to make optimum profit. They are made up of Non-Government Organization (NGOs), Community Based Organization (CBOs) and individual agencies. In many parts of the developed countries, private companies are engaged in the supply of water, electricity, etc, on user charges basis. In 1971, Manhattan Water Company was incorporated by Aaron Burr and Alexander Hamilton to supply New York City with piped water and in 1975 Aqueduct co-operation supplied water to Boston city. (Harir 1992).

2.6.3 Partnership management Strategy

Another strategy that has been gaining popularity both in the developed and developing countries are the partnership strategy. This is a process by which people as consumers of utilities and services, and as citizens, influence the flow and quality of such utilities and services available to them. The approach as a management strategy contains a number of general principles that are designed to overcome the limitations of the existing urban administration and management system in the provision of urban water supply services.

2.7 REQUIREMENTS FOR PARTNERSHIP

This covers the legislative, administrative or political support to enable it as part of the process. According to the DFID (1998), it is rare to find or an agency with the systems, structure, skills or staff to enable partnerships. There is also a great deal of scepticism about the value of partnership, particularly with regards to NGOs which are regarded with suspicion. There is also lack of capacity and vision within such Agencies to sustain partnerships.

The following requirements are therefore necessary for partnerships;

- Supportive legislative and administrative context to enable and facilitate partnerships.
- Coordination and (visionary) leadership
- Capacity building in institutions involved in the process and development of local expertise.
- The present of strong and vibrant civil society organizations.

2.8 MODELS OF PRIVATE SECTOR PARTICIPATION

There are several models of private sector involvement in water supply and sanitation utilities, with numerous variations, depending on the legal and regulatory frameworks, the nature of the company and the type of contract. The typical forms of private sector are briefly described below, ordered in terms of the extent of private sector responsibility. The models include various types of service and management contract, lease contracts, concessions and complete divestiture, as summarized in table 2.2

Table 2.2 Illustrates the different PPP options for water.

PPP Option	Service contract	Management contract	Lease contract	Concession contract	BOT contract	Divestiture
Financing investment	Public sector	Public sector	Public sector	Private sector	Private sector	Private sector
Financing working capital	Public sector	Public sector	Private sector	Private sector	Private sector	Private sector
Contractual relating with retail customers	Public sector	Public sector (on behalf of the public sector)	Private sector	Private sector	Private sector	Private sector
Private sector Responsibility and Autonomous	Low	Low	Low to Medium	High	Medium to High	High
Demand for private capitals	Low	Low	Low	High	High	High
Financial risk for private sector	Low	Low	Low to Medium	High	High	High
Duration of contract/ licence (years)	1-2	3-5	5-10	20-30	20-30	License may in perpetuity with provision to withdraw or revoke
Ownership	Public sector	Public sector	Public sector	Public or private sector	Public then private	Private sector
Management	Mail public sector	Private sector	Private sector	Private sector	Private sector	Private sector
Setting Tariffs	Public sector	Public sector	Contract and Regulator	Contract and Regulator	Public sector	Regulator
Collecting tariffs	Public sector	Public sector	Private sector	Private sector	Public sector	Private sector
Main objectives of Private sector participation	Improve operating efficiency	Improve operating and technical efficiency	Improve operating and technical efficiency	Mobilize private capital and expertise	Mobilize private capital and/or expertise	Mobilize private capital and expertise

Source: World Bank, 2003 Private participation in infrastructure: Trends in Developing countries in 1990 to 2001.

2.8.1 Service contracts: They are usually short term agreements whereby a private contractor takes responsibility for a specific (mostly operational) tasks, such as installing meters, repairing pipes or collecting bills for a fixed or per unit fee on behalf of the public sector based institution that is providing the service.

2.8.2 Management contract: Under this model, the government transfers certain operation and maintenance responsibility for investment and expansion. The public sector based partner owns all the assets and take responsibility for risks and the private organizations takes over responsibility for managing a service to specified standards by using staff, equipment, etc, of the public authority. Payment is either fixed or performance related.

2.8.3 Lease and affermage contract: the contracts are similar to management contracts, but the private operator takes responsibility for all operation and maintenance functions, including billing and revenue collection. In both cases, the operator collects the tariff revenue but, under an affermage, the contractor is paid an agreed-upon affermage fee for each unit of water produced and distributed; whereas under a lease, the operator pays a lease fee to the public sector and retains the remainder. In this, one partner making use of equipment/assets without purchasing but paying a lease to the other partner.

2.8.4 Concession contracts: under concession contracts, the private contractor manages the entire utility and is required to takes over responsibility for operating a service and collecting charges, and possibly funding new investment in fixed assets, maintenance and expansion of the system at its own commercial risks. Concessions have longer terms to allow the operator to recoup its investment and, at the end of the contract, the assets either are transferred back to the state or a further concession is granted. The role of government is predominantly regulatory. A variant of this is what has been described as Build-Own-Transfer (BOT) type contracts. It is similar to concession contracts, with the difference that the private contractor

is responsible for constructing the infrastructure from scratch but the asset/service will be transferred to the public sector after a period of time. Another one is the Build-Own-Operate (BOO) type of contracts. It is a partnership between public and private sectors whereby the private firm is authorized to build own and operate the asset/ service, is the same as (BOT) but the private sector does not transfer the ownership.

2.8.5 Divestiture contracts: Under the divestiture model, the government transfers the water business, including the infrastructure, to the private company on a permanent basis through the sale of some or all of the shares in the company. This model has only been adopted in a small number of cases, such as England and Wales (full divestiture) and Chile (partial divestiture). In England, the privatized water companies are run under strict commercial rules with tight regulation. Another one similar to Divestiture is privatization where the public enterprise/asset is sold to a private partner.

In addition to the above models, further options of private sector participation include joint ventures and cooperatives. A joint venture is an arrangement whereby a private company forms a company with the public sector, with the participation of private investors, which then takes a contract for utility management. Cooperatives are set up as limited companies, and domestic customers are members who elect the administrative board, although these are more common in villages and towns.

2.9 ADVANTAGES OF LEASE CONTRACTS AND CONCESSION

In the partnership arrangements, concession may be preferable to lease contracts because there are some obvious advantages to assigning responsibility for investments to a commercial entity that is also responsible for operations. The operator is well placed to

forecast demand and make investment decisions that will satisfy demand in a commercially viable fashion. Inappropriate investments often result when decisions are made in isolation from commercial considerations. In addition, the owner of physical assets has a stronger incentive to maintain them than does a lessee. However, concession arrangements are not always feasible. If the cost of an investment exceeds the borrowing capacity of the private sector, or if the political and economic situation makes the private sector reluctant to invest, the public sector might have to assume responsibility for planning and investment. In such cases, a lease contract is the appropriate commercial arrangement, but mechanisms should be incorporated into the lease contract to ensure that adequate maintenance will be carried out. Once most of the costly investments have been completed, or the political and economic situation has improved, it may be possible to convert a lease contract into a concession under which the company makes limited future investments and pays a rental fee on completed investments

Lease contracts allow for the involvement of professional private companies in the technical and commercial operations of public services. These have a built-in incentive to improve efficiency, but without the burden of capital expenditures. Such arrangements are widely used in France for water supply, sanitation, and solid waste management services and they have been used for the delivery of various public services in West Africa.

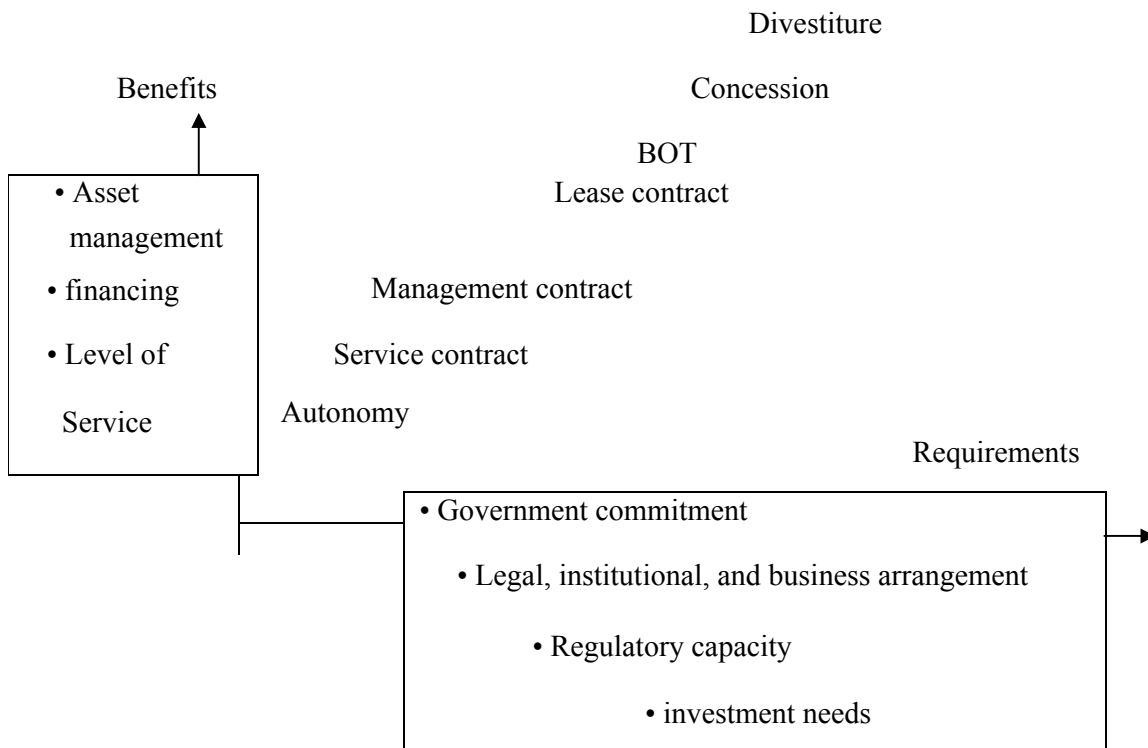
2.10 APPROACHES TO SELECTION OF PRIVATE SECTOR PARTICIPATION OPTIONS

There is *no standard approach*; each country has to develop its own. Learning from other country experiences needs a good understanding of commonalities (e.g., lack of resource for investment, lack of regulatory tradition and capacity) and differences (e.g., legal systems).

2.10.1 Incremental Approach to PSP in Nigeria

A key aspect of the proposed Strategy is to avoid the cookie cutter approach to PSP. The one-size-fits-all notion which prescribes leases, BOTs, concessions and/or divestiture universally is based on a lack of information, analysis, and understanding of the essentially incremental nature of institutional change to achieve greater commercialization. Rather, the approach here is to develop in consultation with selected SWAs and the federal government, a method for selection of PSP options which reflects specific key determinants affecting PSP outcomes.

Fig.2.2 Range of reform options



The key benefits sought from PSP are operational and management improvements leading to increased levels of service, increased viability of the whole water operation and an

appropriate level of financing. Figure 1 above illustrates the range and nature of potential PSP options. As more risk and responsibility are taken by the private sector, and it takes on a greater proportion of financing, so the types of available PSP options will change (moving upwards, and to the right on the diagram). The extent of the PSP requirement depends on the specific needs of the particular SWA. The needs fall into two broad categories: (i) need for Investment e.g. infrastructure condition, rehabilitation/expansion, operational improvements, equipment/training/staffing, etc; and (ii) need for management and operational improvements e.g. management and institutional change, financial and commercial management, asset management, and O&M. The exact choice of both PSP option and level of investor support will depend on the needs of the SWA, its current stage of development, and the level of support available for reform.

2.10.2 Implementing the Incremental Approach

Table 2.3 (sample grid attached below) provides a matrix of reform options for SWAs classified by reform-mindedness of water entities thus far. This table is merely illustrative and not based on micro data. It provides an at-a-glance rough picture of the gradual nature of PSP oriented reform as applied to ground zero, or where SWAs are today. This exercise will provide SWAs appropriate guidance to self-select their reform option, as well as providing a longer term vision for increasing PSP. The usefulness of this matrix is twofold: first, it orients the SWA to anticipate needs of the private sector/operators in bidding for participation; and second, it assists the SWA to self-select the most appropriate PSP option.

Table 2.3 Matrix of PSP Oriented Reform Options

Entity	Basic Management Reforms	SWA Autonomy from State Govt.	Service Contract	Management Contract	Lease	Concession	BOT/BOO
Level I States (very reform minded, initiated cost recovery, prepared for increase in tariffs, high billing and collection ratio)				√	√	√	√
Level II States (expressed interest in reform, undertaken studies, minor management reforms initiated, no fiscal reforms undertaken)			√	√	√		
Level III States (little interest and initiatives, moderate to poor performance record)	√	√	√			(√) ¹⁵	

Source: Federal Ministry of Water Resources, 2009

2.10.3 Method for SWA Performance Evaluation

The best available performance indicators for the SWAs are shown here, the states should use these figures for their own benchmarking exercise to gain a reasonable indication of how well they are performing. In considering the sort of reform that might be appropriate, a lesser group of indicators such as in the table below would be appropriate (one significant broad indicator in each of the political, institutional, technical and financial areas). Use of the points system of the table to classify states could provide a first indication of possible reform option that might be supported by major financiers of the sector. It is proposed that this system of scoring remain flexible rather than remaining static, and that it evolve as experience is gained and the most progressive states graduate.

Table 2.4 Performance evaluation of SWAs

Political will to reform		Availability of current Audit Report		Level of water accounted -for		Annual revenue collected from consumers	
Level	Points		Points	Level	Points	Level	Points
Strong	20	Yes	10	> 50%	0	< 50% of O & M costs	0
Medium	10	No	0	35-50%	2	> 50% of O & M costs	2
Weak	0			20-35%	5	> 100% of O & M costs	5
				20%	10	> 100% of O & M and Depreciation	10

Source: Federal Ministry of Water Resources, 2001

Total Points Scores Possible highest level of support to be considered by financiers

45 or more (Level III) - Immediate investment project

32 or more (Level III) - Preparation of lease + lifeline investment during preparation, with investment after lease signed.

24 or more (Level II) - Preparation of management contract, with possible investment after contract signed

20 or more (Level I) - Technical assistance through the federal Ministry of Water Resources

Note: For states having less than about 500,000 urban populations, other considerations may apply.

1. Among the available forms of PSP, management contracts and leasing are likely to be most applicable to the current Nigerian context. Phase one will be limited to commercialization through service and/or management contract/s. If successful, this may be a precursor to the next leasing contract phase. Institutional reforms that would occur during the first phase, as

well as improvements in technical and financial performance resulting from the management contract, would pave way for the lease contract. Some SWAs (up to 10) would be ready to enter immediately into the second phase, while many will need to begin with phase one.

2. In service and performance based management contracts, the contractor assumes responsibility for overall operation and maintenance of the systems or a major component such as a treatment plant, with the freedom to make day-to-day management decisions that affect the short-term results. It is possible to create incentives to improve productivity and reduce unaccounted for water by basing the contractor's pay partly on its measurable performance, such as volume of water sold, reductions in UFW or collection rates. Because such contracts do not require large investments on the part of the contractor and because they are primarily an interim solution, it is advisable to limit their duration to five years. Management contracts involve limited risk for the private firm. For this reason, they could play a useful role in Nigeria as an interim arrangement. In cases where there is the need for substantial rehabilitation, and it is difficult to arrange a leasing contract, a management contract could put the SWA on the path of commercial efficiency, while allowing the private firm to test the waters on a low-risk basis before committing to the more comprehensive lease contract arrangements.

3. Under leasing, contracting out operational functions would liberate SWAs from the day to day management of operations and maintenance and make it possible for them to concentrate on policy-making, regulation (through contracts), investment planning and investment itself. Unlike a management contract the lease arrangement requires the private operator to assume commercial risks. The private operator must finance working capital and replacement of certain components, such as connections, pipes below a certain size, small pumps etc. The state government, owner of the assets, retains responsibility for investments and debt service. In return for assuming more of the risks the private operator has more autonomy than a

management contractor, particularly control over working capital and all aspects of personnel management. A successfully implemented lease contract would establish a foundation for eventual private investment in water supply assets under a concession contract. States where the financial performance is improving, and rehabilitation is well under way, should be able to arrange a lease contract without an interim management contract.

4. BOO/T arrangements may be appropriate for some major investments, such as water production. However, interface between the BOO/T and the rest of the system needs to be properly defined. Large new production facilities cannot be recommended until distribution systems are in good order and well managed. Various forms of risk guarantee would be needed to help minimize costs to consumers under BOO/T arrangements. On the other hand, a full concession could be an appropriate model in few specific circumstances, where there is little existing water supply infrastructure (some strong level A states which are growing rapidly, or perhaps some very weak Level I states, where the government has no capacity at all and no option but to give complete responsibility to the private sector, as is already happening in many areas on a small scale). Risks are likely to be assessed by the private sector as being high, with a resulting impact on tariffs in such cases. As with a BOO/T, guarantees could reduce such perception of risk.

2.10 CASE STUDIES

Water privatization has a relatively long history in Africa beginning with Cote d'Ivoire, which entered into a lease with SODECI, a subsidiary of SAUR in 1960. But water privatization is still in its infancy in Nigeria. The lessons and models illustrated by the country cases are briefly summarized below:

2.11.1 Nasarawa State, Nigeria: Service contract Model

The Nasarawa State Water Board (NSWB) has engaged the services of consultants to draw up a formula that would ease the charging and collection of bills from its customers and meters instalment. The services of consultants were employed, they include; Dele Otuntoju & Co in Keffi and Kunle Ladejobi & Co. In Akwanga which began operations on November, 1st 2004

The action had become necessary because it needed efficient hands in the collection of bills from its numerous customers in these areas and the water rate was increased as the minimum rate was no more N240 but N400. This increase had become necessary because of the cost of providing good water had become very capital intensive even though they get subvention from the state government. The model was tried but failed to yield the desired objective. This was abandoned because it was not successful.

2.11.2 Cross River, Nigeria: ORTECH - Management Model

The Cross River State Government (CRSG) signed a tri-partite Public Private Partnership (PPP) management contract with ORTECH and the Cross River State Water Board Ltd (CRSWBL) and with the State Government as Guarantor. The PPP became effective in February 2004 after the contractor had completed a number of pre-defined pro-effectiveness tasks. The main aim was to substantially improve on the operational efficiency and revenue collection levels and to provide an economic and reliable consumer service.

The PPP agreement is a fixed-price management contract with investment and pre-financing obligations on the private sector partner. The contract governs the relationships within the partnership; and the contract imposes very specific obligations on ORTECH including. For example, the Working Capital expenses including own personnel, and management of all

CRSWBL personnel and assets assigned in the Partnership.

Operation

The initial constraint was that the existing circulation network was too weak to withstand the pressure of water from the new plants resulting in numerous and unmanageable leakages. The old densification system was shut. In the circumstances, the PPP had to start from a zero base in terms of the numbers of service connections. Since then, service connections have steadily increased from zero to about 10,000 within the four years of PPP operation in the three locations of the State. The operation constraint is neither technical nor managerial but the huge cash involvement. The PPP service delivery is very reliable. Water supply in the three locations in the State is 24 hours every day of the year since production is powered by electric generators using NEP A as standby source. There is general satisfaction from customers in these areas as a result of the high quality of service delivery.

Summary of Achievements in the Partnership

- Customer Service Standards and responsiveness to customers' needs have been improved significantly
 - All customers are metered and in many cases with pre-payment meters.
 - Major consumers of water are identified and registered and supply of water is monitored with bulk metres.
 - Water kiosks have been leased and franchised thus leading to creation of employment opportunities. Current revenues from water kiosks serving mainly low income groups stand at approx. NGN 1.5 million per month.
 - Some services are being outsourced leading to the creation of employment opportunities and development of small businesses.
 - Preventive Maintenance Programmes have been implemented in all areas of the Plant. And the same time prompt repairs are carried out to the distribution network leading to control of

water wastage.

- Water Production is being controlled to minimise production losses, water wastage, and Chemical wastage.

- Water quality is ensured by consistently exceeding the WHO (World Health Organization) standards. Efficient use of treatment chemicals which produces public health programmes in the State.

