Assessment of Rural Water Supply Management in Selected Rural Areas of Oyo State, Nigeria

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Abbreviations

ATPS	African Technology Policy Studies
ECOWAS	Economic Community of West African States
DDI	Demand Driven Intervention
DFFRI	Directorate of Food, roads and rural Infrastructure
FCT	Federal Capital Territory
FGDs	Focus Group Discussions
FGN	Federal Government of Nigeria
IDI	In-Depth Interview
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
LGA	Local Government Area
MDGs	Millennium Development Goals
NEPAD	New Partnership for African Development
NPE	National Policy on the Environment
OYSMEWR	Oyo State Ministry of Environment and Water Resources
RBDA	River Basins Development Authority
UNICEF	United Nations Children and Education Fund
WATSAN	Water and Sanitation Project
WCOS	Water Corporation of Oyo State

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Executive Summary

Human welfare and economic development generally depend on the use of water. In Nigeria, water resources management and utilization is crucial to the country's efforts to reduce poverty, grow the economy, ensure food security and maintain the ecological systems. After almost sixty years of water supply development in Nigeria, it is unfortunate that as many as 43% of the population still lack access to safe water. The situation in the rural areas is particularly bad compared to the urban areas. In recognition of the poor state of water management in the country and its implication for socio-economic development and environmental sustainability, the present democratically elected government has prepared a new national policy on water resources development. One of the objectives of the policy is to provide good potable water for the rural population at an affordable price. To achieve this objective, there is need to better understand the constraints and challenges of rural water supply. Apart from addressing the issues of participatory governance, cost recovery and appropriate technology, there is also a need to take into consideration the values, attitude, preferences and capacities of the different stakeholders in the supply and management of water in rural areas. The new integrated approach to sustainable water supply requires greater knowledge and understanding of the technological, social, economic and ecological dimensions of water resource management and how they are inter-related. Developing the capacity to engage in integrated sustainable development planning from the community level to the highest national decision-making level, remain a major challenge in Nigeria and many other African countries. It is in the light of this that this study assesses the extent to which stakeholders are willing and able to adopt and implement sustainable, cost-effective and environmentally friendly management options for water resources in selected rural areas of Oyo State, Nigeria.

The specific objectives of the work include a review of the changing trend of the national and state government policy framework for water resource management in relation to the motivation for policy design, knowledge capacity building, and the degree of compliance with the new principles and approach; determining the 'social solidarities' or the willingness of the stakeholders to adopt and/or implement government policies and programmes on water resources management in the selected rural areas of Oyo state, Nigeria; assess the knowledge base of the different stakeholder groups about the technological, socio-economic and ecological dimensions of water resources management, in terms of the availability of data and information, familiarity with the study area, and the interaction between the stakeholder groups and, lastly, suggest ways of improving the peoples' indigenous knowledge of water conservation in order to enhance the livelihoods of the rural dwellers in the state and Nigeria ion general.

The study areas include three rural/semi-urban Local Government Areas (LGAs) of Oyo state. The three Local Government Areas; are Ibarapa, Afijio and Lagelu. The choice of the three study areas is justified on the ground that the areas are different in terms of portable water supply problems and management. For instance Ibarapa represents an area where there has been intervention from Water and Sanitation Project (WATSAN) of Oyo State. On the other hand, Ilora is a semi urban area with some elements of government intervention while Igbo-Elerin represents an area where there has never been any intervention in the past.

The study adopted a combination of qualitative and quantitative methodology, including Focus Group Discussions (FGDs), in-depth interviews (IDIs) with stakeholders as well as structured and semi-structured questionnaires survey. Relevant policy and programme documents of government were collected and reviewed. In addition, semi-structured interviews were carried out with some senior government officials. For the questionnaire survey, 200 questionnaires were administered in each location while FGDs were held in Igbo Elerin, Eruwa and Ilora to complement the results of the questionnaire survey. Data analysis involved the use of both qualitative and quantitative statistical techniques. The present policy and institutional framework for water resources management, and how it has changed overtime were described qualitatively.

The existing manpower development programme of government in terms of the level of manpower, the skills of the manpower, involvement of stakeholders and learning process is virtually non-existent. For instance, at the Oyo State Ministry of Environment and Water Resources (OYSMEWR), the Environment Unit of OYSMEWR, especially the units concerned with clearing of dumpsites and wastes during the monthly 'environmental sanitation-day' received more attention by the government than the Water Resources Unit.

There is still the age-long popular opinion among the rural dwellers that the provision of social amenities, including water supply, is the sole responsibility of government. There is the need to change this orientation through grassroots awareness programmes. However, the success story in Igbo-Oloyin of community water supply and management shows that water supply provision and management can even be more successful and sustainable in the rural areas than in the urban areas if the community is involved in the planning and execution of such projects especially if government can provide the initial infrastructure or capital outlay.

The knowledge base of the different stakeholder groups about the technological, socio-economic and ecological dimensions of water resources management is very low. For some communities, however, the indigenous knowledge in the conservation of traditional water sources (e.g. streams and rivers) exists but need to be improved upon. Rural populace must be educated properly about the quality of the water they consume. This is because water that is available in poor quality is far dangerous than water that is not available at all.

With regard to “social solidarities” or the willingness of the stakeholders to adopt and/or implement government policies and programmes on water resources management, the outcome of this study indicates that many people in the study area are not aware of any government policy on water supply provision and management, either at the Federal or State level. Therefore, the issue of the stakeholders willing to adopt and/or implement government policies at present does not arise. However, going by the discussions held at the FGD session and informal interviews held with opinion leaders in the communities, there is willingness to embrace and implement any programmes and policies that will address water supply problems in rural communities. For instance, in Igbo-Oloyin near Ibadan, the community has effectively managed the borehole provided by a prominent indigene for more than 20years.

Given the enormity of the water supply problem and food insecurity situation, not only in the rural areas but the urban areas in Nigeria, the existing indigenous knowledge system (IKS) are incapable of meeting the challenges, hence the need for the integration of the indigenous system (IK) with scientific knowledge. Government and relevant agencies should as a matter of priority conduct and execute a regional study or set of studies on indigenous water management techniques in order to fill some of the gaps and throw some light on the process of up-scaling and integration of indigenous knowledge of water management with modern/scientific knowledge. Consequently, deliberate efforts should be made to ensure that the knowledge integration process would include improvements in policies and institutional arrangements.

In conclusion, this study brings out the sustainable technological and ecological policy options for improved water management within the peculiar socio-economic and institutional context of the study area. The results formed a database on ideas and experience of local initiatives which could be adapted to solve water supply problems in similar rural communities in Nigeria and elsewhere in the African continent.

Chapter One

Introduction, Aim and Objectives of Study

1.1 Introduction

Water is a precious natural resource, vital for life, development and the environment. It can be a matter of life and death, depending on how it occurs and how it is managed. When it is too much or too little, it can bring destruction, misery or death. Irrespective of how it occurs, if properly managed, it can be an instrument for economic survival and growth. It can be an instrument for poverty alleviation lifting people out of the degradation of having to live without access to safe water and sanitation, while at the same time bringing prosperity to all (UN-WATER/AFRICA, 2004). However, when it is inadequate in either quantity or quality, it can be a limiting factor in poverty alleviation and economic recovery, resulting in poor health and low productivity, food insecurity and constrained economic development.

The interdependence between water availability and development is exemplified by the link between water and poverty. Due to poverty, access to adequate water and sanitation is low in Africa. As a result of inadequate access to safe water and sanitation, there is a high incidence of communicable diseases that reduce vitality and economic productivity on the continent. Inadequate access to water and sanitation is thus both a cause and a consequence of poverty. Similarly, inadequate water resources can become a constraint to improved agricultural development and food security.

Systematic development of water supply and management in Nigeria dates back to the colonial times. The colonial administration developed domestic water supply as part of overall programme to improve the level of personal hygiene and environmental sanitation throughout the country, and thereby the health of the people. Unfortunately, as noted by Oyebande (1977), the priority accorded domestic water supply by the colonial administration had not been sustained by post independence governments of the country. For example, between 1946 and 1960 the average percentage of the total government expenditure on water was 11.4%, whereas between 1962 and 1975, it decreased to 4.5%. Although there was a steady increase in the percentage of the total government expenditure spent on water between 1975 and 1992, between 1992 and 1996, there was a 50% decrease in the total budgetary allocation for water supply (Areola and Akintola, 1997; Falusi and Gbadegesin, 1998). The implication of this is that between 1992 and 1996, the total water supply for industrial, agricultural and domestic use increased at a rate of about 1.0% whereas population growth rate was 2.84% (NPC, 1991).

Apart from the relatively low level of financial commitment to water supply development in general, successive governments in the country also laid emphasis on urban water supply while rural areas are almost completely neglected. The federal government, through the River Basin Development Authorities (RBDAs) the first of which was established in 1976 and the Directorate of Food, Roads and Rural Infrastructure (DFRRI) which was put in place in 1986 attempted to address the problem of rural water supply in the country. Through the two strategies, a large number of boreholes with manual and powered pumps were sunk in various parts of the country. Pipe borne water was also extended to some rural areas, through the state water corporations, but this option was hardly used because of the high cost of laying pipes to rural communities which are generally separated by large distances (NEST, 1991; Akintola, et. al., 1980). Regrettably, these efforts did not last up to a decade. Many of the rural communities that were served with boreholes were unable to derive maximum benefits from them. Some of the problems identified include lack of public participation in the management of the boreholes, technological problems, ignorance of the people, and corruption (NEST, 1991). This has led to the cancellation of the DFRRI while the focus of the RBDAs has now been limited to the provision of water for agricultural purposes (Falusi and Gbadegesin, 1998).

After almost sixty years of water supply development in Nigeria, it is regretable that only 60% of the population has access to safe drinking water, and in rural areas less than 50% of the households have access to good portable water (National Millennium Development Goals Report, 2005). Rural people in the country still depend very much on rivers, streams, ponds, and shallow wells for their water needs. During the dry season, some of these sources dry up and households have to invest a substantial amount of their resources to get water of doubtful quality. This has very serious implications for the economic development and social welfare of the people specifically and the country as a whole. First, there is the tremendous economic waste involved in people spending so much time and effort in search of water. Secondly, lack of water often means relatively low levels of personal hygiene and environmental sanitation. Thirdly, because water is needed for most productive activities, inadequate access to water limits the livelihood options of the people, particularly in rural areas (IDRC, 2002).

In recognition of the poor state of water management in the country and its implication for socio-economic development and environmental sustainability, the new democratically elected government prepared the first national policy on water resources development in year 2000. One of the objectives of the policy is to provide good portable water for the rural population at an affordable price. However, to achieve this objective, there is need to better understand the constraints and challenges of rural water supply. Apart from addressing the issues of participatory governance, cost recovery and appropriate technology, there is also a need to take into consideration the values, attitude, preferences and capacities of the different stakeholders in the supply and management of water in rural areas. Generally, human-water relations date back many generations, hence in many traditional societies, people have developed cultural values, attitudes and norms of behaviour in relation to water use.

1.2 Problem Statement

Human welfare and economic development generally depend on the use of water. In Nigeria, water resources management and utilisation is crucial to the country's efforts to reduce poverty, grow the economy, ensure food security and maintain the ecological systems. Nevertheless, the issue of water resources management in the country focuses mainly on water supply and it receives only minimal attention by government. This approach may be attributed partly to the disjointed sectoral approach to development planning in the country and the idea that water is a public good. It may also be partly attributed to the fact that the international development community have not given due attention to water resources until very recently. Falkenmark (1988) for example, criticised the highly acclaimed Brundtland report (WCED, 1987) for its failure to adequately address the issue of the role of water in sustainable development. Similarly, Toth (1996) noted that water has received relatively modest attention in debates about global environmental change and sustainable development as at the mid 1990s.

In the last decade, particularly in the last half of the decade, the issue of sustainable water resources management has attracted the attention of the international community and policy makers in Africa. The issue of water resources management was for example addressed at the Millennium Summit (2000) which produced the Millennium Development Goals (MDGs), the World Summit on Sustainable Development (2002), the 3rd World Water Forum in Kyoto (2003), the Africa Ministerial Council on Water, and the programmess and actions articulated under the New Partnership for African Development (NEPAD) framework.

The new emphasis on water resources management in Africa is coming with a shift in the principle and approach to the management of water resources. It is now recognised that water is a commodity of strategic importance because of increasing demands and rising costs, coupled with diminishing supplies (Sharma et. al., 1996). Furthermore, it is recognised that it is no longer feasible in a long-term, cost-effective and environment friendly manner, to increase water supply by building additional dams and conveyance systems, sinking new wells, constructing desalinisation plants, etc. In addition, it is now recognised that solutions must be found at the user-end of the pipe, that is, improving water use productivity, reducing conveyance losses, reusing water and optimising allocation (Sanstrom, 1997). The underlying principle is that water is a scarce good with dimensions of economic efficiency, social equity and environmental sustainability. Therefore, it has both public and private characteristics, and hence there is an important role for public and private participation in efficient management and development of water, particularly communities that use water (Sharma et al., 1996; Karikari, 1996).

