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STAFF APPRAISAL REPORT

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

APRIL 20, 1992

Infrastructure Operations Division  
Country Department IV  
Africa Region

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## CURRENCY EQUIVALENTS

(March 1992)

Currency Unit	=	Naira (₦) = 100 Kobo (k)
US\$1	=	₦ 18.0
Naira (₦)	=	US\$0.056

## MEASURES AND EQUIVALENTS

1 kilometer (km)	=	0.62 miles
1 meter (m)	=	3.28 feet
25.4 millimeters (mm)	=	1 inch
1 cubic meter (m <sup>3</sup> )	=	264 US gallons
	=	220 imperial gallons
	=	1000 liters
3.8 liters (l)	=	1 US gallon
4.5 liters (l)	=	1 Imperial gallon

## ABBREVIATIONS AND ACRONYMS

ADP	-	Agricultural Development Project
DWSQC	-	Department of Water Supply and Quality Control
ERR	-	Economic Rate of Return
FCT	-	Federal Capital Territory
FGN	-	Federal Government of Nigeria
FMF&ED	-	Federal Ministry of Finance and Economic Development
FMWR	-	Federal Ministry of Water Resources
KDSWB	-	Kaduna State Water Board
KTSWB	-	Katsina State Water Board
lcd	-	liters per capita per day
LGA	-	Local Government Authority
ML	-	million liters
MLD	-	million liters per day
NEPA	-	National Electric Power Authority
NTCWR	-	National Technical Committee on Water Resources
NWRP	-	National Water Rehabilitation Project
NWRI	-	National Water Resources Institute
RBDA	-	River Basin Development Authority
SOE	-	Statement of Expenditures
SWA	-	State Water Authority
SWB	-	State Water Board
UFW	-	unaccounted-for water

## FISCAL YEAR

January 1 - December 31

## NIGERIA

## FIRST MULTISTATE WATER SUPPLY PROJECT

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This report is based on the findings of a Bank appraisal mission which visited Nigeria in June, 1991, comprising Messrs./Mmes. David Henley, (Sanitary Engineer and mission leader), William Roach (Senior Financial Analyst), Eleanor Warner (Operations Analyst), Letitia Obeng (Sanitation Specialist), Svein Stoveland (Consultant and Rural Water Supply Specialist). George Plant (Senior Sanitary Engineer) acted as peer reviewer. Secretarial support was provided by Ms. Mary Fisher. Mr. James Wright and Mr. Edwin Lim are the managing Division Chief and Department Director respectively for the operation.

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**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**  
**CREDIT AND PROJECT SUMMARY**

- Borrower:** Federal Government of Nigeria (FGN)
- Beneficiaries:** Katsina State Water Board (KTSWB), Kaduna State Water Board (KDSWB), and Federal Ministry of Water Resources (FMWR)
- Amount:** SDR 74.7 million (US\$101 million equivalent)
- Terms:** Standard IDA terms with 35 years maturity
- Onlending Terms:** The Federal Government of Nigeria will onlend US\$51.5 million to Katsina State and US\$47.5 million to Kaduna State at standard IBRD variable interest rate for twenty years including a five-year grace period. State governments will pass on the credit amounts for technical assistance and rural water supply as equity and onlend the remainder to the water boards at 15% interest, with 25 years maturity including 6 years of grace, and will bear the foreign exchange risk. US\$2 million will be retained by FGN to assist other states in project preparation.
- Project Description:** The primary objectives of the proposed project are to improve the quantity and reliability of water supply to the more important communities in the two states and to help in commercializing the two water boards. Physical components include: (i) rehabilitating existing facilities and/or increasing supply in seven towns; (ii) providing tools, equipment and water meters; and (iii) limited rehabilitation of rural water supplies. Technical assistance would be provided for: (i) improving technical and financial management of the boards including increased commercialization; (ii) improving operational efficiency; (iii) improving planning procedures; (iv) institutional reorganization of the rural water supply sector to improve the sustainability of future investments; (v) improving environmental sanitation; (vi) training; and (vii) preparing water projects in other states of Nigeria.
- Benefits and Risks:** The provision of adequate potable water supply and sanitation is a necessary prerequisite to improvement in public health, and to permit the development of urban areas as centers of economic growth. Industrial development in several of the towns included in the project has been prevented by the lack of water supply, and the living conditions, particularly of the poor, have become, in many cases, intolerable. The project will help to create the proper conditions for growth; it will improve the living conditions of the poor; and it will reduce the time spent by women in water collection. Risks include the possibility that counterpart funds will not become available as needed

and that the states will hesitate to sufficiently increase tariffs to finance the long term operation and maintenance needs of the water boards. These have been addressed by arranging for counterpart funds to be deducted at source, and by designing practical and politically acceptable tariff increases, including up-front increases, consistent with the expected improvements of service.

Rate of Return: 9.8%

Map: IBRD No. 23242R

<u>Estimated Project Cost</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
	<u>US\$ Million</u>		
<b><u>KATSINA STATE</u></b>			
Katsina town distribution	2.1	8.6	10.7
Funtua system	6.9	22.9	29.8
Malumfashi dam reconstruction	1.0	2.8	3.8
Daura system expansion	0.2	0.6	0.8
Rural water supply rehabilitation	0.1	0.4	0.5
Operational equipment	0.2	1.4	1.6
Institutional strengthening	0.3	1.7	2.0
Construction supervision	<u>0.9</u>	<u>2.9</u>	<u>3.8</u>
Base cost (March 1992)	<u>11.7</u>	<u>41.3</u>	<u>53.0</u>
Physical contingencies	1.1	4.1	5.2
Price contingencies	1.7	6.1	7.8
Total Katsina State	<u>14.5</u>	<u>51.5</u>	<u>66.0</u>
<b><u>KADUNA STATE</u></b>			
Zonkwa project	3.5	12.9	16.4
Kwoi project	3.6	13.6	17.2
Ikarā project completion	1.5	6.3	7.8
Rural water supply rehabilitation	0.1	0.4	0.5
Operational equipment	0.2	1.5	1.7
Institutional strengthening	0.3	1.7	2.0
Construction supervision	<u>1.1</u>	<u>2.5</u>	<u>3.6</u>
Base cost (March 1992)	<u>10.3</u>	<u>38.9</u>	<u>49.2</u>
Physical contingencies	1.0	3.6	4.6
Price contingencies	1.4	5.0	6.4
Total Kaduna State	<u>12.7</u>	<u>47.5</u>	<u>60.2</u>
Project Preparation	<u>0.0</u>	<u>2.0</u>	<u>2.0</u>
<b>TOTAL PROJECT COST</b>	<u>27.2</u> <sup>1/</sup>	<u>101.0</u>	<u>128.2</u>

<u>Financing Plan</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
	<u>US\$ Million</u>		
IDA	0.0	101.0	101.0
Katsina State	14.5	0.0	14.5
Kaduna State	<u>12.7</u>	<u>0.0</u>	<u>12.7</u>
Total Financing	<u>27.2</u>	<u>101.0</u>	<u>128.2</u>

**Estimated IDA Disbursements**

<u>IDA Fiscal Year</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
	<u>US\$ Million</u>							
Annual	5.4 <sup>2/</sup>	10.3	23.7	29.7	19.7	7.8	4.0	0.4
Cumulative	5.4	15.7	39.4	69.1	88.8	96.6	100.6	101.0

<sup>1/</sup> Of this amount, an estimated US\$7.0 million equivalent is for duties and taxes.

<sup>2/</sup> Includes initial deposits of US\$3.2 million to special accounts.

# FEDERAL REPUBLIC OF NIGERIA

## FIRST MULTISTATE WATER SUPPLY PROJECT

### STAFF APPRAISAL REPORT

#### I. THE WATER SUPPLY AND SEWERAGE SECTOR

##### A. Background

1.01 Nigeria is the most populous country in Sub-Saharan Africa with a population, given by the 1991 census, of 88.5 million. It is located between latitudes 4°N and 13°N and has an area of approximately 925,000 km<sup>2</sup>. The climate varies from semi-arid in the north, with about 500 mm of rainfall per year, to wet and humid in the south with over 2,000 mm. There is a well defined wet season in the summer, extending for as little as four months in the north to as long as seven months in the south. In the north, the terrain is flat with sparse natural vegetation, across the center, there are hills and granite outcrops with savannah type vegetation, while in the south the terrain is generally flat with tropical forest vegetation.

1.02 The form of government is a federation comprising 30 states plus the Federal Capital Territory (FCT) of Abuja. Under the Constitution, provision of potable water supply is the responsibility of the state governments. Within each state, the responsibility for water supply in urban and semi-urban areas is usually assigned to a water board or corporation (the State Water Authority (SWA)).

1.03 Over the last ten years, the states have made substantial investments in water supply. However, the absence of maintenance coupled with economic constraints has led to severe deterioration of even comparatively new systems. The recent depreciation of the Naira relative to other world currencies has caused the water boards to have difficulty servicing foreign loans incurred before devaluation, implementing new projects, and importing the necessary spare parts and replacement equipment to keep existing public water supply systems in good order. A study carried out in 1987 indicated that the cost of rehabilitating all urban and semi-urban systems would be about US\$800 million. Another study carried out in preparation of the proposed project, indicated that a similar amount would be needed over twenty years to rehabilitate and expand urban and rural water supply to provide a satisfactory standard of service in just one state.

##### B. Water Resources

1.04 The main rivers (Benue and Niger) and their major tributaries are perennial, as are other rivers in the south of the country. Some rivers in the northern states draining into the Benue/Niger system and into the Chad Basin are seasonal, and do not have any significant flow in years of low rainfall. In these northern areas the exploitation of surface water for water supply and irrigation requires impounding reservoirs, but because of high temperatures, low humidity and paucity of deep reservoir sites, evaporation losses are high. In the central and southern areas of the country, major perennial rivers are frequently exploited for water supply by direct abstraction. The wide variations in rates of flow and water level, and the meandering low flow channels in many places, tend to increase the costs of water intake works. High intensity rainstorms cause soil erosion, and the resulting highly turbid water increases treatment costs. Use of surface water for drinking water supply always requires full treatment which includes clarification, rapid sand filtration and disinfection.

1.05 Parts of the country have underlying sedimentary deposits containing aquifers, which are tapped by boreholes for water supply. Some of these are capable of sustaining high yields, although over-abstraction in places is causing water levels to decline. In other parts of the country, where crystalline rock formations occur, fracture zones can be exploited by boreholes with relatively low yields suitable for rural and semi-urban supplies. Although some large towns and cities have been supplied from boreholes in the past, most major cities will be dependent on surface water sources, possibly supplemented by groundwater, within the next few years. Groundwater usually requires treatment only by disinfection; however, in some places it is very corrosive and has a high iron content, requiring additional treatment.

#### C. Manpower Resources

1.06 The SWAs account for employment of some 25,000 staff nationwide. In general, SWAs have too many low level staff with minimal qualifications (high rates of illiteracy are reported in some states) and too few technically or professionally qualified personnel. There is a low level of management awareness at middle and higher levels, with little emphasis on management training for technical specialists who enter management. Many of the staff who are academically well qualified have not gained work experience in a supervised professional environment and may, therefore, be unable to provide appropriate technical support to the SWAs.

1.07 Review of staffing profiles and training needs is required in most SWAs to define where staff need to be recruited or retrained (para. 2.08), and where shedding of unskilled and unqualified staff is required to improve management, operation and maintenance. SWAs would be more efficient if they were free from civil service regulations regarding staff grading, promotion and remuneration to enable them to compete effectively in the open market in recruiting qualified, experienced and skilled staff for management, supervision and technical duties.

#### D. Level of Service

1.08 Although accurate data are not available, most of the existing urban water supply systems are not capable of meeting requirements. Due to failure of pumps, generators or other equipment, fewer than 10 percent of all water supply systems are reported to be operating at their design capacities. In addition, the output of some systems is limited by fuel shortages as a result of insufficient funds. The average piped water supply to urban and semi-urban populations is in the range of 10 to 40 liters per person per day (lpcd), but many semi-urban communities do not have access to any public water supply. It is estimated that only about half the total urban and semi-urban population has access to reliable water supplies which meet minimum quality requirements for drinking water.

1.09 Sanitation systems in most areas are the responsibility of Local Government Authorities (LGAs). There is practically no sewerage service, most sanitation using on-site waste disposal. Service provided is generally inadequate in the larger towns due to lack of financial and technical resources. Improvement of these services is vital in maintaining public health and preventing further environmental deterioration (see Annex 2.9). Improvements will require strengthening of the LGAs or other sanitation authorities and sustainable budgetary provisions supported by realistic tax policies.

1.10 An estimated 55 million people live in rural areas. Despite the Government's recent efforts to improve rural conditions, many households still rely on the most rudimentary water and sanitation facilities. The majority is at risk from disease, particularly from Guinea Worm, largely because access to reliable supplies of water of acceptable quality is still low.

E. National Sector Institutions

1.11 The Federal Ministry of Water Resources (FMWR) is the technical and professional arm of the Federal Government that advises on all aspects of water resource development in Nigeria. It has eight departments, each of which is headed by a Director: (i) hydrology and hydrogeology; (ii) irrigation and drainage; (iii) water supply and quality control; (iv) dams and reservoirs; (v) flood and erosion control; (vi) planning, research and statistics; (vii) finance and supplies; and (viii) personnel management. The Department of Water Supply and Quality Control (DWSQC) has been established to carry out advisory and monitoring functions in connection with water supply, sanitation and water quality control.

1.12 FMWR is responsible for overseeing the 11 River Basin Development Authorities (RBDAs) (para. 1.14) and the National Water Resources Institute (NWRI) in Kaduna (para. 1.15). It is also responsible for monitoring both the hydrological networks throughout the country and water use activities of SWAs, the National Electric Power Authority (NEPA), the Inland Waterways Department and others.

1.13 The National Technical Committee on Water Resources (NTCWR) is the main link between organizations involved in water resource development and urban water supply. The Committee which meets about four times a year, is chaired by the Director General of the FMWR and members of the Committee are representatives of SWAs, RBDAs, NEPA, Nigerian universities with water resource faculties, the meteorological services, the Inland Waterways Department and the Nigerian Society of Engineers. Inputs to the NTCWR are provided by five working level sub-committees, namely: irrigation and drainage; manpower development; hydrology and hydrogeology; water supply and sanitation; and dams. The NTCWR advises the National Council on Water Resources, which is chaired by the Minister of Water Resources.