2.11.3 Guinea: SEEG-ONEG - Lease Model

The interest of the Guinea case is that PSP for WSS services was launched in a very difficult environment and from a situation of dismal operational performance, insolvency and weak capacity. All factors that rendered reform urgent and precluded the option of normal preparation process with basic institutional steps and tariff adjustments introduced before PSP.

Consequences of privatisation

- In Guinea, major gains in service availability and quality were achieved during the first five years of the lease contract. In part these gains accrued from substantial investment in new water supply, which increased production capacity from 7.5 million to 28.7 million cubic metres per year between 1988 and 1994.

- Share of the population with access to safe water increased from 40% in 1989 to 52% in 1994. Water connections increased from 16,500 in 1989 to 33,500 in 1995. Metering has increased from 5% to nearly 95% of all connections

However not all was perfect with the arrangement

- Rates have increased from \$0.24 to \$0.90 per cubic metre between 1989 and 1995
- SONEG has had difficulty in providing the capital needed for investment, effectively carrying out its regulatory functions, and monitoring compliance of the private contractor,

EEG with contract obligations. In response to a substantial tariff increase, commercial losses have risen because of rising non-performing accounts of consumers. This has led to the erosion of SONEG's financial capacity

- The practice of sharing of risks between the government agency and the private company has created a situation in which no clear commercial incentives are brought to bear on the private management company in its operation and maintenance roles

The outcomes of the Guinea reform have been positive with improvements in service quality, doubling of average consumption, substantial extension in Conakry and 25 other towns and financial stability. However, operational efficiency and billings are still low and tariffs are relatively high considering the low cost of the resource.

While the institutional framework was clear and roles and responsibilities well defined, the relationship between the operator and state organizations did not evolve into a partnership with sufficient trust and mutual interests.

Unreliable reporting, monitoring and alleged high cost of technical assistance are factors that led the government to let the lease expire and to seek to re-launch PSP on new foundations.

2.11.4 Lagos State, Nigeria: Concession Model ongoing

Concession arrangement for private provision of water for wealthy communities in Victoria Island and Lekki Peninsula was entered since 2002. Another arrangement, yet to be fully articulated, will involve cross subsidy in the private provision of water for the low income and poor communities in the Mainland areas. The arrangement with the International Finance Corporation (IFC), which initially spearheaded the implementation of the scheme through, and the World Bank has now taken over since 2002. The major focus had been on the institutional and financial reform of the sector, comprising efficiency, restructuring, cost recovery, enhanced revenue generation and elimination of corruption.

The objectives of the PSP were listed as:

- (a) Bringing technical and management expertise and new technology into the water sector;
- (b) Improving economic efficiency in the sector both in operating performance and the use of capital investment by adopting commercial principles and practices;
- (c) Injecting large-scale investment capital into the sector or gain access to private capital markets to free government funds for other projects; and
- (d) Making the water sector more responsive to customers' needs and preferences.

Two investors will operate side by side; the two new companies which shall subsume the functions of the LSWC. The first company would produce, transmit, and distribute water and collect revenue in the mainland, Lagos West; while the second, would produce, transmit and distribute water and collect revenue in Lagos East, made up of Lekki, Lagos Island, Victoria Island, Ikoyi and Epe. With this proposal there would only be limited but with comparative competition. Following what was in the plan, the Lagos East contract was supposed to be a full scale concession of 25 years, while the West zone would have a short concession contract or a hybrid contract of only 7 to 10 years. Hence the operator would then assume commercial and limited risks.

2.11.5 Cote d'Ivoire: SODECI - Concession Model

The initial contract awarded to SODECI in 1960 for water supply services to the city of Abidjan, was gradually expanded in a context of some degree of "for-the-market" competition with the electric power utility. In 1973, SODECI was given the responsibility for all urban centres under a 12-year affermage contract. In 1987, SODECI's contract was renegotiated leading to a 20-year concession covering Abidjan and all urban centres.

Cote d'Ivoire's WSS sector weathered a serious financial crisis in the mid-1980s. While SODECI maintained its good operational performance, the sector, as a whole, veered into

bankruptcy due to the combination of ill advised investment by the State and the lack of a consolidated sector balance sheet. Eventually, the sector debt was restructured and clear financing mechanisms were established, giving more say to SODECI over sector investments. SODECI withdrew from rural water supply services. The new concession contract was awarded to SODECI through direct negotiations and included a 20 percent reduction of tariff.

Forty-nine percent of SODECI's capital is held locally. SODECI has regularly floated bonds on the local market. Through its partnership with SAUR, SODECI has provided technical assistance services and has participated in PSP ventures in several countries (Guinea, Senegal, Mali, Togo, and Benin). Since 1999, SODECI has been given an affermage contract for sewerage in Abidjan. The tariff and financing mechanisms are based on the model evolved for water supply services.

SODECI has benefited from stable and inspired leadership and has evolved as a coherent management model based on African values with emphasis on training, teamwork and empowerment. It has achieved performance levels, which are at par with the best WSS utilities worldwide. Over the past ten years, it has succeeded in expanding its services in a difficult and uncertain economic and political' environment.

SODECI's current water supply concession includes the following features:

- The State keeps ownership of assets and is represented by the Water Directorate (DH) assisted by the BNETD, a high-powered advisory body.
- SODECI is responsible for: (i) proposing capex for extension and renewal; and (ii) executing investment entrusted to it by DH.
- Tariffs are based on full-cost recovery and self-financing of the water supply sector. Set shares of the tariff are allocated to: (i) the National Water Funds used by the Ministry of Economy to cover debt service; and (ii) the Development Fund held and used by SODECI to

fund extension, renewal and the social connection program under supervision of the Water Directorate. The single tariff applicable throughout the country provides for a measure of cross-subsidy from Abidjan (which has access to relatively cheap and abundant water resource) to other urban centres and small towns.

- Tariffs are negotiated periodically (or as needed devaluation of CFAF in 1994) through a well-set process on the basis of detailed review of costs supported by an analytical accounting system mandated in the concession contract.

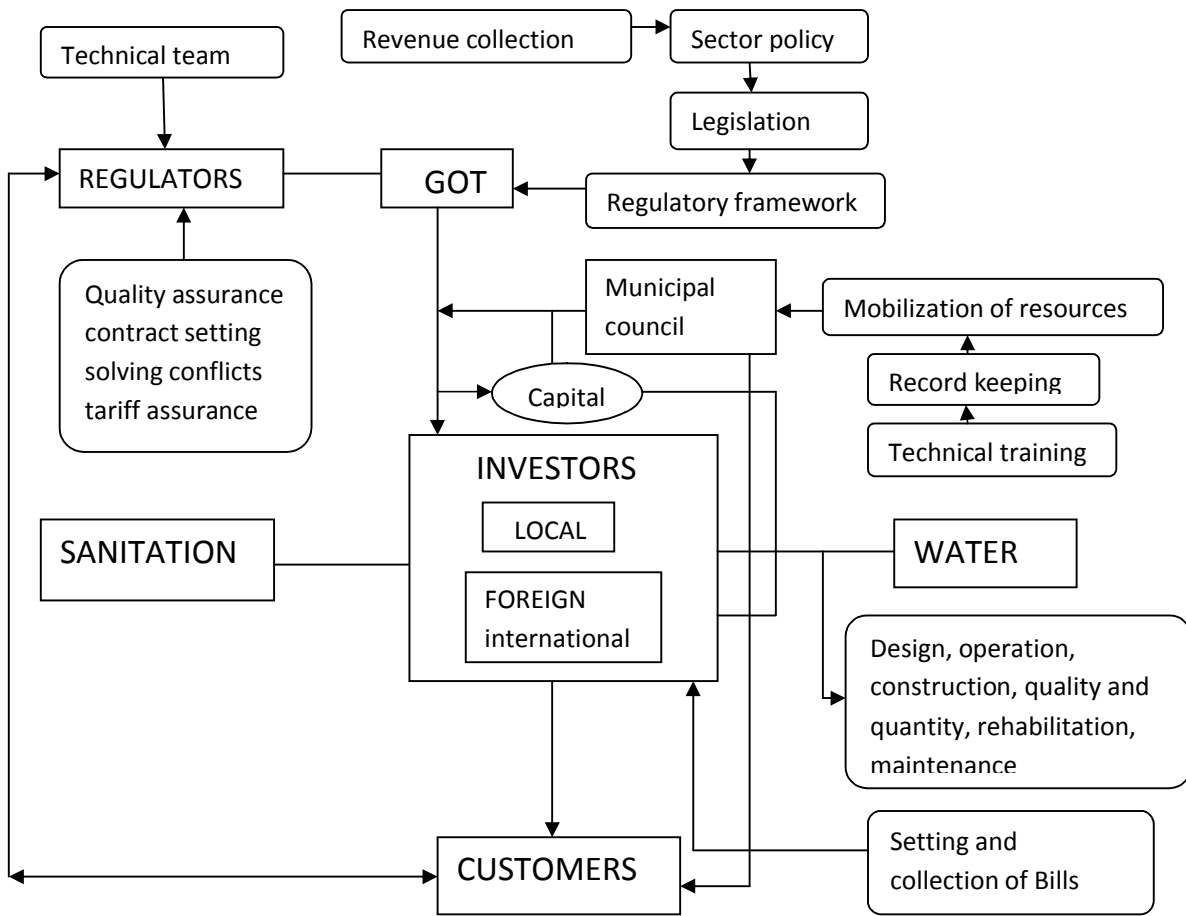
The SODECI model has played a pioneering role in the acceptance of PSP for WSS in Africa and has received numerous missions and study tours. It holds lessons for all aspects of PSP reform, and in particular for implementation, renegotiation, and service to the poor and broadening to sanitation.

The challenge for SODECI and for Cote d'Ivoire is to formulate a long-term strategy for WSS services, focused in particular on: (i) enhanced competition and decentralization (e.g., franchising, second operator); and (ii) services to informal settlements not amenable to social connection programs.

2.12 OPERATIONAL MODEL FOR PARTNERSHIP IN THE PROVISION OF WATER AND SANITATION SERVICES IN TANZANIA

The key issues in water supply and sanitation services are improvement of water supply demands and quality, establishment of proper sanitation services and improvement of sanitation services in the urban areas. Since, Tanzania now is urban areas are composed of heterogeneous settlements, ranging from slum areas to well planned areas. The reform from public ownership of services to partnership with private sector requires a clear model for operation and measurement of achievements to both types of urban settlements.

Figure 2.3 Operational models for Public-Private Partnership in the provision of water and sanitation services in urban areas.



Source: Mashauri and Kayombo, 2000

The proposed model include Government, customers (consumers), investors (local and international), sanitation and water as the system variable while technology, quality to be achieved, quantity, capital, revenue and tariffs as forcing functions to the achievement of the goal set. The model is based on the operational problems on water supply and sanitation services in urban areas in Tanzania. Figure 2.1 shows the operational model for public-private partnership (PPP). The state variables are in boxes and the forcing functions are in circles. The model represents a fairly structured and ordered manner the important interdependencies

and interactions among the various forcing functions and state variables. The expected main question will be will the tariffs be affordable by the communities. On the other hand the investors demand that the tariff cover their investment, operational and maintenance cost.

The relationship between the Government and the customers will be based on the role of the regulators appointed by the government for the purpose of ensuring good quality of services, contract setting, and other forcing functions shown in the figure above. The direct role of the Government will be to set sector policy, legislation, and regulatory frameworks so as to create conducive environment for the private sector to invest on water and sanitation services in urban areas. The Government, municipal councils or local and foreign investors will act as a source of capital for rehabilitation or construction of the new systems. Investors may do so in water supply or sanitation or all together. Some of the urban areas might not attract investors hence the local government will have to mobilise resources as local investors. In this situation the revenue collection will remain an activity at the local government but tariff setting will be done by the service provider and will be reviewed for its acceptance by the regulators.

Technical service team will comprise of town planner, sanitary engineer, electrical engineer, Civil engineer, and a laboratory technician. This team will be responsible for ascertaining of quality of services together with the regulators. Hence a technical team will be responsible to advice the regulators as well as the investors. The model has two levels of operation, the Government and investors. If appropriately operated then no contradictions or overlapping of activities will occur. On the other hand the quality assurance will be the key issue on service provision. High quality services to the customers will accelerate timely payment for the services rendered. The model may be expanded to cover each state variable and forcing function in more details. Example a forcing function for good performance on water supplies is indicated as collection of tariffs by the investors. Tariff collection is also a function of the income to the community, the rate set, and also the efficiency on service rendered. Behaviour

of the community also may influence the way tariffs will be administered (billing and collection). The good performance of such social related model will depend on human performance. The forcing functions to human performance are skill and knowledge, attitude and ability, incentive, working conditions, tools and equipments, supervision, standard procedures, feedback, opportunity to perform and motivation.

CHAPTER THREE

METHODOLOGY OF RESEARCH

3.0 INTRODUCTION

This chapter covers the methods of conducting research in the study, that is, data required, and data collections, sampling procedure or techniques used for the household survey and data analysis and presentation.

3.1 TYPES OF DATA REQUIRED

The main issues under consideration in this research and for which data are required for interpretation and synthesis concern the appraisal of the management of urban water supply system in Lafia Town. The data to be required shall include:

3.1.1 Population and household characteristics

- i. Population figure
- ii. Household connection survey
- iii. Socio- economic survey
- iv. Institutional survey

Table 3.1 Structure of data sets

Structure of data required for water supply partnership	
Research data	indicators
1. Institutional survey	Existing management framework Institutional structure Amounts of revenue generated Collection efficiency Level of cost recovery
2. Technical survey	Existing networks/infrastructure Production and service coverage Distance from existing network Modalities and access to public water supply Spatial framework of distributions Total and per capita provision of water Hours per day/day per month of service
3. social survey	Social characteristics
4. Economic survey	Affordability of water services Households income Ability to pay Willingness to pay
5. Policy environment	NSWB Edict National and local policies

3.1.2 Stakeholders partnership's survey

The stakeholders are planners, environmentalist, other professionals and CSO in:

1. **Public sectors:** - These have included Government ministries, Parastatals and Agencies that are responsible for the direct and indirect provision of water supply in Lafia.
2. **Private sectors:** - These have included the private sector enterprises and donor Agencies, as well as Civil Society Organisations (NGOs and CBOs).

3.2 METHODS OF DATA COLLECTION

The data from primary sources have been obtained using the following methods:

3.2.1 Reconnaissance survey: - This has been carried out to determine the extent of the town and to delineate the various clusters, first and second stage cluster for easy administration of questionnaires. The town streets and roads have been used to identify the neighbourhoods as the cluster units for the survey.

3.2.2 Questionnaire surveys: - The surveys were used to address households as users of the service with respect to access to the existing conditions of public water supply system. Four sets of questionnaires were administered in the study area. Questionnaire 'A' was administered to the management staff of State Water Board. Questionnaire 'B' was an opinion survey of households connected to water supply which was used to obtain general information on water supply condition. Questionnaire 'C' was an opinion survey of households and areas unconnected to water supply and questionnaire D was administered to potential partners.

3.2.3 Informal interviews: - These have been conducted with officials of the Nasarawa State Water Board, Local Government, Lower Benue River Development Authority, Federal Ministry of Water Resources, and non government agencies and CBOs. Information was also obtained from Ministry of commerce, industries and cooperative society, NAFDAC office and National Population Commission.

3.2.4 Secondary data sources: these were explored using books, research reports, officials and unofficial records and documents - These documents were from the Nasarawa State Water Board, Ministry of Lands, Surveys and Town Planning, Nasarawa Urban Development Board, Lower Benue River Development Authority, Government parastatals and Greater Lafia master plan, etc.

3.2.5 Review of Maps: - Some relevant maps were analysed like the Lafia water network coverage map from Water Board as well as archival maps and photographs relating to water supply in Lafia were taken.

3.3 QUESTIONNAIRES OF HOUSEHOLD WATER SUPPLY

A household is defined as independent family unit comprised of married or single persons and their dependants, excluding extended family units. Lafia, as any other cities in Nigeria, residences commonly consist of multiplicity of households sharing a compound. Since the focus is on residential units, only one household head have been interviewed in each compound.

Two questionnaires have been administered to household head in accordance with the connection status of their compounds to the water supply system to solicit the information required. The questionnaires have asked questions on household and socio-economic characteristics, water supply condition and expenditure and suggestions.

Table 3.3 Structure of the Household survey

subject	<u>Questionnaire 1</u> (Households connected to public water supply system)	<u>Questionnaire 2</u> (Households not connected to public water supply system)
Household and socio-economic characteristics	Age, sex, marital status, education, family size occupation and income.	Age, sex, marital status, education, family size occupation and income.
Water supply conditions and expenditure	Connection type, supply characteristics, bills payment, water usage, monthly expenditure.	Reasons for not being connected, water usage, amount spent daily on water, maximum amount to connect
Opinion and suggestions	Present water supply situation, suggestion for improvement	present water supply situation, suggestion for improvement

3.4 SAMPLING FRAME AND SIZE

Lafia urban population is 263,998 with an average 13 persons per household's size which represent 20,308 total households in the urban area.

A sample size of 2.5% was taken given a total of about 500 households were drawn across Lafia urban area and two sets of questionnaires were administered, one is households connected to water supply network and the other households not connected..

3.5 SAMPLING METHOD

Appropriate sampling method, that is, stratified three-stage cluster sampling technique has been employed to collect data from the study area. In the three-stage cluster sampling that was adopted, each of the three Water Board area offices comprises of Lafia North, Lafia East and Lafia West as the first stage cluster, the second stage cluster was that the Water Board area offices were divided into sets of four clusters of neighbourhoods, giving rise to a total of 12 sampling areas from which street blocks as the third stage cluster were identified. This was involved in selecting one block each from the neighbourhoods on the basis of centrality. After selecting the block, 20 compounds, reflecting the coverage number of compounds in street block, were selected from each of these using systematic random sampling; one household head was interviewed.

The selection of a uniform number of compounds is to provide a manageable number of samples and satisfy the requirement of a uniform spread throughout the Lafia town with an estimated total household of 240 for the whole urban areas where the household is piped. That is, in each of the 12 sampling areas 20 compounds were selected and administered with questionnaires. A total of two hundred and forty ($12 \times 20 = 240$) questionnaires were used and

additional one hundred and twenty ($12 \times 10 = 120$) questionnaires were used for un-piped households. Another one hundred and forty ($7 \times 20 = 140$) questionnaires were administered to urban areas not connected to water supply. The total questionnaires that were administered in Lafia urban area was 500.

About fifty (20) questionnaires were also designed and administered to water supply's stakeholders to know their opinions about water supply PSP partnership in study area.

3.5.1 STRUCTURE OF SAMPLIN DESIGN

Table 3.3 Structure of the sampling design

Urban area	Water Board area offices (First stage clusters)	Neighbourhoods (Second stage clusters)	Street Blocks (third stage clusters)
Lafia	Lafia North area	1. Ungwan mangu 2. Millionaire quarters 3. Tudun Gwandara 4. Ungwan Alago	Selection of street blocks in each neighbourhood to systematically identify 20 compounds for the administration of questionnaires to one household each (240 piped Households) and additional 120 questionnaires for household un-piped
	Lafia East area	1. Tudun kawari 2. Ungwan Tiv 3. Sabon pegi 4. Ungwan yazawa	
	Lafia west area	1. kofar Fada 2. Rimi Uku 3. Ungwan Maina 4. Sabon gari	
Urban area	urban area not covered with the water supply network	Neighbourhoods (unconnected to network)	Street Blocks (third stage clusters)
Lafia	Lafia North area	1. Shabu 2. Ombi I and II 3. Bukan sisi I and II 4. Ungwan Nungu	Selection of street blocks in each neighbourhood to systematically identify 20 compounds for the administration of questionnaires to one household each (140 Households not connected)
	Lafia East area	5. Akurba 6. Mararaba Lafia	
	Lafia West area	7. Tudun Amba	

3.6 METHODS OF DATA ANALYSIS AND PRESENTATION

3.6.1 Data analysis:

It is intended that for the purpose of easy understanding, and interpretation of research results, and also considering the nature and scope of the study, simple descriptive statistical data analysis techniques were adopted such as means, median and mode.