The new principle and approach to water resource management has many far reaching implications for policy design and institutional building as well as policy implementation. For example, the change in principle may be regarded as a basic ideological shift. Generally, such ideological shift cannot be imposed on people since it depends on cultural belief and world view of the people (Wildavsky *et al*., 1994). Consequently, there is need to have a better understanding of the values and ideological preferences of policy makers, bureaucrats and the general public. Secondly, a change from supply

management approach to demand management approach requires a change in the manpower and institutional requirements for water resources management. While supply management approach with emphasis on building and construction of dams, boreholes, conveyance systems, etc, require predominantly engineering skills, the new emphasis on demand management with public and private sector participation will require expertise in social systems in addition to engineering skills.

Lastly, the new integrated approach requires greater knowledge and understanding of the technological, social, economic and ecological dimensions of water resource management and how they are inter-related. Developing the capacity to engage in integrated sustainable development planning from the community level to the highest national decision-making level, remains a major challenge in Nigeria and many other African countries. Sharma *et al* (1996) for example noted that in sub-Sahara Africa as a whole, the following institutional capacity problems are rampant: (i) people are unaware that water is a finite resource with supply constraints, that it has a scarcity value, and that there is a cost to using it; (ii) lack of understanding of the consequences of deforestation and land degradation on the quantity and quality of water; (iii) inadequate capacity building and neglect of traditional knowledge bases as well as gender issues; (iv) management of water resources is highly fragmented among sectors and institutions and there is excessive reliance on public sector services; and (v) weak institutional and implementation capacities. The implication of the foregoing is that if the new emphasis on water resources management in Africa and Nigeria in particular is to achieve meaningful results, there is the need to have a better understanding of the institutional capacity both in terms of skilled personnel and the available knowledge and understanding of the socio-economic, technological and ecological issues and problems that are involved.

1.3 Objectives of the Study

The broad objective of this study is to examine the extent to which stakeholders are willing and able to adopt and implement sustainable, cost-effective and environment friendly management options for water resources in selected rural areas of Oyo state, Nigeria. The study focused on the 'social solidarities' and hence the ideological preferences of the stakeholders, the manpower capacity building for water resources management, and the knowledge base about the socio-economic, technological and ecological dimensions of water resources management. The specific objectives are to:

i. review the changing trend of the national and state government policy framework for water resources management in relation to the motivation for policy design, knowledge capacity building, and the degree of compliance with the new principles and approach.

ii. determine the 'social solidarities' or the willingness of the stakeholders to adopt and/or implement government policies and programmes on water resource management in the selected rural areas of Oyo state, Nigeria;

iii. assess the knowledge base of the different stakeholder groups about the technological, socio-economic and ecological dimensions of water resource management, in terms of the availability of data and information, familiarity with the study area, and the interaction between the stakeholder groups; and

iv. suggest ways of improving the peoples' indigenous knowledge of water conservation in order to enhance the livelihoods of the rural dwellers in the state in particular and Nigeria in general.

It is important to note that the issue of water concerns almost everyone in a community. It is also an issue that concerns government at the federal, state and local levels as well as the private entrepreneurs both within and outside a community. Therefore, stakeholders in water supply may literarily mean everybody in a community. However, since it is not possible to take into consideration everyone or every group in the study area, the study was preceded by a stakeholder analysis to identify the key stakeholder groups such as policy makers, relevant government agencies, community development organisations, traditional rulers, households, private firms or investors, etc.

Chapter Two

Conceptual Framework and Literature Review

The challenge of sustainable water resources management, in line with the new principles and approaches, may be conceived in terms of some simple policy relevant questions: how much resources is available and who needs it? Who gets how much? At what cost? And at what price, if any? (IDRC,2002). However, there are also deeper questions that also need to be addressed: who decides? By what procedures? What features of governance will most likely produce management decisions that are fair, effective and environmentally sustainable?

The answers to these questions are by no means trivial and they may vary for different communities or nations depending on their form of organising socio-cultural and political life. This is particularly true for the deeper questions: who decides? By what procedure? Douglas(1987) and Thompson et al. (1990) argued that it is possible to discern four fundamental forms of social organisation from which a large variety of ultimate forms of social and cultural life can be derived. Each of the four ways of organising socio-cultural life (usually called 'ways of life' or social solidarities), that is fatalism, egalitarianism, hierarchy and individualism, consists of specific ways of structuring social relations and a supporting cast of particular beliefs, values, emotions, perceptions and interests (Douglas et al., 2003; Thompson, 2003) as well as specific knowledge systems (Mabawonku, 2003). In the individualist social setting, actors view nature as benign and resilient – able to recover from any exploitation – and man as inherently self-seeking and atomistic. The individualist solidarity trust others until they give them reason not to and then retaliate in kind, and see it as only fair that those who put the most in get the most out. They think institutions that work with the grain of the market (that get rid of environmentally harmful subsidies, for instance) are what are needed. There knowledge system is essentially scientific. In the egalitarian social setting, actors see nature as fragile, intricately interconnected and ephemeral, and man as essentially caring (until corrupted by coercive institutions such as markets and hierarchies). For the egalitarians, it is not enough that people start off equal, they must end up equal as well. Trust and levelling go hand in hand, and institutions that distribute unequally are distrusted, their knowledge system is described as the philosophical.

In the hierarchical social setting the knowledge system is ideological, actors see the world as controllable. Nature is stable until pushed beyond discoverable limits, and man is malleable: deeply flawed but redeemable by firm, long-lasting and trustworthy institutions. Fair distribution is by rank and station or in the modern context, by need. Within the hierarchical social setting, environmental management requires certain experts to determine the precise locations of nature's limit and statutory regulation to ensure that all economic activity is kept within those limits. Lastly, in the fatalistic social

setting, actors find neither rhyme nor reason in nature, and suppose that man is fickle and untrustworthy. To the fatalists, fairness is not to be found in this life, and there is no possibility of effecting change for the better. The knowledge system of the fatalist is described as religious.

Generally, the answers to the deeper questions: who decides? By what procedures? What features of governance will most likely produce management decisions that are fair, effective and environmentally sustainable?, will determine the answers to the policy questions: how much resources is available and who needs it? Who gets how much? At what cost? And at what price, if any? We therefore conceive the water management process as a five stage procedure. The first is the governance and decision-making stage. At this stage, the deeper questions are answered by both the policy makers and the general public. As explained earlier, the answers are determined by the 'ways of life' of the people, or their knowledge systems, cultural beliefs and values. The second stage in the water management process is the water balance modelling. It is at this stage that the question: how much resources are available and who needs it? is answered. It involves the determination of the volume of water being available over space and time, the present and future water needs as indicated by population growth, industrialisation and changing habit of use, and the socio-economic and ecological implications of water supply and demand.

Management guideline development is the third stage in the water management process. At this stage the question, who gets how much? is answered. It involves defining the priorities, goals, rules and capacity requirements. Specifically, it involves defining the policies, regulations and enabling environment as well as the mechanism for sharing water resources between competing interests. The next stage is the implementation stage, and it is the stage that decisions about cost and price are determined. Other issues such as funding, institutional or capacity building, environmental sustainability, and public awareness are tackled at this stage. The last stage is the water supply stage. It involves supplying water for different uses and evaluating the use of water and its implications such as the human dimensions of water supply, environmental sustainability, trans-boundary conflict of interests, and effects of economic and population growth.

The five stages in the water resources management process are interrelated and interdependent. Analysis of the management process may either proceed from the last stage to the first or from the first to the last. The direction of analysis is not important, but it is important to recognise the link between the five stages and to take linkages into consideration in the analysis. For example, analysis of the pattern of social solidarity of the key stakeholders or decision makers may be linked to information about the water balance and management guidelines. Similarly, analysis of the water balance information and management guidelines may be linked with the implementation process and water supply. This is the analytical framework used in the study.

According to Olokesusi (1990), water supply situation in Economic Community of West African States (ECOWAS) is far from satisfactory. The following seem to be the major factors responsible for the inability of member states to satisfy the drinking-water needs of their teeming populations. Water engineers and administrators in ECOWAS have been prone to thinking 'biggest', a series of small

water schemes is nowhere near as proud an achievement as a massive structure, in other words the wrong scale of technology is being used. Unfortunately, the larger systems tend to carry with them a greater degree of vulnerability, since if they break down more people and more enterprises are adversely affected. In some states that are drought-prone, or do not have the infrastructural maintenance and repair support, the failure of one large water project can have immensely negative and sustained consequences. More important, perhaps, is the 'think big' syndrome of aid agencies and consortiums, which has affected the psyche and performance of the water-supply projects.

While acknowledging the existence of the global sector principles for water supply and sanitation of the WHO, which is already being implemented, it is strongly suggested that there should be a more integrated approach to the issue of water supply and sanitation. Accordingly, Olokesusi (1990) suggested some policy guidelines for the future which include:

- An integration of the technical, operational, and financial and health issues right from the start of the planning process would improve results. Participation of the communities in all project phases, which special attention to the role women play and should play in community water supply and sanitation, would also contribute to improvements. Local organization of maintenance and production should also be encouraged as much as possible.
- More emphases should be placed on the provision of hand pumps and wells, especially in the rural areas where large segments of the population live.
- Rain harvesting should be encouraged and the appropriate technology for sorting such water collected should be made available both in urban and rural areas.
- Appropriate technologies such as solar energy and windmills have already been used in Burkina Faso, Chad and the Niger Republic. They should be well funded and results disseminated to member states for possible replication.

A study by the Nigerian Institute of Social and Economic Research (NISER) (1982) revealed that at a general level the urban centres are better served than the rural areas. Also the southern parts of the state enjoy more water supplies than the north. The situation is not likely to improve in the immediate future, particularly when it is realized that there has been a steady decrease in volume of water supplied over the years as against steady increase in the population. This situation is compounded by the high growth rate 8-9% of the urban population compared with the national average rate of 4.5% (NISER, 1982). The alternative sources of water supply in such deprived areas include rivers, streams, brooks, wells, rain water and other potentially hazardous sources. The health hazards associated with such water sources, excluding rain water, are cholera, dysentery, typhoid, guinea-worn, schistosomiasis, and other water-borne diseases (WHO, 1970; Postel, 1985; Chandler, 1985). It is a paradox that the situation has not changed up till now in the country.

The situation of rural water supply in Oyo State tends to be worse because of the large expanse of the state. According to Olokesusi (1987), when women walk up to three hours to get minimal water supplies, water becomes too valuable for washing and an important defence against infection is lost. There is a strong association between water and health in the Oyo State. Experts estimate that a sanitary water supply would eliminate half the diarrhea including 90% of all cholera, 80% of sleeping

sickness and 100% of guinea worm infestation, as well as smaller fractions of several other serious tropical diseases. It can therefore be justifiably concluded that Oyo State faces very critical water inadequacy in both rural and urban areas thereby affecting all uses-domestic, personal, industrial, and commercial; with severe socio-economic consequences; which are hereby highlighted

Although public sector expenditure on provision of water supplies has been increasing in absolute amount, it has been decreasing in comparative terms in view of rising population, costs, inflation and other technical considerations. Revenue for the Water Corporation of Oyo State (WCOS), (the water supply agency), comes from annual subsidies and grants from he state government as well as water rates and charges. Since 1982, The state subsidies and grants to the water agency has continued to decline, a reflection of the nation's dwindling income, since the Federal grants and statutory allocations to the state have been equally falling. A cursory look at Table 2.1 reveals that financial allocation to water supply sector has always been small when compared to other sectors of the economy (see also Figure 2.1).