1.14 The River Basin Development Authorities (RBDAs) were established during the 1970s to develop water resources for multi-purpose use within their respective river catchment areas and to enhance agricultural production. In 1985, the Federal Government decided that the role of the RBDAs would be limited to water resource development and irrigation works and the collection of hydrological, hydrogeological and meteorological data. The main involvement of the RBDAs in water supply has been the construction of multi-purpose dams which provide water for irrigation as well as for some major urban water systems.

1.15 The National Water Resources Institute (NWRI), under the direction of FMWR, was established to train middle level manpower involved in water resources development, irrigation, water supply and related activities. The qualifications conferred by the Institute are recognized by the education authorities of Nigeria. The curricula of the Institute are designed to satisfy an increasing need for training in practical skills and at the middle management level.

**F. State Water Agencies (SWAs)**

1.16 In most of the 30 states and the FCT, responsibility for all potable water supply is assigned either to a state water board or corporation or to a public utilities board which is also responsible for rural electrification. SWAs have, however, for the most part concentrated on urban and semi-urban areas. Each SWA is controlled by a Board comprising members appointed by the state government, one of whom is designated chairman, and ex-officio members designated by title (e.g., Commissioner of the State Ministry of Finance). The chief executive is normally given the title of General Manager and is usually a professionally qualified engineer.

1.17 The SWAs are responsible to their state governments, generally through Ministries of Works or Water Resources, although in a few states they report through a Commissioner for Parastatals or Special Duties or other special assistant to the Governor. The SWAs have, in general, been established under well conceived legislation to develop and manage water supply facilities within their respective states, and to meet sound financial objectives. However, almost all SWAs depend on subvention from the state government to cover at least part of their recurrent operating costs. In addition, all SWAs are dependent on funds for major new construction work, either from state government sources or from external lending agencies channeled through the state government system. Thus, most SWAs have little autonomy to decide on vital matters affecting their financial position, such as staffing levels, staff compensation, tariffs and procurement.

**G. Katsina State Water Board (KTSWB)**

1.18 The Katsina State Water Board was established by amendment of the Kaduna State Water Board Edict of 1971 at the time Katsina State was divided from Kaduna State, under the terms of the Katsina State Amended Edict 1987. The main duties of the Board are to control and manage all water works vested in the Board; to establish, control, manage, extend and develop new and existing water works as may be necessary to meet the requirements of the general public, agriculture, trade and industry; to ensure that water is supplied at reasonable cost and in potable quality and adequate quantity; and to conduct appropriate research. In practice it is responsible only for urban and semi-urban water supply systems. The Board is required by the edict to conduct its affairs on a commercial basis and is given wide powers to establish and collect water rates and raise capital. Its autonomy is limited, however, in that principal fiscal matters are subject to the approval of the Governor.

1.19 The KTSWB has a two-tier management structure. The first tier comprises the central headquarters, and the second district and zonal operations. A Board of Directors, appointed by the Commissioner for Water Resources, formulates policies and guidelines. The Board consists of 14 members, ten of whom are members at large and include representatives from Local Government Authorities and four of whom represent state ministries. The chief executive officer is the General Manager, who has the responsibility to execute the policies and directives of the Board. He is assisted by five Assistant General Managers, responsible for Administration, Operations, Projects, Commercial, and Accounting and Finance. The Board currently has 690 filled positions. Its principal weaknesses are the lack of experienced middle management and inadequate finance to carry out its duties.

## **H. Kaduna State Water Board (KDSWB)**

**1.20** The Kaduna State Water Board was established by the Kaduna State Water Board Edict of 1971. Its duties and responsibilities are similar to those of the KTSWB (para. 1.18).

**1.21** The organization and management structure of the KDSWB are identical to those of the KTSWB, but with an additional division which assists in the maintenance of rural water supplies. There are currently 1,662 staff. As with KTSWB, its main weaknesses are lack of experienced middle level managers and lack of financial resources.

## **I. Previous Bank Group Involvement in the Water Supply Sector**

**1.22** Past assistance by the Bank to the SWAs has mainly funded major new water supply systems in state capitals and technical assistance for project planning and institutional strengthening. The Bank has been involved in lending for four major urban water supply projects, of which two, Borno (Ln 2528-UNI approved June 1985) and Lagos (Ln 2985-UNI approved July 1988), are under execution and two, Kaduna (Ln 1711-UNI approved May 1979 and Anambra (Ln 2036-UNI approved July 1981) have been completed. Lessons learned from these projects, particularly from the Kaduna Water Supply Project (PCR No. 8961), have been taken into account in designing this project. These relate particularly to the need to ensure a reliable flow of counterpart funds for implementation (para. 2.15), to define clearly the needs for technical assistance (extending beyond immediate commencement of operation of the project facilities) and to provide support for programs to reduce unaccounted-for water (para. 2.07). In the ongoing projects, there have been long delays in procurement and an apparent reluctance to go ahead with technical assistance, and the water boards have generally not been able to meet the financial agreements. These concerns have been addressed through up-front tariff increases (para. 3.08) and appointment of consultants for most critical technical assistance as a condition of effectiveness (para. 2.11) as well as preparation and covenanted use of standard bidding documents (para. 2.09) and covenanted adherence to a dated, implementation plan (para. 2.11) and a feasible financial recovery plan (para. 3.08). The Bank has also approved the National Water Rehabilitation Project (NWRP, Ln. 3322-UNI, approved May 1991), which will provide limited funds (up to US\$10 million) to each state for urgently needed rehabilitation works and equipment. The NWRP will also assist institutional strengthening by improving workshop facilities, providing vehicles for maintenance, improving laboratory facilities, improving billing and collection, manpower audit and training needs analysis, and training. States participating in NWRP would be required to increase tariffs to meet all cash operating costs from revenues within five years.

## **J. Sector Strategy**

**1.23** In common with most sectors of Nigeria's economy, the immediate needs in the water supply sector are the rehabilitation of existing systems and improvements in operation and maintenance. Initially these are being addressed by the NWRP which is expected to finance about 25% of the total rehabilitation needs throughout the country, and to start to address some institutional needs (para. 1.22). Many of the systems to be rehabilitated are more than twenty years old, so capacity will be inadequate even after rehabilitation, due to large population increases. Rehabilitation therefore needs to be followed by programs of carefully planned expansion and improvement of existing systems as well as selected new systems to provide acceptable service to the rapidly increasing population. Such programs would be

accompanied by institutional strengthening. Many water authorities in Nigeria have experienced high costs relative to income, and this has been particularly severe during the economic dislocation of the past decade. A strategy to improve the financial condition of water authorities has been developed (see Annex 1.1 ). The proposed project would meet the objectives of the strategy by minimizing costs and improving sources of revenue. It would, in particular, improve the financial reliability of sector institutions through revenue collection and cost recovery measures so that service can be maintained and expanded over the long term. This would require more demanding cost recovery measures than under the NWRP, whereby depreciation or debt service costs would also be recovered.

#### **K. Rationale for IDA Involvement**

1.24 The project would form part of the Bank Group's program of assisting to develop Nigeria's infrastructure and is an essential element of the country's economic development, since adequate water supply is necessary for the efficient functioning of cities, maintenance of health standards, and to improve the living conditions of women and the poor. It will incorporate aspects of several of the Bank Group's programs of special emphasis such as poverty alleviation, women's development, environment, and public sector management all of which are important to development. The Bank Group now has considerable experience in water supply in Nigeria, and has a comparative advantage in encouraging institutional development and long term sustainability, and ensuring the appropriateness of investments. The NWRP commenced during 1991 and the proposed project and any similar future projects, would provide additional finance and support for states which desire to further improve and expand their water supplies and are prepared to adopt the necessary financial measures to do so.

## **II. THE PROJECT**

#### **A. Project Objectives**

2.01 The project originated as a result of the large gap between available water supply and demand and the need to improve the service offered by the State Water Authorities. Four states were initially considered for inclusion in the project, however, coverage was restricted to two states to lessen project complexity. It would aim to support economic growth by enhancing health and productivity of growing urban areas; it would promote equity, helping to alleviate poverty by improving health standards of the lowest income urban households and the living conditions of women; and sustainability would be ensured by support for institution building and financial self sufficiency. The primary objectives of the proposed project are to improve both the quantity and reliability of water supply to the more important towns in the two states to meet basic needs and as an essential step in promoting economic development, to help in commercializing the water boards, and to assist in preparing water projects in other states.

#### **B. Project Design**

2.02 Existing water supply facilities are described in Annex 2.1. The water boards' investment programs, including the physical components of the project, have been designed

by the boards assisted by consultants and IDA, to provide for the most urgent needs and to maximize the utilization of existing water supply facilities. With this in view, rehabilitation (including work under the NWRP) has been given highest priority, including the restoration of existing works, the matching of distribution capacity with water production capacity, and the repair of water leakage in the distribution systems. Systems have been designed with limited capacity consistent with conservative demand projections, to account for considerable tariff increases which will be required under the project. Demand projections have been based on a usage of 20 lcd for users of public standpipes, and from 80 to 100 lcd (increasing up to year 2005) for consumers with house connections (para. 4.07). Industrial and commercial demands of up to 37% of the domestic demand have been added, depending on evaluations made by consultants for each town. In determining the required production capacity, allowance for unaccounted-for water has been made, reducing over five years from a present amount of up to 50% (average 42%), to about 25% as a result of the works to be undertaken under the NWRP and the improved management which would be achieved under the proposed project. Annex 2.2 provides details of population and demand projections for all towns serviced by the two water boards.

2.03 During project preparation, studies of Katsina State Water Board (KTSWB) and Kaduna State Water Board (KDSWB) were carried out by consultants. They made similar recommendations, concurred by IDA, including limited structural changes to the Boards' organizations, and greater commercialization, including improvements in tariff and charging policies, consumer metering, and accounting (including computerization). The Boards have made modifications to their organizational structures in response to these studies, and have accepted the other recommendations in principle. A program of technical assistance to assist in commercialization of the Boards and to further strengthen their operations has been developed (para. 2.07). Other studies recommended devolution of responsibility for rural water supply to the LGA level and development of a mechanism by which a contribution would be made by the beneficiaries to implementation and to operation and maintenance. This concept has been accepted by both states, and Katsina has taken an initial step by separating rural water supply responsibilities from KTSWB; appropriate changes would be supported under the project (para. 2.07). Agreement was reached at negotiations that each state will by December 31, 1994, reorganize the rural water supply sector accordingly and in accordance with national strategy being developed by FMWR. The project allows for financing a small amount of work to improve rural water supply after this reorganization has been completed, to consolidate the proposed new methodology.

### C. Project Description

2.04 The project would include: (i) physical rehabilitation of existing systems; (ii) selective increase of supply facilities; (iii) improved operation and maintenance practices; (iv) improved investment planning; (v) setting and achieving realistic financial objectives; and (vi) manpower development. The most urgent rehabilitation work in each State, including a leak detection and repair program and the supply of some operational equipment and water meters would be undertaken under the NWRP in accordance with an agreed program (para. 2.11). Agreement was reached at negotiations that each state will participate in the NWRP.

2.05 In Katsina State, the project would include the following components (refer also to Annex 2.1):

- (i) completion of about 15 km of water transmission, 65 km of distribution pipelines and elevated storage in Katsina town and nearby communities to permit distribution of the full supply from the existing water works;
- (ii) construction of a new system to augment the existing supply at Funtua. This would include a new dam, water treatment plant, transmission pipeline to town, system storage and extended distribution system;
- (iii) limited expansion of the Daura water supply system including new boreholes to increase water production;
- (iv) remedial construction of the dam at Malumfashi;
- (v) supply of maintenance vehicles, tools and operational equipment, water meters, and meter testing and repair facilities;
- (vi) limited rehabilitation of some rural water supplies; and
- (vii) institutional and financial strengthening as described below (para. 2.07).

2.06 The project for Kaduna State would include the following (refer also to Annex 2.1):

- (i) completion of the water treatment plant, and construction of transmission and distribution pipelines and system storage at Ikara;
- (ii) construction of new regional water supply systems at Kwoi and Zonkwa, each including intake works, water treatment plant, transmission mains and distribution systems. Zonkwa would also include a small dam;
- (iii) supply of maintenance vehicles, tools and operational equipment, and water meters;
- (iv) limited rehabilitation of some rural water supplies; and
- (v) institutional and financial strengthening as described below (para. 2.07).

2.07 The program of technical assistance in each state would include: (i) improvement of the water board's operation and maintenance practices, including a review of technical aspects of its operations to reduce costs (such as for power and chemicals) and minimize unaccounted-for water, assistance to implement the results of the review, development of maintenance and stores procedures (including inspection of dams), and improvement of planning procedures (Terms of Reference at Annex 2.3); (ii) improvement of accounting, billing, collection, and management information systems (building on work under NWRP), including computerization where appropriate (Annex 2.4) and a thorough program of metering of consumers; (iii) a tariff study including recommendations for collection from public standpipe users (Annex 2.5); (iv) undertaking a public relations and hygiene education program to improve the awareness of the communities of their benefits and obligations regarding public water supply, and how to maximize their health benefit (Annex 2.6); (v) support for the reorganization of

rural water supply (para. 2.03 and Annex 2.7); (vi) preparation of state-wide water resources master plans including socio-economic studies (Annex 2.8); and (vii) development of plans for sullage disposal, drainage and improved sanitation (Annex 2.9).

2.08 There will be a considerable amount of practical on-the-job training included in the project under several components of the technical assistance program, which will commence during the early stages of project implementation. Under the NWRP, consultants are now being employed to analyze the required staffing profiles for state water boards, identify the most critical training needs in the sector and the capability of local training institutions to meet those needs. This is expected to be completed and reviewed with the Bank during 1992, and provision has been made under the proposed project to finance formal training of KTSWB and KDSWB staff in line with these proposals developed under NWRP.

#### D. Status of Preparation

2.09 In Katsina State, the physical components of the project are in varying stages of preparation. Designs for the new works for Katsina town, for Funtua dam and for remedial works at Malumfashi dam, have been prepared by consultants and are ready for tendering. In Kaduna State, designs have been prepared by consultants for most of the major works required under the project, but will need to be reviewed and updated before inviting tenders, expected to be within six months of credit effectiveness. A model bidding document has been prepared for NWRP and agreement was reached at negotiations to its use in this proposed project. Draft terms of reference for technical assistance have also been prepared (para. 2.07) and agreement to their use was reached at negotiations.