3.6.2 Data presentation:

The data obtain from the field surveys were presented in form of ideographs or pictograms for easy comprehension and understanding. Some of these graphic techniques included tables, ratios and percentages, charts and frequency distribution as well as figures where necessary.

CHAPTER FOUR

EXISTING MANAGEMENT OF PUBLIC WATER SUPPLY SYSTEMS IN LAFIA TOWN

4.0 INTRODUCTION

The purpose of this chapter is to appraise the existing management of public water supply systems in Lafia town. The various components of the framework, that is, the institutional and financial frameworks have been examined, as well as existing management strategy. At the end, the problems that limit the success of the current management framework have been established.

4.1 LEGAL FRAMEWORK FOR WATER SUPPLY

Existing edicts for water supply and sanitation comprise the following acts and decrees: (i) Decree 101 of 1987, the decree vests control of Nigerian Water Resources in the Office of the Federal Minister of Agriculture and Water Resources, (ii) Decree no. 35 of 1987, establishing the 11 River Basin Authorities, (iii) Edicts establishing State Water Agencies for the 36 States and the FCTA. The Policy development and institutional reform are accompanied with corresponding new legislation and regulations. At present, the FMAWR, with the support of the EC, is in the process of updating the water law; the final round of nationwide consultations has commenced and the Parliamentary approval is expected to be secured in December 2007.

4.1.1 Water Board Edict 1998.

Since the creation of Nasarawa State in 1996, the functions of water supply and management have been in the domain of Nasarawa State Water Board. The Water Board have been

mandated by the Nasarawa State Water Board edict No. 8 of 1998 to secure and provide adequate water supply for the people of Nasarawa State.

PART III -Objectives, Functions and Powers of the board

The Board has an objective of endeavouring to achieve a sustainable water system development in the state, and shall: -

- I- Secure for the present and future generations as well as for commercial and industrial consumers, an efficient use of potable water;
- ii- Formulation and execution of schemes for the provision of water in the State.
- iii- Produce for distribution to all residents of the State sufficient potable water for their health and well being.

The above objectives are to be achieved by the Board with the following functions

- (a) to control and manage all water works vested in the Board under this Edict;
- (b) to establish, control, manage extend and develop water work as the Board may consider necessary for the purpose of providing wholesome, potable water for the consumption of the public and for domestic, trade, commercial, industrial, scientific and other uses;
- (c) to ensure that adequate wholesome water is supplied to its consumers regularly and at such charges as the Board may, from time to time, determine;
- (d) to conduct to organise the conduct of research in respect of water supply, water development and matters connected therewith and submit the results of such research to the commissioner for the formulation of policy;

(e) to develop, maintain and beneficially exploit water resources both natural and artificial;
and

(f) to determine rates charged paragraph (c) of this sub-section, and any other service rendered, shall be such that revenue for any year would be sufficient or as nearly as may be, to pay all working expenses, repayment due on loans borrowed by the Board for any extension works.

The powers of the Board are spelt out in Section: 13 of the edict establishing the Board.

(1) Subject to, the provisions of this and for the attainment of the object and functions of the Board under this edict, the Board shall have power:

(a) to construct, re-construct, maintain and operate water-works, public fountains and all other stations, buildings and works necessary for the discharge of its functions under this edict;

(b) to extract water from any lake, river, stream or other natural source;

(c) to extract water from underground sources by means of sinking boreholes, wells artisan wells and the construction of their supporting structures;

(d) to examine any surface or underground water for the purpose of determining its productive quality and quantity including the existence and extent of pollution, and cause of such pollution and remedies thereof;

(e) to enter land or premises at any time of the day for the laying, examining, repairing or removing any water pipe or hose, provided that before entry is made on any such land or premise, notice shall first be given to the owner or occupier thereof,

(f) to enter any land or premises after giving notice, where practicable to the owner or occupier for the purpose of: -

(i) inspecting any service or meter to ascertain-whether there is any wastage, obstruction or damage to any service or meter or anything connected therewith;

(ii) laying pipes or installing meter or other instruments or appliances;

(iii) ascertaining the amount of water used or taken; and

(iv) connecting, disconnecting or otherwise controlling the supply of water to a tenement;

(g) to diminish, withhold or suspend, stop, turn off or divert the supply of water through or by means or a water service stop cock, valves, sluices, conduits, aqueducts either wholly or partly whenever the Board considers it necessary so to do;

(h) to enter into any commitments, agreements or other arrangements in respect of the provisions, distribution or sale of water;

(i) to enter into contract or other legal transaction; and

(j) to acquire and hold any movable or immovable property and to dispose of such property and where there is any hindrance to the acquisition of the property, the property may be acquired for the Board under the land use act of 1978 or any other law that may be enacted.

(2) In addition to the powers conferred by Sub-section

(I) if it appears to the Board that any land in the State is likely to be needed for the purposes of any water-works, the Board by its employees with all necessary workmen enter on any such land and may, subject to the Board giving, where practicable, 7 day's notice to the owner or occupier of the land on which it is intended to enter-

(a) survey and levels of the land;

(b) dig or bore under the soil; and

(c) do all other acts necessary to ascertain whether the land is adapted for such purposes.

To achieve the above objectives, Nasarawa State Water Board has at present 9 (nine) water schemes across the State which Lafia scheme is inclusive.

Part Iv- Management and Staff of the Board.

The management affairs of the Board: - Members of the Board shall be charged with the responsibility of laying down general policies in respect of the execution of all functions of the Board under this Edict.

In Nasarawa State, State Water Board has been empowered with edict No. 8 of 1998 to provide water to all urban areas in the State. There was no change in the legislative environment in which the NSWB operate under as the Boards continue to function under the then existing edict which granted the Governments full control over the utilities. The institutions operate under the civil service rules and procedures in the conduct of their activities. The institutions therefore lack operational, managerial and financial autonomy to run their business, which situation was prevailing at the time of this study.

4.2 ADMINISTRATIVE STRUCTURE OF NASARAWA STATE WATER BOARD

4.2.1 Organizational framework of operation

For optimum operation and maintenance of the water system therefore, the Nasarawa State Water Board have organizational structure, which will enhance the performance of the duties of each department and lead to the achievement of organizational goals and objectives.

4.3 DEPARTMENT AND MANPOWER REQUIREMENTS FOR OPERATION AND MAINTENANCE

The management structure for Lafia is based on six departments with various responsibilities

4.3.1 Management structure

The management structure for Lafia is based on six departments with various responsibilities as summarised in table 4.1.

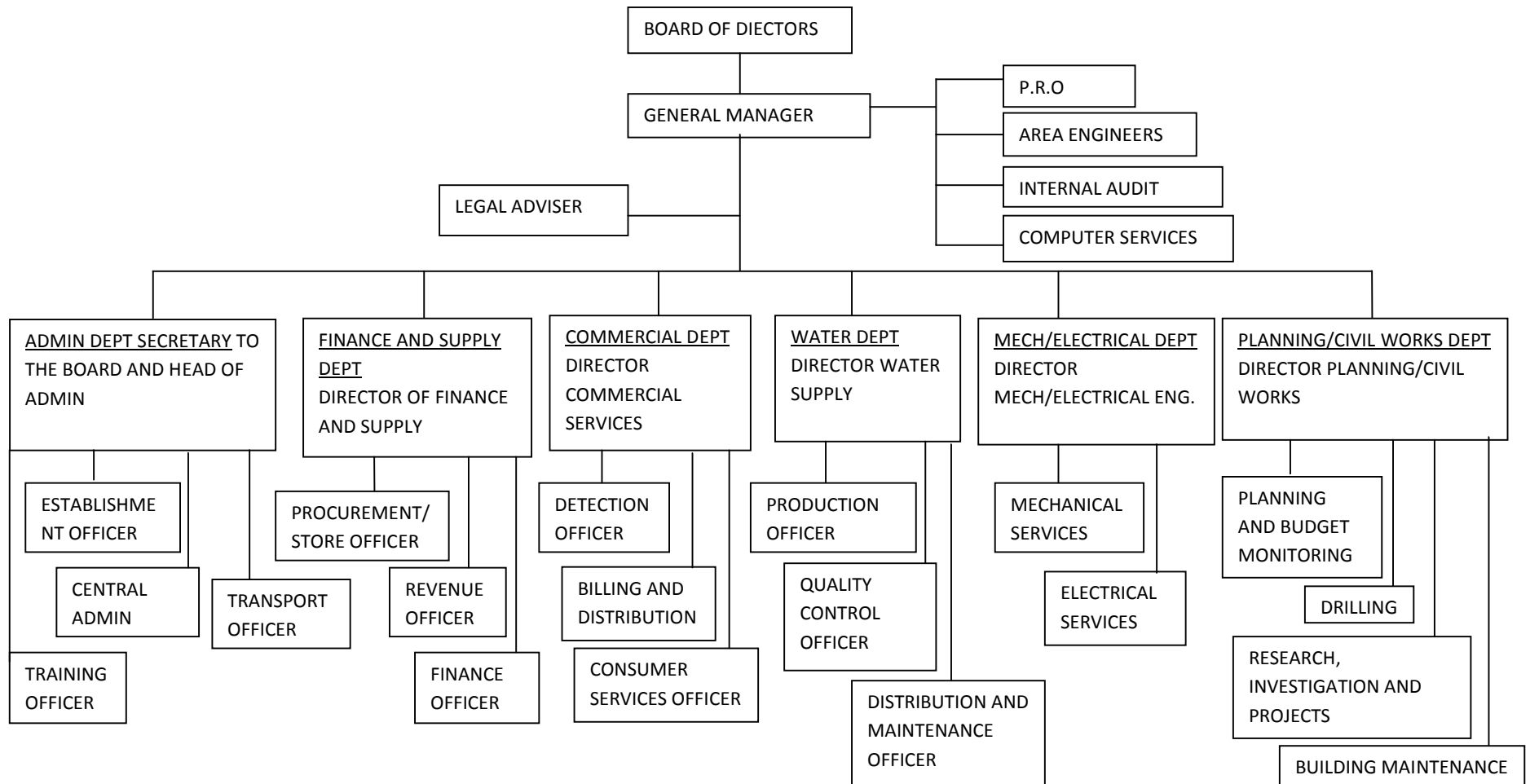
Table 4.1 Management structure of Nasarawa State Water Board

Management Unit	Water Board Departments	Functions
NSBW departments	Administration	Overall management of the Board (save the autonomous plant under a General manager. Includes personnel management, public relations, policy implementation) All other units as described below are under the General Manager
	Finance and supply	Compilation of bill and keeping of accounts of revenue and expenditure
	Commercial	Distribution of bills and collection of payments, processing of new connections applications, keeping record of connections and consumption, providing information for billing. Operates with 3 area offices- Lafia North, Lafia West and Lafia East roughly reflecting the urban area
	Water supply	Water supply production, water quality control, water distribution. Repair and maintenance of equipment and facilities for distributing water and detection of faults. Making new connections to consumers and monitoring illegal connections
	Mech/Electrical	Operation and maintenance of vehicles, repair of electrical faults
	Planning and civil	Planning and budget monitoring, drilling, research investigation and projects. Building maintenance.
Plant management Unit	Water intake, treatment and pumping unit. Operates the water supply department under a Plant Engineer who oversees all operations of the plant under the General Manager of the Board.	

Source: State Water Board, 2009

Fig. 4.1

NASARAWA STATE WATER BOARD
ORGANIZATIONAL CHART
AS FEBRUARY, 2008



4.3.2 The Board manpower for operation and maintenance

The Water Board has 69 staff, shared into various departments and units of the Agency. The number of manpower required is insufficient to carry out the work effectively as shown in Table 4.2. The plant unit have the highest number of workers and the workforce is mostly poorly educated with over 45% of the workers with secondary school certificate.

Table 4.2 Number staff in the Water Board

DEPARTMENT	NO. OF STAFF	Required No.	Deficit
Office of the General manager	6	6	-
Personnel Department	9	9	-
Water supply dept	5	22	17
Mech/Electrical Dept	9	15	6
Planning and Civil Dept	5	28	23
Commercial Dept	5	18	13
Finance and supply	6	15	9
Lafia Plant Treatment	17	36	19
Lafia Area office	7	18	11
Total	69	161	85

Source: Water Board, 2009

From the examination of the various departments, it was revealed that the Board have insufficient manpower for its operation and need to employ more 23 staff in the department of planning and civil to augment the staff deficient and about 17 in water supply department.

4.4 OPERATION AND MAINTENANCE MANAGEMENT

The overall efficiency of the production of potable water depends solely on the operational management and staff allocated to their respective duties. Finance also plays an important role, as lack of funding for consumables and spare parts put considerable constraints on management. This subsequently results in poor water quality, premature breakdowns and

reduction of water supply to consumer. Therefore, it is important that an effective and reliable management structure is formed to undertake the respective tasks of operating and managing the water supply and distribution system of Nasarawa State.

4.4.1 Operations of the public water supply system

Public water supply system came into operation in Lafia since 1985, when Lafia was still Local government council in Plateau state. The Lafia operation was an area office under the Plateau State water Board until the creation of Nasarawa State, which Nasarawa State Water Board was also created to charge of Water operations in Nasarawa State. The Lafia water schemes was designed and commissioned in 1985, with a treatment plant capacity of 13,600 m³/day.

4.5 WATER DEMAND MANAGEMENT STRATEGIES

The water demand management strategies are methods in which Water authorities ensure efficient operation and maintenance of water supply. The Board do not have single meter for reading of water consumption and system leakage, therefore their water billing is based on flat rate. The maintenance of damage pipes is done through a routine check up or the community inform the Water Board about the damaged pipes.

4.6 FINANCIAL FRAMEWORK OF THE BOARD

4.6.1 Water Collection Charges

The billing system of collecting water charges in Lafia town is based on flat rate because households are not metered. The billings system is poor, collection efficiency (or revenues collected as a proportion of total billed) is about 65 percent, and accounts receivable stand at more than two years of billings

Table 4.3 water charges

Type of use	Amount charge per month
1. Residential	
Single taps	N400
Full connection	N800
2. Commercial	N1500
3. Institutional	N1000
4. Industrial	N2500

Source: Water Board, 2009

From the table above, the study reveals that Water Board water billing and collection is based on assumption of flat rate. The residential single tap is charged with N400 for single tap to the house or compound and they are the category that cannot afford for complete house connection. For those charged with N800 were houses fully connected to WC's, kitchen, lawn, etc, they are mostly the categories that can afford for complete house connection and they owned modern type of houses.

4.6.2 Revenue of the Water Board

The Nasarawa State Water Board largely depends upon government subvention N750, 245 monthly, that is, about N9 million per annum. It also gets additional funds monthly through revenue collection. The board generate a total of N23, 902,009 from January to December, 2008 as revenue. In 2009, the Board received total revenue of N1, 726, 170 for Lafia town only, this shows depreciation in the revenue collection due to inability of the Water Board to produce and distribute water this year. At the time of this study, Lafia and Doma water scheme was closed down because contract for the rehabilitation and expansion of the water scheme was awarded and is ongoing which has led to declined in revenue collection of the Board. See table 4.4.

Table 4.4 Monthly water bills collection by three Area offices (Jan-Jul, 2009).

Month	Jan	Feb	Mar	April	May	June	July	Total
Amount	234,600	259,770	271,400	337,900	256,800	195,800	167,900	1,726,170

Source: State Water Board, 2009

4.6.3 Water Expenditure of the Board

The Board expenditure on water supply from 2003 to 2009 show that the Board receipt a total of N383, 658,118.10 and spent more than the amount received which stand at N420, 520,520.11. The receipt for 2009 stand at N6, 541,300 and about N1, 726,170 were gotten from revenue collection of the Board while the remaining balance came from Government subvention as shown in the table 4.5.

Table 4.5 Receipt and Expenditure from 2003-2009 of NSWB

Year	Receipt	Expenditure
2003	N41,352,901.00	N40,935,012.00
2004	N49,172,863.00	N33,719,800.00
2005	N67,051,259.60	N64,206,353.65
2006	N56,361,500.00	N52,105,913.00
2007	N121,473,201.10	N118,477,885.00
2008	N83,093,994.40	N95,953,506.46
2009	N6,541,300.00	N15,122,050.00 Jan-July
Total	N383,658,118.10	N420,520,520.11

Source: Water Board, 2009

The financial resources available to Water Board have been inadequate to meet the water production, purchase of equipments, maintenance and running of day to day operation of the Water Board. The receipt and expenditure of the Water Board have not been stable, it increases and declines because of poor revenue collection, broken and damaged pipes, disconnection from system as a result of non payment of bill, inadequate power supply and poor subvention sometimes from the State government have been responsible for the fall and decline in revenue and expenditure as shown in the table above. These have contributed to low performance and inefficient operation of the Water Board.

4.7 PERFORMANCE INDICATORS FOR NASARAWA STATE WATER BOARD

The performance of the Water Boards has been poor since the creation of the State. This happened as a result of influx of people to the state capital and the Board could cope with the management of water supply in Lafia town.

Table 4.6 Performance indicators of NSWB

S/No.	Indicators	Unit	Remark
1	Total Number of system under SWA	8 Systems	There are six conventional water works and two operating on boreholes
2	No system under preventive maintenance	None	They did not take parts in the PMP workshop
3	Total quantity of water produced by SWA in all the system	4,428m/day	They pump 1-2 times a week due to lack of diesel for generator and PHCN is not supplying full current
4	Production capacity Utilization	Approximately 25%	Operates 1-2 times a week and for only 3-6 hrs each operation
5	Percentage unaccounted for water (UWF)	No record	Since water does not flow in the entire network, and no water meters, there are no records of leakages and hence no record for UWF
6	Coverage's of existing tariff system. a. Cash operating expenses (COE) and debt service or b. Depreciation (whichever is higher)	N1,424,215 monthly average	Operating expenses has always outstripped the average monthly sales of N557, 754. Cash position ratio is 39% No record of debt servicing
7	Total number of registered consumers	5677	From our customer enumeration survey the number of arrears in Lafia is 3621
8	% of consumer metered	0%	No metering system in the whole State
9	% Coverage of pipes network mapped	33%	No record on the ground to give the exact figure.

Source: Water Board, 2009, Sauri Consultants, 2001 & Field survey, 2009

The performance evaluation of Nasarawa State Water Board (NSWB) shows that, there are eight water systems, which six are conventional water works and two operate on boreholes. The Lafia water works operate on River Amba dam and the treatment plant is sited close to the dam but due to rehabilitation of the water scheme it was closed down at the time of this

study. There is High levels of water loss that is, unaccounted for water and its deterioration is causing physical losses, with 40 per cent of the water being lost through leakage. High financial losses due to poor ability to recover costs, lack of metering, and low transparency and accountability in the system have identified as major problem of effective water provision and management in the area during the survey conducted. The quantity of water produced, production capacity utilization and other indicators was discussed in the course of this study.

4.8 PREVIOUS EFFORT ON WATER MANAGEMENT STRATEGIES

The most outstanding and notable efforts that addressed some of the challenges in the sector came under the recent completed national water rehabilitation project. The project was sponsored with a loan from World Bank and counterpart funds from both Federal and State government. The funds were not only used to rehabilitate water supply schemes but several efforts were made under the institutional development components of the projects to address the challenges through the following:

- Manpower assessment and training needs analysis;
- Development of operational manuals for billing and collection, accounting and budgeting, stores procedures, preventive maintenance;
- Engagement of technical consultants for customers' enumeration, mapping, water audit and operation and maintenance improvement;
- Engagement of financial consultants for financial and accounting system improvement, purchasing and supply procedures improvement, billing and collection improvement and fixed assets revaluation.