Table 2.1: Financial allocations to water supply in Nigerian Federal Budget (1991-2004)

Year	Capital Allocation to Water (million naira)	Percentage of Total Capital Expenditure
1991	83.8	0.02
1992	71.7	0.01
1993	63.3	0.12
1994	197.5	0.6
1995	0.0	0.0
1996	2,195.1	14.9
1997	2,786.2	1.5
1998	3,843.4	1.5
1999	-	-
2000	14,388.0	2.2
2001	64,761.7	7.2
2002	31,942.2	4.8
2003	31,942.2	4.8
2004	31,942.2	4.8

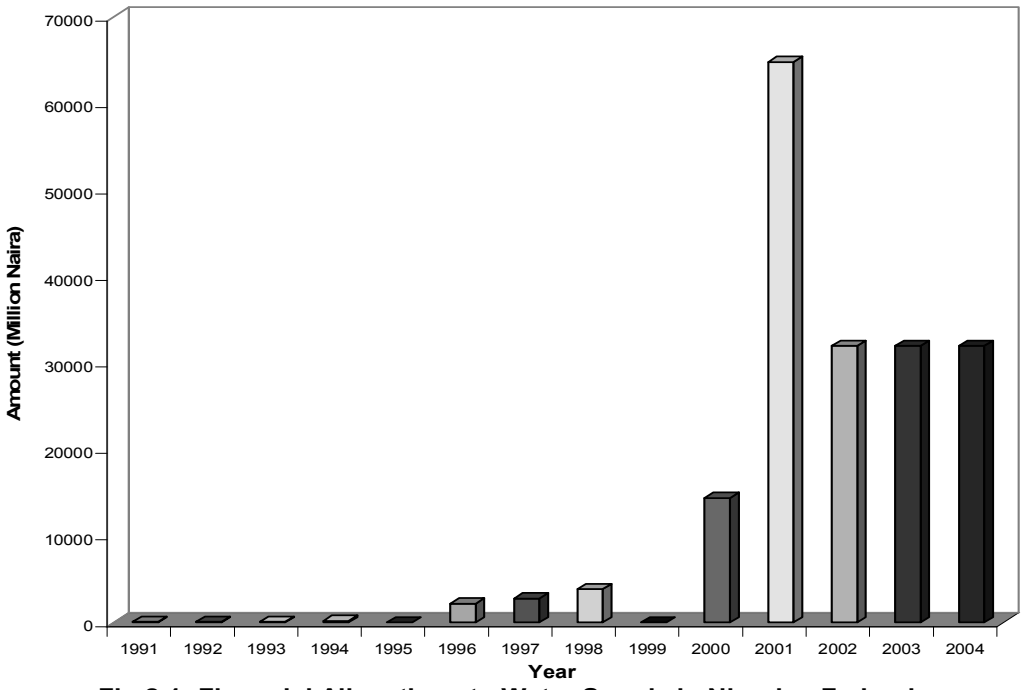

Figure 2.1: Financial allocations to water supply in Nigerian Federal Budget (1991-2004)

According to Faniran and Akintola (1997), the laws establishing the state water agencies list several functions that include the duty to

a) control and manage all urban and semi-urban water supplies;
b) establish, control, manage, extend and develop such new or existing water supplies as may be considered necessary for the purpose of meeting the requirements of the general public, agriculture, trade and industry;
c) ensure that water is supplied to consumers thereof at reasonable charges and in potable quality and quantity;
d) organize the conduct of comprehensive research for utilization in the formulation of policy relating to the to the supply and usage of water in the state; and
e) examine surface and ground water for the purpose of detecting any pollution and its causes.

There is a dearth of high level management and professional/managerial staff; in most cases this cadre constitutes less than 4% of the total staff strength (Faniran and Akintola, 1997). The dismal manpower situation of the state water agencies is manifest in the very small proportion of personnel with tertiary level technical and engineering qualification. The number of professionally qualifies high level personnel, particularly, qualified engineers, is very small in all the state water agencies with the possible exception of Abuja, the Federal Capital Territory (FCT)

Research has shown that rural water supplies in sub-Saharan Africa, particularly those relying on hand pumps, often demonstrate low levels of sustainability. The key causes for this include inappropriate policy or legislation; insufficient institutional support; unsustainable financing mechanisms; ineffective management systems; and lack of technical backstopping. The problem will only be solved by adopting a holistic approach to planning and implementation rather than focusing on one issue (such as community management or spare parts supply) in isolation (DFID, 2004).
The provision and maintenance of village water supplies is usually the weakest link in the technological process, mainly for organizational reasons. Thus, to improve the situation, devolution of authority from the state to the local level and effective co-ordination with other agencies is needed. The use of locally made handpumps, and the training of 'barefoot water technicians' for maintenance purposes is usually recommended for rural water supply in Africa.

Of necessity is the integration of public participatory process in water supplies in the state. The public could help in many ways. For example with proper organizational arrangement, citizens can help in deciding where water facilities should be located and be responsible for their maintenance, repair and fault reporting. They can also be involved in installing pumping station, building public wells and financial contributions. Nevertheless, they still require logistical and technical support from the three tiers of governments. The contributions of community associations, co-operatives and charity organizations should also be explored judiciously.

According to Okorie *et al* (2001) in a study in Swaziland, a major factor attributed to the unsustainability of many rural water supply schemes to imposition of inappropriate technologies, unavailability of spare parts, lack of local maintenance and operational capacity, lack of local community education and participation, ineffective community demand, and lack of co-ordination of sector agencies. Thus, sustainable interventions in rural water supply and sanitation depend on finding solutions to the problems. The community's willingness to commit their time and money to the projects is critical to their sustainability.

With reference to Swaziland, Okorie *et a* (2001) are of the opinion that the development of a national technology policy for funding and accelerated rural water supply and sanitation sector and for sustainability should be guided by the following elements

- investment and development programming;
- prioritization of maintenance operations;
- community-agencies cost-sharing policy;
- systematic co-ordination mechanism;
- institutional development and capacity building;
- community education and participation;
- community-based water and environmental health committees;
- water quality and environmental health monitoring and treatment;
- information management system; and
- rural water supply and sanitation research agenda.

These core elements are aimed at cost reduction, improved funding, increased efficiency in fund utilization, scheme operation, and service delivery, which would culminate in enhanced schemes' sustainability. The importance of each of the elements is outlined below.

In rural areas of Nigeria, water is traditionally, managed for two major purposes namely agriculture and domestic consumption, although this distinction is blurred sometimes. Sources of such waters vary from direct rainfall to waters from runoffs, rivers, streams, creek flows and seepage. Underground water resources are also harnessed. The water so collected have been used to meet domestic needs in addition to requirements for watering livestock, for runoff farming and irrigation. Rainwater collection (harvesting) is extensively practiced for the purposes of domestic consumption using indigenous knowledge methods for rainwater collection, purification and storage. However, part of the harvested water is being used to provide water for backyard gardens (farms), and domestic livestock. The two major techniques of water harvesting are micro-catchments and roof collection (Olokesusi, 2004)

With reference to roof collection techniques, until the advent of western containers such as plastics and metal, Africans typically collected rainwater from roof-tops with the aid of calabashes and earthen pots. These objects are merely placed below the roof eaves and the water drops into them. Another traditional collection technique involved the construction of sliced bamboo gutters along the roof eaves, through which the water flows into calabashes and earthen pots. The water would then be taken into homes and other areas for consumption purposes.

On the other hand, in several parts of Africa, water meant for drinking is subjected to one form of treatment or the other. Whenever surface water has been collected, it is allowed to stand for some hours before it is decanted into earthen pots for storage. The precipitated materials are discarded. In most households water hygiene is a top priority. For example in many African societies the household prohibits any body from using his/her own cup (calabash usually) to fetch water from the communal water pot. Rather there is a container (a calabash in southern Nigeria) fastened to the pot, which all members of the household are expected to use for collecting water into their own containers for drinking. Earthen pots are often buried in compounds rather than inside rooms in the hot arid and semi-arid areas so that the water temperature could be moderated. In the wetter parts such as parts of Yorubaland in south-west Nigeria, such earthen pots are placed inside the home for the same purpose. In rural Ibadan in the south-western part of Nigeria, *Adenopus breviflorus* or *Tagiri* (inYoruba) is usually placed beside the household earthen pot in the dry season so as to wade off evil spirits and "germs" causing measles (Olokesusi, 2004). In addition, empirical investigations by the researchers also revealed that there are several other innovative indigenous technologies for rural water supply management in different parts of Nigeria. Some of these IKs include pot chlorination, solar disinfection, simple sand filters, nylon filters, harvesting of groundwater and recharging of groundwater, among others.

The harvesting of rainwater from roofs maximizes the efficiency of runoff collection. This is because the characteristic pattern is a scatter of small rainwater catchments, each serving an individual farm, homestead or hamlet. This type of development is much more environmentally friendly because it offers very good technical advantage in terms of the conservation of the scarce water resource. Moreover, the technique fits quite well into the settlement pattern.
An innovative method of rainwater harvesting is that spotted by the researchers in Ekpoma, a semi-urban community in Edo State, Nigeria. It is a good example of the use of IK knowledge in rain harvesting was seen in Ekpoma, a town in Edo State, Nigeria where large surface or underground reservoir are constructed with concrete and a water hose is connected from the roof top so that rainwater collected from the roof top drains directly into the reservoir. To ensure that water going into the reservoir is free of, at least, sediments, a net is placed at the end of the hose where it enters the reservoir. Examples of this method are shown in Plates 1 and 2.

The use of this method guarantees that there will be availability of water for use in the community throughout the year, especially during the dry season. Similar technologies are also commonly used in Imo and Anambra States.

From the foregoing, a major positive impact of these water management and coping mechanisms apart from ensuring availability of water for domestic uses, is improved agricultural production, which enhances poverty reduction. Ready access to water also contributes to reliving both time and constraints which are both critical in rural communities. To some extent there would be improvements in personal and environmental hygiene. These developments widen livelihood options. The implication of all these is environmental improvement due to the recursive relationship between poverty and environmental degradation.

Pot chlorination is an indigenous technology that has also been recommended for use in rural areas because of its affordability and flexibility in usage. According to Cairncross and Feachem (1993), one method of chlorination can be used in village wells. It involves a pot containing a mixture of coarse sand and bleaching powder, which is hung underwater in a well. The double pot is suitable for a well serving up to twenty people, and needs to be refilled with 1 kg of bleach and 2 kg of sand every two weeks. The trouble with these pots is that they tend to make the water taste unpleasant for the first few days after refilling. There is no point at all in using a water disinfection process if it drives people to use water of worse quality, or if it is not reliably operated. Nevertheless, chlorination of a rural water source may be a worthwhile temporary measure during an epidemic which is suspected to be a water-borne.

Another example of a good approach to rural water supply is the “Water Provision and Conservation System in Umuocham, Imo State, Nigeria”. This water provision and conservation system was designed by Mr. Ako Amadi. Ako’s overall objective is to help communities design and implement environmental initiatives which are ecologically sound and which are suited to the needs of poor rural and semi-rural communities. Since lack of adequate water supplies is a constant and critical problem in most parts of Nigeria, Ako has most recently concentrated on designing a system that

dramatically improves the water supply of the thirteen communities in which he works. His first step was to conduct a feasibility study. The result of this study led him to design a water provision and conservation system that closely matched local needs. Ako's next step was to get the community interested in the idea and willing to participate. He held several meetings with the community leaders, who, though initially hesitant, eventually became convinced of the project's potential, and agreed to support the effort. To strengthen their commitment, Ako set up a local governing committee, which included local leaders, to manage and monitor the system after Ako has moved on to other communities. The project is thus designed to be managed by local communities. For harvesting the wet season's rainwater, a network of cement lined gutters is constructed. The gutters slope and empty into an open cement cistern in which water hyacinths and lilies are planted on a gravel bed for microfiltration. Over this, bamboo or metal sheets channel collected water into a closed tank, while excess drainage runs into the cistern. Separate taps are attached to each cistern for the water supplies for agricultural and domestic purposes, respectively. The system is designed to be village property and open to everyone without a fee. In addition to providing a safe domestic public water source and water for agriculture and commercial use, the initiative simultaneously provides a training program for young people in the field of water resource management. Ako plans to spread his idea by implementing it in all thirteen communities in which he presently works. He has already received a substantial Ford grant for his water project pilot and several other projects his organization is involved in, and he is confident that with the success of this pilot, he will be able to get funding to spread the idea.

An important lesson from Ako's project is that the principle of co-management should guide water resources development and management. The "top-down" governance of science and technology should yield to this reality. This implies that local beneficiaries and "outside experts" work together giving equal weight to both knowledge types. This approach would produce more positive outcomes if the process of project development and acquisition of traditional knowledge are carried out in a participatory manner, rather than consultation.

Chapter Three

Research Methodology

3.1 The Study Area

The study areas include three rural/semi-urban Local Government Areas of Oyo state. The three Local Government Areas; are Ibarapa, Afijio and Lagelu. The choice of Ibarapa as one of the study areas is due to the fact that it is a predominantly rural area with over 1,200 communities or localities (State Valuation Office, 2004) that are grouped around fourteen large communities that are classified as semi-urban towns. Administratively, the area is organised into three local government areas (Ibarapa east, Ibarapa central and Ibarapa north) and it forms part of the Oyo South Senatorial District which has nine local governments in all. Oyo state as a whole is organised into three Senatorial districts and thirty three local governments.

The people of Ibarapa in Ibarapa Local Government Area (LGA) are predominantly farmers. Although farming activities in the area is largely subsistence in nature, in the last few years, there has been an upsurge in the number of large commercial farms in the area. This implies that water demand in the area is essentially for agricultural and domestic purposes. Agricultural production in the area depends largely on rainfall; therefore aggregate water demand in the area depends on population which is estimated to be 227,754 (NPC, 1991). Apart from population growth, infrastructural development and lifestyle changes due to infrastructural development and socio-economic growth are other possible determinants of water demand in the area.

Ibarapa covers about 2317 Km^2 of rolling derived savannah country to the west of Ibadan, between approximately Latitude 3^0 and $3^0\,20'$ and Longitude 7^0 and $7^0\,50'$ The Ogun and Oyan rivers form its eastern and western boundaries respectively. Generally, the topography consists of broad undulating plains dotted with isolated or massed inselbengs and occasionally, with long wooded ridges. The river valleys are very broad and shallow, while the rocks are mostly impermeable granite gneisses with quartz hands and are very poor aquifers. Underground water is limited to a few isolated weathering basins. Wells, rivers and streams in the area are filled by inflow only during the rainy season from April to October. Therefore, during the dry season, water shortage is a very serious problem in the area. Meanwhile, rainfall is highly seasonal and more serious is the fact that the beginning and end of the rainy season fluctuate very much from year to year though the area is within a rainfall zone of 1000 – 1200 mm per annum.