#### E. Project Implementation

2.10 Each water board would manage its component of the project under its Projects Division. Consultants would be employed to assist the Boards in managing the project and to take responsibility for contract administration and construction supervision, and to train board staff. These consultants would also be responsible for review where necessary of designs prior to tendering. Although the two projects divisions concerned have limited experience in the management of projects of this size, with the assistance of the consultants for construction supervision and with strong supervision by IDA, they would be able to implement the project. Agreement was reached at negotiations that the state governments will continue to employ in the SWB people with sufficient experience to manage the project.

2.11 A project implementation schedule is at Annex 2.10. Implementation of the project is expected to be complete by the end of 1998 and the proposed credit closing date is September 30, 1999. During negotiations, assurances were received that each water board will follow the implementation program in Annex 2.11 to ensure all aspects of the project are properly implemented and to assist in the institutional development of the board, and regularly exchange views with IDA on their performance and undertake appropriate remedial measures. Appointment of the consultants for design review and construction supervision and for improving the efficiency of operations of the boards (two consultancies are required in each state) would be undertaken in at least one state prior to effectiveness of the proposed credit. Appointment of these consultants in the other state would be a condition of disbursement in that state.

F. Project Cost

2.12 The total project cost is estimated at US\$128.2 million, including a foreign exchange component of US\$101 million, or about 79% of total project costs. These estimates include about US\$7 million equivalent in taxes and duties. Detailed cost estimates are in Annex 2.12. Cost estimates are summarized below:

SUMMARY OF PROJECT COST ESTIMATE

	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>% Foreign</u>	<u>% State</u>
	-----N million-----			-----US\$ million-----			<u>Exchange</u>	<u>Base Cost</u>
<b>A. <u>KATSINA STATE</u></b>								
1. Katsina town completion of distribution system	39.0	154.2	193.2	2.1	8.6	10.7	80.4	20.2
2. Funtua expansion project	124.1	412.7	536.8	6.9	22.9	29.8	76.8	56.2
3. Malumfashi rehabilitation	18.0	51.3	69.3	1.0	2.8	3.8	73.7	7.2
4. Daura system expansion	3.0	10.6	13.6	0.2	0.6	0.8	75.0	1.5
5. Rural water supply rehabilitation	1.1	6.4	7.5	0.1	0.4	0.5	80.0	0.9
6. Operational equipment	4.4	25.8	30.2	0.2	1.4	1.6	87.5	3.0
7. Institutional strengthening	5.1	30.1	35.2	0.3	1.7	2.0	85.0	3.8
8. Construction supervision	<u>16.4</u>	<u>51.7</u>	<u>68.1</u>	<u>0.9</u>	<u>2.9</u>	<u>3.8</u>	<u>76.3</u>	<u>7.2</u>
Base Cost (March 1992)	211.1	742.8	953.9	11.7	41.3	53.0	77.9	100.0
Physical Contingencies	20.2	73.9	94.1	1.1	4.1	5.2	78.8	9.8
Price Contingencies	<u>139.2</u>	<u>491.5</u>	<u>630.7</u>	<u>1.7</u>	<u>6.1</u>	<u>7.8</u>	<u>78.2</u>	<u>14.7</u>
<b>TOTAL Katsina State</b>	<b><u>370.5</u></b>	<b><u>1308.2</u></b>	<b><u>1678.7</u></b>	<b><u>14.5</u></b>	<b><u>51.5</u></b>	<b><u>66.0</u></b>	<b><u>78.0</u></b>	<b><u>124.5</u></b>
<b>B. <u>KADUNA STATE</u></b>								
1. Zonkwa project	63.8	232.3	296.1	3.5	12.9	16.4	78.7	33.3
2. Kwoi project	64.5	245.6	310.1	3.6	13.6	17.2	79.1	35.0
3. Ikara completion of new project	27.3	113.7	141.0	1.5	6.3	7.8	80.8	15.8
4. Rural water supply rehabilitation	2.1	7.4	9.5	0.1	0.4	0.5	80.0	1.0
5. Operational equipment	3.6	27.3	30.9	0.2	1.5	1.7	88.2	3.5
6. Institutional strengthening	4.7	29.7	34.4	0.3	1.7	2.0	85.0	4.1
7. Construction supervision	<u>19.1</u>	<u>44.1</u>	<u>63.2</u>	<u>1.1</u>	<u>2.5</u>	<u>3.6</u>	<u>69.4</u>	<u>7.3</u>
Base Cost (March 1992)	185.1	700.1	885.2	10.3	38.9	49.2	79.1	100.0
Physical Contingencies	17.6	63.9	81.5	1.0	3.6	4.6	78.3	9.3
Price Contingencies	<u>118.6</u>	<u>432.3</u>	<u>550.9</u>	<u>1.4</u>	<u>5.0</u>	<u>6.4</u>	<u>78.1</u>	<u>13.0</u>
<b>TOTAL Kaduna State</b>	<b><u>321.3</u></b>	<b><u>1196.3</u></b>	<b><u>1517.6</u></b>	<b><u>12.7</u></b>	<b><u>47</u></b>	<b><u>60.2</u></b>	<b><u>78.9</u></b>	<b><u>122.3</u></b>
C. FMWR Project Preparation	0.0	36.0	36.0	0.0	2.0	2.0	100	
<b>TOTAL PROJECT COST</b>	<b><u>691.8</u></b>	<b><u>2540.5</u></b>	<b><u>3232.3</u></b>	<b><u>27.2</u></b>	<b><u>101.0</u></b>	<b><u>128.2</u></b>	<b><u>78.8</u></b>	

2.13 Base costs are expressed in March 1992 prices. Cost estimates were prepared by consultants in 1990 and have been updated to reflect increases in price since that time. Physical contingencies of about 10% have been added to the base cost of the physical components. Price contingencies have been based on 20% increase in local costs in 1992, 15% in 1993, 12.5% in 1994 and 10% annual increases thereafter and on increases in foreign costs of 2.5% in 1992, 4.6% in 1993 and 4.1% per year thereafter, to reflect anticipated inflation in Nigeria and on a basket of Nigeria-specific imports.

2.14 Provision is made for about 2000 man-months (80% local) of consultant input to assist the water boards with construction supervision, and about 400 man-months (45% local) for the technical assistance and studies.

#### G. Project Financing

2.15 An IDA Credit of SDR 74.7 million (US\$101 million equivalent) to the Federal Government of Nigeria (FGN) is proposed under standard IDA conditions with 35 years maturity. This would be onlent to the two participating states, US\$51.5 million equivalent to Katsina and US\$47.5 million equivalent to Kaduna, and US\$2.0 million would be passed on as grant to other states for studies. It would finance 100% of the foreign costs of the project, about 83% of total cost exclusive of taxes and duties. For the Katsina and Kaduna States components, Agreement was reached at negotiations that onlending will be at IBRD variable interest rate for 20 years including 5 years of grace, and that the states will bear the foreign exchange risk. Agreement was also reached that the states will pass on those parts of the credit related to technical assistance and rural water supply as equity (US\$2.3 million equivalent for Katsina and US\$2.4 million equivalent for Kaduna), and onlend the remainder to the water boards, for 25 years including 6 years of grace, at 15% interest rate. The interest rate has been set taking into account the poor financial situation of the two SWBs, which currently do not recover recurrent costs from revenues, and the need for a realistic financial recovery program to be effected over the next six years (para. 3.08). A subsidiary loan agreement would be required between FGN and each of the two states and between each state and its water board. Signing of the sub-loan agreements by one state would be a condition of credit effectiveness and signing by the other state would be a condition of disbursement in that state. Local funds required for the project would be provided by the state governments as equity. During appraisal, each state's finances were reviewed and it was indicated that the project would not create an unbearable burden on state finances (para. 3.03). At least one state would give instructions, binding over the life of the project, to the Federal Ministry of Finance and Economic Development (FMF&ED) to deduct its share of the project's finances from its Federation Account in equal monthly installments and deposit into a state project account as a condition of credit effectiveness. An initial deposit equal to the first monthly installment would be made in the state project account as an additional condition of effectiveness. These two conditions would be required by the other state as conditions of disbursement in that state. The financing plan for the project is indicated below.

Project Financing Plan

	Local	Foreign	Total
	-----US\$ Million-----		
<u>Funds Required</u>			
KTSWB	14.5	51.5	66.0
KDSWB	12.7	47.5	60.2
FMWR	<u>0.0</u>	<u>2.0</u>	<u>2.0</u>
<u>Total Requirements</u>	<u>27.2</u>	<u>101.0</u>	<u>128.2</u>
<u>Sources of Funds</u>			
Katsina State Government <sup>1</sup>	14.5	0.0	14.5
Kaduna State Government <sup>2</sup>	12.7	0.0	12.7
IDA	<u>0.0</u>	<u>101.0</u>	<u>101.0</u>
<u>Total Sources</u>	<u>27.2</u>	<u>101.0</u>	<u>128.2</u>

1. Including an estimated US\$3.7 million equivalent of taxes and duties.
2. Including an estimated US\$3.3 million equivalent of taxes and duties.

**H. Procurement**

2.16 Procurement arrangements for the project are summarized in the table below. For procurement purposes, the project would be divided into about 12 major works components (including the supply of the necessary materials). Contracts for these would be awarded after International Competitive Bidding (ICB). In addition, about four contracts for the supply of operational equipment and water meters would be awarded after ICB. The major procurement packages are detailed at Annex 2.13 Operational equipment and other miscellaneous goods estimated to cost less than US\$100,000 per contract and not more than US\$1.0 million in aggregate, would be procured through international shopping with the evaluation of price quotations from at least three suppliers. Procurement of further operational equipment estimated to cost less than US\$200,000 per contract would be under local competitive bidding (LCB), up to a total value of US\$1.0 million. For rural water supply rehabilitation and other minor works there would be little interest by foreign contractors, since it is scattered geographically and spread over time; procurement by LCB is proposed, in accordance with procedures acceptable to IDA which would include local advertising, public bid opening, clearly stated evaluation criteria and award to the lowest evaluated bidder. Foreign firms would be allowed to participate. The total value of such procurement would not exceed US\$1.7 million, about 1.3% of the total project cost with a maximum contract value of US\$0.5 million and an average of about US\$200,000. Prior IDA review of advertisements, bidding documents, tender evaluations, recommendations for awards and draft contracts, would be required for all contracts over US\$200,000 equivalent, covering, in value, over 95% of the contracts to be awarded. Consultants to be financed under the project would be selected in accordance with the World Bank Guidelines for the Use of Consultants. Detailed consultant requirements are at Annex 2.14.

**Summary of Proposed Procurement Arrangements**

	(US\$ millions)			
	<u>ICB</u>	<u>LCB</u>	<u>OTHER</u>	<u>TOTAL</u>
1. Works contracts for rehabilitation and augmentation of existing and new systems	107.1 (83.4)	1.7 (1.5)	-	108.8 (84.9)
2. Supply of goods, (operational equipment and water meters)	1.7 (1.6)	1.0 (0.9)	1.0 (0.9)	3.7 (3.4)
3. Services for training and technical assistance (including construction supervision)	-	-	15.7 (12.7)	15.7 (12.7)
<b>Total</b>	<b>108.8 (85.0)</b>	<b>2.7 (2.4)</b>	<b>16.7 (13.6)</b>	<b>128.2 (101.0)</b>

Note: Figures in parentheses are the respective amounts, in US\$ million equivalent, to be financed by IDA. "Other" covers procurement of goods by international shopping and consultancy services in accordance with guidelines.

2.17 For contracts for the procurement of goods under ICB, a domestic preference of 15% or duties (whichever is less) would apply. For works contracts procured under ICB, the margin of preference for local contractors would be 7.5%.

**I. Disbursements**

2.18 The proposed credit would be disbursed over seven and a half years on the following basis:

**Allocation and Disbursement of IDA Credit**

<u>Category</u>	<u>Amount</u> (US\$ million)	<u>% to be Disbursed</u> <u>from IDA Credit</u>
1. Civil works including supply and installation of mechanical and electrical equipment		
(a) Katsina state	39.0	75% of total expenditures
(b) Kaduna state	35.6	75% of total expenditures
2. Supply of operational equipment, and water meters		
(a) Katsina state	2.2	100% of foreign expenditures
(b) Kaduna state	2.2	and 70% of local expenditures

3. Training, technical assistance and construction supervision		
(a) Katsina state	5.0	100% of foreign expenditures
(b) Kaduna state	5.0	100% of foreign expenditures
4. Project preparation (FMWR)	2.0	100%
5. Unallocated		
(a) Katsina state	5.3	
(b) Kaduna state	<u>4.7</u>	
Total	<u>101.0</u>	

Disbursements would be completed by September 30, 1999. Annex 2.15 presents the expected annual disbursements for the project and the standard disbursement profile for similar projects in Africa. Projected disbursements lead the profile in early years of the project because of the advanced state of preparation of some components and the measures that have been taken to advance project procurement activities.

2.19 In order to facilitate implementation of the project, a Special Account in foreign currency would be established for each state and for FMWR in a commercial bank, on terms and conditions acceptable to IDA. Initial deposits of US\$1.5 million each would be made to each state account, and US\$0.2 million to the FMWR account, sufficient to cover estimated eligible disbursements over four months. The accounts will be replenished against withdrawal applications with standard documentation for eligible reimbursable expenditures. All disbursements under the project would be made against standard documentation except for contracts of less than US\$50,000 equivalent which may be claimed under Statements of Expenditures (SOEs), with related documentation retained for review by IDA supervision missions. During negotiations, agreement was reached that, by June 30 each year, the state water boards will submit to IDA the financial statements of the Special Account, Project Accounts and SOEs for the preceding calendar year, audited by an independent auditor acceptable to IDA.

#### J. Land Requirements

2.20 Each water board has land rights for its water supply systems. Most proposed new works, including reservoirs, will be located on land owned by the Government, which will be available to the Boards at no cost. Land for the Zonkwa reservoir has been reserved for many years, and no resettlement is required. Land for the Funtua reservoir is being acquired, and resettlement of a few hundred families is required. A satisfactory plan for resettlement has been developed in consultation with the people being relocated.