4.9 PROBLEMS OF THE EXISTING MANAGEMENT OF PUBLIC WATER SUPPLY SYSTEMS IN LAFIA TOWN

The challenges and problems of providing adequate water supply to the residents of Lafia town by the Water Board are very enormous to be handled by Water Board alone. The following are the problems and challenges identified from the survey conducted:

1. Weak institutional arrangement of Nasarawa State Water Authority: - The Nasarawa State Water Board (NSWB) from its inception in 1985 has the sole responsibility of providing water to the residents of Lafia town. The State Water board has a Board of Directors and a General Manager controlled by the respective ministry, mostly the State Ministry of Water Resources (SMWR).

The General Manager is appointed by the respective state governor. There is significant turnover of staff at this level resulting in managerial instability. Senior staff are frequently transferred from the State Water board to state government departments and vice versa. The pay scales are similar to the civil service and much lower than that of the private sector, often leading to lack of staff motivation and corruption in the system. The technical expertise of staff was low as observed and has few engineers, accountants and commercial officials. The problem was compounded by the embargo on recruitment of new staff.

The edicts establishing the NSWB do not provide that they operate as autonomous entities; therefore, they operate more like government departments closely integrated into the civil service. The Water Board depend on subvention from their state governments to cover a significant portion of their recurrent costs. As a result, the state government is not obliged to pay for water used, causing high wastage and perpetuating a vicious cycle.

2. Large political interference in the tariff setting and collection: - The public sector in Nasarawa State has been characterized by stagnancy. In running of the Water Board politics has played a major role. It has been observed that Political interference on tariff policies have led to inefficiency and chronic financial weakness of the Water Board.

In the bid of impressing the populace the government have made unrealistic tariffs and collection policies that are not aimed at meeting cost of water production. Even with the government subsidy on the cost of water production for the populace of Lafia town yet funding is inadequate to invest in increasing production to meet water needs.

3. Poor Legal framework: From the study it was also revealed that the Water Board still functions under old existing edict that established it which granted the government full control over the utilities. There is a weak and ill-defined legal arrangement on institutional linkages vertically, laterally and functionally. This is especially true as it relates to the new WSS policies. Existing edicts, decrees and acts reflect centralized planning and institutional arrangements and supply driven WSS interventions. Thus there is lack of legislation, regulations and procedures to effectively implement policies and project implementation through LGAs and Communities.

4. Poor commercial Performance

Regardless of improved attitudes resulting from NWRP, the State Water Board is still not sufficiently commercially oriented. As they do not have reliable Management Information Systems (MIS), the commercial-oriented operation is limited to basic procedures of billing

and collection based on incomplete and at times inaccurate customer data which further constrain the income of the NSWB. Moreover, the NSWB is still charging their average domestic customers a flat monthly rate, usually low and designed to serve the poor. However, most of the poor are not connected to the urban water supply network and, thus, do not enjoy the benefits of the flat-rate policy. In summary, the NSWB do not have a firm grasp on the commercial side of the business – volume produced, volume sold, amount lost through usage by “free-riders” and uncollected accounts.

With respect to revenue generation, the State Water Board is handicapped by (i) very low tariffs ranging from about US\$2.02 to about US\$2.41/m³ compared to US\$3.65 and US\$3.80 in Cote d’Ivoire and Senegal where tariffs cover full costs; (ii) under-billing because of inaccurate customer databases and flat-rate billing; (iii) very low revenue collection rate (in some less than 10% of billed amounts, due to poor standards of service); (iv) significant level of arrears, particularly from government agencies and similar high users; and (v) high and steadily increasing operating costs.

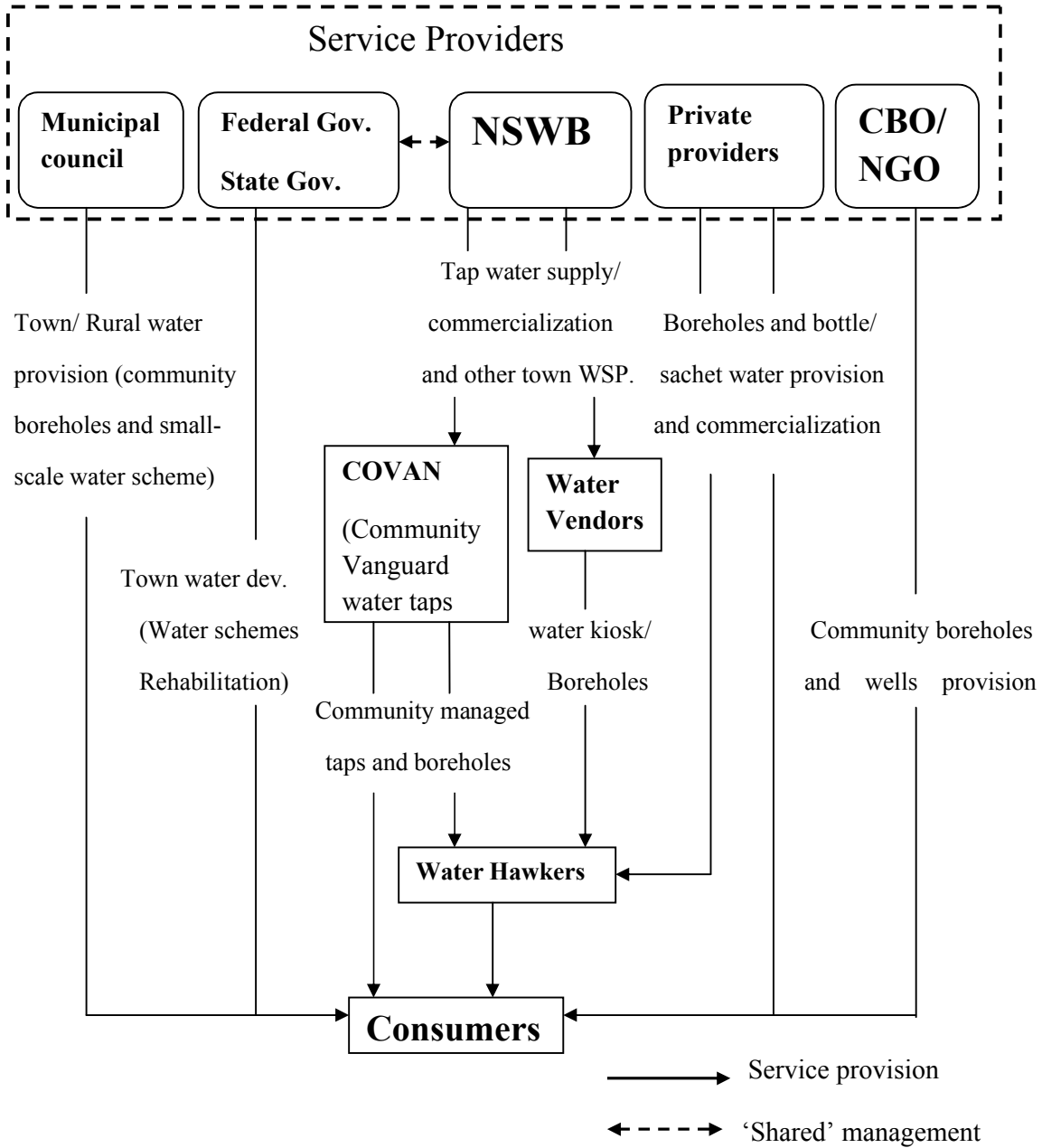
5. Weak Financial Performance: - Based on information compiled from the study on financial performance of the Water Board, their financial situation is critical, largely due to the policy environment, that is, policy that regard water as social goods and political promises to make water free for all which do not enable efficiency and independence in financial management and operations. The financial performance viz profitability has been weak for the past 10 years. Additionally, revenue generated cannot cover operating costs and this is due to low tariffs, high operating costs and poor collection of revenue. Performance of the water boards remains weak in the area of credit policy management. The Boards have not made serious efforts in increasing tariff levels, and are yet to charge an economic price

towards achieving cost recovery. The present tariff levels are insufficient to generate enough revenue to meet the recurrent expenditure and funds have been the major constraint to efficient and effective operation and maintenance of Water Board. The average tariff currently charged by NSWB is N400 /m³ whereas the economic price has been estimated at N900/m³. The present tariff levels cannot ensure the financial sustainability of the Board.

4.10 AN OVERVIEW OF WATER SERVICE PROVIDERS' NETWORK IN LAFIA URBAN AREAS

There has been a lot of instability in the institutional arrangement for managing water supply in Lafia; a problem that exists all over the country. Urban water supply management is the responsibility of the State Water Agency. However, the functions are also been performed by other ministries and parastatals without adequate framework for coordination and operation.

Fig. 4.2 Water service providers' framework in Lafia.



4.10.1. Public water supply operators

(i). Federal Ministry of Water Resources

The Federal Ministry of Water Resources and Rural Development (FNWR&RD): Under the Ministry, there are two parastatals, namely the River Basin Development Authorities which are responsible for establishing and supply or bulk water amongst other things and the

National Water Resources Institute which is responsible for manpower development and research in the water supply sector.

The Federal Ministry of Water Resources (FMWR) is situated at the Federal Secretariat temporary site GRA, Behind Specialist Hospital, Lafia. The branch ministry here in Lafia has number of staff and equipments for their daily operation and management. They provide boreholes with overhead tanks in the state.

The River Basin Development Authorities were created in 1976, with 12 of them nationwide. Amongst these is the Lower Benue River Basin Development Authority which operates in Lafia and was saddled with the responsibility for planning and developing water resources, irrigation work and collection of hydrological, Hydro geological and meteorological data. Their main involvement in potable water supply has been the provision of multi-purpose dams and the supply of water bulk, some to urban water systems and also small scale water supply schemes. RBDA has provided two water boreholes in Lafia town which supplies water to two communities and water vendors who buy water there and sell to the people, These water schemes is been managed by the communities.

(ii) State government

The State Water Resources Ministries (SMWRs) or State Ministries of Works (SMWs) are responsible for regulatory, policy making, strategy development, oversight, monitoring & evaluation, maintaining databases, and guiding the state WSS agencies.

(a). Nasarawa State Ministry of Water Resources and Rural Development

The Nasarawa State Ministry of Water Resources and Rural Development is saddled with the responsibility of coordinating and monitoring the development of water resources in the both the urban and rural areas of State. They collaborate with the other water institutions in the provision water supply in all the 13 local government of the State.

(b) Nasarawa State Water Board:

The Nasarawa State Water Board (NSWB) was established with edict No. 8 of 1998. The edict empowers her to secure for the present and future generation as well as commercial and industrial consumers an efficient potable water supply. The functions of the Board include treatment, distribution and sale of water and public enlightenment on water conservation. It is also empowered to purchase water and sale to consumers. It operates a tariff system which seeks to emphasize on cross subsidies to make water affordable to all the consumers. It also provides public stand taps initially free to the poor but now leases the taps to vendors who in turn sell the water to individuals and water hawkers.

(iii) Local government

Local Government Authorities (LGAs) are responsible for the provision of Rural Water Supply and Sanitation services within their areas of jurisdiction, though with limited existing capacity to meet the challenges posed by this responsibility.

The Lafia local government council has been responsible for the provision of boreholes in some community in Lafia town. The department of works of the local government is in charge of the water supply.

4.10.2. Private Water Supply Operators:

These usually produce water (usually from boreholes equipped with electric submersible pumps) and sell to water hawkers and individuals at the water source site. Their strength lies on their proper coordination, and control, availability or financing, easy access to relevant

Skills, higher operation efficiency compared to State Water Board. The opportunities are public relations campaign and trade association to standardise practices. The weaknesses include inadequate quality control, unorganised or multiple government taxes, lack of legal backing for operation, inadequate sanitation and hygiene, lack of continuity of business and inconsistent government policies.

(i) Private Organizations.

This consists of individual and cooperate organization. The individual organization involved in water supply in Lafia includes; water production establishments, private water factories/companies as well as development partners. Fully private businesses and entrepreneurs are already found where the existing water utility has low coverage or poor service. They obtain water directly from private water sources and serve the areas that have not water utilities coverage. Private providers have also served higher income groups or businesses when water is scarce or inconvenient to obtain. At the largest scale, private water companies build, own, and operate water systems in Lafia. At the smallest scale, private water vendors and sales of water at kiosks and shops provide many individuals and families with basic water supplies.

(ii) Civil society organizations.

Various community organizations, including Water and Sanitation Committees (WASCOMs) are progressively being involved in community management of water infrastructure. Increasingly, NGOs are becoming more interested and committed to actively participate in the sub sector. An association of NGOs has been formed that seeks to collaborate with state to improve on delivery of water supply services in Lafia town. Private sector participation in the water supply sub-sector has been limited. However, it appears there is a pool of drillers of boreholes, civil works contractors and suppliers of hand pumps in Lafia town.

(a). Community Based Organizations (CBOs):

CBOs are group that are formed to represent and protect local interests. These groups are known to possess creative energies in solving their communal problems, usually centred on water supply, sanitation, drainage construction, road repair and security, among other social services. CBOs in the form of the various youth's clubs and other voluntary organizations are found in abundance within the study area. There are over 40 of them, but only about 18 are

registered with the social welfare department of Ministry of Women, Youths and social development. With respect to water supply about 10 are recognised as being active in terms of contributions to community water development.

(b). Nongovernmental Organizations (NGOs)

A recent phenomena is the sudden propulsion of NGOs to high visibility in African development, such that not only have NGOs become development practitioners, they are seriously considered as being capable of accelerating the sustainable development process (Cheaka et al.,1998). NGOs are essentially based on the credo of voluntary action for the good of society, and with no profit motive behind their actions.

There are currently about (91) NGOs registered in Nasarawa State. Seven (7) of these are involved in water and sanitation management.

4.10.3. Water Vendors and Hawkers:

The appraisal of water supply in Lafia town shows that only about 3250 households had functioning water connections to the public water supply system and approximately, there are about 86 private boreholes in Lafia town which is equipped with water storage facilities (generally either 500-1000 gallon tanks) which is been sold to households. There are probably about 24 major public boreholes scattered throughout the city which supply water to water vendors at the time of this study. The vast majority of the population obtain its water from the vending system which has been created and is operated by the private sector. This water vending system is elaborate and not organized.

The water vendors bought their water from the State Water Board or private sources and who in turn charge the consumers N5.00 for a 20 litre container. The vendors are registered with the Water Board and have a strong association. Their strengths and opportunities lie on the use of simple and cheap equipment, ability to mobilise easily, co- operation with the

Water Board, legal recognition and water shortage in houses. Their threats and weakness include lack of environmental planning, inadequate water source, lack of understanding of their role by the government, lack of legislation and standard water tariff, poor accessibility and lack of immediate response by the utility to report of water shortage at their water source.

Hawkers are those who buy water from the vendors or other sources and deliver water to household. They charge from N10 per 20 litre containers (usually plastic containers locally called Jerry cans). The delivery of water is by hand cart (in small volumes); they get water from either the public boreholes or from the private boreholes and deliver it to the people in the town and sometimes the hand cart drivers spend more than 1-2 hours waiting at the boreholes to get water for delivery, and 1-2kms to deliver water to their customers. From interviews conducted with the hand cart drivers in Lafia town, it was reveals that they make about N800-N1200 a day from the business but they added even with the reasonable amount they make, the business is not an easy one. See plate 4.1 & 4.2

Water Vendors



Plate 4.1 show water vendors waiting for water

Water Hawkers



Plate 4.2 Hand cart delivery

Table 4.7 Water provision and commercialization in Lafia

Delivery system	Provider	Source	Price and payment system	Cost to the provider	Remark
Dug wells in Households	Households owners	Households	Nil	Nil	Shallow and mostly dry up season, usually not safe.
Community lined concrete	Local Authority	Within the community	Nil	Nil	Fairly deeper, but dry up during some long dry seasons. Not many available
Boreholes with hand pumps	Local, state and Federal Governments	Community	Nil	Nil	All the three tiers of government have continued to provide this system without adequate community participation or arrangement for sustainability. UNICEF, UNDP and World Bank now involve the communities
Public stand posts	Utility	Utility systems	Free	N10.00	Traditionally free, later local and State governments agreed to pay but the payment is not forthcoming
Water selling points and kiosks	Utility	Private	N5.00 per 20 litres, cash to the Vendor	N10.00	This was introduced due to the reluctance of payment by government and the pressure on utilities to recover costs
Privately owned borehole based systems	Private individuals	Utility or private systems	N6.00 sold to hawkers and individual	Not disclosed by the owners	Price depends on the electricity source. it is N5.00 when run from National grid and N6.00 when run from owners' generator
Hawkers	Individuals or organized	utility	N10.00 to per 20 litres jerricans. Cash payment to the hawker	N5.00 or N6.00 depends on the source	The hawkers collect water in 20 litres jerricans (some time load as many as 16 jerricans in a cart) from community well- where they pay nothing, or water selling kiosk where they pay N5.00 or N7.00 per jerricans
Household with single tap	utility		N400 per month to the utility upon receipt of a bill	N20.00	Where utility water exists, some households are able to connect the household with the utility supply system.

Source: Field survey, 2010

4.11 CHALLENGES OF WATER INSTITUTIONS

Water supply is on the concurrent legislative list, which poses a challenge to coordination and definition of roles. Presently the following Federal laws, namely: Water Resources Act, 1993, Minerals Act, 1990, NIWA Act 1997, RBDA Act. 1990 as well as state water Edicts and customary laws are relevant in the development and management of the nation's water resources. The three levels of government, Federal, State and Local, share responsibility for water resources management thus, leading to fragmentation, duplication and lack of inter-sectoral coordination with each segment pursuing its independent water agenda.

At the beginning of the 2002, there was a tripled fragmentation in the management of water supply. Firstly, there is an institutional fragmentation of public and private sector in water provisioning to which the State government are not providing control and regulatory functions. Secondly, technical fragmentation shaped by the increasing demand of water supply by the people and thirdly, spatial fragmentation where different zones of the town area received different levels of water services.

The town area is served by private water companies that are unorganized and this is insufficient to supply adequate water to the rapid population increase. Water supply that is provided and controlled by Water Board is inefficient and in spite of the increase demand, the services have not been extended to cover the people waiting to be connected. Therefore, thousands of people, especially the poor, lack adequate access to safe drinking water. Improving services significantly will require more efficient operation of Nasarawa State Water Board in rehabilitating and extending supply systems. The State Government through World Bank is turning to the private sector to help address these needs. But this PSP is no simple panacea; its success depends on how well the chosen private sector arrangement fits local circumstances, on whether the regulatory environment is suitable, and on how well the reforms respond to the concerns of those affected.

CHAPTER FIVE

5.0 WATER SUPPLY CONDITIONS AND MODE OF ACCESS TO PUBLIC WATER SUPPLY SYSTEM IN LAFIA TOWN

5.1 CONDITIONS OF WATER SUPPLY IN LAFIA TOWN

Generally, the existing water supply infrastructure is clearly inadequate for the needs of the population, a situation made worse by the low-performance in the production and distribution system. A substantial number of households do not therefore have direct access to water from the system. Ineffective service delivery has also meant that those that are connected cannot rely on it due to the inconsistent supply. The situation for the whole urban areas is summarised below;

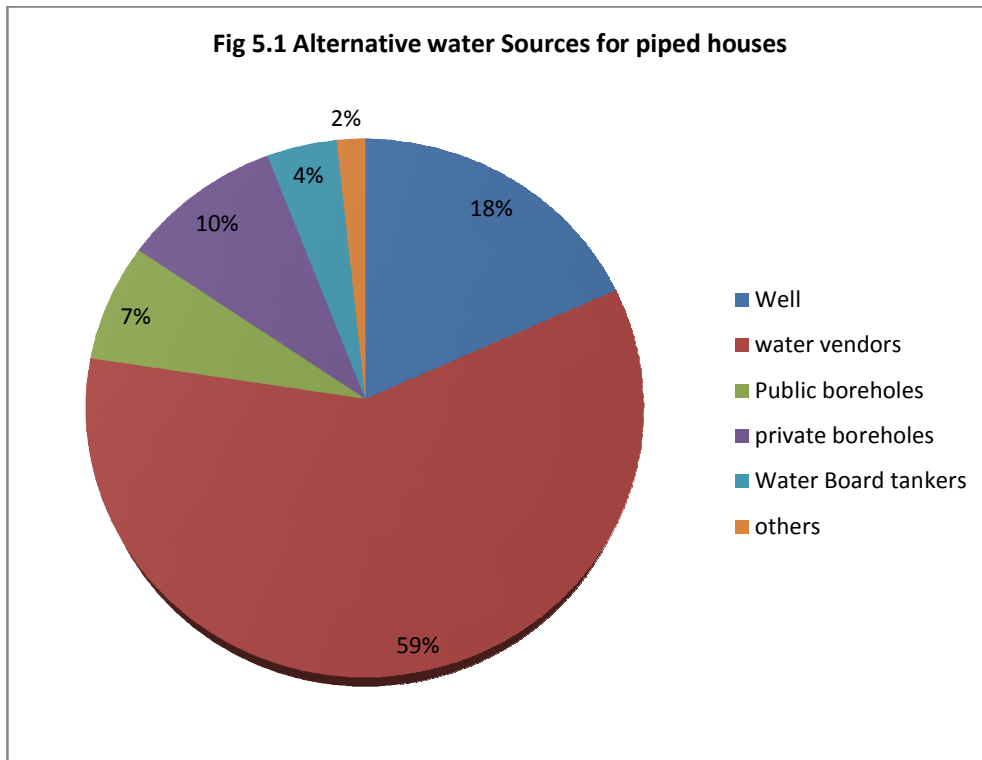
5.2 SOURCES OF WATER SUPPLY AND GENERAL CHARACTERISTICS BY PIPED HOUSES

This gives us a general overview of water supply condition in the areas where pipe water supply has covered in Lafia urban area.