Lack of good portable water has always been a major problem in Ibarapa area and government at different levels has been interested in the problem. In the 1970s, a dam was constructed in Eruwa by the state government for the purpose of providing pipe-borne water to the major towns in the area (Akintola et. al, 1979). It was then not possible to connect the rural communities to the pipe-borne supply network because of the low population density of the rural areas. Rural water supply is provided through the state Water and Sanitation Project (WATSAN) which was established in 1992 with the support of UNICEF. Boreholes and deep-wells were sunk by WATSAN in rural areas across the state including in Ibarapa. The agency was also involved in the mobilisation and enlightenment of communities on WATSAN activities so as to reduce the 'government owned' syndrome thereby, having sustainable programme. Furthermore, the agency also encourages maintenance culture for infrastructure provided by the WATSAN project.

After almost three decades of pipe-borne water supply and over one decade of rural water supply by the state WATSAN project, the water needs of the people are yet to be adequately met. An indication of the poor water supply situation in the area is the upsurge in guinea-worm infection in the rural areas of Ibarapa in the last five years (personnal interview with WATSAN official) . Because of the socio-economic and political implications of the health impact of inadequate water supply situation in Ibarapa area, both the state government through the state Water Corporation and the federal government through the WATSAN project and financial support from Japan Grant Aid Programme are implementing a new water supply development agenda in Ibarapa. The question that policy researchers and analysts are now asking is: why did past efforts aimed at providing water for domestic purposes in Ibarapa area unable to meet the water needs of the people? and how effective and efficient are the new rural water supply development programmes and to what extent are they sustainable?

Afijio LGA is located towards the northern part of Ibadan, the capital of Oyo state. The LGA is made up of about 6 communities, Akinmorin, Fidti, Ilora, Jobele, Imini and Olorunda with the headquarters at Jobele. Among the 6 communities, Ilora is selected for the current study because of its nearness and the influence of Oyo town on its development. Ilora is a typical semi-urban community where government's presence especially in the provision of pipe-borne water could be easily seen. The choice of Ilora assisted the researchers in the comparative analysis of government initiatives in water supply with that of the other two LGAs where NGOs and people's initiatives predominate.

Igbo-Elerin community is located in the Lagelu LGA of the state. This LGA is located towards the north eastern part of Ibadan, the capital of Oyo state. The community is made up of smaller communities such as Olode, Apatere, Oyedeji, Elesu and Osuna Jiboro. Igbo-Elerin community is a typical rural community in Oyo state. The community has a population of less than 10,000 according to the 1991 population census. The major sources of water supply in the town are the local streams, a few hand dug wells and a borehole donated by an indigene of the community some years ago. Water supply in the community is usually from streams and harvested rain water during the rainy

season. However, during the dry season the members of the community depend solely on the few hand dug wells, local springs and brooks and the borehole.

The choice of the three study areas is justified on the ground that the areas are different in terms of portable water supply problems and management. For instance, Ibarapa represents an area where there has been intervention from Water and Sanitation Project (WATSAN) of Oyo State. The study, therefore, evaluates how effective this intervention has been. On the other hand, Ilora is a semi urban area with some elements of government intervention while Igbo Elerin represents an area where there has never been any intervention in the past. The question of how the communities in the three areas have been able to cope is addressed in the study. The three areas selected for the study are compared in terms of the willingness of the stakeholders to participate in water supply management, the impact of previous government intervention and indigenous knowledge based system in water management.

3.2 Data Collection and Analysis

There is an increasing recognition in the literature on field methods in development studies that judicious combination of qualitative and quantitative methods can help solve problems that are associated with each type of methods taken separately (Kanbur, 2001; White, 2002). Therefore, the study adopted a combination of qualitative and quantitative methodology, including Focus Group Discussions (FGDs), in-depth interviews (IDIs) with stakeholders as well as structured and semi-structured questionnaires survey.

3.2.1 Data Collection: Types and Sources

Data collection activities followed directly from the objective of the study. Relevant policy and programme documents of government were collected and reviewed. In addition semi-structured interviews were carried out with some top-government officials.

In order to determine the 'Social Solidarities' or the willingness of the stakeholders to adopt and/or implement government policies and programme on water resources management in the study area, focus group discussion with different stakeholders groups as well as structured questionnaire administration to all the stakeholders were carried out.

For the remaining objectives of the study, structured and semi-structured questionnaires were used to collect data from stakeholders, relevant government agencies and top government agencies. For the questionnaire survey, 200 questionnaires were administered in each location thus making a total of 600 questionnaires while FGDs were held in Igbo Elerin, Eruwa and Ilora to complement the results of the questionnaire survey. The questionnaires were administered to head of households or their representatives where they were not available after two repeat visits by field enumerators.

3.2.2 Data Analysis

Data analysis involved the use of both qualitative and quantitative statistical techniques. The present policy and institutional framework for water resources management, and how it has changed overtime was described qualitatively. Out of the 600 questionnaires administered, only 487 were good enough for analysis.

The questionnaires had several closed ended questions with appropriate rating scales hence, SPSS software was used in the analysis. Simple frequencies and percentages generated from the analysis were presented in tables and figures to discuss data and information on various issues addressed by the study objectives. Furthermore, the FGDs and IDIs were carefully content analysed and the results used to complement the quantitative data.

Chapter Four

Historical Antecedents of Water Policy Formulation in Nigeria

4.1 Introduction

Nigeria has abundant water resources although they are unevenly distributed over the country. The highest annual precipitation of about 3,000 mm occurs in the Niger delta and mangrove swamp areas of the south-east, where rain falls for more than eight months a year. There is a progressive reduction in precipitation northwards with the most arid north-eastern Sahelian region receiving as little as 500 mm a^{-1} precipitation for about 3-4 months of rainfall. Widespread flooding occurs in the southern parts of the country, while the northern parts experience chronic water shortages during the dry season when rain fed springs, streams and boreholes dry up.

The problems associated with the lack of adequate portable water supply in the country threaten to place the health of about 40 million people at risk. According to the World Bank (1990), it would cost in excess of US$10 million a year to correct such problems if ground and surface water contamination goes unchecked. The people most affected tend to be the urban and landless poor. In the long-term, the present level of environmental degradation could create health problems from water-borne diseases from most of this population. Many people are already affected by having to consume unsafe drinking water. Water contamination also places other resources at risk; fisheries and land resources, for example, have already been affected significantly. Most of the environmental pollution problems arise from anthropogenic sources, mainly from domestic and industrial activities.

It is based on the realisation of this fact and the importance the Federal Government of Nigeria (FGN) attached to adequate water supply that water resources management has always being part and parcel of the National Policy on Environment.

4.2 The National Policy on Environment (NPE)

The National Policy on the Environment (NPE) was launched by the then Head of State, General Babangida in Abuja on 27 November 1989 (FEPA, 1989). The goal of that policy was to achieve sustainable development in Nigeria and, in particular to:

- Secure for all Nigerians a quality environment adequate for their health and well-being.
- Conserve and use the environment and natural resources for the benefit of present and future generations.

- Restores, maintain and enhance ecosystems and ecological processes essential for the functioning of the biosphere and for the preservation of biological diversity and to adopt the principle of optimum sustainable yield in the use of living natural resources and ecosystems.
- Co-operate in good faith with other countries, international organizations and agencies to achieve optimal use of transboundary natural resources and effective prevention or abatement of tranboundary environmental pollution.

As outlined above, although no specific mention of water resources management is contained in the policy, on environment as launched by the Federal Government include all natural resources including water.

4.3 Water Resources Management the NPE

The turning point for water resources development and management in Nigeria could be traced as for back as 1960 after the severe drought of the 1960s. The Government's response to the catastrophe was the initiation of strategies for co-ordinated and effective water resources development, culminating in the creation of the Federal Ministry of Water Resources and the River Basin Development Authorities in the mid-1970s. The activities of these institutions were further strengthened in 1981 by the establishment of the National Committee on Water Resources, and by the Water Boards at the state level. These bodies were charged with taking an inventory, and ensuring rational and systematic planned management and conservation, of the country's water resources.

4.4 Strategies under the NPE

Implementation of the Nigerian National Policy on Environment depends on specific action directed towards major sectors and towards problem areas of the environment (FEPA, 1989). The management approach adopted in the policy is based on an integrated, holistic and systemic view of environmental issues. The programme activities of this policy are expected to establish and strengthen legal, institutional, regulatory, research, monitoring, evaluation, public information, and other relevant mechanisms for ensuring the attainment of the specific goals and targets of the policy. It will also encourage environmental assessment of proposed activities which may affect the environment or the use of natural resources prior to their commencement. The strategies put forward for effective water resources management in the policy include:

- Promulgation of a national water resources law to co-ordinate water resources development.
- Formulation of a water resources master plan.
- Improvement of water use efficiency for sustainable development.
- Implementation of water conservation measures including inter-basin water transfer.
- Establishment and enforcement of national water quality and emission standards to protect human health and aquatic ecosystems and species.

- Establishment of environmental monitoring stations or networks to locate and monitor sources of environmental pollutants and to determine their actual or potential danger to human health and the environment.
- Continuous data collection for resources monitoring and management.
- Introduction of economic incentives.

Programmes to assess the available water resources of the country were strengthened to provide, among other things, data on:

- Hydrological features affecting surface water resources.
- The location of groundwater resources and their characteristics in terms of depths, yields, permeabilities, storage and recharge.
- Per capita water use and requirements.
- Changes in hydrological regimes resulting from human activities, such as water use or extraction, pollution and the effects of mining and lumbering.
- The management of small and large dams.
- Irrigation problems with regard to crop water requirements, salinity, drainage and pollution from fertilizers, pesticides and cultivation activities.
- Existing freshwater living resources.

As part of the strategies for the implementation of the National Policy on Environment in the water sector, a comprehensive national water resources master plan has now been drawn up with support, from the Government of Japan, through the Japan International Cooperation Agency (JICA). For the first time, a decree on water resources protection and management has been promulgated (FGN, 1993), with the purpose of:

- Promoting the optimum planning, development and use of the Nigeria's water resources.
- Ensuring the co-ordination of such activities as are likely to influence the quality, quantity, distribution, use and management of water.
- Ensuring the application of appropriate standards and techniques for the investigation, use control, protection, management and administration of water resources.
- Facilitating technical assistance and rehabilitation for water supplies.

4.5 The 2000 National Water and Sanitation Policy

During the Water and Sanitation Decade of the 1980's a number of lessons were learnt.

a) The most important one was that the sustainability of rural water and sanitation investments is dependent on the degree to which communities are involved in the decision making, funding and operation of the facilities. Rural water schemes are usually the responsibility of the *State Water Agencies* which in the past have provided fuel, operators, watchmen and repair services, but which increasingly are relying on the beneficiary communities to supply these. Tariffs for such schemes normally are not charged because the cost of revenue collection is generally overwhelming. Since these rural systems cannot be operated on a commercial basis, water supply agencies minimize their financial losses by limiting their services.

b. The problems experienced in achieving adequacy in the rural areas prompted the Federal Government to commence a decentralization programme designed to make LGAs more autonomous and responsive to local needs, and technically and financially capable of providing services. The programme is intended to end dependency on the central government and "top-down" planning. This is being achieved by giving the country's 774 LGAs primary responsibility for planning and administration of their own development programme, increasing their budget allocations, and requiring communities to take the lead in decision making and implementing development projects based on their particular needs.

In year 2000, therefore, the Federal Government formulated a new National Water Supply and Sanitation Policy which was not subsumed under the National Policy on the Environment. This policy states inter alia 'the center-piece of Nigeria's water supply and sanitation policy shall be the provision of sufficient portable 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 policy document goes further to set water supply improvement standard for urban, semi-urban and rural policy objectives. The new broad policy objectives for water resources development and management in the country have been redefined to include formulation of a comprehensive and integrated policy for sustainable development of the nation's water resources. The new policy would institutionalize multisectoral and integrated water resources management approaches that would promote national utilization and conservation of the resources based on equitable allocation and ensuring the protection of the ecosystem. Promotion and support for the provision of water and sanitation to guarantee adequate supply of portable water for all needs are given prominence in the policy.

Also the policy is designed to enhance the preparation of adequate regulations and legal framework that would guarantee full protection of the resources from pollution, and over exploitation. It would foster bilateral and multilateral cooperation to facilitate the equitable and rational development and exploitation of transboundary water resources.

The development of appropriate technical and managerial capacities and institutions that could support and sustain integrated water resources development in the country and the institutionalization of principle of stakeholder participation, decentralization, the participation of women, equity and economic values are also incorporated in the new policy.

There are also political challenges in the area of appropriate pricing, equitable allocation of water and sometime policy implementation are extremely linked to political pressures and dictates. Other challenges relate to institutional issues, and international issues, like proper definition of roles at all levels of government, which is still vague and which encourages duplication of efforts and multiplicity of agencies across sector.