#### K. Project Supervision

2.21 Each water board would submit quarterly progress reports for review by IDA. In addition, three IDA missions per year, each staffed by a sanitary engineer, a financial analyst/institutional specialist and an operations analyst and other specialists, and each of about two weeks duration, would be required during the first three years of the life of the

project and two per year thereafter to support project implementation. Missions would review project management performance, progress with the physical components of the project and the institutional development measures required, exchange views on SWB performance compared to the agreed implementation program (Annex 2.11) and physical and financial targets (para.3.13), and agree on remedial measures. A supervision plan is given in Annex 2.16. Total input required by IDA would be about double an average infrastructure project in Nigeria. During negotiations, agreement was reached that a mid-term review would be undertaken by the end of 1994 to review project management, progress against the action program (Annex 2.11) and development of the Boards against agreed performance indicators (Annex 3.3) and to agree on any necessary corrective actions.

### III. FINANCIAL ANALYSIS

#### A. State Governments' Finances

3.01 A summary of Katsina and Kaduna State of 1990 actual and 1991 budgeted receipts and expenditures is presented in Annex 3.1. Katsina State receipts and expenditures are budgeted at ₦1.1 billion for 1991. The State relies heavily on statutory revenue from the Federation Account (₦763.0 million or 69% of total receipts) and capital receipts representing grants and external loans (₦253.4 million or 23% of total receipts). Internally generated revenues (₦82.8 million or 8% of total receipts) provide the balance of Katsina State financing. Kaduna State receipts and expenditures are budgeted at ₦1.5 billion for 1991. The State is also heavily dependent on statutory revenue from the Federation Account and capital receipts (combined ₦1,209.6 million or 80% of total receipts). Internally generated revenues (₦300.0 million or 20% of total receipts) comprise the remainder of Kaduna State receipts.

3.02 The State governments have the main responsibility for ensuring the financial solvency of the SWBs. They are the sole owners of the SWBs; approve all water charges; and provide subventions to the SWBs to cover rural water supply operations and maintenance costs, debt service payments, investment requirements and any shortfalls in operating income. The States of Katsina and Kaduna in 1990 provided ₦27.9 million (3.6% of Katsina State total receipts) and ₦120.7 million (14.8% of Kaduna State total receipts) to their respective SWBs. Total 1991 contributions to the SWBs are budgeted to reach ₦41.6 million (3.8% of state total receipts) and ₦118.4 million (7.8% of state total receipts) in Katsina and Kaduna States, respectively.

3.03 The financing plan for the project includes State governments' financing of all local costs, amounting to ₦370.5 million for Katsina State and ₦321.3 million for Kaduna State, spread over the implementation period. The State governments would be required to provide counterpart funding in equal monthly installments (para. 2.15). In addition, the State governments will be responsible for repayment to the Federal government of the IDA credit and the associated foreign exchange risk. As both SWBs plan to participate in the NWRP (para. 2.04), the State governments will also be responsible for a small amount of counterpart funding and debt service on the related IBRD loan. The financial objectives under the proposed project are two-fold: (a) to improve the financial performance of the SWBs to the point where they are able to cover their recurrent costs and debt service payments, and (b) to relieve the heavy burden on the State governments' finances. Under this approach, State

governments' subvention to the SWBs to cover their operating income shortfalls and debt servicing would be phased out by 1998; State governments' financing to the SWBs would be limited to provision of local counterpart funding of the investment program, if any, the debt service related to NWRP and the foreign exchange risk on the IDA Credit. Under this scenario, Katsina State government financing would drop from a peak in 1993 of 7.4% of annual State receipts and then fall rapidly to about 2% of State receipts in 1999, while Kaduna State government financing would peak in 1992 at 11.3% of annual State receipts and decline to less than 1% in 1999 (Annex 3.1).

**B. SWBs' Past Financial Performance**

3.04 The SWBs' past (1989 and 1990) and budgeted (1991) financial performance is summarized in the table below and detailed in Annex 3.2.

	<u>SWBs' Past Financial Performance</u>					
	<u>(Naira 000s)</u>					
	<u>KATSINA</u>			<u>KADUNA</u>		
	Actual	Actual	Budget	Actual	Actual	Budget
	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Volume sold (M3 000s)	6897	7154	7373	40150	36293	41975
Average tariff (Naira)	1.19	1.65	1.98	0.48	1.12	1.23
Net revenue	6675	10794	13055	14469	33265	41014
Cash Operating Expenses	15512	24786	29874	43976	47592	57762
Cash from operations	-8837	-13992	-16819	-29507	-14327	-16748
Depreciation	586	2680	3965	35423	34694	22404
Operating loss	-9423	-16672	-20784	-64930	-49021	-39152

Past and budgeted financial results of the SWBs show large operating losses, a generic problem in Nigeria as discussed in Annex 1.1. The State governments provide subventions to cover the recurrent operations shortfall, rural water supply operating expenses, debt servicing and investment funds.

3.05 The principal reasons for the SWBs' poor financial performance are:

- (a) **Tariffs**. Estimated average 1989 tariffs (Katsina, ₦1.19/m<sup>3</sup> and Kaduna, ₦0.48/m<sup>3</sup>) are well below production costs for even well-managed water utilities. The last tariff increase prior to 1990 was in 1985. Over the four year period (1985-1989) local inflation was 133% and the Naira was devalued by over 700%; real average tariffs thus fell sharply.

- (b) **Collections.** Collection/billing ratios for 1989 (Katsina, 70% and Kaduna, 71%) are low. Part of the collection problem stems from consumer resistance to pay for poor and unreliable service.
- (c) **Unaccounted-for Water.** Estimated unaccounted-for water (Katsina and Kaduna, both over 40%) is high, resulting in a combination of increased operating costs and reduced revenues.
- (d) **Staffing.** Number of employees (Katsina and Kaduna, both around 35 employees/1,000 connections) is excessive, particularly at the unskilled level (para. 3.08).

3.06 Because of past poor financial performance, the KDSWB has a large accumulated operating deficit resulting in negative capital of ₦283 million as of December 31, 1990. In addition, the State government has been picking up the Board's debt service payments under a previous IBRD loan. These payments totaling ₦381 million as of December 31, 1990, have been treated on the books of KDSWB as an outstanding loan. As a condition of credit disbursement for Kaduna State, the State government would restructure KDSWB's capital and long-term liabilities by converting its loan to equity and make arrangements that debt service payments on behalf of KDSWB during the transition to full cost recovery be treated as a grant. The conversion of debt to equity would achieve a satisfactory debt/equity ratio. The KTSWB capital structure is sound, with no long-term debt.

### C. SWBs' Financial Policy and Tariffs

3.07 The Edicts establishing the SWBs provide for a reasonable financial policy: revenues shall be sufficient to cover operations and maintenance costs and debt servicing and such other sums as may be proper to set aside for general reserves, extensions, renewals, depreciation, etc. The Executive Council of each state is responsible for approving all water rate increases.

3.08 The State governments approved and implemented a three year (1990-1992) package of water tariff increases designed to offset operating cost increases, particularly in chemical and power costs, and improve the financial performance of the SWBs. Rate increases range upward from 83% for public institutions, 133% for residential users, and 180% for industrial/commercial consumers. Tariff structures are presented in Annex 3.4. Despite the substantial rate hikes, the SWBs will need to carry out a medium-term program of further tariff increases and operational improvements to meet minimum financial requirements, i.e., revenues sufficient to cover operations and maintenance costs and debt servicing. A sustained six year program of tariff increases in real terms (KTSWB, 17% p.a. and KDSWB, 14% p.a.) plus operations improvements, including, inter alia, reductions in unaccounted-for water, improvements in collections, manpower rationalization and reorganization of rural water supply operations, is required. The KTSWB has recently begun its program to shed staff by spinning off the rural water supply operation. The above program would allow: (a) the KTSWB to fully cover from revenues its operations and maintenance costs by 1994 and, in addition, its full debt servicing costs by 1998, and (b) the KDSWB to meet from revenues its operations and maintenance costs by 1993 and additionally its full debt servicing costs by 1998. Agreement was reached at negotiations that each SWB will adjust tariffs and take other actions as necessary to meet its operations and maintenance expenses and debt servicing costs and performance indicators (para. 3.13) in accordance with the following timetable.

**SWBs' Covenanted Financial Performance**

<u>Year</u>	<u>KATSINA</u> <u>Revenues as a Percent of</u>		<u>KADUNA</u> <u>Revenues as a Percent of</u>	
	<u>Recurrent Cost</u>	<u>Recurrent and Debt Service Cost</u>	<u>Recurrent Cost</u>	<u>Recurrent and Debt Service Cost</u>
1992	46	46	81	33
1993	65	59	100+	44
1994	92	69	100+	55
1995	100+	70	100+	66
1996	100+	80	100+	77
1997	100+	90	100+	88
1998	100+	100+	100+	100+

While projected tariffs appear to be affordable (para. 4.07), a study to be carried out under the project would address the present differential tariff structures, including the need for and effectiveness of cross subsidies among and within consumer categories, an overhaul of public standpost billing and collection and effects on revenue of nearly universal consumption metering (para. 2.07).

**D. SWBs' Billing and Collection**

3.09 The KTSWB and KDSWB have 21,400 and 45,600 water connections, respectively. Metering is limited, for the most part, to high usage industrial, commercial and public institution consumers. Most residential accounts are not metered. Neither of the SWBs has operational meter testing and repair facilities. Estimated unaccounted-for water is over 40% in Katsina and Kaduna. A program to reduce unaccounted-for water, including consumption and production metering, will be financed under the project (para. 2.07) and the National Water Rehabilitation Project.

3.10 Billing systems for the two SWBs are similar. Bills are prepared manually, except in the Kaduna City District, where computerized billing by a private data processing bureau has been recently introduced. Metered connections are billed monthly, while flat rate domestic connections are billed quarterly in Katsina and bi-monthly in Kaduna. Collection/billing ratios are poor, but improving: KTSWB collected 70% of billings in 1989 and 80% in 1990; KDSWB collected 71% of billings in 1989 and 80% in 1990. Net accounts receivable at year-end 1990 amounted to ₦4.4 million, equivalent to about five months' billings, for KTSWB, and ₦30.1 million, equivalent to almost nine months' billings, for KDSWB. Over 60% of the SWBs' combined accounts receivable are due from private consumers, which is symptomatic of consumer resistance to pay for poor and unreliable service. Many of the accounts are old or represent flat rate billings to consumers who received no water because of supply outages or distribution breakdowns. The two SWBs should carry out a major accounts collection and write-off exercise. Assistance will be provided under the project to improve the billing and collection systems, including consumer relations programs and further computerization (para. 2.07).

## E. SWBs' Accounts and Audits

3.11 The two SWBs have similar financial management systems. Annual budgets are prepared, with actual revenues and expenditures compared with budget amounts on a quarterly basis. Manual accrual basis accounting systems, with separate profit and loss accounts for each district, are maintained. The SWBs prepare monthly district income statements and semi-annual financial statements; yearly accounts are normally available within four months of year end. The accounting and reporting systems are adequate but can be improved. Financial management improvements under the project would assist the SWBs in fixed assets and inventory valuation and control, micro-computerization of accounting systems and additional training.

3.12 The Auditor General of each state appoints an external auditing firm to examine the SWB's accounts. The external auditors expressed unqualified opinions on the SWBs' 1990 financial statements. Agreement was reached at negotiations that the SWBs' annual accounts and audit reports will be submitted to the Bank within six months of the end of the fiscal year.

## F. SWBs' Future Financial Performance

3.13 One of the project's main objectives is to improve the operational and financial performance of the SWBs. The proposed financial strategy is aimed at complete coverage from the SWBs' revenues of operations and maintenance costs and debt servicing costs. The improvements are phased in over a six year period, with subventions from the states to cover the operations shortfall and debt servicing gradually reduced to nil by 1998. Summary financial projections for the period 1992-1999 are presented in the table below and detailed, along with assumptions, in Annex 3.2.

### SWBs' Projected Financial Performance

(Naira 000s)

	<u>KATSINA</u>				<u>KADUNA</u>			
	<u>1992</u>	<u>1994</u>	<u>1996</u>	<u>1998</u>	<u>1992</u>	<u>1994</u>	<u>1996</u>	<u>1998</u>
Volume Sold (M3 000s)	7629	11534	17577	23214	44165	55480	64313	71248
Average Tariff (Naira)	2.52	5.60	9.25	12.27	1.79	3.59	5.51	7.44
Net Revenue	16722	58836	151213	265313	67458	178077	323504	484046
Cash Operating Expenses	35983	55935	85538	124616	71892	102807	126133	163141
Cash from Operations	-19261	-2901	65675	140697	- 4434	75270	197371	318905
Depreciation	5991	12093	32057	66801	23680	36676	61874	78860
Operating Income	-25252	-9192	33618	73896	-28113	-38593	135497	240045
Operations Subvention	19261	0	0	0	4434	0	0	0
Debt Service Subvention	381	26757	37746	0	133984	145854	95385	0
State Subvention	19642	26757	37746	0	138418	145854	95385	0

Performance indicators are included in Annex 3.3.

3.14 Improvement in the SWBs' future financial performance is predicated on a combination of tariff increases, operational efficiencies and sales volume increases. The effects on the SWBs' future financial performance of not fully achieving the projected efficiencies and volume increases are discussed below and detailed in the project files. The financial sensitivity analysis for 1998, the last full year of project implementation, shows that:

- (a) if sales volume is 10% less than projected, operating income would fall (KTSWB, ₦17.2 million; KDSWB, ₦37.0 million), and an additional tariff increase (KTSWB, 7%; KDSWB, 9%) would be required to cover the decrease in operating income;
- (b) if improvement in unaccounted-for water is 50% of projected, operating income would fall (KTSWB, ₦13.9 million; KDSWB, ₦13.9 million), and an additional tariff increase (KTSWB, 5%; KDSWB, 3%) would be required to cover the decrease in operating income; and
- (c) if collections rate is 90% of projected, operating income would fall (KTSWB, ₦25.6 million; KDSWB, ₦47.7 million), and an additional tariff increase (KTSWB, 11%; KDSWB, 11%) would be required to cover the decrease in operating income.