5.2.1 Alternative Sources of water rely upon in case of shortage or breaks down in piped supply

Despite the public water supply to residents of Lafia, water has not been sufficient and the people resort to any form of alternatives water supply for their domestic use. From the survey conducted it has been revealed that about 18.3% of the households still depend on well water to supplement the public stand-pipe for domestic use. About 59.2 % rely on the water vendor

for their water collection whereas 7.1% also depends on public boreholes and 9.6% use private boreholes. From the result 4.2% rely on Water Board tankers and 1.7% depends on other sources of their water supply.



Source: Field survey, 2009

5.2.2 Adequacy of water supply in Lafia Town.

The table below shows the duration, availability and adequacy of water supply by respondents with public taps in their residents. The survey revealed that households gets water for average 8 days per month and average 3 hours per day.

Table 5.1 Duration of water supply for households connected

Variables		
	Frequency	(%)
Respondents connected to water system		
Houses with running tap	193	53.7
Houses without running tap	167	46.3
Total	360	100.0
How often Taps Run per Day/Month		
Occasionally	109	45.4
Once A Week	45	18.8
2-3 Times A Week	39	15.0
> 3 Times A Week	57	23.8
Total	240	100.0
Average supply of water per hours/day		
2hrs	86	35.8
3hrs	24	10.0
4hrs	105	43.8
5hrs	25	10.4
Total	240	100
Respondents Perception On Adequacy of Water		
Adequate	17	7.1
Not Adequate	68	28.3
Highly Inadequate	150	62.5
No response	5	2.1
Total	240	100.0

Source: Field survey, 2009

From the survey conducted in table 5.1 shows that 53.7% of all the respondents had running public taps in their homes while 46.3% do not have such facilities at home. Of those that had running taps at home indicates that only 23.8% of them had water running more than three times in a week. About 45.4% of the respondents only had water occasionally and 18.8% had water once a week. The remaining 15% had water running in their taps two to three times in a week.

This study here shows how sufficient and adequate is water supply from Water Board. This revealed that 7.1% of the household have sufficient and adequate water supply due to storage system in their houses and about 28.3% have not adequate water supply. While 62.5% of the

households show that the water supply is highly inadequate and 2.1% did not response to the question.

5.3 HOUSEHOLDS NOT CONNECTED TO PUBLIC WATER SUPPLY SYSTEM

5.3.1 SOURCES OF WATER SUPPLY AND GENERAL CHARACTERISTICS BY UN-PIPED HOUSES

This gives us a general overview of water supply condition in the areas without pipe water supply coverage in Lafia urban area.

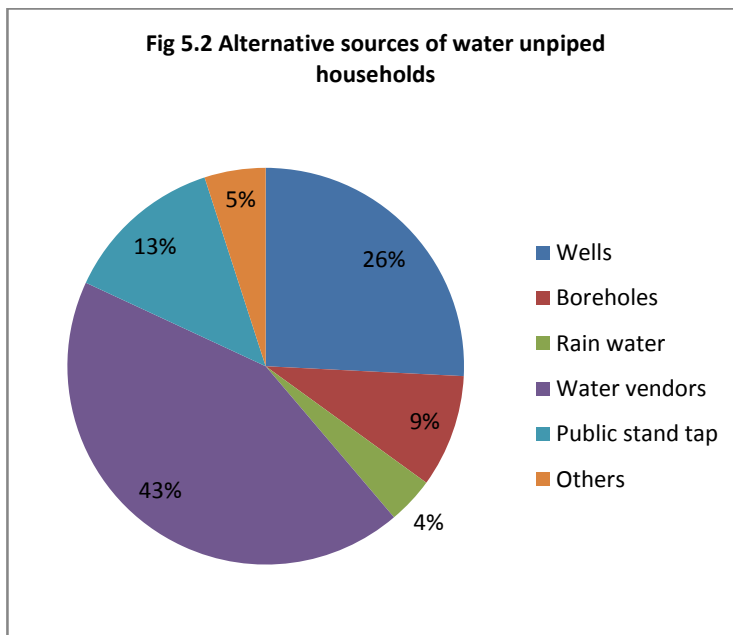
5.3.1.1 Sources of Water Supply by Un-piped Houses

The survey as shown in table 5.2 revealed that wells supplies 25.8% and water vendors 43.1% constituted major domestic water sources for respondents who did not have running public taps at home. Other water sources include rain water 3.8% and 9.2% use boreholes as their source in the study environment. A majority of the respondents 75% who did not have taps at home had to depend on well and water vendors or travel for less than 100 metres daily in order to fetch water for their domestic needs. 23.5% however had to travel for 100-500 metres while 1.5% travelled more than 500 metres daily to obtain water from boreholes and hand pumps. The survey also shows that about 65% of all the respondents who did not have running taps at home spent at least one hour daily to fetching water from other sources.

Table 5.2 Sources of Water Supply to households not connected

Variables	Frequency	(%)
Domestic Water Sources Used By Respondents With No Taps		
Well	67	25.8
Boreholes	24	9.2
Rain Water	10	3.8
Water vendors	112	43.1
Public stand tap	34	13.1
Others	13	5.0
Total	260	100.0
Distance Travelled To Obtain Water By Respondents With No Taps		
< 100 metres	195	75.0
100 – 500 metres	61	23.5
> 500 metres	4	1.5
Total	260	100.0
Time Spent Daily On Fetching Water By Respondents With No Taps		
< 30 mins	59	22.7
30-60 mins	169	65.0
1 hrs	28	10.8
>1 hrs	4	1.5
Total	260	100.0

Source: field survey, 2009



5.4 MODE OF SUPPLYING PUBLIC WATER IN LAFIA TOWN

5.4.1 EXISTING PUBLIC WATER SUPPLY AND DISTRIBUTION SYSTEMS

As mentioned earlier, most urban water schemes in Nasarawa State utilizes surface water as the raw water sources and conventional method of treatment is being utilized to achieve the required quality for the domestic consumption.

From the survey, it has been observed that the scheme at were commissioned about 24 year ago was poorly maintained and operated. Apart from the operation and maintenance problem, the electro- mechanical equipment have out lived their useful (economic) lives and maintaining them is no longer economical and therefore needs replacement or full upgrading/optimization.

The maps of the existing pipe distribution systems for Lafia have been prepared. These maps shows the location of the pipes, their diameters, lengths, fittings and appurtenances, ground elevation locations, elevation of tanks locations, pump characteristics and control valves.

5.4.1.1 The existing water sources

The main raw water sources utilized for potable water supply in Nasarawa State is surface by means of impounding the rivers and in few cases groundwater extraction through boreholes.

Lafia dam was built on River Amba to impound water for Lafia treatment plant. The dam is about 1km downstream of the town. At present, the treatment plant extracts about 13.6 million litres of raw water per day. From the physical inspection, the dam can accommodate similar size of treatment plant and may not likely accommodate any more after doubling the capacity of the existing treatment plant.



Plate 5.1 Show Lafía dam



Plate 5.2 Show Lafía treatment work



Plate 5.3 show part of the treatment plant

5.5 CAPACITY UTILIZATION OF LAFIA WATER WORKS

A study conducted by Sauri consults (2000), on the existing water production, access to the consumption and peak flows show a major constraint in the water work due to lack of production meters and poor record keeping. They also observed that log-books are not well kept and in some cases are not in existence therefore, operation and maintenance are done based on the experience of the operators.

Table 5.3 Water production Statistics

	Total/month (m)	Installed Capacity (m/day)	Min. m/day	Max. m/day	Average production m/day	Capacity Utilization Average %	Remark
A. Raw water pumped	89,530	-	1,817.9	7,498.7	4,658.3	-	One pump functional
B. Treated Water pumped	85,104	13,600	1,728	7,128	4,428	32.6	One pump functional

Source: Nasarawa State Water Board, 2009

The table above shows the calculated statistics of water production in Lafia waterworks, which the estimated production was put at about 4,428m³/day but the present installed capacity of the treatment plant is 13,600m³/day. From this it shows that the average capacity utilization is put as 32.6%. Despite the importance of treated water to satisfy increasing water needs, the treatment capacity in Lafia town is very limited and is not fully exploited. Only 4438 m/day of the water are treated.

5.5.1 POPULATION PROJECTION

Nasarawa State, which came into existence after the 1991 census, is divided into thirteen (13) Local Government areas. The final results of 1991 population census fit into these division

and figures for each local government area is available as obtained from National Population Commission as well as that of 2006 census figure was released by the Commission but without the details of various towns and villages within the State which is still awaited. These figures are hereby reproduced in Table 5.4

Table 5.4 The 1991 and 2006 census figures for Local government areas in Nasarawa State.

S/NO	Local Government Area	1991 Census	2006 Census
1.	Akwanga	69,201	113,430
2.	Awe	76,823	122,574
3	Doma	90,719	139,607
4	Karu	120,125	205,477
5	Keana	46,079	79,253
6	Keffi	60,759	92,664
7	Kokona	73,114	109,749
8	Lafia	240,656	330,712
9	Nassarawa Eggon	73,129	149,129
10	Nassarawa	127,843	148,835
11	Obi	101,074	148,874
12	Toto	89,596	119,077
13	Wamba	38,756	72,894
	State Total	1,207,876	1,863,275

Source: National Population Commission (1991 and 2006).

However, the 1991 census put the population of Lafia town as 78,247 with an estimated annual growth rate of 2.5%. When projected to 1996 the population stands at about 103,590. The 1991 figures were then projected to the year 2009 using various growth rates for different sub-periods as appropriate. The population of villages which were at the outskirts of Lafia in 1991 but now engulfed by Lafia was similarly treated and merged together with that of old Lafia.

The population projection figure of various growth rates per annum is an attempt to reflect the effect of natural increase (officially estimated at 2.5% per annum) and migration to arrive

at somewhat an servitude figure which would be more or less than one based on the usual assumption of 6% growth rate for urban areas in Nigeria. The estimates amount to a total population of 203,790 for the area. This is broken down according to the neighbourhood as shown in Table 5.5

Table 5.5 Lafia urban area population, 2009

Urban area	1991 Pop.	Rate (%)	1996 Pop.	Rate (%)	2006 Pop.	Rate (%)	2009 Pop.
Lafia	78,247	2.5	88,642	8.0	191,371	6.0	227,926
Bukan Sidi	802	2.5	907	20.0	5616	6.0	6689
Tudun Amba	1359	2.5	1538	5.0	2505	5.0	2900
Tudun Kawari	2622	2.5	2967	6.0	5314	5.0	6152
Unwan Nugun	384	2.5	435	10.0	1128	5.0	1306
Ombi I	110	2.5	125	35.0	2513	6.0	2993
Ombi II	136	2.5	154	25.0	1434	6.0	1708
Shabu	2920	2.5	3304	4.0	4891	5.0	5136
Gandu sarki	236	2.5	267	4.0	395	4.0	444
Mararaba	2514	2.5	2844	4.0	4210	4.0	4736
Akurba	2127	2.5	2407	4.0	3563	4.0	4008
	91,457	Av. 2.5	103,590		222,940		263,998

Source: NPC, 1991, Field survey NII URP, 2006 & Projected, 2009.

Note: The population of Ombi I and Ombi II has the highest growth rate (between 1996-2006) due to the establishments of Nasarawa State Polytechnic and Nasarawa State University, Keffi, Faculty of Agriculture, Lafia campus which has led to the rapid growth of the population as conducted in 2006 by NDII URP, Naspoly.

Table 5.6 Population of Lafia town by Area office

Area office	1991	1996	2006	2009
Lafia North	16,457	18,619	73,025	89,025
Lafia East	26,150	29,586	59,193	69,851
Lafia West	48,850	55,2385	90,722	105,122
Total	91,457	103,590	222,940	263,998

Source: Field survey, 2009

5.5.2 PROJECTED WATER DEMAND FOR THE LAFIA TOWN

The results of projections are shown in table 4.7. This table show the projected population per capita consumption as well as domestic water demand. They also indicated the levels of industrial/commercial, horticultural/ agricultural and other demands given the proportionality relationship shown at the bottom of each table 5.8

Table 5.7 Domestic water demands of the various area offices in Lafia town

AREA OFFICES	POPULATION				LPD	WATER DEMAND m ³ /day			
	1991	1996	2006	2009		2009	1991	1996	2006
Lafia North	16,457	18,619	73,025	89,025	125	2057.1	2327.4	9128.1	11128.1
Lafia East	26,150	29,586	59,193	69,851	125	3268.8	3698.3	7399.1	8731.4
Lafia West	48,850	55,385	90,722	105,122	125	6106.3	6923.1	11340.3	13140.3
Total	91,457	103,590	222940	263,998		11432.2	12948.8	27867.5	32999.8

L.P.D= Litres per persons per day

Cpcd= consumption per capita per day

Source: Field survey, 2009 and Sauri consults, 2000

Table 5.8 Projected water demands in Lafia town

YEAR	PROJECTED POPULATION	PER CAPITA CONSUMPTION DEMAND lpd	DOMESTIC WATER DEMAND m ³ /day	INDUSTRIAL /COMMERCIAL DEMAND m ³ /day	HORTICULTURAL /AGRICULTURE DEMAND m ³ /day	TOTAL AVEARGE DEMAND m ³ /day	TOTAL PEAK WATER DEMAND m ³ /day
1991	91457	125	11432	2286	1142	14860	16346
1996	103590	125	12949	2590	1295	16834	18517
2006	222940	125	27868	5574	2787	36229	39852
2009	263998	125	33000	6600	3300	42900	47190

Note: Industrial/commercial demand projected at 20% domestic demand

Horticulture/Agricultural demand projected at 10% domestic demand

Peak factor is assumed to be 1.1

5.5.3 MEDIUM WATER DEMAND (1991-2009)

From the above analysis, the demand for the medium and long term is clearly spelt out. The medium requirement for Lafia town is hereby formulated below.

Table 5.9 Water demand in m³/day

TOWN	INSTALLED CAPACITY	PROJECTED DEMAND	DEMAND GAP	REMARKS
Lafia	13,600	42,900	29,300	Grossly inadequate

It can be seen clearly that water supply coverage of the urban centre of Lafia is grossly inadequate. The schemes at Lafia has been inadequate even before the creation of the State in 1996 as the projected water demand is put at 16834 m³/day in 1996 as against the treatment plant capacity of 13,600m³/day which was commissioned since 1985.

To meet up this gap, there is the need to rehabilitate the existing scheme in Lafia so that the scheme could be operated at its maximum efficiency and to deliver the commodity at its peak, that is, the installed capacity. In addition to the rehabilitation of the scheme in Lafia, this scheme should be expanded immediately as provisions have been made during the design of this scheme.

5.6 MODES OF ACCESS TO PUBLIC WATER SUPPLY

In these modalities each individual house has either its own private tap connected to the network system, or is own open well or hand pump.

5.6.1 Full and single connection

The modes of public water supply in Lafia town for households have been full connection and the single connection type of supply.

Table 5.10 Types of house connection by Neighbourhood

Neighbourhood				
	Full connection	(%)	Single connection	(%)
Ungwan Mangu	7	2.9	13	5.4
Millionaire Quarters	16	6.7	4	1.7
Tudun Gwandara	2	0.8	18	7.5
Ungwan Alago	9	3.8	11	4.6
Tudun Kawari	6	2.5	14	5.8
Ungwan Tiv	5	2.1	15	6.3
Sabo Pegi	8	3.3	12	5.0
Ungwan Yazawa	12	5.0	8	3.3
Kofar fada	2	0.8	18	7.5
Rimi Uku	3	1.3	17	7.1
Ungwan Maina	4	1.7	16	6.7
Sabon Gari	9	3.8	11	4.6
Total	83	34.6	157	65.4

Source: Field survey, 2009

The survey conducted shows that 34.6% of households have full connection to public water supply and 65.4% have only single type of connection. While the household without any of these connection gets water from public stand taps or use other sources of water supply for their daily activities.

Table 5.11 Summary of type of house connection in Lafia Town

Variables		
	Frequency	(%)
CONNECTION TYPE		
Full connection	83	34.6
Single connection	157	65.4
Total	240	100.0

Source: Field survey, 2009

5.7 PIPED AND UN-PIPED HOUSES WITHIN WATER SUPPLY NETWORK COVERAGE

The information here shows us the area covers by water network supply where some houses were connected while others were not connected but depends on public taps and well due to high cost of connection.

Table 5.12 Piped and un-piped houses in the area with public network

Neighbourhood	Piped House (%)	Un-piped House (%)	Active connection (%)	Non active connection (%)
Ungwan Mangu	45	55	20	25
Millionaire Quarters	35	65	20	15
Tudun Gwandara	30	70	10	20
Ungwan Alago	60	40	35	25
Tudun Kawari	40	60	20	20
Ungwan Tiv	50	50	30	20
Sabo Pegi	50	50	25	25
Ungwan Yazawa	55	45	40	15
Kofar fada	65	35	30	35
Rimi Uku	75	25	35	35
Ungwan Maina	80	20	50	30
Sabon Gari	50	50	20	30
Lafia (Average)	57.3	42.7	29.6	21.8

Source: Field survey, 2009

The study conducted reveals that 57.3% of households are connected to public water supply while 42.7% of households are not connected to water supply in spite of the water coverage network in their area but depends on public stand-pipe.

The households connected to public water supply have 29.6% of their connection active and 21.8% have their connection not active because they were disconnected by the Water Board.

“Active connection” means private water connections that are presently operational (i.e not disconnected by the Water Board for non-payment of bills).

The Non-active connections were disconnected by the water Board for non-payment of bills. Most of such households have refused to renew their connections apparently in reaction to the poor services performance of the Water Board.

5.7.1 MODE OF ACCESS BY UN-PIPED HOUSES

In Lafia town, many (in some areas, most) consumers are not connected, and rely on “on-sellers” who may purchase water from private boreholes and deliver it to them, collecting payment that reflects their costs (the water itself, the overhead costs needed to keep the delivery system working, and often a profit or margin of surplus). The delivery mechanisms in Lafia town are:

5.7.1.1 Public Stand tap

Under this mode of supply, the stand pipe, or public tap, is the most suitable and safe distribution outlet for households without pipe network connection to their houses. The stand pipe usually has two taps facing out wards. These taps is of the “waste not” spring-operated type. Each type is capable of discharging about 4 gallons per minute so that a 2 taps stand pipe will supply about 8 gallons per minute. It has been estimated that each stand pipe will serves no more than 500 peoples. This means, in fact, that the tap will have to supply water for 5 hours a day in Lafia where the consumption is 5 gallons per capita per day. A stand post or “kiosk” from which consumers must fetch the water. See plate 5.4



Plate 5.4 Show point source water supply

5.7.1.2 Supply by Water Board Tankers

The Water Board have about 5 tankers that supply water to the areas that are not connected or where there is shortage of water supply. Water delivery by tankers is usually in large volumes, to storage tanks. See plate 5.5 and 5.6



Plate 5.5 Show Water Board distribution Tanker



Plate 5.6 Show Kofar Kaura Tanker purchase water and sell to consumers

5.8 PROBLEMS OF WATER SUPPLY IN LAFIA TOWN

The cost of water faced by both piped and un-piped households in obtaining water differ greatly. Households with piped water supply simply pay a fee to the Water Board, which is flat rate for residential buildings. The cost of water is a complex situation for households without piped connections. This is usually involves a direct cash price paid at the source.