The Need for a Better Policy

The inadequacies outlined above in the Nigerian Water Supply and Sanitation industry call for a well articulated approach to water supply and sanitation towards a systematic development of the industry over a defined period of time. The approach therefore should define an acceptable National Policy that will set up a planning process, research and manpower development, institutional structure, legal framework and financing strategy that will meet the socio-economic requirements of the country. The major provisions of the policy are as follows:

Policy Objectives:

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.

Target

i) The initial target is to meet the national economic target of improving service coverage from 40% to 60% by the year 2003.
ii) Extension of service coverage to 80% of the population by the year 2007.
iii) Extension of service coverage to 100% of the population in the year 2011
iv) Sustain 100% full coverage of water supply and wastewater services for the growing population beyond the year 2011.

Consumption Standard

Separate water supply and sanitation considerations are made to match the three socio-economic profiles of the population as follows:

- Rural water supply guaranteed minimum level of service of 30 liters per capita per day within 250 meters of the community of 150 to 5,000 people serving about 250-500persons per water point.
- Semi-urban (small towns) water supply represent settlements with population of between 5,000-20,000 with a fair measure of social infrastructure and some level of economic activity with minimum supply standard of 60 liters per capital per day with reticulation and limited of full house connections as determined by the beneficiaries/government.
- Urban water supply 120 liters per capital per day for urban areas with population greater than 20,000 inhabitants to be served by full reticulation and consumer premises connection.

Components of the Policy Objectives

The elements of the policy objectives include but are not limited to the following.

i. Increase service coverage for water supply and sanitation nationwide to meet the level of socio-economic demand of the nation in the sector.
ii. Ensure good water quality standards are maintained by water supply undertakings.
iii. Ensure affordability of water supply and sanitation services for the citizens.

iv. Guarantee affordable access for the poor o *basic human need* level of water supply and sanitation services.
v. Enhance national capacity in the operation and management of water supply and sanitation undertaking.
vi. Privatize water supply and wastewater services (where feasible) with adequate protection for the poor.
vii. Monitor the performance of the sector for sound policy adjustment and development for water supply and sanitation.
viii. Legislations, regulations and standards for water supply and sanitation.
ix. Reform of the water supply and sanitation sector to attain and maintain internationally acceptable standards.

Policy Strategies
In order to achieve the policy objectives, the following strategies are enumerated relative to each of the elements of the policy objective.
Increase service coverage for water supply and sanitation nationwide to meet the level of the socio-economic demand of the nation on the sector.

i. Undertake water supply and sanitation feasibility survey for all the states and the FCT to acquire baseline data for proper investment planning.
ii. Rehabilitation and modernization of existing water supply works to restore them to their optimum operational capacity.
iii. Expansion of existing urban water supply works to enhance capacities to meet over grown demand.
iv. Distribution network repair and renewal for all urban water supply schemes.
v. Comprehensive metering of all water supply schemes from abstraction through distribution to consumer connections.

The water policy also proposed important reform issues in water supply provision in the country. One of the reform issues is that water should be managed at the lowest appropriate level (appropriate being key and a function of the specific conditions in the concerned areas and communities). This principle promotes consumer appreciation for the value of water and sanitation investments. If local conditions and demand are taken into account in the planning, financing, implementing and operation of water supply and sanitation systems, the sense of ownership and willingness of communities to share in the cost and operations and maintenance will be greatly enhanced, thereby increasing the sustainability of the systems.

Although the 2000 National Water Supply and Sanitation Policy stated that government shall sponsor capital investments for rural water supply, the level of provision of water in the rural areas is still very low. For instance as shown in Table 4.1, the rural areas in Nigeria lagged behind in various sources of drinking water available to households, except the open public well, rivers/streams and rain water in which they have higher percentages compares to the urban areas in 2003 (see Figure 1). This is not surprising considering the fact that, unlike in the urban areas, rural dwellers rely more on water

from rivers, streams and ponds. Also, rain water is a major source of water for domestic use, especially for drinking in the rural areas. Among the geo-political zones, the south-west zone in which the study is based ranked low in terms of supply of piped water into dwelling yard, protected well in dwelling yard, protected public well and the use of rain water as sources of water supply. In the Western zone, it takes about 9 minutes from dwelling houses to major sources of water.

Table 4.1: Distribution of households by access to water supply and sanitation facilities (2003)(%)

Household Characteristics	**Residence**		**Geo-political zone**						
	Urban Central	Rural	North East	North West	North East	South South	South West	South	Total
Source of drinking water:									
Piped into dwelling/yard/plot	14.4	2.3	7.8	4.6	10.2	8.3	3.2	4.6	6.6
Public tap	18.5	6.2	8.1	9.7	11.8	11.3	4.6	18.8	10.6
Open well in dwelling/yard/plot	9.4	14.2	12.6	15.1	22.9	1.8	3.3	9.2	12.5
Open public well	6.7	21.2	9.4	30.8	25.0	1.5	5.2	12.7	16.0
Protected well in dwelling /yard/plot	6.7	3.7	5.5	1.8	3.3	10.8	7.0	3.5	4.8
Protected public well	24.4	16.3	11.5	5.3	12.1	33.1	35.8	25.6	19.2
Rivers/stream/spring/pond	8.1	29.9	38.1	19.4	11.3	16.7	34.8	16.8	22.1
Rain water	0.5	2.1	0.1	0.0	0.0	6.7	4.3	0.5	1.5
Tanker truck	5.9	1.9	5.9	4.4	0.6	7.3	1.4	4.2	3.3
Other	5.2	2.0	0.6	8.9	2.9	1.8	0.5	4.1	3.2
Total	**100.0**	**98.8**	**99.6**	**100.0**	**100.1**	**99.8**	**100.1**	**100.0**	**99.8**
Time to water source									
Percentage 25 minutes	64.9	51.4	51.1	58.2	62.1	59.4	45.8	59.4	56.3
Median time to source	4.6	9.9	10.0	9.4	6.5	4.9	14.8	9.2	9.4
Sanitation Facility									
Flush toilet	28.7	6.7	9.6	4.5	4.5	41.3	21.2	23.4	14.6
Traditional pit toilet	55.6	56.9	50.1	74.6	74.3	39.8	42.3	39.1	56.5
Ventilated improved pit (vip) Latrine	5.5	1.9	1.9	0.5	1.6	0.9	8.5	5.5	3.2
Bush/Field	9.7	31.6	38.0	20.1	19.2	17.6	19.7	30.7	23.7
River	0.3	2.7	0.4	0.3	0.3	0.1	8.2	1.2	1.9
Others	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Persons per sleeping room	2.9	3.6	4.0	3.7	3.3	3.0	3.6	2.2	3.3

Note: percentages may not add to 100 due to missing cases

It could be noted from the above that the policy emphasis for the provision and distribution of water in the country generally and the state in particular is the assurance of portable quality as well as adequate quantity to all groups of people irrespective of structure or geographical scale.

Given the above scenario, there is a formidable lack of policy dynamism with the changing trends in the society. The subsisting document on water remains the patchy 29-year-old edict of the state establishing its water boards even when the Nigerian society has witnessed enormous changes in its social, economic, political and the overall institutional sector during the period. For instance, the country has transited, within the period from a prosperous oil boom to an austere oil doom, as well as from unpopular military government to a broad based participatory democratic government. All these changes possess implications for infrastructural and service provision such as water and waste management. Yet the existing water edict was not built to accommodate such changes. This lack of policy dynamism especially in the water supply sector has continued to affect water supply provision in the state, the rural areas been worse hit.

4.7 Oyo State Water and Sanitation (WATSAN) Project

The Oyo State UNICEF-Assisted Water and Sanitation (WATSAN) Project is the agency responsible for rural water supply and sanitation in the state. The 'WATSAN' project as it is often referred to come into being early 1992 with the software components (community mobilsation/hygiene education, sanitation etc) in the Ministry of Health and later moved to the Governor's Office. The hardware components are geophysical survey, drilling operation, platform construction, pump installation, and latrine construction.

The objectives of Oyo State WATSAN Project are to:

a) increase access to portable water supply by provision of boreholes with durable hand pumps and eventually eradicate faecal and water related diseases in the rural areas of the state
b) improve standard of living and productivity in rural areas
c) increase access to proper waste disposal through promotion, construction, use and maintenance of low cost "sanplat" (sanitation platform) latrines
d) promote behavioural changes with respect to water use, personal hygiene and efficient means of excreta disposal; and
e) enable participating communities to operate and maintain their own installation through specially designed training and cost recovery schemes.

For the realization of these objectives, the WATSAN Project consists of various units including, planning, monitoring and evaluation, community mobilization/hygiene education, sanitation, water supply, workshop, administration and finance.

Financing of the WATSAN project is a joint effort of the UNICEF, state government, local governments and participating communities.

a) The UNICEF provides the heavy/light equipment rigs, compressors, vehicles, workshop machines, workshop tools etc.
b) The state government is responsible for providing drilling materials
c) The local government is responsible for provision of some drilling materials, staff accommodation and field allowance
d) The participating communities on their own are responsible for the operation and maintenance as well as the provision of security for the facilities provided to prevent vandalisation.

The WATSAN project was designed to have 6 units

1. Administration and Finance
2. Water Supply Unit
3. Sanitation Unit
4. Community Mobilization/Hygiene Education Unit
5. Project Monitoring and Evaluation
6. Workshop/Maintenance Unit

The water supply unit, which is the project's core unit, is further divided into sub-units comprising the drilling, geophysical, pump installation/platform base and alternative water supply units. The alternative water supply unit promotes the exploitation of alternative water supply e.g. hand-dug well, rain harvest, pond water up grading as well as spring water upgrading/development. The various units are interrelated and have one form of intervention or the other in the community where boreholes are constructed.

For water supply projects executed by WATSAN to be sustainable, emphasis is now on demand driven intervention (DDI). According to an official of WATSAN., past experience in project execution showed that many communities where the project are executed do not usually appreciate the fact that project belongs to them. As a result, the projects are not well utilized and maintained.

DDI is an expression on the part of the communities that they need the project and signals the willingness on the part of the affected communities to be part of the project by making their intention known to the local government which in turn will contact the state office of WATSAN. The community should be able to prove that they are willing to contribute monetarily or through labour input for example during the casting of concrete platform, scooping of available sand within community to be mixed with cement for casting. It is at this moment that WATSAN will sit and deliberate with the affected community. Usually, the level of financial involvement is shared in the following proportion: state (50%), local government (40%), and community (10%). This level of involvement, especially on the part of the community is expected to give them a sense of belonging and ownership of the project so that they will not be indifferent to or neglect the facility.

In executing a project in any community, the first intervention is from project monitoring and evaluation unit (PME). The PME finds out if there is any existing water source in the community, particularly drinkable water sources. The PME goes to take statistics and collect data such as total population

of the community, number of women and children since UNICEF lay emphasis on women and children. Data are also collected on existing infrastructures in the community such as access roads, schools, etc. It is based on this that the appropriate water technology for any community is chosen. Usually, any community that is made up of less than 200 people is provided with hand-dug well/rain harvest system. If the community has a pond or spring, it is upgraded. For a community that has between 200-500 people, it is provided with hand operated borehole. A community that has more than 500 people, is provided with motorized borehole or multiple boreholes in a situation where there is no electricity. Apart from project implementation, the PME again re-intervene to monitor the impact of the facility on the community.

The community mobilization/hygiene unit engages in advocacy aimed at educating the public about the intention of government to provide target community with portable water supply. It is during the interactive session with the community that the role the community wants to play during the project will be spelt out. Thereafter, WATSAN will inaugurate committee comprising 10 members made up of artisans (because of their technical skills), opinion leaders and some officials of WATSAN project.

From inception, WATSAN has dug about 800 boreholes in not less than 28 out of the 33 local government areas in the state. WATSAN maintains a good database of their activities especially information about communities and borehole records. Two of the 3 LGAs used for this study i.e. Ibarapa and Lagelu are among the 28 LGAs that have benefited from WATSAN provided boreholes.

WATSAN has recorded some measure of success in the provision of water for rural areas in Oyo State. However, the major problem with many of the boreholes provided is that no sooner than the boreholes are provided that they break down, mostly due to lack of maintenance of the facility on the part of the community. Of the three boreholes provide by WATSAN in Eruwa, only one is still functioning. Hence the present arrangement for the WATSAN provided boreholes is not sustainable. For example in Oloode village in Lagelu LGA, two boreholes were constructed by WATSAN, the first using motorized pump was not completed because the local government and the community could not fulfill their own parts of the agreement; that is, the 40% involvement by the LGA and the 10% by the community. One the other hand, the hand pump constructed more than 8 years ago is still functioning but grossly inadequate for the population of the village. According to some of the inhabitants, it takes up to 25 minutes queuing and waiting to fetch a bucket of water. Hence, more than 50% of the inhabitants depend on streams, brooks and springs as their major sources of water supply especially during the dry season. On the other hand, the motorized pump bore-hole constructed by WATSAN in Apatere, Lagelu LGA worked for a few months only. The problem again has to do with the non fulfillment on the part of the local government authority and the community especially as far as the maintenance of the facility is concerned.