#### IV. PROJECT BENEFITS AND IMPACTS

##### A. Project Benefits

4.01 When fully operational in 1999, the project will provide improved water supply to about 1.0 million people in urban areas in Katsina and Kaduna States, including about 0.6 million who had not had water supply previously. For the 0.4 million already having supply, service will be improved from providing limited quantities of water of marginal quality for only a few hours each day, to a continuous supply of potable water sufficient to meet domestic, commercial and industrial demands. A further 2.6 million will benefit indirectly from more commercially and service oriented water boards. In addition, some of the groundwork will be done to improve water supply to over five million rural people.

4.02 Direct project benefits include increasing the quantity, quality and reliability of water supplies, thereby improving public health by providing an adequate amount of potable water for personal cleanliness and hygiene. Continuous pressure would eliminate the present danger in some areas of drawing back contaminated water into the network. The project would reduce the time spent, mostly by women, in water collection duties. Water would also be available to meet the projected demands of commercial and industrial users, thus removing an obstacle to the development of these sectors, and permitting the development of urban areas as centers of economic growth.

4.03 The project would reduce operating costs and improve the operating efficiency of the two state water boards. It would improve the management ability and performance of the water boards, thereby raising their public image, a prerequisite to encouraging consumers to pay for their water supply. It would develop the water boards into self supporting and sustainable entities with realistic long term development goals. It would also unburden them

from the difficult demands of the rural water supply sector, which will pass to the local government and community levels which are better placed to bear them.

**B. Least Cost Solution**

4.04 The proposed project has been designed following review of alternative development programs and addresses the highest priority needs in this sector in the two states. The scope of each sub-project is sufficient for anticipated demands, and where appropriate, only limited first stage developments have been included in the project. Expensive investments in headworks have been postponed where possible, and consequently further stages will be required in the future as demands for water increase. The technology adopted has also been kept at an appropriate level, but will be reviewed for some items and modified as necessary before inviting tenders. The project is the least cost solution to the provision of water to the project beneficiaries, a large proportion of whom are at or below the poverty level.

**C. Environmental Impact**

4.05 The proposed project would not be expected to have significant adverse impact on the environment, but rather to improve well-being, health and sanitary conditions in the project area. However construction of two new dams would increase the habitat for mosquitos and bilharzia snails and could cause downstream pollution by sediments during construction if not managed properly. In addition, both dams could be subject to pollution from activities in their catchments. Environmental assessments have been prepared for both dams, and these are summarized in Annex 4.1 for Funtua, and Annex 4.2 for Zonkwa. During negotiations, a mitigation plan to minimize environmental impact relating to the two dams, including the hiring of a health specialist by December 31, 1992, was discussed and agreed (Annex 4.3). Where appropriate, the actions required under the mitigation plan have been incorporated into the implementation program (Annex 2.11), or agreed terms of reference, or will be incorporated into bidding documents. A limited resettlement effort is required and is being undertaken (para. 2.20). The project would increase the use of water, and consequently the amount of wastewater which must be disposed of. Guidelines would be developed under the project to improve environmental sanitation in each state, and plans would be formulated to improve drainage of sullage and stormwater in project towns (Annex 2.9). Any detrimental effect would be minor with no lasting or irreversible impact.

**D. Poverty Impact and Affordability**

4.06 About half of the beneficiaries of the proposed project are at or below the poverty level. By 1999, most households within the project area would be served by the project, including about 500,000 people at or below the poverty level. Project expenditure directly related to the poor is estimated at about US\$44 million, 34% of total project costs.

4.07 The poverty threshold in urban areas in Nigeria is estimated at about US\$1180 per year for a family of eight members, based on 1988 prices. Monthly household water consumption for the poor, utilizing public standpipes, is estimated at about 4.8 cubic meters. At the higher tariff levels required under the project, this would represent US\$8 per year, or about 0.7% of current family income, which is affordable. For those with house connections, monthly household water consumption would be in the 15 to 30 cubic meters range, which

would represent more than US\$36 per year, or in excess of 3% of poor family income. This is probably near the limit of affordability, and hence many poorer consumers would prefer to utilize public standpipes, or at least severely limit their water consumption. In estimates of water demand for project design, about 43% of consumers were assumed to obtain their water from public standpipes.

E. Adequacy of Tariffs

4.08 The average incremental cost of water to be produced under the proposed project is estimated at about ₦12 per cubic meter. The highest block of industrial tariffs would increase this level after proposed tariff increases, but the high block domestic tariff would remain below this figure even after being increased by about two and a half to three times (in real terms) as is proposed under the project. A study to be carried out under the project (para. 2.07) will establish appropriate tariff levels and structures to ensure that all high block tariffs at least equal average incremental cost.

F. Economic Rate of Return

4.09 Economic analysis of urban water supply projects raises difficult issues related to quantification of benefits from the project such as the measurement of benefits from improved health, improved productivity, and the promotion of further economic activity. There are serious methodological issues associated with quantification of these economic benefits for water projects and this will generally lead to serious under-estimation of benefits. For the proposed project, perceived value of water to the consumer has been accepted as one measure of its economic worth, although it does not necessarily incorporate its full value. In these two states, consumers typically pay the equivalent of ₦10 per cubic meter to vendors for up to 30 liters per person per day, and up to the equivalent of ₦250 per cubic meter for smaller quantities during the dry season. The first of these figures has conservatively been adopted together with the projected average tariff of ₦4 per cubic meter at a consumption of 90 liters per person per day to provide a crude indication of willingness to pay, yielding a minimum value of economic rate of return (ERR) for the project of 9.8%, 12.8% for Katsina and 6.3% for Kaduna. Details of the ERR calculation are presented in Annex 4.4. Rate of return is lower for Kaduna because of the nature of the developments being undertaken, economy of scale factors and differing hydrological conditions. ERR is sensitive to the value placed on the first 30 liters per person per day, a 10% decrease in this value reducing ERR to 9.1%, but less sensitive to average tariff, 10% decrease causing ERR to fall to 9.7%. A 10% increase in capital costs would cause ERR to fall to 8.9%. Taking an alternative approach to quantification of benefits, assuming a 10% reduction in health care costs, and a 5% increase in per capita productivity as the value of benefits, yields an ERR of 14.4% for the project (16.7% for Katsina and 11.8% for Kaduna), these figures being almost proportional to assumed percentage improvement in productivity. To some undetermined extent this value would be in addition to the values indicated by households' willingness to pay, however, no attempt has been made to estimate this, or to quantify other potential benefits, and the figures given are, therefore, likely to under-estimate the ERR. During project implementation an improved means of measuring socio-economic benefits under the project will be established, as part of the component to prepare follow-on investments.

## G. Project Risks

4.10 The type and scale of the various sub-projects to be undertaken are not uncommon in the Nigerian context, and there is no unusual risk associated with their implementation. The major risk associated with the project is that counterpart funds would not be available as required, a factor which has delayed previous projects. To overcome this problem, at least one state would agree, as a condition of effectiveness of the proposed credit, to give authority to the FMF&ED, binding over the life of the project, to deduct its share of the project's finances from its Federation Account and deposit into a project account according to an agreed schedule, including the making of the initial deposit (para. 2.15). The same conditions would be conditions of disbursement for the remaining state. Establishment of such a mechanism is now being required by the Federal Government for all state development projects in Nigeria.

4.11 A second risk is that the states will hesitate to sufficiently increase tariffs to finance the long term operation and maintenance needs of the boards and to cover debt service. Agreement was reached at negotiations to phased tariff increases to meet the agreed financial objectives (para. 3.08). The tariff study to be undertaken under the project, would recommend tariff levels and structures and agreement was also reached on implementation of the recommendations of the study (para. 2.11).

4.12 Management of the project will be in the hands of the two water boards, under their projects departments, assisted by consultants for contract administration and construction supervision. This will be a major undertaking which could tax their capacities, but it is important for each board to accept this responsibility as part of its development process. Agreement was reached that staff of sufficient experience would continue to be employed by the SWBs to manage the project (para. 2.10) and their performance will be continuously monitored (para. 2.21)

## V. AGREEMENTS REACHED AND RECOMMENDATION

### A. Agreements Reached at Negotiations

5.01 During negotiations, agreement was reached with the Government of the Federal Republic of Nigeria, that it will onlend the proceeds of the IDA credit to the states at the IBRD variable interest rate for 20 years, including five years of grace (para. 2.15).

5.02 Agreement was reached with each state and its water board that they would:

- (i) reorganize the rural water supply sector by December 31, 1994, by devolving responsibility to the local government and community level and in accordance with national strategy being developed (para. 2.03);
- (ii) participate in the National Water Rehabilitation Project (para. 2.04);
- (iii) use the model bidding document prepared for NWRP (para. 2.09);

- (iv) use agreed terms of reference for technical assistance under the project (para. 2.09);
- (v) continue to employ in the SWB people with sufficient experience to manage the project (para. 2.10);
- (vi) implement the project (including all technical assistance components) in accordance with an agreed program (Annex 2.11) and regularly exchange views and undertake remedial measures. (para. 2.11);
- (vii) pass on those parts of the loan related to technical assistance and rural water supply to the water board as equity, and onlend the remainder for 25 years including six years of grace, at 15% interest rate with the State bearing the foreign exchange risk (para. 2.15);
- (viii) by June 30 each year submit to IDA the financial statements of the Special Accounts, Project Accounts, and SOEs for the preceding calendar year audited by an independent auditor acceptable to IDA (para. 2.19);
- (ix) undertake a mid-term review of the project with the Association by December 31, 1994, to review project management, progress against the action program (Annex 2.11) and development of the Boards against agreed performance indicators (Annex 3.3) and to agree on any necessary corrective actions (para. 2.21);
- (x) adjust tariffs and take other actions as necessary to meet its operations and maintenance expenses and debt servicing costs and performance indicators (para. 3.08);
- (xi) submit to IDA the SWB's annual accounts and audit reports within six months of the end of the fiscal year (para. 3.12); and
- (xii) ensure that the environmental impact relating to two dams is minimized in accordance with an agreed mitigation plan that includes the hiring of a public health specialist by December 31, 1992 (para. 4.05).

**B. Conditions of Credit Effectiveness**

**5.03 All of the following actions would be taken by at least one state prior to credit effectiveness:**

- (i) appointment by the water board of consultants for construction supervision and for improving its efficiency of operations (two consultancies are required)(para. 2.11);

- (ii) signing of subsidiary loan agreements between the Federal Government and the state, and between the state and its water board (para. 2.15);
- (iii) giving instructions, binding over the life of the project, to FMF&ED to deduct its share of the project's finances from its Federation Account in equal monthly installments and deposit them into a project account (para. 2.15); and
- (iv) deposit of the initial installment into the project account (para. 2.15).

**C. Conditions of Disbursement**

5.04 All of the following actions would be taken by the second state prior to disbursement in that state:

- (i) appointment by the water board of consultants for construction supervision and for improving its efficiency of operations (two consultancies are required) (para. 2.11);
- (ii) signing of subsidiary loan agreements between the Federal Government and the state, and between the state and its water board (para. 2.15);
- (iii) giving instructions, binding over the life of the project, to FMF&ED to deduct its share of the project's finances from its Federation Account in equal monthly installments and deposit them into a project account (para. 2.15); and
- (iv) deposit of the initial installment into the project account (para. 2.15).

5.05 In addition, for Kaduna State only, KDSWB's capital and long-term liabilities would be restructured by converting its loan to equity and arrangements made that debt service payments on behalf of KDSWB during transition to full cost recovery be treated as a grant (para. 3.06).

**D. Recommendation**

5.06 Having reached the agreements and subject to the conditions indicated above, the proposed First Multistate Water Supply Project is suitable for an IDA Credit of SDR 74.7 million (US\$101 million equivalent) to the Federal Republic of Nigeria.

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**

**Nigeria: Water Supply Sector Strategy**

**I. Background**

1. Water utilities in many Nigerian States have faced difficult financial problems and deteriorating economic conditions for some time. The high cost of imported equipment in terms of the depreciating domestic currency and inadequate cost recovery policies have contributed to large financial deficits. This has left most water authorities dependent on state subventions to operate and maintain their water systems, to service debt and to finance new investments. The states' own financial constraints have often limited the amount and dependability of recurrent and capital subventions requiring the agencies to defer maintenance and limit new investment. The examples from three Nigerian states, below illustrate the magnitude of the problem.

2. The Kaduna State Water Board (KSWB), starting from a low revenue and cost base in 1979, has incurred losses in the last 12 years. Whereas in 1979 KSWB could recover two-thirds of its operating costs, having relatively little fixed assets and expenses, by 1989 operating costs (including cost of finance) had grown to 5.6 times total revenues. The Anambra State Water Corporation (ASWC) has made losses since 1983 and these increased from N6.3 million in 1983 to N167 million in 1989, mainly due to the interest on an IBRD loan and increased depreciation on new investments. The financial performance of the Borno State Water Authority (BSWA) remained about constant from 1982 to 1988. Both years showed annual operating losses of about N11 million.

3. Improved financial performance of water utilities is essential for the public sector's ability to improve the reliability of water service and to extend its coverage. To achieve this, it is first necessary to understand the underlying causes of the financial losses in the sector. Several factors, including poor management, poor investment planning, inefficient production and distribution, lack of timely tariff measures, absence of financial discipline and accountability, and the increasing cost of imported inputs in terms of domestic currency have contributed to lack of financial viability in water utilities. This annex presents estimates of the relative magnitudes of the factors contributing to poor performance in three water utilities. It shows how these factors would be addressed under the proposed project and it suggests elements of a longer-term strategy which would be developed for addressing these issues in Nigeria.

## **II. Factors in the Rising Cost of Water**

### **A. Low Investment Efficiency**

4. Water production and distribution in Nigeria is very capital intensive, as indicated by a low value of output per unit of investment. In Kaduna, the value of fixed assets was 28 times the revenue earned in 1989 and 12 times that of 1990. Some of the low efficiency of investment may be due to the semi-arid nature of the state. More expensive water supply headworks, such as dams, may be more necessary here than elsewhere in the country. In some cases lower cost technology may be overlooked. Some project designers are not familiar with least cost approaches and in some instances there has been over-investment in headworks and an imbalance between production capacity and capacity for transmission and distribution. This is compounded by a lack of appropriate materials and expertise locally and poor supporting infrastructure such as power.