Service delivery is not keeping pace with demand, especially for the fast growing number of households living in Lafia town. This is evident because there have been inadequate supply since the creation of Nasarawa State in 1996 as the projected water demand stand at 16834m³/day as against the treatment plant capacity of 13,600m³/day. The projected water demand for 2009 is put at 42,900m³/day as against the installed capacity of the treatment plant of 13,600m³/day giving a demand gap of 29,300m³/day.

The calculated measurement of water production in Lafia waterworks at the month of October, 2009 reveals that the total estimated production was put at about 4,428m³/day but the present installed capacity of the treatment plant is 13,600m³/day. From this it shows that the average capacity utilization is put as 32.6%. Despite the importance of treated water to satisfy increasing water needs, the treatment capacity in Lafia town is very limited and is not fully exploited. Only 4438 m³/day of the water are treated.

The survey conducted reveals that the water coverage in Lafia urban area was only 33% and 67% of the urban area were not covered by the network. From the 33% of the urban area that was covered with public water supply network out of which 57.3% of the households have their houses connected while 42.7% are not connected to official networks but depend on public taps and other sources. The result also shows that about 30% of the Lafia urban population have access to potable water supply and others rely on alternative sources of water

supply that may be polluted while less than 40% have their water needs met. This suggests that water supply in Lafia town is grossly inadequate to meet the daily demand. There is need to increase water supply coverage in Lafia town.

5.9 WILLINGNESS TO PAY FOR IMPROVED WATER SUPPLY

One option open to government agencies for improving infrastructure service delivery is opening up such services for private sector participation. The rationale for privatization is usually the deterioration of service delivery (Pirez, 1994), but it is usually based on the ability, to pay. Due to the deterioration of services and governments inability, privatization is becoming an inescapable reality of present day urban management. In order to investigate the viability of that, household heads were asked if they could afford to pay for increase water bills and connection bill if water supply is commercialized.

5.9.1 Monthly income levels of household heads

It was shown from studies worldwide that household may spend an average of 3% and 5% of their income to finance their water supply requirements (Majundar, 1990).

Recent studies of water vending have also shown that many households pay much more than 3-5 percent of their income on water. For example, in perhaps the most carefully conducted study of household water expenditures among the urban poor; it was found that the poorest households in Port-au-Prince, Haiti sometimes spend 20 percent of their income on water (Fass, 1988, p. 175). In Addis Ababa the urban poor spend up to 9 percent of their income on water (Linn, 1983, p. 159). In Ukunda, Kenya, a town of about 5000 people 40 kilometres south of Mombasa, it was found that on average households were spending about 9 percent of

their income on water from vendors; many households were spending a higher percentage (Whittington, Lauria, Okun, and Mu; 1988).

Therefore, household willingness to pay for higher tariff and connection charges provided one of the ways of assessing how many consumers will be connected and stay connected if water supply is improved through PPP arrangement in the study area. This will help to determine the success or viability and durability of the partnership framework.

Table 5.13 Monthly incomes of respondents in (N)

Variables		
	Frequency	(%)
6. MONTHLY INCOME OF RESPONDENT		
10,000& below	15	3.0
10,001- 20,000	54	10.8
20,001-30,000	110	22.0
30,001-40,000	184	36.6
40,001-50,000	92	18.4
50,001 and above	34	6.8
No Response	11	2.2
Total	500	100.0

Source: Field survey, 2009

From the table above, the monthly income is both from primary and secondary sources of income. Generally, majority of household heads earn between N10, 001 to N40, 000 monthly, representing 69.4%, while those who earn less than N10, 000 monthly form about 3.0%. About 25.2% of household heads earn N41, 000 to N50, 001 and above where as 2.2% does not respond.

5.9.2 Monthly expenditure on water by household heads

The monthly expenditure on water by households was used to assess the ability of the respondents to pay for water supply if commercialized in Lafia town.

Table 5.14 Monthly expenditure on water by respondents in (N)

Variables	Frequency	(%)
6. MONTHLY EXPENDITURE OF RESPONDENT		
150 & below	34	6.8
151-300	68	13.6
301-450	163	32.6
451-600	121	24.2
601-750	82	16.4
751 & above	32	6.4
Total	500	100.0

Source: Field survey, 2009

From the survey conducted it shows that the level of household expenditure is generally low, about 32.6% of the respondents spent on a monthly basis an average of N375 on water supply and about 24.2% spent no less than N450 on water supply monthly. The result reveals the level of earnings of respondents as they are not likely to spend above 7% of their income on water supply. As the level of income increases, the likely that households would pay more for improved water services also increases.

5.9.3 Household WTP (% of income)

The Table below presents the proportion of income that the respondents are willing to pay for improved water supply, that is, constant water supply. Respondents were asked the amount they can pay for improved water services and the results were calculated in percentage vis a vis their monthly income.

Table 5.15 Household WTP for Improved Water Supply

Variables	Frequency	(%)
Household WTP (% of income)		
None	21	4.2
>1-1	23	4.6
2-3	214	42.8
4-5	108	21.6
6-7	72	14.4
7-9	54	10.8
No response	08	1.6
Total	500	100.0

Source: Field survey, 2009

The study shows that about 4.2 % of the respondents indicated that they were not willing to pay anything from their income for improved water services, 4.6 % were willing to pay below or 1 % and 42.8 % agreed to pay between 2-3% of their monthly income on improved water supply. While about 21.6 % indicated that they were willing to pay 4-5% or more for improved water supply for their households and 14.4% were willing to pay 6-7% of their income for improved water supply while 10.8 % were willing to pay 7-9%.

The study has shown that majority of the respondents are willing to use 3-7% of their income to pay higher tariff for water supply, particularly if the existing services are improved on, in terms of the quality, quantity, and the reliability of supply.

5.9.4 Willingness to pay for connection charges

Houses that are not connected were asked whether they were willing to pay for connection charges to the public water supply system if water supply is improved on commercial basis.

Table 5.16 Willingness to pay for connection charges

Variables	Frequency	(%)
Household WTP for connection		
WTP for connection charges	243	93.5
Non WTP for connection charges	17	6.5
Total	260	100.0

Source: Field survey, 2009

A majority of the respondents 93.5% in the entire neighbourhood expressed a willingness to pay for connection charges. However, about 6.5 % of the respondents indicated that they are not willing to pay for connection charges. This shows that as the connection charges increases, the willingness to pay for improved water services by household would decrease.

5.10 ASSESSMENT OF THE OPINION OF STAKEHOLDERS IN PUBLIC WATER SUPPLY PARTNERSHIPS

A survey was conducted on the stakeholders (private water companies, organizations, planners and environmentalist) to find out their acceptance to the proposed partnerships arrangement for water supply and management in Lafia town. The results are discussed below:

Table 5.17 Opinion on involving private sector in water supply in Lafia

Variable	Number of questionnaires administered= 20	
	Frequency	%
Involvement of private sector will solve water problem		
Agreed	16	80
Disagreed	4	20
Total	20	100.0
Response on willingness to participate		
Yes	13	81
No	3	19
Total	16	100.0
Response on reasons for failure of partnership in other sectors		
Reason	Frequency	(%)
Poor Government policies	16	80
Lack of legal and regulatory framework	13	64
Lack of good governance	17	85
Lack of stakeholders' involvement	11	55
Political interference	8	40
Poor market environment	19	95
Breach of contract agreement	6	30
Ranking of priority of the reason for failure in partnership		
Reason	Ranking (%)	Order of importance
Poor market environment, Lack of good governance and poor Government policies	100-80	Very good reason
Lack of legal and regulatory framework	79-60	Good reason
Lack of stakeholders' involvement and political interference	59-40	Fair reason
Breach of contract agreement	39-10	Poor reason

Source: Field survey, 2009

From the survey conducted on the stakeholders' opinions about the involvement of private sector on water supply in Lafia shows that about 80% agreed that private sector participation is the only way of solving water supply situations in Lafia town while 20 % disagreed with that opinion. Their reason was that Water Board only needs proper funding by the State Government. From the 81% that agreed for PSP arrangement for public water supply about 86% are willing to participate in the management if given the mandate while about 19% did not shows any willingness. The survey on the failure of PPP arrangement in Nigeria indicates that about 80% of the sample was with the opinion that poor government policies were the problem and 64% believed that lack of legal and regulatory framework was the failure. 85% shows that lack of good governance was the problem and 40% said political interference was the contributory factor to the failure of partnerships and 95% indicated that poor market environment while 55% and 30% said lack of stakeholders' involvement and breach of contract agreement respectively.

The ranking shows that Poor market environment, Lack of good governance with very good reason and poor government policies has the highest priority follow by Lack of legal and regulatory framework with 79-60%, Lack of stakeholders' involvement, and political interference with 59-40% and breach of contract agreement.

Form the opinion of respondent' it shows that PSP arrangement is a feasible option for solving water supply problem in our urban area. This also suggest for proper market feasibility study before the privatization of water in our urban centres.

CHAPTER SIX

ASSESSMENT OF PARTNERSHIPS ENVIRONMENT FOR PRIVATE SECTOR

PARTICIPATION

6.0 INTRODUCTION

This chapter is concern with assessing the enabling environment for a sustainable partnership model in public water supply. The model have been identified which need an enabling environment for its effectiveness and sustainability in the study area. These focus on the policies environment and willingness of consumers to pay for the services if water supply is improved through partnership.

6.1 ASSESSMENT OF POLICIES ENVIRONMENT

6.1.1 Water Board Edict 1998.

Nasarawa State Water Board was established vide edict No. 8 of 1998 and is charged with the responsibility of providing and supply water to the general public throughout the state.

In Nasarawa State, State Water Board has been empowered with edict No. 8 of 1998 to provide water to all urban areas all water sources development is under the Board control and no one has the right to develop water without the permission of the Board therefore, the Board shall grant permission to any person who wishes to develop water supply in the State. In the edict there was no change in the legislative environment in which the NSWB operate under as the Boards continue to function under the then existing edict which granted the Governments full control over the utilities. The institutions operate under the civil service rules and procedures in the conduct of their activities.

The strengths and opportunity of the utility (NSWB) include strong backing by law with government support and close relation with community based organization. The opportunities include the existence of water market, cost recovery and reliability of service. Its weaknesses and threats include lack of operational, managerial and financial autonomy to run their business, inadequate funding, and inconsistencies in government policies, corruption and frequent electricity power failures. This situation was prevailing at the time of this study.

6.1.2 National Water and Sanitation Policy, 2000

It is envisaged that an appropriate national water reform could not be achieved without the existence and due observance of the provision of a national policy. Hence, information on this policy will help chart an appropriate course of action on water sector reform.

According to the Federal Ministry of Water Resources (2000), the objectives of Nigeria's National Water and Sanitation Policy are as follows:

The centre-piece of Nigeria's water supply and sanitation policy shall be the provision of sufficient potable water and adequate sanitation to all Nigerians in an affordable and sustainable way through participatory investment by the three tiers of government, the private sector and the beneficiary.

The government believes that it alone cannot achieve all these goals. Hence, it provides a space for private sector participation towards achieving the objectives and strategies of the policy. According to the policy, the government will promote private sector participation by:

(i) The Federal Government shall create the enabling environment for private operators to participate in water supply and wastewater services in Nigeria;

(ii) The Federal Government shall establish a body to be charged with the responsibility of regulating the activities of water supply and wastewater undertakings in a sector permissive of greater private participation;

(iii) The Federal Government shall promote private sector participation in the water supply industry to attract resources for lasting development of the sector;

(iv) The Federal Government shall formulate laws to regulate the activities of the private operators in the water supply and wastewater services to guarantee adequate protection of consumers as well as fairness to the service provider.

At the policy level, the NWSSP promotes privatization as a viable strategy for sharing the burdens of water infrastructure investments and operational costs and as a solution to incessant water shortages and scarcities. It also emphasizes the need to cover the costs of service provision through revenue collection efficiency and changes to tariff structures. The Policy concedes that despite the onset of privatization, service provision should be maintained for the poor. But what it fails to elaborate upon is how these social commitments are to be mainstreamed into its implementation. For the Federal Government, the legal basis for the privatization of Federal Government's enterprises is the Public Enterprises (Privatization and Commercialization) Act. Although, the terms, "privatization" and "commercialization" are not defined in the Act, it is clear from its section 2 that privatization entails that the public enterprise must have a share capital. The implication is that the relevant public enterprise must transform into a limited liability company either through the repeal or substantial modification of its enabling law. With commercialization, it is evident from section 8 of the Act that although transformation into a limited liability company is not contemplated, commercialization will confer upon the public enterprise, autonomy especially

in connection with the fixing of the prices, rates and charges for goods or services and the capitalization of assets.

6.1.3 National Economic Empowerment Development Strategy (NEEDS) 2003

Nigeria's economic reform agenda titled National Economic Empowerment Development Strategy (NEEDS) commenced in April 2003. NEEDS provides a framework for a nationally coordinated strategy at federal, state and local government level towards accomplishing the socio-economic and industrial development of Nigeria. At the Federal level, the NEEDS program is three pronged – empowering people, promoting private enterprise and changing the way government works in Nigeria. One key feature identified under the strategy for promoting private enterprise is the need for private sector participation in the financing and provision of infrastructure. At the state level, there has been an endorsement of the NEEDS program and a commitment to a minimum set of criteria which includes infrastructural development.

6.1.4 Infrastructure Concession Regulatory Commission Act 2005

In Nigeria, the Federal Government and some of the states have recently enacted laws in the area of private sector participation in the development and maintenance of public infrastructure. The Lagos State Roads, Bridges and Highway Infrastructure (Private Sector Participation) Development Board Law is one of such laws and it will form the focus of this article. Others laws include the Lagos Water Sector Law and the recently enacted Infrastructure Concession Regulatory Commission (Establishment, etc.) Act 2005. Where appropriate, these other laws will also be considered.

These laws on infrastructure financing are aimed at promoting privately financed infrastructure projects in line with recommendations of the United. The Infrastructure Concession Regulatory Commission (Establishment, etc) Act 2005 provides for the participation of the private sector in financing the construction, development, operation, or maintenance of infrastructure or development projects of the federal Government of Nigeria through concessions or other contractual arrangements.

Nations Commission on International Trade Law (UNCITRAL) on model legislative provisions for privately financed infrastructure projects which the General Assembly of the United Nations recommended for due consideration by member states when revising or adopting legislation on private participation in development and operation of public infrastructure.

The edict and water policy acts is the legislative framework that provides for the management of water services is outdated. Some Acts appear to be in conflict and effective and inefficient management is impeded. In isolation, many of the legislative barriers are small, but collectively they highlight systemic problems with the framework that need to be addressed, sooner rather than later. Many discuss strongly favoured a consolidation of water services act. The review of local government act 1974 and the favoured approach of enabling local government legislation will force the development of new water services legislation.

6.1.5 Framework for the selection of local and international private companies

In order to achieve the aims and objectives of Nigeria's National Water Policy various issues need to be considered. We also need to keep in view that concern is primarily on enhanced

water supply in line with global and national targets, goals and standards. Hence, privatization (conventionally defined) is just one of the options towards achieving this goal.

Table 6.1 Proposed Frameworks for Nigeria Environment

Settlement Types	Types of Settlement			
	Urban		Small towns	Rural
Max. Water Consumption	120 litre/p/d		60 litre/p/d	30 litre/p/d
Population size	Above 0.5 mill (“city”)	20,000 – 0.5 mill	5,000 to 50,000	Less than 5,000
Possible Future Management (PSP)	Publ. Utility, Nat. & Intern. Companies	Publ. Utility, Local, Nat. Companies	Community, Priv. Entrepreneur. Local Companies	Community, private, entrepreneur.
Water Service Level	House connection (120 l/p/d)	House connection (120 l/p/d)	Street standpipe (60 l/p/d)	Water point, motor/hand pump 30 l/p/d
Comments on categories	Urban developed infrastructure		Poor infrastructure, unregulated development	Rural, low pop. Density.

Source: Federal Ministry of Water Resources (2000)

Table 6.1 shows the proposed framework for water supply provision and involvement of local, national and international Companies. This framework was provided by FMWR, 2000 as guide to engage private sector participation in water supply management.

From the framework, an urban area that is above 0.5million people is considered as ‘city’ and public utility should be provided with a possible future management (PSP) either National or International Companies while an urban area of 20,000-0.5million people is considered as ‘town’ and a public utility should be provided with possible future management (PSP) by engaging either Local or National Companies. The framework also shows that an area of 5,000-50,000 people is to be considered as ‘small towns’ with a community water provision and a possible future management by either Private entrepreneur or Local Companies while as area of less than 5,000 people is regarded as ‘rural area’ with a community water provision and a possible future management by private entrepreneur.

6.2 ASSESSMENT OF REGULATORY FRAMEWORK

6.2.1 National guidelines for regulating water supplies in Nigeria: Regulatory framework overview 2006

These national guidelines on water supply services regulation are intended to set out the proposed approach to enhanced regulation of urban water supply services in Nigeria in furtherance of the national policy and the delivery of improved services to the urban population based upon two key aspects:

- 1) Key legal and institutional reforms to provide the basis for establishment and operation of independent regulation of water supply services at the state level (including the establishment of State Water Regulatory Commissions), supported by national coordinating mechanisms.
- 2) A national strategic approach to promoting improved management and investment in the water supply sector, the Water Investment Mobilisation and Application Guidelines (or WIMAG), to be implemented in each participating state through a memorandum of understanding (MOU).

These guidelines support the implementation of a regulatory framework that reflects best practice approaches to regulation in the water supply sector.

Best practice indicates that a regulatory framework for water supply services should:

- Provide for the separation of the key functions of policy making, regulation (and tariff setting) and service provision.
- Support capable, properly resourced and empowered regulators and the independence, legitimacy and accountability of the regulatory process.

- Support strong, autonomous (free from government interference) and self-reliant water utilities.
- Ensure that the interests of all relevant stakeholders are taken into account in regulatory decision making.
- Provide a basis for clear and transparent procurement of private sector participation in the water supply sector.
- Support the objectives of economic and social regulation.

A model state Water Supply Services Regulatory Law (WSSRL) has been drafted for individual state governments to use as a basis for establishing state regulatory frameworks.

The principal purposes of the law are to:

- Clarify the institutional roles in relation to policy, regulation and service provision.
- Establish the state water regulatory commission.
- Provide a clear legal basis for the regulator's powers, functions and governance arrangements.
- Provide for the setting of service standards and regulation of tariffs.
- Provide for licensing of water service providers, and the rights and obligations of water service providers.
- Provide for review, appeals and enforcement mechanisms.
- Establishes a basis for improved reporting and data collection.
- Provides for state-wide development plan.
- Sets out minimum provisions governing private sector participation.

Despite with this policy in place, the state government have not made any effort to establish state water laws and state water regulatory commission. These guidelines have provided us with a basis for private sector participation to improve water supply in Lafia.