Chapter Five

Socio-Economic Dimensions of Water Provision and Management in the Study Area

5.1 Introduction

This chapter examines the socio-economic dimensions of rural water supply and management in the areas covered by this research. Using the results of the survey questionnaires and the FGDs held in three different communities, issues of availability of water supply, sources, storage techniques, willingness to pay for improved water supply, indigenous technology in water sourcing and storage, among others, are discussed.

5.2 Socio-Demographic Characteristics of Survey Respondents

5.2.1 Sex of Respondents

A total of 487 respondents were interviewed in the three study areas. About 50.5% were male while the remaining were females. There is a deliberate attempt to represent the sexes almost equally because of the universality of water and the higher influence of women in decisions relating to fetching and using water. Often in the developing world, particularly in both its rural and traditional urban settings, decisions about household water use fall directly on women who are expected to simply get water by whichever means while the male goes to farm or for other economic activities for household livelihood. The result of this analysis is presented in Table 5.1.

5.2.2 Marital Status

There are three marital characteristics among the respondents in the sample communities. These are the singles, the married and the others. About 41% of all respondents were single while about 58% were married. The remaining 1% was among others including the widows and divorced or the separated. More often, the quantity of water used is related to the household size, hence the married households are likely to be high consumers of water. The interest of this group is therefore not surprising. It must be noted that household water fetching exerts a lot of pressure on large households in the rural areas where almost all adult members are expected to partake in the production process.

5.2.3 Age of Respondents

More than three quarters of those interviewed were above 20 years of age. The result consistently shows that the highest proportion of the total number of respondents falls between the ages of 20-40

years. This result is not surprising considering the fact that these age cohorts are the most active when it comes to fetching water. On the other hand, the decision to fetch and use water in the household, in most cases, rests squarely on this age group. The major implication of this result is that since substantial amount of time is spent in fetching water in rural areas (see Table 5.1), it then means that there is substantial human hour loss because this age group is the most active working group. It should be noted that most rural informal income generating activities are labour intensive. Therefore, the productivity of labour is drastically reduced in the course of fetching water, and low productivity deepens poverty.

5.2.4 Education of respondents

It is a well known fact that the literacy level in rural Nigeria is generally low. The result obtained from this analysis, therefore, is not much different from what is expected. The highest education attainment of more than 75% of the respondents is secondary school. This result is even a little improvement when compared with literacy level in many other parts of Nigeria. This is because of the high level of interactions between these communities and Ibadan metropolis, the Oyo State capital and economic nerve centre. The number of respondents with tertiary education is highest in Eruwa. This is because of the presence of a tertiary institution (The Polytechnic, Ibadan, Eruwa Campus) in the community. It is the only community among others surveyed that has a tertiary institution. Literacy level has some implications on quantity and quality characteristics of water use by households as well as the management of the existing water sources, especially in the rural areas.

5.2.5 Income of Respondents

Income of rural dwellers in Nigeria is often generally low. In the study areas, the situation is not quite different. The result of analysis shows that close to two-third of the total number of respondents earn less than N10,000 monthly (approximately US$77.5 a month)*. Oral interviews conducted with the respondents revealed that majority of them earn even far less than the stated amount. Infact, about 15.6% of the respondents were not willing to disclose the amount they earn, claiming that since they don't have regular income, there is great variation in the amount of money that comes their way from time to time, sometimes earning per month could be near zero naira. Low income earnings in the rural areas have implication for willingness to pay for provision of water supply in the communities. It will also affect their willingness to contribute to the management of the existing water supply infrastructure especially boreholes, which is the only source of safe portable water supply in most of these communities (Table 5.1).

5.2.6 Occupation of Respondents

The distribution of respondents among the various occupation groups in the communities studied show that there are more traders (26.9%) than any other group. Farming accounts for about 18% of the respondents. This distribution is interesting because it shows, among other implications, that in rural areas, the non-farm informal sector is growing. Moreover, there is also the gender perspective of this distribution, most women are usually in the distributive trade sector and constitute a substantial part of the sampled respondents in the communities. In all the communities, the influence of the urban settlements is visible and increasing. This scenario possesses implication for water sourcing

among the household in the communities. Farming ranks as the second major occupation in the area and this may also on the long run have implications for the degradation of major sources of water such as rivers and streams etc. Furthermore, the two major occupations in the focus communities – trading and farming – are activities that require long human hour daily. Hence, if the same set of people that are expected to fetch water are also expected to be in the market or farm, then the implications of water fetching for human hour loss to water fetching would be glaring. This statement is supported by the findings of Akintola et al (1980). According to them 'none of the housewives goes to fetch water less than four times daily … thus a sizeable proportion of the rural labour force is engaged in fetching water daily. Indeed during the dry season many farmers often join in the search for water'. It must be emphasized that the 'other' in Table 5.1 has a surprisingly larger proportion than most other occupation groups. This could be attributed to the influence of students in the communities studied. There is a campus of the Polytechnic at Eruwa, which partly explains the greater proportion (18.9%) of this group among sampled respondents in the community.

5.2.7 Household Size

Most rural households in Nigeria are large because of the kinship structure and the extended family system. It is not surprising therefore that almost half (47.4%) of the total number of the respondents have between 6 and 10 members in their households. Furthermore, another 22.2% have above 11 members in their household. Household size has implication for quantity of water consumed in the household. Considering the existing low level of water provision in the rural areas, it then means that less water is available per person in the household. It also means that households would fetch water more frequently and from a variety of sources with varying quantities. According to Akintola *et al* (1980), many rural inhabitants have no choice but to make use of whatever sources of water that is available no matter the quality.

5.2.8 Length of Stay in the Community

The lengths of stay in the sampled communities varied between 1 year to more than 20 years. More than 29% of the respondents in the three communities have stayed between 1-5 years. However, majority of this group (56.6%) are respondents from Eruwa where the satellite campus of the Ibadan Polytechnic is located. This is suggesting that most of the respondents who have stayed between 1 year and 5 years are likely to be students. Apart from this group, more than 30% of all respondents in all communities have stayed in their respective communities for upwards of 20 years. The implications of this include a generally highly awareness of water related issues in their communities. Over time, these groups of people have been familiar with water supply and demand interactions; and may also be able to establish changing trends in this interaction and the management of the situation.

(Footnotes)

* Based on the official exchange rate of
₦
129 to US$1 in May, 2006.

Table 5.1: Socio-Demographic Characteristics of Respondents

Location/Socio-economic characteristics		Igbo-Elerin		Ilora		Eruwa		Total	
		No	%	No	%	No	%	No	%
Sex	Male	81	16.6	76	15.6	89	18.3	246	50.5
	Female	84	17.2	64	13.1	93	19.1	241	49.5
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**
Marital Status									
	Single	25	5.1	70	14.4	104	21.4	199	40.9
	Married	140	28.7	70	14.4	73	15.0	28	58.1
	Others	-	-	-	-	5	1.0	35	1.0
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**
Age	<20 years	7	1.4	38	7.8	22	4.5	67	13.8
	20-30	32	6.6	40	8.2	89	18.3	161	33.1
	31-40	39	8.0	42	8.6	40	8.2	121	24.8
	41-50	29	6.0	13	2.7	23	4.7	65	13.3
	51-60	35	7.2	6	1.2	6	1.2	47	9.7
	>60	23	4.3	1	0.2	2	0.4	26	5.3
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**
Education									
	No formal	84	17.2	7	1.4	12	2.5	103	21.1
	Primary	27	5.5	21	4.3	9	1.8	57	11.7
	Secondary	46	9.4	55	11.3	48	9.9	149	30.6
	Vocational	-	-	16	3.3	17	3.5	33	6.8
	Tertiary	8	1.6	38	7.8	88	18.1	134	27.5
	No response	-	-	3	0.6	8	1.6	11	2.3
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**
Occupation									
	Farming	64	13.1	16	3.3	6	1.2	86	17.7
	Artisan/Craft	7	1.4	23	4.7	6	1.2	30	6.2
	Public servant	4	0.8	12	2.5	18	3.7	34	7.0
	Self-employed	13	2.7	36	7.4	22	3.5	71	14.6
	Trading	51	10.5	50	10.3	30	6.2	131	26.9
	Others	20	4.1	-	-	92	18.9	112	23.0
	No response	6	1.2	3	0.6	8	2.9	23	4.7
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**
Income									
	<₦10,000	142	29.2	100	20.5	86	17.7	328	67.4
	₦10,001-20,000	5	1.0	9	6.0	37	7.6	71	14.6
	₦20,001-30,000	4	0.8	5	1.0	3	0.6	12	2.5
	No response	14	2.9	6	1.2	56	11.5	76	15.6
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**
Length of Stay in the Community									
	1-5 years	38	7.8	24	4.9	81	16.6	143	29.4
	6-10 years	27	5.5	31	6.4	29	6.0	87	17.9
	11-15 years	4	0.8	15	3.1	7	1.4	26	5.3
	16-20 years	7	1.4	31	6.4	21	4.3	59	12.1
	Above 20 yrs	86	17.7	30	6.2	31	6.4	147	30.2
	No response	3	0.6	9	1.8	13	2.7	25	
	Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**

Household size								
1-5	29	6.0	32	6.6	67	13.8	128	26.3
6-10	105	21.6	59	12.1	67	13.8	231	47.4
11-15	19	3.9	18	3.7	31	6.4	68	14.0
16 and above	12	2.5	26	5.3	2	0.4	40	8.2
No response	-	-	51	1.0	15	3.1	20	4.1
Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**	**487**	**100.0**

Source: Survey Data, 2005

5.3 Water Sources, Use and Availability

This section discuses water use, sources, as well as problems households confront in obtaining water for domestic uses. Critical problems confronting household in obtaining water for domestic uses including time and distance are discussed with specific reference to their variations in the study areas.

5.3.1 Sources of Water

Rural areas in Nigeria are endowed with several sources of water. The sources vary from natural sources like rivers, streams, ponds, rainwater, and human made sources like wells, boreholes and in few cases, pipe borne water. These rural communities, by force of circumstances, therefore depend on many sources of water supply because no one source is capable of supplying all the water needs throughout the year.

In the communities, more than half of the total respondents indicated borehole/well as the source of water they used most frequently, while rainwater is the least frequently used (0.6%). However, in Ibadan rural communities, river/stream is the commonest and most available source of water they use. It is used by about 17% of the total respondents in this area.

The reasons for the above distribution may have to do with the fact that most of the sources of water in the areas are seasonal and are incapable of all year round provision of water. There seems to be a special focus of the state and Ibarapa local government on Eruwa as regards to water provision because of the presence of a higher institution with students' population that may influence agitation for improved water provision in the area. Hence, there is a visible failure of tap water supply to the community, while majority of the respondents (24.8%) indicated that borehole and well are sources of water frequently used.

The reasons given in the survey for the four water sources the respondents used frequently include 'always available', 'cheaper', 'convenient to get', and 'high quality'. Some 31% respondents in all the communities did not indicate any reason. It is important to note also that some respondents indicate more than one reason suggesting that such reasons as cost, availability, convenience as well as quality may concurrently inform the decision to use a water source. In all, 33.5% of the total respondent used their source frequently because it is always available while another 27.3% used their source

because of its cheap cost. Quality consideration formed only 12.4% of the reason for why respondents' sources of water were frequently used. This finding also supports the inferences drawn for the reasons for the preference of water sources by the respondents.

5.3.2 Preferred Water Source

In order to assess appropriate intervention strategy on the development of sources of water in the study areas, the respondents were asked to indicate the source(s) of water they would ordinarily prefer to use not minding the present level of availability. The preference was highest for borehole in all the sample communities followed by tap water. There are two implications of this finding. First, it shows that as against the results discussed in section 5.2.1, the rural dwellers are also aware of water quality and hence their preference for sources with greater quality. Secondly, it also shows that in most communities, the source they used frequently was not the source they would have preferred. The reasons for their preference include availability, cost, convenience and quality.

In all cases, the quality of the source ranked as the major reason why respondents preferred their water source. For instance, about 32% of the respondents indicated that the reason for the preference for their water source is because of its high quality; while about 24% choose the preferred source because it was convenient to get. About 19.6% indicated they preferred water sources that are both cheap and always available.

A major inference from the distribution is that although about 32% choose their source because of its quality, further investigation reveals that on the whole, quality consideration is not a priority of rural water supply at least in the perception of the users. This has implication for quality improvement of rural water because although the users may accept it when it comes, they on their own may not initiate efforts to improve quality but only those efforts that serve to simultaneously reduce cost and availability at the convenience of the rural populace may likely attract the attention of rural dwellers. Infact as highlighted during the FGD discussion at Igbo-Elerin a participant noted: "Once the borehole breaks down or residents refuse to contribute money to buy fuel to operate the borehole, we shift to our ever-reliable streams. It is God's gift".

5.3.3 Household Member Involved in Fetching Water

On the aggregate, women and children form the major groups (60%) involved in fetching water in all cases. This shows that water fetching is the primary responsibility of women and the children. The proportion of men fetching water in the three communities of focus is generally low representing only about 2.7% of the total respondents. In a typical African community, there is a near strict division of labour in households in relation to water fetching, cooking and farming activities. The first two is almost exclusively reserved for women while the last is for men. This has implication for planning for water supply. A meaningful water supply strategy in the rural areas must therefore involve more women than men because these are the group that is more conversant with the existing water problems and coping strategies in their communities.