5. Water supply investment appears to have been more efficient in Anambra State due to a strategy of developing lower cost water from boreholes and greater autonomy in tariff setting which have enabled ASWC to gradually improve its financial performance. By 1989, ASWC's revenues from water sales were covering 73 percent of recurrent expenditures. The value of fixed assets averaged only 4.5 times income earned for both 1989 and 1990. However, fixed assets have not been revalued since 1982, so the actual situation is likely to have been worse.

### **B. Poor Utilization of Capacity**

6. Data on production capacity and sales volume are incomplete, but clearly there is scope for improvement. The volume of water sold in Kaduna is estimated at about 40 million cubic meters in 1989, and as much as 44 percent of this output was unaccounted for in 1990. One objective of the earlier project was to limit water losses to 25 percent of production (some water leakage is not economical to curtail), but this met with limited success. Few water systems in Nigeria are metered which would help in leak detection and could lower consumption by up to 40%, enabling existing capacity to be used more effectively. In 1986, unaccounted-for water at BSWA was estimated at 50%. Funding has been included in a Bank-financed project for meters and other equipment to reduce unaccounted-for water to 28% by 1991, but this part of the program has not yet been initiated.

### **C. Debt Service**

7. Water utilities have high levels of liabilities compared to their value of assets. In Kaduna, high liabilities are due to the first IBRD loan as well as debts to the state government arising from accumulated debt service. KSWB's liabilities amounted to ₦890 million in 1990 or 47 percent more than its total assets. Up to now KSWB has serviced its external debts by borrowing interest free from Kaduna State and in effect letting the state service its debts. As a result, liabilities to Kaduna State amounted to ₦380 million in 1990.

8. In Anambra's case debt service, largely on an IBRD loan, increased considerably between 1987 and 1989 due to the depreciation of the naira against the dollar. Table 7 indicates the debt service increase from ₦11 million in 1987 to ₦33 million in 1989.

9. BSWA's capital structure at the end of 1988 is very strong, with a debt/equity ratio of less than 0.25. The foreign exchange risk for a Bank-assisted project is being borne by the state government, insulating the BSWA from devaluation. Debt service payments were minimal through 1988 and had little effect on BSWA's financial results.

#### D. Exchange Rate Related Costs

10. Rapid depreciation of the naira has led to large increases in the cost of imported inputs into water production, such as chemicals and spare parts. The nominal rate of exchange for the naira rose by a factor of 13.5 between 1979 and 1990. As shown in Table 1, in 1990, the cost of chemicals was 35 percent and electricity and lubricants 41 percent of KSWB's income. In addition, the income statement shows a separate "exchange loss" item which was 6.8 times revenue in 1989 and 1.8 times that of 1990. Increases in the price of electricity, also partly due to devaluation, have also contributed to losses by KSWB. Devaluation of the naira affected BSWA's operating costs mainly through increases in electricity cost. Power costs amounted to 56% of BSWA's 1988 revenues.

11. Exchange rate changes also have had a very adverse effect on water boards with foreign currency denominated debt. In Anambra, if loan interest and exchange losses are excluded, operating losses dropped slightly from ₦6.3 million to ₦6.0 million during the 1987 to 1989 period. However, if the loan interest charges are included, the losses rose to ₦167 million.

12. As the book value of fixed assets is adjusted to reflect their higher replacement value due to the increasing value of foreign exchange, and as new equipment is purchased from abroad, larger amounts must be set aside for depreciation. In Kaduna, depreciation allowances were as much as 175 percent of revenues in 1989 and 83 percent of revenues in 1990. In ASWC fixed assets were last revalued in 1982 and all the subsequent depreciation charges are based on historical book values, even though the replacement cost of the imported equipment have increased markedly. The 1990 depreciation charge of 14.6% of operating costs would have been much higher if fixed assets had been periodically revalued.

#### E. Water Agency Related Costs.

13. Although most water agencies in Nigeria are legally boards or corporations, they often function more as government departments. Government must clear procurement, authorize staffing and salaries and approve tariffs. This close relation to government often inhibits the financial and administrative autonomy of the boards, contributes to increased costs through delays in approvals and makes it difficult for the water agencies to hire and retain competent staff.

### III. Inadequate Income Generation

#### A. Tariffs

14. In most water utilities, income has remained depressed with infrequent revisions of water tariffs and often with most water consumers charged a low flat rate regardless of the amount of consumption. Free riding is also present. In Kaduna there have been tariff

increases but adjustments have been too infrequent and have not matched increases in the cost of production. Since 1978, the average water rates which were less than ₦0.30 per cubic meter were raised several times and a more differentiated rate structure has been adopted. However, rate increases were relatively moderate up to 1990. BSWA's tariffs have not been increased since 1987 leading to a serious deterioration in the Authority's financial performance. ASWC took steps to improve its income in 1983 with a 75 percent tariff increase. This resulted in monthly revenue collections almost three times those of the previous year. A more fundamental improvement was achieved in 1988 when the State Government allowed ASWC to make yearly tariff adjustments of up to 20 percent without authorization from government.

15. A comparison between the rate of increase in nominal wages and the changes in the price of water would shed some light on prices that the low income households can pay for water. Although wages and personal income data are not readily available for Nigeria, a large decline in real per capita income, particularly in dollar terms has taken place since 1980. Between 1980 and 1987, real incomes are estimated to have fallen by 62 percent for the urban households and by 30 percent for the rural households (see Table 2). This may in part explain the political reluctance and the real limits to raising water tariffs more rapidly and frequently. Lack of political autonomy of the Water Boards in most states adds to the political difficulty of tariff adjustments in line with increasing costs.

#### B. Billing and Collection

16. Inadequate billing systems and poor collections have often constrained the income of water authorities. Water authorities do not appear to have a firm grasp on the volume of output, amount of water lost through "free-riders" usage and uncollected accounts. In Kaduna, amounts collected were about 80 percent of billings until recently. Large water consumers, including the public sector, owed KSWB ₦35 million in 1990, an amount equal to 85 percent of sales in the same year. BSWA did an excellent job of collections in 1988, with a collection/billing ratio of 100%. Despite this effort, customer accounts receivable at the end of 1988 still represented over 11 months of annual sales. In Anambra, billing and collection operations have been relatively successful with 77% of the billings collected in 1990 and 80% in the first six months of 1991. This is mainly due to the commercialization of these operations during the early stages of the project implementation.

#### IV. Summary

17. It is clear that the large and persistent losses by water authorities are due to a number of factors. Much of the increase in cost was related to the economic instability, structural adjustment and devaluation which took place in the 1980s. In 1989 in Kaduna exchange losses (revaluation of debt in naira terms) were 55% of total expenses (see Figure 1). The cost of finance, chemicals and energy, as well as higher depreciation allowances, all of which are linked to the rate of exchange, increased as the international value of the naira fell adding to the cost of devaluation. At the same time, water sales, denominated in domestic currency and sensitive to the purchasing power of low income consumers, whose real incomes were falling, could not increase in real terms. Even though revenues from water sales rose by a factor of 4 in Kaduna from 1979 to 1989, costs rose by a factor of almost 8 during the same

period (see Table 1). These factors help to explain the impact on Nigerian water utilities of past financial deterioration .

18. Even before Nigeria's economic situation worsened in the early 1980s, water authorities faced difficulty charging and collecting economic tariffs for costly water systems. In many states the cost of water production and distribution of a unit of water are high relative to per capita income which suggests that the issues related to cost and income outlined above must be confronted even in the absence of economic destabilization. Exchange rate depreciation exacerbated an already critical situation.

#### V. The Proposed First Multistate Water Supply Project in the Context of Sector Issues

19. The proposed water supply project for Kaduna and Katsina States is designed to address, during the project period, most of the issues outlined above and thus reduce the risk of repeating past problems.

##### A. Cost Factors

20. Investment Efficiency. Alternative development programs have been carefully reviewed, and the proposed program would address the highest priority needs in the two states. The scope of each sub-project is sufficient for anticipated demands and, where possible, limited to first stage development to minimize costs. Expensive investment in headworks have been postponed where possible until demand increases, and the extent of distribution will be balanced with production capacity. Appropriate technology has been adopted, and some items will again be reviewed and modified before inviting tenders. Assistance to reduce operating costs is also included in the project.

21. Capacity Utilization. Unaccounted for water is estimated at about 44% in Katsina and 41% in Kaduna. Each Board has already initiated a program of leak detection and repair. An action program, including technical assistance, has been agreed upon to reduce losses further. Managers are being made aware of the large potential benefits of loss reduction. A program of metering is being introduced to enable an analysis of the water system efficiency and particularly to identify leakage. Targets for water waste reduction are included in the monitoring indications which will be reviewed carefully by supervision missions.

22. Debt Service. The Katsina State Water Board is relatively new and has very little debt. The Kaduna State Government has been repaying loans for KSWB which accumulated up to ₦381 million up to the end of 1990 and has been treated as a loan to the KSWB. At present KSWB cannot service the loan, so it has been agreed under the project that the State Government will restructure KSWB's liabilities, converting its accumulated arrears to equity and assuming its loan payments. In order to help the Board to return to financial viability, the State Government will continue to service the loan on a grant basis until KSWB's income permits it to resume the payments as well as to cover its other obligations under the loan. (about 1998).

23. Foreign Exchange Risk. In the proposed project, both State Governments will assume the foreign exchange risk, thus relieving the Boards of a cost which has been heavy in the past, which is very difficult to pass on to their consumers and which is beyond the control of

the water utilities. The experience of BSWC has shown that when water utilities are isolated from foreign exchange risks, the financial position will stabilize.

### B. Income Generation

24. Water Tariffs and Collections. Both State Governments have agreed to cover recurrent cost and debt service cost from beneficiaries by 1993 and 1998 respectively. As a first step in achieving this, both State Governments have implemented large, up front tariff increases ranging from 83% for public institutions, 133% for residential users and 180% for industrial/commercial users. The rates now allow for a graduated structure based on volume. Kaduna is already recovering 81% of recurrent costs, which is unusually high in the Nigerian context, and Katsina is recovering 46%. A program of 10% to 35% annual stepped increases in real terms has been agreed upon so that the boards will meet recurrent and debt service costs by 1998.

25. Billing and Collection. Both boards collected about 80% of billings in 1990, up from about 70% in the previous year. Assistance will be provided under the project to further improve the billing and collection systems and to write off uncollectible debts. A customer relations program and further computerization will also be included.

26. More Rigorous Enforcement of Covenants. Progress in meeting covenants in past Credit Agreements is being monitored much more rigorously in Nigerian projects. As a result one state government is being notified of the Bank's intention to suspend disbursements if substantial progress is not made soon in addressing financial and institutional development covenants. In addition, extension of closing dates on other Loans and Credits now depends upon satisfactory progress complying with loan agreements.

### VI. Confronting Longer-Term Issues in the Water Supply Sector.

27. Some of the more fundamental issues in the sector are being dealt with over the longer term through collaboration of the Bank and the Government of Nigeria.

28. Use of Affordable Technology. It is important to keep project costs affordable. With so much water supply equipment imported, devaluation of the naira has clearly been a driving force behind the inflation of water supply costs. Present exchange rates should increase the incentive to produce more water supply equipment and chemicals in Nigeria. Ways to improve local production of inputs required should also be explored. The use of low cost options should be explored where feasible. Especially until the financial incentives governing investment decisions in water authorities are improved, it is important to improve investment analysis, especially forecasts of demand to ensure appropriate scale and efficient use of resources, and appropriate technical design.

29. Enhanced Autonomy. More emphasis is needed in the future on the autonomy and accountability of water supply agencies. More autonomy to control staffing, to enhance tariffs (within established limits) and to manage procurement can significantly improve efficiency, if combined with sufficient financial accountability. The case of ASWC demonstrates the importance of autonomy in tariff setting. It was granted autonomy by the State Government

to make limited tariff adjustments. The result was a dramatic improvement in cost recovery from 20% of recurrent costs in 1983 to 73% in 1989. Delegation of other types of authority from the Lagos State Government to the Lagos State Water Corporation (LSWC), such as authority to approve contract awards below certain thresholds, have been discussed but not yet acted upon.

30. Private Sector Participation. Private sector participation is a way to reduce costs, assign accountability and improve efficiency. Water supply agencies in several countries have increased the efficiency of their operations through private sector participation of various types. Private participation can be used in fairly simple management contracts, for example, maintenance contracts or contracts for billing and collection. Alternatively, the private sector can be placed in charge of most aspects of the utility with contracts to maximize incentives for efficiency. With growing world-wide recognition that public sector utilities invariably face political pressures which compromise economic efficiency and financial performance, private sector participation should be seriously considered. The World Bank, with the assistance of federal and state water supply agencies in Nigeria, is currently examining specific ways of introducing private sector participation in Nigerian water utilities under a separate study.<sup>1</sup>

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<sup>1</sup>. Nigeria: Private Sector Participation in Lfrastructure and Urban Services.