6.3 POLITICAL ENVIRONMENT:

There are a number of obstacles facing private participation in some sector in Nigerian due to political uncertainty. But there is generally political will to bring in private sector to participate in managing water supply; this was clearly shown by various policies enacted for involvement and protection of private sector in service delivery. Therefore, there is strong commitment by the Nasarawa State government through its policies to bring in private investor to the State to develop water supply (ADB appraisal of Plateau and Nasarawa water supply project, 2005). A private consortium (contractor Ibrums Nig. Ltd) was engaged with a contract to replace dilapidated equipments, overhauling of high-lift pumps, refurbishing of treatment galleries and extension of distribution network as well as procurement of additional 1000KVA electricity generator and also the recent concession agreement signed (On Frid 18th Feb. 2011), by the State Govt with a private consortium in Nigeria to development 20 mw electricity in the State which shows a clear political commitment private sector.. Political environment is also relatively stable over the years which can guaranty private sector investment

6.4 ASSESSMENT OF THE LEVEL OF ENABLING ENVIRONMENT FOR PSP OPTIONS

There are enabling environments both locally and nationally for water supply reform options and this section try to assess the level in order to ascertain the reform options to be adopted for water supply system.

Table 6.2 Assessment of enabling environment for possible PSP reform option in water supply system

S/No.	criteria	Grading matrix		Reforms option
		Level	Score	
1	Size of NSWB	Bigger Medium Small	10 5 2	5
2	Annual revenue collected from consumers	>100% of O & M >50% of O & M <50% of O & M	10 5 2	2
3	Level accounted for water	20% 20-50% >50%	10 5 2	2
4	Availability of reliable information on current Audit report	Very good Good Fair	10 5 2	5
5	Regulatory framework	Strong Moderate Weak	10 5 2	5
6	Enabling policies	Very good Good Fair	10 5 2	10
7	Political will to reform	Strong Moderate Weak	10 5 2	10
8	Willingness to pay for higher tariff	50-100% strongly agreed 20-50% Agreed <20% Disagreed	10 5 2	10
9	Stakeholder support for PSP	High Moderate Low	10 5 2	10
10	Availability of partners both locally and nationally	Adequate Fairly adequate Not adequate	10 5 2	5
11	Size of the urban population	<2million 2m-500,000 >500,000	10 5 2	2
	Total			66 points

Source: Modified after Federal Ministry of Water Resources (2001), World Bank, 2004

REMARK:

Total points score is possible option for water supply reform in Lafia town

70 or more points score- immediate investment project or other PSP options

50 or more points score- Preparation of lease + lifeline investment during preparation, with investment after lease signed

30 or more points score- preparation of management contract, with possible investment after contract signed

10 or more points score- technical assistance through the Federal Ministry of Water Resources

Note: For towns having less than about 500,000 urban populations, other considerations may apply.

From the above assessment of the enabling environment, it shows that the reform option in Lafia environment- scored 66 points which fall on preparation for PSP options for public water supply system. By these assessments, the study shows that Lafia environment is ripped for PSP reform options.

6.5 ASSESSMENT OF PPP MODELS FOR PUBLIC WATER SUPPLY SYSTEMS

The problems with the existing management framework of public water supply are that of institutional development defined as the qualitative and quantitative changes in management, operations and maintenance of an organization which have hindered the efficiency supply of water in Lafia town. However, Nasarawa State Government is finding ways towards improving the Board institutionally so that it can be efficient and autonomous. Hence, private sector participation is a necessary ways in which this can be done learning from available

literature review of case study from various countries of experience. Four options of reforms were identified for application and assessed using some factors based on institutional and management framework of the Water Board to come out with appropriate option for application.

Therefore, there are four main models of PSP for water supply, each of which has different levels of ownership and management. The model (World Bank promoted) where a private commercial company enters into one or a combination of possible contracts or arrangements with a host government. These range from service to concession contracts and are as follow:

- Service contract (Nasarawa State Model) billing and collection with low autonomy and limited responsibilities;
- Management contracts (Cross River Model) where the operator assumes operational technical responsibilities but with no commercial risk;
- Lease contract (Kaduna model) in which the operator is responsible for management and maintenance but not for investment
- Concession arrangement (Lagos model): Lagos State awarded a contract where the private operator is involved in financing both working capital for operation and maintenance and management of the whole system, and investment for the expansion and rehabilitation of the system.

6.6 FACTORS FOR ASSESSING MODELS OF PARTNERSHIP IN WATER SUPPLY

The likely options for PSP to be applied in Lafia town shall be assessed using some factors based on countries of experience successes in relation to the existing management framework of NSWB and to come out with the best option. The factors for assessing the likely partnership options for Lafia water supply shall comprised of the following; institutional arrangement of the water Board, water resources, financial situation, size of the utility,

investments requirements, staffing and human resources, etc. These factors were used at Decision makers' workshop in Dakar, Senegal, 2002 to assess the private sector participation in water supply and sanitation services in Sub-Saharan Africa.

Table 6.3 Assessment of PSP reform options based on Lafia conditions

S/No	Factors (existing water supply utility)	Grading matrix		PSP options			
		Level	Score	Service contract	Management contract	Lease contract	Concession contract
1	Institutional arrangements: degree of independence of the public utility	50-100% 10-50% <10	10 5 2	2	2	5	10
2	Water resources: availability and closeness to the sources	Yes No	5 0	0	0	5	5
3	Financial situation of the sector	Viable Non-viable	5 2	2	2	5	5
4	significant tariff adjustment	High Moderate Low	10 5 2	2	5	10	10
5	Size of the public utility	Big Medium Small	10 5 2	2	5	10	10
6	Investments requirements	Long term Medium term Short term	10 5 2	2	2	5	5
7	local capacity to generate funds	High Moderate Low	10 5 2	2	5	10	5
8	Cost-recovery tariff	Highly necessary Necessary Not necessary	10 5 2	2	2	5	10
9	Staffing and human resources	Understaffing Overstaffing	5 2	5	5	5	2
10	Availability of reliable information on facilities, accounts, high return, customers etc.	Very good Good Fair	10 5 2	2	5	10	5
Total				21 points	33 points	70 points	67 points

Source: Modified, 2010 based on Private sector participation in water supply and sanitation services in Sub-Saharan Africa. Decision makers' workshop Dakar, Senegal, 2002

The table above shows the assessment of the PSP reform options on the context of the public water supply privatization in Nigeria and part of West Africa. A matrix was provided to determine the level of its operation and successes. The first factor that was used here is the degrees of independence of water supply utility based on the study investigated shows that water utility privatization under concession have 50-100% degree of independence, the lease model ranked between 10-50% with a score of 10 marks and 5 marks respectively while the management and service option has less than 10% degree of independence, These were ranked based on the objectives in which the PSP options water reform was achieved and the result indicated that the concession option may need higher degree of independence follow closely is the lease option while the management and the service option have 2 mark each.

The assessment of the public utility shows that it has an available water resource which is close to the source for concession and lease model while the management and service model are not. The financial framework was discovered to be more viable under the concession and lease model, which may not be favourable for the service and management option to improve water sector. The study also shows that the concession and lease exhibits high tariffs adjustments follow by the management model and service contract. The assessment also show that concession model and lease model scored 10 marks which to bigger size of utility while the management and service model need a small size of utility to achieve its objectives. The assessment also shows that the concession and lease model need medium term investments and the service and management options may need only short term investment. In addition, the lease model has a local capacity to generate funds and high level of cost-recovering tariff more other options or reform" The assessment also shows that the staff and human resources are understaffed and inadequate which favour the service, management and lease contract with 5marks each while the concession has 2 marks. More so, the available information on the system favours the lease option compare to other reform options.

6.6.1 SELECTING THE BEST OPTION FOR PARTNERSHIP ARRANGEMENT

From the above assessment of different PSP options based on case study experiences and NSWB conditions show that the lease contract ranked the highest with 70 points following closely is the concession model with 67 points. The management and service contract ranked 33 and 21 points respectively.

Therefore, lease contract with the highest points has emerged as the option of choice for partnership arrangement for public water supply systems in Lafia urban environment. This is a necessary step toward future concession option if the environment is favourable or ripe for the higher option, Therefore, a lease is a good preparatory step towards longer concession contract because in some time, a concession may become necessary to generate required investments necessary for Lafia town.

The evolution of the model of "lease" has been driven by efforts to redistribute risks among the operator, the Private Company and the Government.

6.7 SUMMARY OF FINDINGS AND OBSERVATIONS

The findings shows that NSWB is faced with the challenges of institutional development (this is defined as the qualitative and quantitative changes in management, operations and maintenance of an organization in an efficient manner), which need a major institutional reforms to meet the water requirements for Lafia urban area. The findings in this study depict a typical situation in most Nigerian urban centres with regard to poor state of water supply. For quite some time now, most Nigerian cities are grossly under service with pipe borne water (World Bank, 2006). The recent trend (from 1999 onwards) has been the increasing involvement of private companies in urban water supply and development assistance from international donor agencies and multilateral agencies in order to improve efficiency in service delivery.

From the study these problems were observed:

6.7.1 Poor operational management: The State Water Board is currently trying to produce as much water as they can, in a very constrained operating environment and with a production capacity insufficient to supply the existing needs. Even the design capacity of water systems often cannot be attained because of the deteriorated state of facilities and erratic public power supply.

The State Water Board wants to operate at reasonable capacities but is constrained by power unreliability and high cost of electricity. The Board also suffers from maintenance of water treatment plant, leak detection, billing and collection and customer relations and marketing,

water quality control, pipe network and appurtenances, high cost of chemical and payment of bills by domestic consumers.

In an attempt to contain operating costs, the State Water Board has reduced their hours of operation to match available revenue further impacting on the level of service provided and the willingness of consumers to pay. But they also cut back on their operations and maintenance expenses to the point where, virtually no maintenance is being carried out, leading to rapid deterioration of the systems and the need for costly and premature asset replacement. The poor operational management are manifested into:

1. Low water coverage: The results obtained shows that water coverage in Lafia urban area was only 33% and 67% of the urban area were not covered by the network. From the 33% of the urban area that was covered with public water supply network out of which 57.3% of the households have their houses connected while 42.7% are not connected to official networks but depend on public taps and other sources. The result also shows that about 30% of the Lafia urban population have access to potable water supply and others rely on alternative sources of water supply that may be polluted while less than 40% have their water needs met.

2. Water Losses and cost recovery: In addition to the need to increase coverage, there is some inefficiency in the system associated with, among other things, the low levels of maintenance of the infrastructure. Its deterioration is causing physical losses, with 40 per cent of the water being lost through leakage. High levels of water loss, high financial losses due to poor ability to recover costs, lack of metering, and low transparency and accountability in the system have identified as major problems of effective water provision and management in the area during the survey conducted.

3. Inadequate service system: Service delivery is not keeping pace with demand, especially for the fast growing number of households living in Lafia town. This is evident because there have been inadequate supply since the creation of Nasarawa State in 1996 as the projected water demand stand at 16834m³/day as against the treatment plant capacity of 13,600m³/day. The projected water demand for 2009 is put at 42,900m³/day as against the installed capacity of the treatment plant of 13,600m³/day giving a demand gap of 29,300m³/day.

4. Low water production and distributions: The study also shows the calculated measurement of water production in Lafia waterworks. Estimated at the month of October, 2009 reveals that the total estimated production was put at about 4,428m³/day but the present installed capacity of the treatment plant is 13,600m³/day. From this it indicates that the average capacity utilization is put as 32.6%. Despite the importance of treated water to satisfy increasing water needs, the treatment capacity in Lafia town is very limited and is not fully exploited. Only 4438 m³/day of the water are treated.

6.7.2 Inadequate funds/insufficient Manpower: The operations and management of the water systems is done solely by the staff of the Board. This is faced with serious problems of lack of funds to train personnel to enable them meets the challenges of providing adequate water and insufficient manpower to carry out daily operation of the Board. In addition the funds to adequately maintain existing system and expansion of the system are inadequate and also lack of funds also means the lack of capital to invest more in the expansion of existing water system to meet the growing need. Due to the fact that water supply is capital intensive the private sector is to encourage investing into water supply.

6.7.3 Poor pricing policies: Generally it is held that water supply should be provided at a very low cost or at no cost to the consumers. This is especially true in situations in which the relative shortage is high. This approach has resulted in very high level of overexploitation in some regions, and a social reluctance to accept price increases. Water distribution has been highly subsidized, both in investment and in operation. Water administrative and pricing policies in Lafia town have not been very effective in facing increasing water demand under circumstances of relative water scarcity and budget limitations. This situation has had the result that water supply revenues have made little contribution to financing and that, consequently, the water sector is increasingly dependent for its development on the State budget.

6.7.4 Low tariff/ commercial losses: The survey shows that the water supply tariff is very low which cannot offset the cost of water production couple with unreliable data on household water use and other entities. Billing are based on presumed consumption and collection have been inefficient as indicated on the consumers arrears from the performance indicators of the Board on table 4.6 with 5677 registered consumers and number of arrears is 3621. The system suffers commercial losses such as unbilled and uncollected revenues, theft and illegal connections as revealed by the study.

6.7.5 Existing water supply is clearly inadequate: The Lafia urban water supply situation is probably among the most acute in Nigerian cities, considering the fact that much attention was not given to public water supply in Nasarawa State. The consequence of this development is that the water supply requirements for the population are not met as shown earlier in the research, only a small fraction of these needs (33%) are met by the Water Board. This has implications for public health in Lafia town.

6.7.6 The enabling environment: The assessment of enabling environment in terms of willingness/ability to pay, stakeholders' participation and the enabling policies reveals that Lafia environment is ripe for water supply reform options.

1. Enabling policies: The assessment of enabling policies reveals that there are policies and legislations both locally and nationally that support private sector participation as one of the ways of improving water supply in our cities.

The National Water Supply and Sanitation (WSS) Policy, which was officially adopted by the Federal Government of Nigeria in 2000, enunciates the basic principles and defines the enabling environment for sustainable development of WSS. The National Water Resources Policy has been prepared and it constitutes the principal instrument for the sustainable water development. Existing edicts for water supply and sanitation comprise the following acts and decrees: (i) Decree 101, the decree vests control of Nigerian Water Resources in the Office of the Federal Minister of Agriculture and Water Resources, (ii) Decree no. 35 of 1987, establishing the 11 River Basin Authorities, (iii) Edicts establishing State Water Agencies.

2. Assessment of willingness to pay: It has become evident as confirmed from this survey that the people are willing to pay if water supply is improved. The study has shown that majority of the respondents are willing to use 3-7% of their income to pay higher tariff for water supply, particularly if the existing services are improved on, in terms of the quality, quantity, and the reliability of supply.

3. Ability to pay for water supply: This study reveals that there exists consumers' ability to pay as inherent in the monthly expenditure on alternative sources of water supply. Expenditure on water supply from other sources shows that residents spent about N60 buying water each day from water vendors, N45 from Neighbour's borehole, N30 from water Stand pipe, N50 private borehole and N40 from other sources. The households across Lafia Urban

area spend an average of N50 daily (that is, N1500 monthly) to buy water especially during the dry season. While an average cost of public water supply system in Lafia town by households with piped water supply show consumers paid N400 single tap per month and for full house connection is N800 per month.

4 Stakeholders' willingness to participate: The stakeholders' survey shows that private sector participation is the option for solving water supply problems in Lafia town and about 80% are willing to participate in the process.

6.7.7 Assessment of PSP models: The investigations from the study show that for improved efficiency, effectiveness and sustainable water supply in Lafia, a lease contract would seem the most practical and realistic private sector participation option for Lafia town at this moment to achieve the national and state water supply policy objectives, Therefore, the study has adopted the lease contract as the best model for public water supply in Lafia.

6.8 PSP options as Principal Thrust for Lafia Urban Water Supply reform

The summary of findings above shows that there are problems with the existing management of public water supply system in Lafia town. The lesson from the past shows that the government alone cannot manage to sufficiently provide water services to acceptable level; therefore, the shortest route to the achievement of this goal is structural reform of the water utilities which are service providers addressing the shortcomings which currently beset them. Thus the thrust of the reform is to steer the development of NSWB along the path of PSP. However, PSP is not viewed as a rigid model, rather as a wide range of options which, at a minimum, seek to introduce commercial criteria in pricing, service delivery and/or allocation of resources.

CHAPTER SEVEN

PROPOSALS, RECOMMENDATIONS AND CONCLUSION

7.0 PROPOSED PARTNERSHIP ARRANGEMENT FOR PUBLIC WATER SUPPLY SYSTEM IN LAFIA TOWN

The study above shows that public water supplies in Lafia town need a major institutional reform and not outright privatization of the sector because of its implications in urban development. Therefore, a ten years lease contract is proposed for public water supply in Lafia town and before the privatization program becomes effective, the Water Boards must allow for adequate and timely tariff increases in order to ensure their financial soundness, long-term viability and sustainability. It may be desirable for the NSWB to have a continuous training programme through Training of Trainers scheme to provide the Boards with qualified staff to effectively and efficiently manage all technical infrastructures improve productivity and reduce staff expenditure.

7.1 Guiding Principles for the reform

- Maximum benefits from PSP will come with higher degree of autonomy to operator compatible with risks involved and what can be realistically achieved in critical areas: tariff, staffing, investment.
- Reform has to lead to financial viability and long-term financial autonomy through internal cash generation. The short-term financial viability (covering O & M) of systems to be

established as autonomous entities should be established at the planning stage, i.e before undertaking related institutional restructuring.

- Tariff adjustments to achieve at least short-term financial autonomy, enabling legislation and institutional restructuring should be introduced before PSP. If required tariff increases are too steep, operational subsidies need to be secured as part of PSP during the recovery tariff.

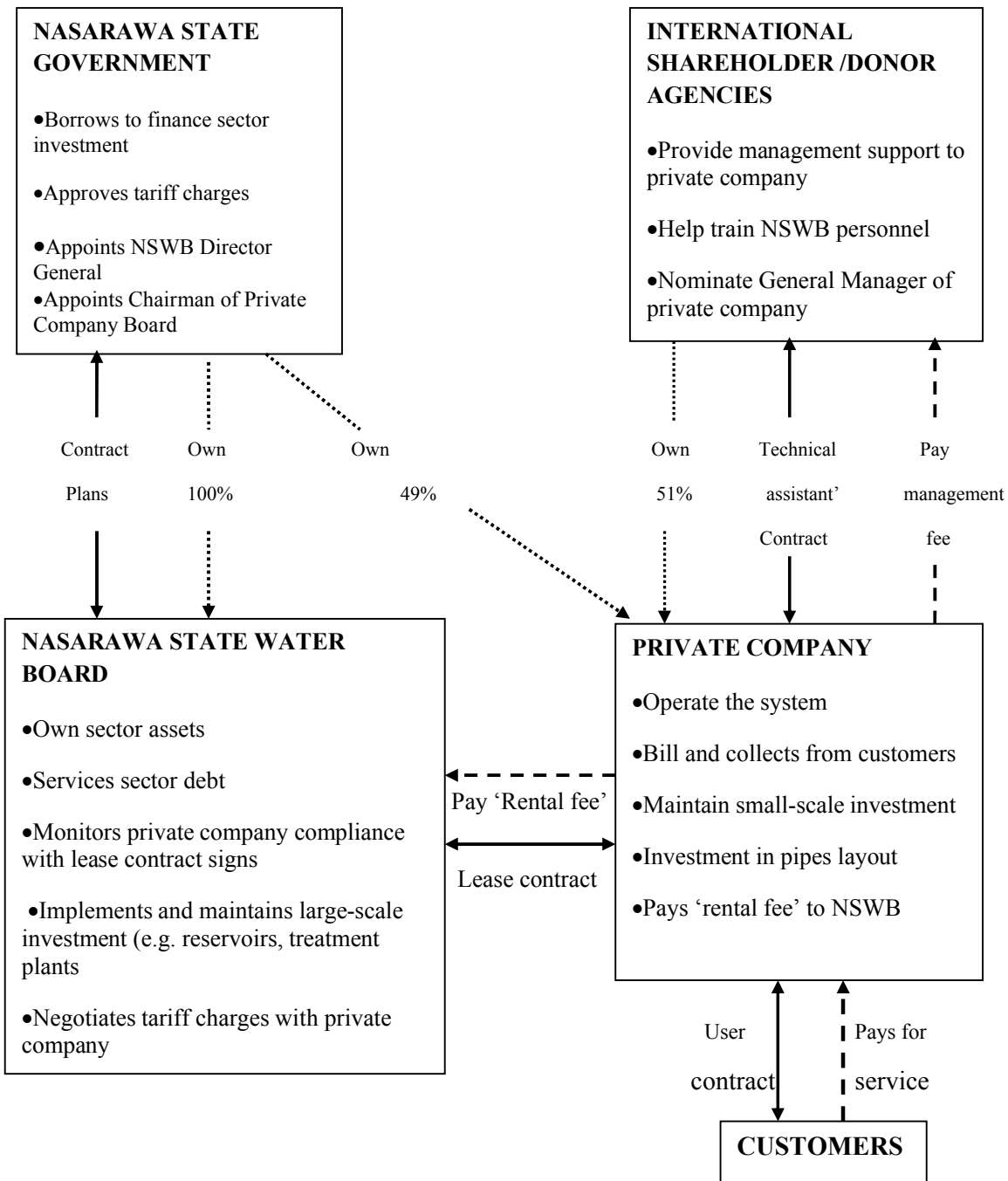
- Allocation of responsibilities among public sector actors involved in the reform need to be clear and credible, Lack of confidence in untested institutional arrangements will discourage bidders.