5.3.4 Time Spent in Fetching Water

A great deal of time and energy is spent fetching water in the rural areas in Nigeria. The result obtained from this study reveals that there is variation in time spent fetching water among the communities sampled. While, on the whole, more than half of the total number of respondents spend less than one hour fetching water daily, the highest proportion of respondents spending more than 3 hours daily in fetching water are from Eruwa. This is because Eruwa is one of the largest rural communities in Oyo state in terms of population and land area. There is therefore a lot of pressure on the few boreholes that are provided in the community. The length of time spent in fetching water also varies from season to season, being highest during dry season. It is not surprising then that similar to other studies (e.g Akintola et al, 1980), in people's estimation of the benefits of rural water supply improvement schemes, the considerations of obtaining water of improved quality are only secondary to those of reducing the time and energy expended in fetching water (Table 5.2).

5.3.5 Distance of Main Sources of Water Supply from Respondents' Residence

One of the reasons why a great deal of time and energy is spent fetching water in rural areas is because many of the sources are of considerable distance from the settlements especially during the dry season. Though the distance from the source of water supply to majority of the respondents (24.2%) is less than 1 kilometer, the highest proportion of the total number of respondents (39%) could not estimate the distance to the main source of water they use. Again another high proportion of the respondents claimed that the distance to main water source is more than 5km above. This response is highest among respondents in Ilora and Eruwa. This result is not surprising considering for example, the fact that Eruwa is a linear settlement. The distance between the two ends of the community is about 7 kilometers. Apart from this fact, many respondents actually obtain their water from rivers/streams which are located far away in the bush (See Table 5.2 and Box 1).

Box 1: Perception of use and problems of rivers/streams in the study area

Oyo state is highly dissected by rivers and streams. Among the major rivers include Ogun and Ona rivers. Water from rivers and streams is an important source of water supply in many rural communities. For instance, in this study all the communities surveyed, depend largely on rivers and stream for their water supply. The major problems with the use of water from rivers/ streams include doubtful quality and the distance of these streams from the communities. A visit to some of these streams by the researchers revealed that, on the average, the walking time to these steams is 15 minutes. On the other hand, the researchers found that the stream (Ogere) visited in Igbo Oloyin contained a lot of sediments giving the water a brownish colour.

The people believed that the streams are a blessing to them since they have considerably reduced the problems of water scarcity in the area. The water scarcity peaks during the dry season and eases during the rainy season. As a result, people have to spend longer time at the stream. According to many of the respondents in Eruwa, people do sleep overnight at the stream at the peak of dry season. Because of this, some male household heads are compelled to help in fetching water from the stream with the use of bicycle or motorbike. The water from most streams in Eruwa is often not drinkable. Therefore whenever the existing WATSAN provided borehole is not functional, women and children often keep the night waiting for their turn to fetch at hand-dug wells at the streams. Thus, the issues of distance and time spent at water source have combined effects of making water collection a tedious, laborious and time wasting exercise.

Table 5.2: Water use and sources in the sample communities

Location	Igbo-Elerin		Ilora		Eruwa	
	No	%	No	%	No	%
Source of water frequently used						
Borehole/well	64	13.1	59	12.1	121	24.8
Rainwater	11	2.3	19	3.9	12	2.5
River/stream	81	16.6	12	2.5	29	6.0
Borehole/rainwater	1	0.2	0	0.0	3	0.6
Borehole/river	3	0.6	1	0.2	0	0.0
Rainwater/river	0	0.0	3	0.6	0	0.0
No response	5	1.0	46	9.4	17	3.5
Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**
Reasons for the Source Frequently Used						
Always Available	126	28.5	65	28.7	90	52.0
Cheaper	135	30.5	61	28.2	31	17.9
Convenient to get	111	25.1	55	25.5	26	15.0
High Quality	56	12.7	23	10.6	24	13.9
None of the above	14	3.2	15	6.9	2	1.1
Total	**442**	**100**	**216**	**100**	**173**	**100**
Water source preferred						
Harvest rain	2	1.2	42	27.4	16	8.6
Borehole	149	88.2	66	42.9	83	44.4
River/stream	10	5.8	13	8.5	13	7.0
Tap	3	1.8	9	5.6	55	29.0
No response	5	3.0	24	15.6	20	10.3
Total	**165**	**100.0**	**154**	**100.0**	**187**	**100.0**
Reasons for the Source Preferred						
Always Available	144	24.6	17	10.0	22	12.2
Cheaper	139	23.8	27	15.8	17	9.4
Convenient to get	152	26.0	35	20.5	37	20.6
High Quality	145	24.8	68	39.8	84	46.7
None of the above	5	0.85	24	14.0	20	11.1
Total	**585**	**100**	**171**	**100**	**180**	**100**
Reasons For Not Using the Preferred Water Source						
Not Always Available	89	47.0	46	33.8	88	57.1
Expensive	78	41.2	42	30.9	15	9.7
Difficulty to Get	20	10.6	28	20.6	41	26.6
Low Quality	0	0.0	10	7.4	4	2.6
Not Available at All	2	1.0	10	7.4	6	3.9
Total	**189**	**100**	**136**	**100**	**154**	**100**
Household member involved in fetching water						
Women	17	3.5	24	4.9	15	3.1
Men	2	0.4	11	2.3	0	0.0
Children	15	3.1	38	7.8	37	7.6
Women & Children	131	26.9	60	12.3	101	20.7
Others	0	0.0	2	0.4	20	4.1
No response	0	0.0	5	1.0	9	1.8
Total	**165**	**33.9**	**140**	**28.7**	**182**	**37.4**

The commonest methods of storing water that respondents currently used in the three study areas include buckets (21.8%) and local pots (21.2%). Only about 8.5% use surface tanks in all the communities. Use of kegs/jerry cans and drums are not too common as only 17.8 % of the sampled respondents used each of the methods.

Table 5.3: Local Methods of Storing Water by the Respondents

		Location					
		Igbo-Elerin		Ilora		Eruwa	
		No	%	No	%	No	%
Methods of storing water	Inside drum	17	8.9	33	18.0	80	25.1
	Kegs/jerry can	18	9.4	34	18.6	72	22.6
	Plastic bowl	8	4.2	29	15.9	42	13.2
	Buckets	56	29.3	37	20.2	44	13.8
	Local pots	86	45.0	35	19.1	37	11.6
	Surface tanks	6	3.1	15	8.2	44	13.8
	Total	**191**	**100**	**183**	**100**	**319**	**100**
Methods respondents currently use	Inside drum	13	8.3	19	17.2	48	26.2
	Kegs/jerry can	7	4.5	19	17.2	54	29.5
	Plastic bowl	7	4.5	18	16.4	33	18.0
	Buckets	50	32.1	27	24.5	21	11.5
	Local pots	61	39.1	19	17.2	15	8.2
	Surface tanks	18	11.5	8	7.2	12	6.6
	Total	**156**	**100**	**110**	**100**	**183**	**100**

Source: Survey Data, 2005

The FGD sessions held in Ilora revealed that traditional ways of storing, preserving and storing water in most rural areas is fast giving way to modern methods. For instance, one of the participants stated that "in the olden days, our people stored water in earthen pots. Nowadays, we store water in plastic containers. In addition, we also purify water from doubtful sources using alum. It is used mainly for muddy water. Since public taps were constructed in the late 1960s, I doubt if anybody uses pots again". Another participant stated that

> "it was easy to detect from which streams water was fetched by their tastes; each stream has its own peculiar taste. Then, water-borne diseases were common. Now most people are educated and the selling of sachet water has eradicated some of these diseases. However there is typhoid these days that were not common then"

Rain harvesting is another important area where indigenous knowledge has been applied to increase available water for domestic uses especially for drinking purposes in rural areas of Nigeria. The study area is not an exemption. However, the existing methods of rain harvesting from roof tops and storage cannot guarantee large quantities of water for domestic use over a long period of time. In

other words, only small quantity of water can be harvested and stored which may not last an average household for more than three to five days.

Though rain harvesting is a good means of ensuring access to potable water, at least for a short period of time in the study area, nevertheless, some of the technology challenges in this borders on how to preserve the water so collected for a long period of time and how to make it safe for drinking.

5.5 Respondents' Perception of who should Provide Water in the Rural Communities

In Nigeria, there are institutional arrangements that 'put' the responsibility for water supply on the three tiers of government namely, local, state and federal tiers of government. However, the failure of this arrangement with resultant acute water supply has led to the growth of private operatives in the supply of water to communities. In the study areas, the three tiers of government claimed to be involved in the provision of water. According to the respondents, the government, the community and the public/private involvement (NGOs, and religious associations or collaboration between government and community are the most common). The believe of about 97% respondents in the rural area of Ibadan is that provision of water is the responsibility of government; the remaining 3% believe that water could be provided by the community. As shown in Table 5.4, 77.4% of the respondents see water provision as the responsibility of government while 11% each sees it as that of community and public/private responsibility. The result of this analysis is presented in Figure 5.5.

That 97% and 84% of the respondents in Ibadan and Eruwa areas believe government should provide water for communities is a reflection of the political dominance of the Ibadan/Ibarapa senatorial district in Oyo state. On the other hand, residents of Ilora with little or no potential patronage by successive governments had for a very long time depended on self-help and other private initiatives in the supply of water.

Table 5.4: Respondents Opinion on Who Should provide water in the community

	Location					
	Ibadan Rural		**Ilora**		**Eruwa**	
	No	**%**	**No**	**%**	**No**	**%**
Government	159	97	76	48.7	155	84.2
Community	5	3	41	26.3	12	6.5
Public/private	0	0	39	25	17	9.2
Total	**164**	**100**	**156**	**100**	**184**	**100**

Source: Survey Data, 2005

in Ibadan rural and Ilora. This is indicative of the low disposable income of the people in rural areas. Other ways the respondents are willing to be involved in water supply and management include provision of skilled labour, membership of community management committee for water facilities and payment of water rates. The results are depicted in Figure 5.6a.
For those who are unwilling to b e involved in water supply provision and management, the main reasons given include lack of money and the fact that the responsibility of providing potable water for people is that of government. However, many of the respondents who are not willing to be involved in water supply provision and management were found to be non-indigenes. This reason was given mostly by respondents in Eruwa where a large proportion of respondents that gave this reason are the tertiary institution students in the community. It should be noted that since the institution is non-residential, the students live among the indigenes in the community. The consistently lowest percentage that payment of water rate accounted for is indicative of that fact that there is no pipe borne water supply to respondents' houses. Most of the existing water supply provision is the few boreholes in the communities from where the households have to go and queue to obtain water.

Asked which ways the respondents think the community could be involved in water supply provision and management, again financial contribution and maintenance of facilities accounted for the highest proportion of responses in Ibadan rural and Eruwa (34.2% and 33.5% respectively). Other ways suggested by respondents include provision of skilled labour, and payment of water rates.

On whether the respondents who are not presently involved in the provision of water supply and management will be willing to do so in the future, more than half (61.6%) of the respondents said no. The analysis reveals that those who said no are consistently high in all the three locations. Again, financial contribution and maintenance of facilities are the major ways they will be willing to be involved water supply provision and management in the future. The outcome of the focus group discussions held in Igbo-Oloyin with a cross section of the people is presented in Box 2.

Table 5.5: Structure of Community Involvement in Water Supply

Location		**Ibadan Rural**		**Ilora**		**Eruwa**	
		No	**%**	**No**	**%**	**No**	**%**
Structure of individual Involvement	Financial	50	31.6	38	20.0	58	33.5
	Provision of skilled labour	33	20.9	31	16.3	18	10.4
	Payment of water rates	8	5.0	29	15.3	27	15.6
	Maintenance of facilities	54	34.2	48	25.3	53	30.6
	Membership of community mangt.	13	8.2	44	23.2	17	9.8
	Total	**158**	**100**	**190**	**100**	**173**	**100**
Structure of community Involvement	Financial	59	27.6	56	25.3	72	33.0
	Provision of skilled labour	43	20.1	42	19.0	29	13.3
	Payment of water rates	24	11.2	29	13.1	31	14.2
	Maintenance of facilities	68	31.8	51	23.1	49	22.5
	Membership of community mangt.	20	9.3	43	19.5	37	17.0
	Total	**214**	**100**	**221**	**100**	**218**	**100**

Source: Survey Data, 2005

Box 2: Good Practice of Rural Water Supply Management: A Case Study of Igbo-Oloyin

The major sources of water supply in Igbo Oloyin are boreholes and stream. The members of the community prefer the water from the borehole because it's cleaner and more accessible than the stream. The borehole, which was provided by a prominent indigene, is about 20 years old. When the borehole was first provided, it was powered by a diesel generator provided by the donor. However members of the community are responsible for contributing money to buy the diesel used in powering the generator. It was revealed during the Focus Group Discussion that women are more active than men in contributing money to buy diesel for the generator. Government electricity supply under the rural electrification Supply Scheme is occasionally used to power the borehole, but as claimed by most participants it is very unreliable. Therefore, fetching water from the streams remains the most reliable.