Table 1. Kaduna State Water Project - Pre- 1989 Financial Situation

	<u>Million Naira per Year</u>			<u>Index</u>			<u>Share of Sales</u>		
	1979	1986	1988	1979	1986	1988	1979	1986	1988
Water Sales	4.5	17.5	17.7	100.0	388.9	393.3	100.0	100.0	100.0
Prod./Dist. Costs	2.5	7.8	18.1	100.0	312.0	724.0	55.6	44.6	102.3
Administration	3.5	4.0	4.8	100.0	114.3	137.1	77.8	22.9	27.1
Depreciation	0.0	5.9	28.3				0.0	33.7	159.9
Interest	0.7	0.9	1.8	100.0	128.6	257.1	15.6	5.1	10.2
Total Costs	6.7	18.6	53.0	100.0	277.6	791.0	148.9	106.3	299.4
Total Cost/excl. Dep.	6.7	12.7	24.7	100.0	189.6	368.7	148.9	72.6	139.5
Net Income	-2.2	-1.1	-35.3	-100.0	-50.0	-1604.5	-48.9	-6.3	-199.4
Net Income/excl. Dep.	-2.2	4.8	-7.0	-100.0	218.2	-318.2	-48.9	27.4	-39.5

Source: PCR

Table 2

Index of Real Household Incomes of Key Groups, 1980/81 - 1986/87

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	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
Urban Self Employed	100	83	72	63	46	46	41
Urban Wage Earner	100	87	81	69	50	50	44
All Urban Households	100	76	69	58	43	43	38
Rural Self Employed	100	103	95	86	73	74	65
Rural Wage Earner	100	90	83	76	52	53	47
All Rural Households	100	102	94	85	70	80	70

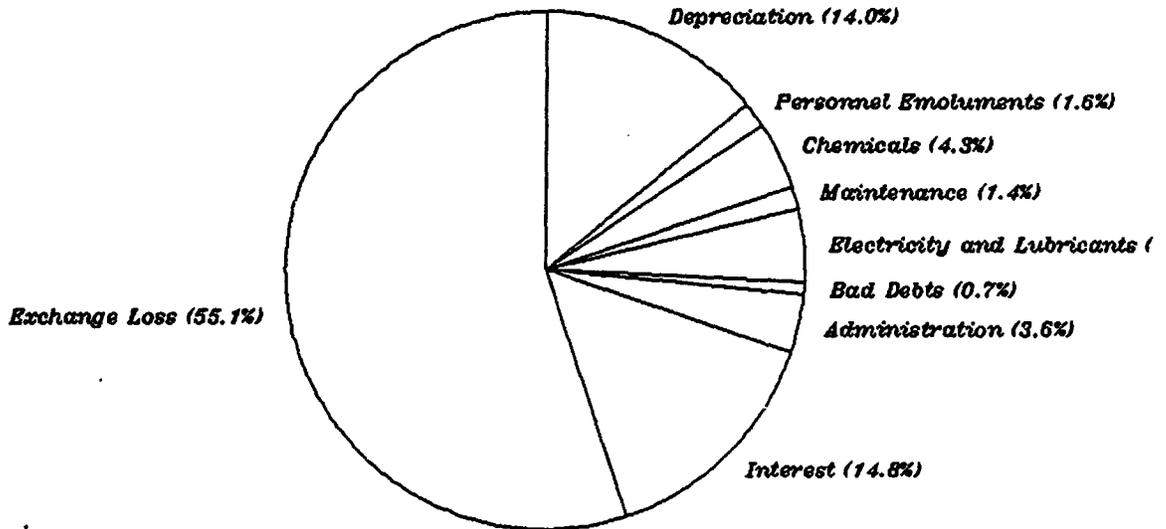
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Source: Nigeria: 1990 CEM, p. 31

Figure 1

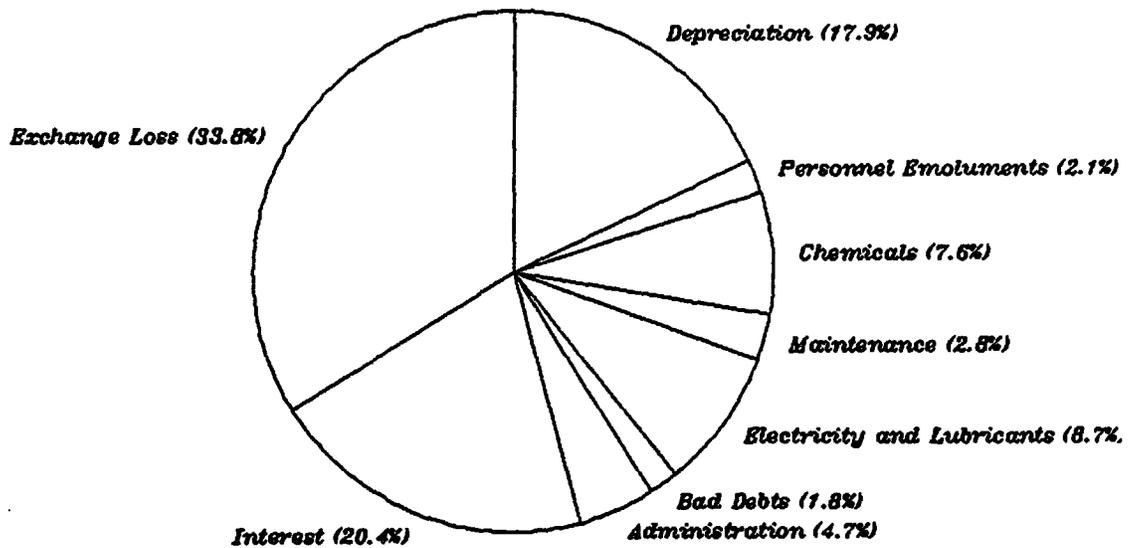
### Kaduna State Water Board

Composition of Expenses 1989



### Kaduna State Water Board

Composition of Expenses 1990



FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Description of Water Supply Systems

Katsina City

1. The Katsina water supply system serves Katsina city and several neighboring towns and villages. The system which was built in 1975, is supplied from the Ajiwa dam and 50 MLD (recently increased from 25 MLD) treatment works, approximately 20 km east of Katsina. The treatment works use conventional processes of clarification, filtration and chemical dosing. Water is pumped from the treatment works to a 14.5 ML ground level concrete reservoir near Katsina. From this reservoir, water flows by gravity to a booster station in Katsina which then feeds two identical 2.3 ML elevated storage reservoirs in different parts of the city. Gravity feed distribution mains extend from the elevated reservoirs to supply Katsina city as well as areas outside of Katsina.
2. A large number of open wells throughout the city are still used consistently. Most of these are polluted to some degree. Consumers in some areas experience inadequate water pressure for more than 8 hours per day due to inadequate capacity of the distribution system.
3. Under the project about 80 km of transmission and distribution pipelines, pumping stations, and an additional elevated reservoir, will be constructed within the town.

Funtua

4. The existing Funtua system serves Funtua town and extends about 20 km to Bakori and Kabomo. Raw water comes from Mairuwa dam approximately 12 km northwest of Funtua. The treatment works, near the dam site, consist of a conventional plant with a capacity of 4.5 MLD and a prefabricated package plant having a capacity of 2.3 MLD. The conventional plant was commissioned in 1971 and the package plant was added in 1983. At present, only the conventional plant is operational, due to difficulties in conveying raw water to the package plant in the dry season. Water is pumped from the treatment works to a 2.25 ML circular concrete reservoir on a hill in Funtua, and distributed from there. There is also a borehole at Bakori which feeds into the system and produces about 100,000 liters per day. The current water requirement far exceeds the existing supply, and numerous open wells throughout Funtua make up the shortfall.
5. Under the project a dam would be constructed on the River Gwagwaye located within 5 km of the existing Mairuwa Waterworks. A two staged program is considered. Stage 1, financed under the project, would include construction of the dam and 15.2 km of 800 mm diameter pumping main to Funtua designed for the maximum potential output available of 30 MLD. The treatment works, pumping stations storage reservoirs and reticulation network reinforcements would be sized at 20 MLD. Stage 2 would provide the balance of the safe yield available from the dam, 10 MLD.

### Malumfashi

6. The existing system consists of an impounding reservoir at the Turo dam, a 3.5 MLD conventional treatment plant feeding a 4.5 ML elevated steel storage reservoir, and a distribution system in Malumfashi town. The source and treatment works are located about 15 km north of Malumfashi, while the storage reservoir is located approximately 1 km south of town on a large rock outcrop. A transmission main also extends 30 km to Kankara, which has a 0.23 ML elevated storage reservoir and distribution system.

7. The dam has many problems including poor construction, noticeable settlement, seepage, inadequate spillway, erosion in spillway channel and vegetation growth on both faces. The safety of the dam cannot be assured unless remedial works are undertaken. Work to be done includes raising the dam crest by 1.9 m to prevent overtopping, construction of a new spillway, repairs to intake tower outlet gate and landscaping the downstream face for erosion control.

### Daura

8. The Daura city water supply is based upon 9 boreholes. Water is pumped from the operating boreholes to two elevated steel storage tanks for gravity distribution throughout the city. The tanks have capacities of 0.9 ML and 0.23 ML respectively. Water will also be piped 12 km to Sandamu via a booster station. The current water supply from the operating boreholes is approximately 2.9 MLD. The water distribution system consists of 75, 100 and 150 mm AC pipe, reaching most areas of the city. Work to be included in the project includes augmenting supply capacity by increasing the number of boreholes, about 14 km of distribution pipeline, stores, and repair facilities.

### Ikara

9. The present supply at Ikara is from individual wells, which are inadequate particularly in the dry season. Commercial/industrial activity in the town (food processing) has been hindered through lack of water supply. The civil works have been completed for several years for the Gimbawa dam, pumping station, rising main, and water treatment plant, however no mechanical or electrical equipment has been installed. The project will finance pumping and water treatment equipment of 4 MLD capacity (of 8 MLD ultimately proposed), 10 km of 300/400 mm diameter transmission main to the town, about 20 km of distribution network, and system storage.

### Kwoi

10. At present water supply in Kwoi is obtained from wells via water vendors or from individual household wells, which are inadequate particularly in the dry season. Lack of water supply is hindering further development of the town. The project would finance a weir intake on the Gurare River, a pumping station and conventional water treatment plant of about 6.5 MLD capacity, about 14 km of 350/400 mm transmission pipeline to the town, system storage, and about 75 km of distribution network up to 400 mm diameter.

### Zonkwa

11. The present situation in Zonkwa is similar to that in Kwoi. The project will finance a new dam, intake pumps and treatment plant of about 5.0 MLD capacity, 5 km of 300 mm transmission pipeline, system storage, and about 70 km of distribution network up to 250 mm diameter.

### Kaduna and Zaria Cities

12. Although not benefiting directly from new works under the project, both Kaduna and Zaria cities will feel the influence of institutional development by the Kaduna State Water Board. Each of these towns is served by a dam, conventional water treatment plants, and distribution network. In Kaduna, there are three plants of capacity 150 MLD (financed under Ln. 1711-UNI), 54 MLD, and 27 MLD. In Zaria there are two, of 50 MLD and 10 MLD. There is currently excess capacity in Kaduna, but a major shortage in Zaria where additional reservoir and treatment capacity are required, subject to further studies.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Projections of Population and Water Demand

1. Demand projections have been based on estimates made by consultants of populations and forecast population growth, and an anticipated consumption per person, with allowance for industrial and commercial needs. The last official census in Nigeria was in 1963, and the results are generally considered suspect. However these results have had to form the basis of population projections, with comparisons being made with other statistics such as school enrollments and voting registers. Populations served by the various systems vary from about 30% up to 95% of total service area population at present, with an objective of 95%. The estimated current populations and projected populations for all towns served by the two water boards, including all project towns, are shown in the attached tables.

2. In projecting water demands, towns have been divided into three categories, large, medium, or small, and different proportions of consumers utilizing house connections (HC) and standpipes (SP) have generally been assumed for each, as follows:

		HC%/SP%
Large towns	1990	50/50*
	2005	65/35
Medium towns	1990	30/70
	2005	40/60
Small towns & semiurban	1990	15/85
	2005	20/80

\* Except Kaduna city and Zaria where alternative figures were adopted to better fit current statistics, 62/38 in Kaduna and 45/55 in Zaria, increasing to 70/30 and 55/45 respectively.

Per capita demand has been projected conservatively to increase from 80 litres per day in 1990 to 100 in 2005 from house connections, and to remain constant at 20 litres per person per day for standpipe users. In fact, these quantities will rarely be available in all towns from house connections, since at all times there will be a deficit in supply capacity in at least one town of the state. Averages for all towns supplied by the boards are indicated in the attached tables. Additional water requirements for commercial and industrial uses have been estimated by consultants as an additional percentage (ranging from 5% up to 37%), depending on the nature of development in each town, to give the total water demand in each town.

3. Water production requirements depend also on unaccounted-for water (UFW). Accurate figures on UFW are not available, since neither water production nor amount sold is metered. However assessment of available records indicates that between 35% and 50% of water produced is not accounted for. Experience here and elsewhere would suggest that 20% to 25% might be physical losses, and the remainder might be under-measurement of usage, in

various forms. It is assumed in making projections of future sales and production, that total UFW will reduce over five years to about 25% for existing systems and will be 20% for new systems. A comparatively small part of this reduction would be achieved by the proposed leakage detection and repair program, and the remainder by reducing the undermeasurement. It is expected that this will be possible since the cause of these "losses" can be clearly identified. Typically, the amount of water billed to any consumer is a nominal amount based on the number of fixtures he has at the time of connection. Typically also, connections are extended to neighboring residences without reference to the water board, while billing is still based on a single family. Where meters have been installed recently on a sample of consumers, actual usage has been shown to be from 17% to over 200% in excess of the nominal amount billed prior to metering. A comprehensive metering program and properly designed tariff structure as proposed under the project, will account for a much larger proportion of water used, and encourage consumers to obtain their own connection and economize on water usage.

4. Numbers of connections and public standpipes have been projected from current numbers. Present statistics vary a great deal from town to town, but indicate that from 6 to 26 people are served per house connection, and from 200 to 2600 per standpipe, but with considerable uncertainty in these figures. Surveys have indicated that a maximum of about 12 persons per house connection should be expected if each household had an individual connection, and 300 persons per standpipe has been adopted as an objective. It is expected that numbers will reduce towards these two objectives in the project towns during the life of the project, for example reducing from 21 to 15 persons per connection and from 2600 to 1200 persons per standpipe in Kaduna city and remaining at about the current figures of 8 and 310 in Katsina city. Projected numbers of connections are given in the attached tables.