7.2 PARTNERSHIP ARRANGEMENT

The partnership arrangement in Fig 7.1 show that the asset ownership is by the public sector (Government) and the Government will put in capital investment to develop the water supply whereas the operation and maintenance of the system will be done by the private operator while both parties share in the commercial risk.

The reform involved a set of three contracts: one between the Government and NSWB (“Contrat plan”); one between NSWB and Private company (the lease contract), and one between private company and its international shareholders (a “Technical assistance” contract). In addition, there are contracts between private company and its customers, i.e., users of the water system.

Figure 7.1 Proposed Partnership Arrangements



In this new arrangement, the government will enter into a lease arrangement with private sector operation for water services in Lafia town. Public Private Partnership (PPP) lease contract is a tri-partite agreement to be signed by the State government between the private

consortium (asset holding company) with the Nasarawa State Water Board and the State Government as Guarantor.

The main aim of this partnership was to substantially improve on the operational efficiency and revenue collection levels and to provide an economic and reliable consumer service. In the lease contract two companies were to be involved: a state-owned water authority (Nasarawa State Water Board) and a water private company (An asset holding company). The state will own (49%) and a private consortium will own (51%) of its operation and maintenance whether national or local asset holding companies. In addition to the lease contract, the one international partner will sign a “technical assistance contract” with private company to provide managerial support, technical assistance and financial expertise, and to help train NSWB personnel. As their contribution to private consortium, international partner will provide 51% of the initial capital. For its contribution, the Government donated equipment and infrastructure from NSMWR and, through NSWB, took responsibility for accumulated sector debt.

7.3 PARTNER SELECTION

The times of a free selection of partners in the field of public procurement are over – at least since the coming into force of the Public Procurement Act 2002. When looking for a suitable and qualified partner, the “rules” under the public procurement law have to be observed. In the **pre-qualification phase** it is often advisable to restrict the number of bidders to three to five. Due to the complexity and volume of the subject to be negotiated (e.g. technical, economical, financial and legal aspects); a higher number of bidders would be excessively time-consuming, which would entail an incalculable increase of costs. The best bidders are usually pre-selected on the basis of strict criteria, in particular with regard to quality and the

number of similar references. Young domestic enterprises find it often difficult to submit qualified references. In order not to be eliminated at an early stage, it is advisable to substitute the proof of performance by the resources of a sub-contractor or through the creation of a consortium.

7.4 GENERAL OBLIGATIONS IN THE PARTNERSHIP

7.4.1 Private Sector Partner

- Undertake the PPP lease Contract for an initial period of 10 years and prepare the Board for eventual transition to a full concession;
- Provide specialist personnel and manage the operations of the Water Board: Production Transmission, Distribution, Billing, Revenue Collection, and Commercial Operation;
- Provide reliable customer service and water coverage with optimal use of resources;
- Take all steps necessary to achieve the agreed performance objectives by maximising water production and revenue generation;
- Provide training and development opportunities for the NSWB staff assigned;
- Propose and recommend adjustments to Tariff Schedules and other charges for water services.
- Finance working capital and replacement of certain components, such as connections, pipes below a certain size, small pumps etc.

7.4.2 Public Sector Partner (NSWB and Nasarawa State Government)

- Setting of Tariffs and consultation with the Private Partner for Tariffs changes;

- Allow, the Private Partner to manage the agreed functions of the Board without Interference;
- Management of Executive Division functions;
- Assignment of relevant assets to the Private Sector partner;
- Assignment of relevant NSWB personnel to the Private Partner;
- Payment of salaries of NSWB staff.

7.5 Establishment of Nasarawa State Regulatory Commission

The research proposed the establishment of a management regulatory commission in Line with the National Guidelines for Regulating Water Supplies in Nigeria 2006. This is an independent statutory body to be saddled with the responsibility of regulating both the technical and economic regulation of the water sector. The Regulatory Commission would be funded through a Regulatory charge to be added to the water tariffs. The commission shall comprise of membership from Federal Ministry of Water Resources, State Ministry of Water Resources, State Water Board and Stakeholders in the society.

7.6 POLICY RECOMMENDATIONS FOR EFFECTIVE PARTNERSHIP FRAMEWORK IMPLEMENTATION

Making water supply services accessible should not only be considered as one target of the MDGs, but also as a core responsibility of both national and local governments to satisfy the legitimate rights of all citizens. In this regard, governments are increasingly seeking professional expertise through various forms of Partnerships, which are expected to

significantly contribute to achieving national objectives in affordable ways. However, successful Partnerships require the following:

1. Political commitment

There should be a strong political will and commitment from government to promote water supply system, sustained consistently over a long time period, is critically important to the success of public-private partnership.

2. Regulatory and legal framework

To ensure and protect the interest of the public and other stakeholders, government should play a regulatory role in the whole process and formulate clear legislations that will give guidance and confidence to all partners, especially to private operators working in the sector, to determine their own policies and plans and to protect their financial interests and property rights. The existing laws and legislations should be strengthened to ensure successful PSP.

3. Contracting out with private sector

Qualified local, national and regional enterprises should be given the opportunity to compete for PPPs. Governments should consider involving small-scale providers, especially community-based organizations and private local companies, which hold a comparative advantage and can play a key role in reaching un-serviced groups of households in the urban areas.

4. Tariffs and subsidies

i. Governments should ensure that tariff levels and structures benefit all consumers, including low-income ones, by selecting appropriate pricing systems, such as the increasing block tariff and uniform volumetric charge.

ii. When governments decide to provide full or partial subsidies, this should be restricted to providing one-time assistance for household connections and stand posts, especially in poor areas, so that consumption will remain equitable for all consumer categories.

5. Option for the poor:

The low income group should be provided with suitable low-cost options of obtaining water supply through the public stand posts and commercial distribution outlets. These options have proved suitable and convenient in several low income situations in view of the lower cost of distribution.

6. Sources of Funds:

Local sources of funds - which are generally cheaper than foreign sources - need to be explored for investments to upgrade existing facilities. Federal, State, Local government and any donor agencies should pull their resources together to ensure the success of the reform.

7. Information and communications:

Information and communications are essential components of the reform. Therefore, the reform process should be carried out while keeping stakeholders well informed and the public must be properly sensitized at each step of the process towards PSP. This will prevent confusion from taking place and lead to capacity building.

7.7 CONCLUSION

Provision of water supply and management poses serious challenge to most cities in Nigeria. The increasing pressure on the government from challenges emanating from the water sector has made private sector participation inevitable just as it has brought improved performance to some few developing nations where it has been practiced. One of the policy trusts of National Water supply and Sanitation (NPWSS), 2000 and the MDG's goals is to provide adequate and potable water supply to the urban and rural population by the year 2015. To achieve the national and state water supply policy objectives major institutional reforms must be carried out in our water sectors.

More importantly, meeting the Millennium Development Goals (MDGs) on water and sanitation by 2015 will require a dramatic scaling up of efforts, both in terms of the extent of action required and the speed with which these actions must be undertaken. Also, the NPWSS policy and World Bank programmes have identified commercialization and private sector participation as some of the options to these problems. PPP option for water supply offers one of the ways out of the urban water problems in our city and meeting the 2015 MDGs. Once it is promoted and appropriate division of roles for the identified partners is decided, improvement will be recorded without further increase in investment by government. Therefore, the NPWSS policy and World Bank programmes have identified commercialization and private sector participation as some of the options to these problems.

The discussion above has provided some useful insights as to the way forward for water privatization in Nigeria and that there is no one-model-suits-all approach to water privatization. Each country must therefore design a framework most suitable to its environment. Finally, the proposed partnership arrangement for public water supply system in Lafia town can act as a starting point for organizing various other partnerships to deal with urban infrastructure service management and delivery problems in Nigeria.

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APPENDICES

APPENDIX 'A'

USE SURVEY QUESTIONNAIRES (Household connected to Water Board supply)

DEPARTMENT OF URBAN AND REGIONAL PLANNING

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA

Research questionnaire on potable water supply

This survey is being conducted on water supply in Lafia with a view to making proposals for its improvement. It will be appreciated if you would kindly answer the following questions. All information provided shall be treated confidentially and used purely for academic purposes.

Thank you.

Section A: Household characteristics

(Households connected to the public piped water)

Note: please tick the appropriate answers.

1. Age of respondent
2. Sex of respondent.
3. Marital status.....
4. What is your family size?
5. Level of Education. a) None b) Primary school c) Secondary d) Post secondary
e) University f) Others (specify).....
6. Occupation of respondent. a) Civil Servant b) Farmer c) Artisan d) Trader
e) others (specify).....
7. How much do you earn per month? (Indicate income from all sources).....

Section B: Water supply situation

8. Which source(s) do you rely on for your water supply? a) Well b) Spring c) Public stand-pipe d) Water vendor Borehole
9. If Public stand-pipe, what type of water supply connection is in your residence? a) Full house connection b) Single tap

10. How often you have water from the public tap? a) Occasionally (b) Days in a month..... (c) Hours in a day.....
11. What is the quantity of water used daily for all purpose in your house?
 (a) <140 (b) 140-160 (c) >160
12. What is the quantity of water used daily for domestic purpose?
 (a) <40 (b) 40-50 (c) >50
13. How adequate is supply from public stand-pipe? (a) Adequate (b) Not adequate
 (c) highly inadequate
14. Is your house connection metered? a) Yes b) No
15. Is your connection active? a) Yes b) No
16. How much is your bill for the supply from the Water Board (indicate average amount per month).....
17. Do you pay your bills regularly? a) Yes b) No
18. If No, why.....
19. When was the last payment made?
20. In case water supply improves, will you be ready to agree to pay increased water bill?
 a) Yes b) No
21. If No, why.....
22. How much maximum can you pay as monthly bill?
23. Would you like to be involved in the management of water supply in your area? a) Yes
 b) No
24. If yes, what are your reasons? a) You want to improve the water condition of your area
 b) No particular reason c) Others (specify).....

Section C: Suggestions

25. What is your general opinion on the state of water supply in Lafia? a) Very poor
 b) Poor c) Fair d) Good
26. What is your general opinion on the main causes of the problems?.....
27. Give general suggestions on how the situation may be improved?

Thank you for your attention.

APPENDIX 'B'

USE SURVEY QUESTIONNAIRES (Household not connected to Water Board supply)

DEPARTMENT OF URBAN AND REGIONAL PLANNING

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA

Research questionnaire on potable water supply

This survey is being conducted on water supply in Lafia with a view to making proposals for its improvement. It will be appreciated if you would kindly answer the following questions. All information provided shall be treated confidentially and used purely for academic purposes.

Thank you.

Section A: Household characteristics

(Households not connected to the public piped water)

Note: please tick the appropriate answers.

1. Age of respondent
2. Sex of respondent.
3. Marital status.....
4. What is your family size?
5. Level of Education. a) None b) Primary school c) Secondary d) Post secondary e) University f) Others (specify).....
6. Occupation of respondent. a) Civil Servant b) Farmer c) Artisan d) Trader e) others (specify).....
7. How much do you earn per month? (Indicate income from all sources).....

Section B: Water supply situation

8. Which source(s) do you rely on for your water supply? a) Well b) Spring c) Borehole d) Water vendor
9. How long do you travelled to obtain water from this source? (a) < 1km (b) 1-2km (c) > 2km

10. How much time do you spent daily on fetching water from this source? (a) 1hr
 (b) 2- 3hrs (c) > 3hrs
11. Why is your house not connected to the piped water supply system?.....
12. If there is improvement in water supply and your area is covered, will you connect to the system? a) Yes b) No
- 13 If yes, what type of connection will you prefer? a) Full house connections b) single tap
14. If No, why?.....
15. Are you prepared to pay the full cost of water supply from the water board if the supply is regular? a) Yes b) No
16. If No, why?.....
17. How much maximum can you spend to connect to the system?.....
18. How much maximum can you pay as monthly bill?.....
19. Would you like to be involved in the management of water supply in your area? a) Yes
 b) No
20. If yes, what are your reasons? a) You want to improve the water condition of your area
 b) No particular reason c) Others (specify).....

Section C: Suggestions

21. What is your general opinion on the state of water supply in Lafia? a) Very poor
 b) Poor c) Fair d) Good
22. What is your general opinion on the main causes of the problems?

23. Give general suggestions on how the situation may be improved?

Thank you for your attention.

APPENDIX 'C'

STRUCTURE INTERVIEW QUESTIONNAIRES FOR WATER BOARD OFFICIALS

DEPARTMENT OF URBAN AND REGIONAL PLANNING

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA

Research questionnaire for Nasarawa State Water Board

This survey is being conducted on water supply in Lafia with a view to making proposals for its improvement. It will be appreciated if you would kindly answer the following questions. All information provided shall be treated confidentially and used purely for academic purposes.

Thank you.

Section A: Water supply

Note: Tick the appropriate answers.

1. Which department of the Water Board is responsible for the water management in Lafia?

a) Project and planning b) Engineering c) Maintenance d) Others (specify).....

2. How many staff does the department have? a) 1-5 b) 6-11 c) 11-15

d) 16-20 e) Others (specify).....

3. Are the numbers of staff adequate for the responsibility of the department? a) Yes

b) No

What is the quality of water produced by the Nasarawa State water Board? a) 90-100% pure

b) 75-90% pure c) 50% pure d) Below 50% pure

4. What is the billing system of the Water Board?.....

5. Is the supply based on flat rate or metered?

6. How is water bill per tap?

7. What is the consumers' attitude to payment of water bill?

8. Is the water Board planning to increase water bill?

9. If yes, why and how much?

10. Does the Board use rationing method? a) Yes b) No

11. If yes, how? a) Time ration b) Sector ration c) Both

12. What is official time gap of rationing?
13. What is Board's source(s) of funds? a) State Government b) Federal Government
c) Lafia Local Government d) Foreign Aid
14. What is the average amount per year in Naira?
14. How much did Water Board alone generates as revenue last year?
15. What was the Government allocation to Water Board last year?
16. What is the cost of water production per day?
17. Is there any tariff? a) Yes b) No
18. Does the tariff on water supply meet the cost of water production? a) Yes b) No
19. If No, what are the reasons? a) The people do not pay regularly b) Illegal connections
c) Water supply is high subsidized by government d) others (specify).....
20. How much would each consumer need to pay each month for the cost of production to be met?

Section B: Operation and Maintenance

21. How is the water supply system maintained? a) Routine check up by the Water Board
b) Using contractors c) systems are not maintenance d) Others (specify).....
22. Do you experience problems in maintaining the system? a) Yes b) No
23. If yes, what problems are encountered in the maintenance of the water supply system?
a) Lack of funds b) Lack of adequate manpower c) Lack of committed personnel
d) Diversion of funds to other uses e) Others (specify).....
24. How frequent do pipe get damaged in each area of the town?

AREA	FREQUENCY OF DAMAGE OF PIPE
Lafia North	
Lafia East	
Lafia West	

25. How does the department get to know about damaged pipes? a) The public informs the Board b) The Board has gadgets for detecting damage of pipes c) Through routine check up done by Board d) Others (specify).....
26. How fast are the damages repaired? a) Immediately b) Delayed c) Not repaired
27. What problems are associated with delayed repairs? a) Lack of funds b) Lack of skilled manpower c) Lack of committed manpower d) diversion of funds to other uses e) Others (specify).....

Section C: Management

29. In management of water, what strategies are employed by the Board? a) involving the private sector b) Involving the community c) Involving the Local Government
e) Others (specify).....

30. What is the degree of success of strategies? a) Very successful b) Successful
c) Not successful

31. If not successful, what are the reasons for the failure? a) Lack of funds b) Lack of interest by the public c) Inability to get the private sector interest in water supply
d) Lack of qualified manpower e) Others (specify).....

APPENDIX 'D'

STRUCTURE QUESTIONNAIRES FOR STAKEHOLDERS

DEPARTMENT OF URBAN AND REGIONAL PLANNING

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA

Research questionnaire for stakeholders

This survey is being conducted on water supply in Lafia with a view to making proposals for its improvement. It will be appreciated if you would kindly answer the following questions. All information provided shall be treated confidentially and used purely for academic purposes.

Thank you.

1. What is the name of your organization?
2. Is your organization or association registered?
3. What is your organization specialized in doing?

Section A: Water supply situation

4. Do you satisfied with the existing water supply management level in Lafia town? (a) Yes (b) No
5. If 'No' what are the major problems facing water supply management in Lafia?
6. What is your suggestion on how the situation may be improved?

Section B: partnerships

7. Do you think involving the private sector participation will solve the problem? (a) Strongly agreed (b) agreed (c) disagreed (d) strongly disagreed
8. If agreed, are willing to participate in the partnership? (a) Yes (b) No

9. What are your reasons for partnership failure in some sectors in Nigeria like electricity?

Rating of reasons for failure of PPP according to priority and tick as appropriate

Reason	Very good	Good	Fair	Poor
(a) Poor legal policies				
(b) Lack of regulatory framework				
(c) Lack of good governance				
(d) Political interference				
(e) Poor environment				
(f) Stakeholders' involvement				
(g) Bridge of contract				

10. Give general suggestions on how partnership in water supply management can succeed?.....

APPENDIX 'E'

APPROVED WATER RATES WITH EFFECT FROM 2005

NASARAWA STATE WATER BOARD

S/No	CONSUMERS CATEGORY	OLD RATE 2002	NEW RATE 2005
1	DOMESTIC FLAT RATES (N/MONTH)		
	a. 3 or more bedrooms house in low density areas	1,800.00	2,300.00
	b. 3 or more bedrooms house in high density area.	600.00	700.00
	c. 1 or two bedrooms house in high density area	300.00	400.00
	d. single tap house any where	300.00	400.00
2.	DOMESTIC METRED RATES (N/M³)		
	a. First 30,000 litres	15.00	21.00
	b. Over 30,000 litres	16.00	24.00
3.	INSTITUTIONS (N/M³)		
	Federal institution		
	Other State institution		
	Local Government		
	a. First 0.1 million litres	24.00	30.00
	b. 0.1 to 1.5 million litres	24.00	35.00
	c. Over 1.5 million litres	24.00	40.00
	Nasarawa State Institutions (N/m ³)	24.00	24.00
4	COMMERCIAL CONSUMERS (N/m³)		
	a. First 2 million litres	65.00	70.00
	b. Over 2 million litres	70.00	75.00
5	INDUSTRIAL CONSUMERS (N/m³)		
	a. First 5 million litres	65.00	70.00
	b. Second 5 million litres	70.00	75.00
	c. Over 10 million litres	75.00	80.00
6	WATER TANKERS (N/m³)		
	a. Tankers for Domestic water supply	50.00	100.00
	b. Tankers for Industrial water supply	50.00	100.00
7	RAW WATER		
	a. Raw Water (N/m ³)	5.00	7.25
	b. Borehole Flat rate (N/month)	5,000.00	10,000.00

Source: Nasarawa State Water Board, 2009