Even though the water is not as pure as the water from the borehole, the people have formed the habit of purifying the water with the use of alum. Members of the community are educated on the use of alum.

The biggest problem with the use of stream is that it dries up during the dry season. The Akinyele Local Government dug a well beside the stream to ensure availability of water during dry season. The well became blocked after some time.
The prominent indigene that provided the borehole again came to the aid of the community by dredging a portion of the stream. This now guarantees all year round availability of water in the stream.

Even though community members are willing to be involved in the provision and management of water supply, the population is mostly aged and their income is low, however, the community repaired a recently damaged pipe. The community has never contacted the government or the politicians to assist in water provision. The main reason for this is that their prominent indigenes have always come to their aid in the provision of infrastructure and social amenities.

The good practice in rural water supply management in this community includes the fact that women contribute money regularly for the purchase of diesel and therefore hardly rely on Government electricity supply. The contribution is collected at the household level and the head of the household takes the money to the 'Baale' "the village head). This practice has been on for almost 20 years and the borehole is still functioning. The only sad incidence recorded was when the generator was stolen in the mid-1980s. Thank God, the donor came to the rescue again by donating another one.
The provision of water in Igbo-Oloyin through community maintenance of the borehole suggests that once the initial capital outlay is provided, rural communities could be willing to go an extra kilometer to ensure continuous provision of safe portable water. However, the big question remains whether the same type of strategy could be replicated in other areas.

Some of the key factors that have brought about the success story in community provision and management of rural water supply in Igbo-Oloyin as discussed in Box 2 are at present absent in other rural areas studied. However, the same success story could be recorded if these communities are given the same leverage. In the absence of community donors, government can empower the communities in form of providing the initial capital outlay and technicians to handle power supply projects. A semblance of this is that provided by WATSAN, but the projects are often not entrusted to the community after their completion. As a result, the people still see the projects as basically

government projects and are treated as such. For instance, communities where WATSAN has provided boreholes have to notify WATSAN for repairs anytime there is breakdown. This often takes time before any repairs are effected because the involvement of the stakeholders as stated in section 4.7 is expected to be 50:40:10 between the state government, the local government and the communities respectively.

The sustainability of public water supply system in most rural areas of the state, just as in other rural areas in the country, is a major problem with the current water supply schemes. For instance, during the FGDs held in Ilora, some of the major issues that came up border on dry taps. According to one of the participants, Mrs Adunbi,

> "before the regime of the former Military President, General Babangida, there was no problem of water supply in Ilora. However, the situation has been very bad since 1986 (commencement of the Structural Adjustment Programme) especially during the dry season. Most of the public pipe-borne water is now dry and residents usually obtain water from different sources including (i) Wells (ii) Streams (iii) Brooks etc. Most houses have wells. All the wells were constructed through individual efforts. Prior to 1999, government dug about 3 boreholes in the town but we obtained water from the boreholes only within 72 hours of its commission. Yet, we continue obtaining water from our own wells because we know there is water underground. Most of us doubt whether government actually carried out any feasibility study before locating the site for the boreholes"

To date there has been no provision of WATSAN boreholes in Ilora, despite the relatively high population of the community. This was also a major source of agitation during the FGD in Ilora. One of the participants had this to say "So far, no WATSAN borehole in Ilora. This assertion is really contestable because of political maneuvering in Oyo State. It is now difficult to differentiate between WATSAN and state government project because WATSAN is directly under the control of the government of the state. However, if any one is provided by any tier of government, we are ready to rally round government. After all it is for our benefit. We can support such projects by

- protecting the borehole from being vandalized
- contributing money at community level/household level to maintain it. For example, buying generator/diesel to pump water and carrying out minor repairs .
- women and adolescent females in particular are ready to assist because it will reduce the long trek in search of water during the dry season
- given the level of community co-operation all the above can be easily achieved. You know people "in small communities co-operate better than those in big towns".

Chapter Six

Summary, Conclusion and Policy Recommendations

6.1 Summary of Findings

Water supply management in Nigeria and Oyo State, in particular, is faced with a lot of problems which slowed down the development of the resource. Some of these problems as highlighted in the water policies reviewed include.

- The deficiency of the resource itself;
- Unnecessary duplication and overlap in organizations, structures and functions of the relevant bodies;
- The ill-defined and uncoordinated roles of the Federal, State and Local Government agencies responsible for water resources development;
- Failure to recognize the inter-relationship between surface and ground waters, and between water resources and land use; and
- Lack of effective water and environmental protection laws, and the means to enforce the already existing laws.

Although the 2000 National Water Supply and Sanitation Policy stated that government shall sponsor capital investments for rural water supply, the level of provision of water in the rural areas is still very low. Existing data shows that the rural areas in Nigeria lagged behind urban areas in various sources of drinking water available to households, except the open public well, rivers/streams and rain water in which they have higher percentages compares to the urban. This is not surprising considering the fact that, unlike in the urban areas, the water from rivers, streams and ponds are more readily available to rural dwellers.

Given the above scenario, there is a formidable lack of policy dynamism with the changing trends in the society. This lack of policy dynamism especially in the water supply sector has continued to affect water supply provision in the state, the rural areas been worse hit.

However, new broad policy objectives for water resources development and management in the country have been redefined to include formulation of a comprehensive and integrated policy for sustainable development of the nation's water resources. The new policy would institutionalize multisectoral and integrated water resources management approaches that would promote national utilization and conservation of the resources based on equitable allocation and ensuring the protection

of the ecosystem. It would promote and support the provision of water and sanitation to guarantee adequate supply of portable water for all needs both in the urban and rural areas.

It is designed to enhance the preparation of adequate regulations and legal framework that would guarantee full protection of the resources from pollution, and over exploitation. It would foster bilateral and multilateral cooperation to facilitate the equitable and rational development and exploitation of transboundary water resources.

The development of appropriate technical and managerial capacities and institutions that could support and sustain integrated water resources development in the country and the institutionalization of principle of stakeholder participation, decentralization, the participation of women, equity and economic values are also incorporated in the new policy.

There are also political challenges in the area of appropriate pricing, equitable allocation of water and sometime policy implementation are extremely linked to political pressures and dictates. Other challenges relate to institutional issues, and international issues, like proper definition of roles at all levels of government, which is still vague and which encourages duplication of effort and multiplicity of agencies across sector.

In particular, the provision of water to the rural populace in the country by all the tiers of government has been bedeviled by the problems of availability and quality of the resource. However, the findings from this study indicate that the respondents are not too concerned about the quality of water as they are of the availability of the resource.

It is important to note that even though the policies are in place, especially at the federal level, the structures to implement it are either in place but non-functional or completely absent. Most genuine efforts by successive regimes to improve water supply situation in the rural areas are bogged down by bureaucracy in the Oyo State Ministry of Environment Water Resources and the State's Water Corporation to the extent that highly placed officials in the Ministry and the Corporation are not aware of the existence of any water policy at the state or at the federal level.

With regard to "social solidarities" or the willingness of the stakeholders to adopt and/or implement government policies and programmes on water resources management, the outcome of this study indicates that the many people in the study area are not aware of any government policy on water supply provision and management, either at the Federal or State level. Therefore, the issue of the stakeholders willing to adopt and/or implement government policies at present does not arise. However, going by the discussions held at the FGD sessions and informal interviews held with opinion leaders in the communities, there is willingness to embrace and implement programmes and policies that will address water supply problems in the communities. For instance, in Igbo-Oloyin near Ibadan, the community has effectively managed the borehole provided by a prominent indigene. The efforts of the United Nations Children and Education Fund (UNICEF) and the Japanese government assisted Oyo State Water and Sanitation Project (WATSAN) is however yielding significant

results in the provision of portable water for the rural areas of the state especially in the Ibarapa area of the State. For example, in some of the rural communities studied, WATSAN is synonymous with borehole. However, findings and on-site assessment shows that the maintenance of the borehole is still a major problem. The feedback mechanisms between communities and WATSAN therefore need to be improved in order to enhance the efficient functioning and management of the boreholes.

The existing manpower development programme of government in terms of the level of manpower, the skills of the manpower, involvement of stakeholders and learning process is virtually non-existent. For instance, in the Oyo State Ministry of Environment and Water Resources, the Environment Unit, and the unit concerned with clearing of dumpsites and wastes during 'environmental sanitation-day' received more attention by the ministry than the Water Resources Unit. This is because water supply and management are the prerogative of the Water Corporation of Oyo State which is an autonomous government parastatal. Currently, the main focus of the corporation is the provision of pipe-borne water in Ibadan metropolis and other major urban centres in the state. The few projects for water supply in the State are still at the design stage. These include water projects for all local government headquarters in the State.

6.2 Conclusions and Policy Recommendations

The existing policy to supply water through boreholes especially in situations where there is no regular electricity supply to power the machines, as currently obtained in the rural areas studied, is counter productive. Given the fact that women and children are the ones mostly involved in fetching water, there is need to devise technologies for water supply which are women and children friendly. A challenge to the state's water agency, therefore, is the capability to develop and install appropriate technologies to meet the basic water supply and sanitation needs of the millions of citizens who now lack them. The Water Corporation should purchase and install electric power generators in all its waterworks and booster stations. Also, the corporation should ensure regular servicing and maintenance of all their equipment and machinery. It is therefore obvious that more manpower should be recruited into the technical divisions of the corporation.

Rain water is a major source of water in all the rural communities studied. But the technology for storing and preserving the water is still very poor. There is the need to design appropriate water storage devices for use in the rural areas in order to make water available for the people throughout the year. Considering the fact that most of these rural communities are small, centrally placed storage devices that the whole community can use ensure easy accessibility to everyone in the community. The example of rain harvesting method in use in Ekpoma, Edo State even though good is affordable to few households. It is suggested that government can provide some assistance to the people in terms of materials used in harvesting the rain water e.g the corrugated iron sheets, cement and blocks used in constructing the reservoir. The Ekpoma success story can be replicated in most rural areas of Oyo State and Nigeria in general. However, there is the need to improve on the quality of materials used in order to preserve the quality of the water being stored.

The use of underground storage tanks poses a technological challenge to policy makers for the people of Eruwa, and indeed other communities in Nigeria, if some of the issues raised in the national water policies for rural areas are to be achieved. The questions have to do with the designing of storage tanks that can sustain the dry season period and at the same time preserve the quality of the water stored.

The knowledge base of the different stakeholder groups about the technological, socio-economic and ecological dimensions of water resources management is very low. For some communities, however, the indigenous knowledge in the conservation of traditional water sources (e.g. streams and rivers) exists but need to be improved. Rural populace must be educated properly about the quality implication of the water they consume. This is because water that is available in poor quality is far dangerous than water that is not available at all.

There is still the age-long popular opinion among the rural dwellers that the provision of social amenities, including water provision, is the sole responsibility of government. There is the need to change this orientation through grassroots awareness programmes. Infact, the success story in Igbo-Oloyin of community water supply and management shows that water supply provision and management can even be more successful and sustainable in the rural areas than in the urban areas if the community is involved in the planning and execution of such projects especially if government can provide the initial infrastructure or capital outlay.

Empirical studies have revealed that there are various types of innovative (indigenous) technologies for rural water supply in different parts of Nigeria. There is need to document these IKS in order to enhance concerted efforts not only at developing them by local engineers and technicians but also for government to fund research and development of these technologies. Some of these indigenous technologies include pot chlorination, solar disinfection, simple sand filters, nylon filters, *taggiri*, harvesting of groundwater and recharging of groundwater, among others.

A challenge to local engineers and technicians is to develop simple machines and tools that will be affordable to households in rural communities e.g. the simple sand filters or to the community at large e.g. solar disinfection. There is also the need for awareness campaign in rural areas on the use of these different methods. There is need for government to make this method available to poor households by providing money for them to put up the harvesting apparatus in their houses.

As part of the appropriate technology strategy which should be emphasized in these austere times, the use of locally produced handpumps, PVC pipes, protected well and mandatory rain-harvesting is strongly suggested. Rain water could easily be harvested if properly owners are mandated to provide gutters along building roof-eaves which should then be diverted into a covered concrete metal reservoir. Rain water harvesting has been practiced since early history, and it is suitable I both urban and rural areas; and the quality of water collected is generally within the recommended limits for drinking water. The maximum yield possible for a rainwater catchment system is differently proportional to the catchment surface (roof) area. Similarly, the Ako Amadi's experience for the 2500

Umuocham inhabitants of Imo State is an example of a Good Practice that could be emulated in most rural parts of Nigeria and elsewhere.

Given the enormity of the water supply problem the rural areas studied, the existing IKS are incapable of meeting the challenges, hence the acute necessity for integration with new knowledge. ATPS should therefore, as a matter of priority conduct and execute a regional study or set of studies on indigenous water management in order to fill some of the gaps and throw some light on the process of integration of indigenous knowledge of water management with modern/scientific knowledge. Consequently, deliberate efforts should be made to ensure that the knowledge integration process would include improvements in policies and institutional arrangements.

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