FEDERAL REPUBLIC OF NIGERIA  
FIRST MULTISTATE WATER SUPPLY PROJECT  
SUMMARY OF POPULATIONS AND DEMANDS KATSINA STATE

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>KATSINA CITY</b>										
Total Population	362000	378929	396649	415198	434818	454939	476214	498484	521795	546197
Population served	221290	231848	242943	254571	268558	286543	301177	318541	339231	360948
<b>FUNTUA</b>										
Total Population	144000	151336	159045	167148	175663	184612	194016	203900	214288	225204
Population served	46080	48427	50895	53487	56212	59076	62085	61755	128573	180183
<b>MALUMFASHI</b>										
Total Population	70000	73154	76450	79894	83494	87256	91187	95296	99589	104077
Population served	60900	63644	66511	69508	72640	75913	79333	82907	86643	90547
<b>DUTSIN MA</b>										
Total Population	45263	47016	48840	50733	52700	54743	56864	59069	61358	63737
Population served	43000	44667	46398	48197	50065	52005	54021	56115	58290	60550
<b>DAURA</b>										
Total Population	71579	75086	78765	82624	86672	90916	95373	100046	104947	110069
Population served	66000	71332	74826	78493	82338	86372	90604	95043	99700	104585
<b>SEMI URBAN</b>										
Total Population	180000	185397	190956	196682	202579	208653	214910	221353	227991	234827
Population served	12600	25956	40101	55071	72928	104327	152566	221353	227991	234827
<b>JIBIA</b>										
Total Population	75000	77253	79573	81963	84425	86961	89573	92264	95035	97889
Population served	71250	73390	75595	77865	80204	82613	85094	87650	90283	92995
<b>Total Population</b>	<b>947842</b>	<b>988172</b>	<b>1030279</b>	<b>1074242</b>	<b>1120146</b>	<b>1168082</b>	<b>1218138</b>	<b>1270411</b>	<b>1325003</b>	<b>1382019</b>
<b>Total Population served</b>	<b>523090</b>	<b>559263</b>	<b>597269</b>	<b>637192</b>	<b>712945</b>	<b>806849</b>	<b>904900</b>	<b>1053365</b>	<b>1130710</b>	<b>1224814</b>
<b>Percentage served</b>	<b>55.2%</b>	<b>56.6%</b>	<b>58.0%</b>	<b>59.3%</b>	<b>63.6%</b>	<b>69.1%</b>	<b>74.3%</b>	<b>82.9%</b>	<b>85.3%</b>	<b>88.6%</b>
<b>Of serviced population -</b>										
Pop. % by standpipe	67.3%	67.3%	67.3%	67.3%	66.6%	64.4%	62.6%	60.4%	58.8%	57.5%
Pop. % by connection	32.7%	32.7%	32.7%	32.7%	33.4%	35.6%	37.2%	39.6%	41.2%	42.5%
<b>Production capacity (peak MLD)</b>	<b>50.1</b>	<b>51.1</b>	<b>52.1</b>	<b>56.1</b>	<b>67.6</b>	<b>69.6</b>	<b>93.6</b>	<b>120.9</b>	<b>120.9</b>	<b>120.9</b>
<b>Production capacity (av. MLD)</b>	<b>42.5</b>	<b>43.4</b>	<b>44.2</b>	<b>47.6</b>	<b>57.4</b>	<b>59.1</b>	<b>79.5</b>	<b>102.7</b>	<b>102.7</b>	<b>102.7</b>
<b>Actual production (MLD)</b>	<b>35.0</b>	<b>35.7</b>	<b>36.4</b>	<b>39.7</b>	<b>48.1</b>	<b>49.6</b>	<b>66.2</b>	<b>76.1</b>	<b>83.9</b>	<b>91.3</b>
<b>% utilization</b>	<b>82.4%</b>	<b>82.3%</b>	<b>82.3%</b>	<b>83.4%</b>	<b>83.9%</b>	<b>83.9%</b>	<b>83.2%</b>	<b>76.1%</b>	<b>81.7%</b>	<b>88.8%</b>
<b>Total sales (MLD)</b>	<b>19.6</b>	<b>20.2</b>	<b>20.9</b>	<b>24.5</b>	<b>31.6</b>	<b>34.8</b>	<b>48.1</b>	<b>59.1</b>	<b>63.6</b>	<b>69.2</b>
<b>Domestic sales (MLD)</b>	<b>15.1</b>	<b>15.6</b>	<b>16.3</b>	<b>19.0</b>	<b>24.4</b>	<b>27.0</b>	<b>37.1</b>	<b>45.4</b>	<b>48.5</b>	<b>52.3</b>
<b>Unaccounted water %</b>	<b>44%</b>	<b>44%</b>	<b>43%</b>	<b>38%</b>	<b>34%</b>	<b>30%</b>	<b>27%</b>	<b>24%</b>	<b>24%</b>	<b>24%</b>
<b>Litres/person/day - standpipes</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>
<b>Litres/person/day - connections</b>	<b>47</b>	<b>44</b>	<b>42</b>	<b>50</b>	<b>63</b>	<b>58</b>	<b>76</b>	<b>76</b>	<b>76</b>	<b>74</b>
<b>Number of connections</b>	<b>20686</b>	<b>21364</b>	<b>22115</b>	<b>22949</b>	<b>26392</b>	<b>31733</b>	<b>37331</b>	<b>49962</b>	<b>56615</b>	<b>64186</b>
<b>Number of standpipes</b>	<b>821</b>	<b>850</b>	<b>885</b>	<b>927</b>	<b>1040</b>	<b>1148</b>	<b>1306</b>	<b>1670</b>	<b>1757</b>	<b>1893</b>

FEDERAL REPUBLIC OF NIGERIA  
FIRST MULTISTATE WATER SUPPLY PROJECT  
SUMMARY OF POPULATIONS AND DEMANDS KADUNA STATE

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>KADUNA CITY</b>										
Total Population	1175000	1211642	1249427	1286390	1328369	1370000	1404245	1439345	1475323	1512201
Population served	1057500	1090478	1124484	1159551	1195712	1233000	1291905	1352985	1401557	1436591
<b>ZARIA</b>										
Total Population	580400	599904	620054	640902	662439	684701	707710	731493	756075	781483
Population served	430100	445163	460754	476890	493592	510879	528771	547290	566457	586296
<b>SAMINAKA</b>										
Total Population	30000	31731	33562	35499	37548	39715	42006	44431	46995	49707
Population served	9000	9519	10761	12449	14393	16543	18906	21668	24895	28736
<b>KAFANCHAN</b>										
Total Population	100000	102508	105079	107714	110418	113185	116024	118934	121917	124974
Population served	59290	60777	62300	63862	65415	67078	68754	70445	72146	73853
<b>IKARA</b>										
Total Population	47800	49012	50256	51530	52838	54178	55552	56961	58406	59888
Population served	0	0	0	0	0	16253	33331	51265	55486	56693
<b>KWOI</b>										
Total Population	53116	54541	56004	57506	59049	60633	62260	63930	65645	67406
Population served	0	0	0	0	0	0	16676	36358	59081	64036
<b>ZONKWA</b>										
Total Population	55400	56639	57906	59201	60526	61879	63263	64679	66125	67604
Population served	0	0	0	0	0	0	18979	38807	59513	64224
<b>BIRNIN GWARI</b>										
Total Population	23000	23560	24134	24722	25324	25941	26573	27220	27883	28563
Population served	18400	18848	19307	19778	20259	20753	21258	21776	22307	22850
<b>MANCHOK</b>										
Total Population	12300	12602	12912	13229	13554	13887	14228	14577	14935	15302
Population served	9840	10082	10329	11244	12198	13192	13516	13848	14188	14537
<b>Total Population</b>	<b>2077016</b>	<b>2142141</b>	<b>2209344</b>	<b>2278695</b>	<b>2350282</b>	<b>2424119</b>	<b>2491861</b>	<b>2561570</b>	<b>2633304</b>	<b>2707127</b>
<b>Total Population served</b>	<b>1594130</b>	<b>1634867</b>	<b>1693956</b>	<b>1756176</b>	<b>1830370</b>	<b>1916098</b>	<b>2057599</b>	<b>2200011</b>	<b>2318977</b>	<b>2390716</b>
<b>Percentage served</b>	<b>76.3%</b>	<b>76.3%</b>	<b>76.7%</b>	<b>77.1%</b>	<b>77.9%</b>	<b>79.0%</b>	<b>82.6%</b>	<b>85.9%</b>	<b>88.1%</b>	<b>88.3%</b>
<b>Of served population</b>										
Pop. % by standpipe	44.6%	43.7%	43.0%	42.3%	41.7%	41.3%	41.4%	41.3%	41.0%	40.2%
Pop. % by connection	55.4%	56.3%	57.0%	57.7%	58.3%	58.7%	58.6%	58.7%	59.0%	59.8%
<b>Production capacity (peak MLD)</b>	<b>266.4</b>	<b>266.4</b>	<b>266.4</b>	<b>291.4</b>	<b>298.0</b>	<b>302.0</b>	<b>313.2</b>	<b>313.2</b>	<b>313.2</b>	<b>313.2</b>
<b>Production capacity (av. MLD)</b>	<b>226.5</b>	<b>226.5</b>	<b>226.5</b>	<b>247.7</b>	<b>253.3</b>	<b>256.7</b>	<b>266.2</b>	<b>266.2</b>	<b>266.2</b>	<b>266.2</b>
<b>Actual production (MLD)</b>	<b>185.5</b>	<b>194.3</b>	<b>203.9</b>	<b>235.4</b>	<b>232.9</b>	<b>230.7</b>	<b>234.6</b>	<b>251.1</b>	<b>259.5</b>	<b>290.8</b>
<b>% utilization</b>	<b>81.9%</b>	<b>85.8%</b>	<b>90.1%</b>	<b>95.0%</b>	<b>92.0%</b>	<b>89.9%</b>	<b>88.1%</b>	<b>94.3%</b>	<b>97.5%</b>	<b>98.0%</b>
<b>Total sales (MLD)</b>	<b>110.2</b>	<b>115.3</b>	<b>121.4</b>	<b>141.6</b>	<b>151.9</b>	<b>162.0</b>	<b>176.2</b>	<b>188.8</b>	<b>195.2</b>	<b>196.3</b>
<b>Domestic sales (MLD)</b>	<b>71.2</b>	<b>74.6</b>	<b>78.3</b>	<b>92.6</b>	<b>99.7</b>	<b>106.6</b>	<b>116.3</b>	<b>124.6</b>	<b>129.4</b>	<b>130.2</b>
<b>Unaccounted water %</b>	<b>41%</b>	<b>41%</b>	<b>40%</b>	<b>40%</b>	<b>35%</b>	<b>30%</b>	<b>25%</b>	<b>25%</b>	<b>25%</b>	<b>25%</b>
<b>Litres/person/day - standpipes</b>	<b>20</b>									
<b>Litres/person/day - connections</b>	<b>65</b>	<b>66</b>	<b>66</b>	<b>77</b>	<b>79</b>	<b>81</b>	<b>82</b>	<b>83</b>	<b>81</b>	<b>78</b>
<b>Number of connections</b>	<b>43489</b>	<b>45610</b>	<b>47967</b>	<b>52568</b>	<b>60008</b>	<b>69524</b>	<b>79120</b>	<b>85577</b>	<b>91312</b>	<b>95369</b>
<b>Number of standpipes</b>	<b>390</b>	<b>396</b>	<b>424</b>	<b>467</b>	<b>537</b>	<b>666</b>	<b>876</b>	<b>1123</b>	<b>1246</b>	<b>1279</b>

**FEDERAL REPUBLIC OF NIGERIA**

**FIRST MULTI STATE WATER SUPPLY PROJECT**

**Improvement of the Efficiency of Operation of the State Water Board**

**Terms of Reference**

1. The Kaduna and Katsina State Water Boards are expected to receive financial assistance from the World Bank to carry out a program of rehabilitation and limited expansion of water supply facilities, and to upgrade their capacities to carry out the functions of large water supply authorities. To this end, a major program of assistance is proposed to each Board to improve its ability to efficiently operate and maintain its facilities, and to plan for the future, and consultants are required to assist with this program. These terms of reference indicate requirements in the technical and engineering fields. Concurrently with this program, other consultants may be assisting with improvements to accounting, billing and collection procedures, and development of a management information system, including review of computer needs for the Board as a whole and setting up of the necessary computer facilities. The consultants carrying out these two activities are expected to liaise as necessary for the efficient completion of their assignments.

2. It will be of utmost importance for the success of this program that technicians and engineers at the working level are fully trained and understand the objectives of the assistance program and the techniques to be used. To this end, the assistance will include several periods of mentoring, follow up, checking of achievement, and further instruction. In addition, the consultant will be expected to make specific efforts to ensure that its objectives, importance, program, techniques and achievements are transmitted regularly to higher levels in the Board and to the political level.

**Scope of Work**

3. The proposed program will consist of one major component directed towards improving the operational efficiency of the Board in the engineering fields of operation and maintenance, and four subsidiary components. The geographic coverage of the program will be the whole state but with concentration of activities on the Board's head office. The improvement of operational efficiency component will include the six urban systems operated by each Board. Each Board has already initiated a program of leak detection and repair, utilizing leak detection equipment. Relevant parts of this assistance will build upon that program. Separate commission will be arranged for assistance in each state. The scope of work will include but not necessarily be limited to the following:

### **Improve Operational Efficiency**

- (i) Inventory all water resources connected to the system at present or which could be readily reconnected. (These might include the existing surface water supply and old groundwater supplies if of adequate quality.) Determine the cost of producing potable water from each source, investigate means to reduce these costs, and develop operating rules to optimize use of water and minimize operating costs, depending also on demand patterns and transmission and distribution system capacities. This should include particularly a review of all uses of power fuel and chemicals (especially coagulant), and recommendations for maximizing the efficiency of their use.
- (ii) Analyze the distribution system and recommend a system of metering by area to permit this analysis to be improved and to form part of the leak and wastage detection and repair program. Recommend also any necessary production meters and assist the Board with procurement and installation. Analysis of the distribution system should include setting up the system on an appropriate computer analysis program and ensuring that Board staff are able to continue its use.
- (iii) Review the achievement of previous programs of detection of leakage and wastage, and following the installation of meters as indicated in the previous point, recommend a program of further loss reduction, including loss through undermeasurement and illegal connections. Recommend an appropriate program of consumer metering including specification of suitable and cost effective meters.
- (iv) If necessary, prepare a program of leakage repair to be carried out as part of the Board's maintenance activities and prepare contract documents. (Leakage repair may extend beyond the period of this program of technical assistance, in which case Board staff, trained during this program, would take responsibility.)
- (v) Examine water catchments used by the Board and make recommendations for protection of water quality including particularly control of the use of biocides and fertilizers, and activities which would increase erosion and subsequent sedimentation of the reservoir.
- (vi) Analyze the Board's field operations and establish manpower requirements for operation and maintenance. Develop a program of routine preventive maintenance. This should include a program of safety inspections for all dams used for water supply.
- (vii) Analyze stores, stores procedures, and procurement arrangements. Establish necessary holdings of spare parts and chemicals, and locations of stores facilities, and recommend procedures.

- (viii) Recommend equipment, tools, vehicles, etc necessary for the Board to carry out its duties, including establishment of a meter workshop.
- (ix) Determine suitable monitoring indicators for use by the Board management to assist in its duties and in general quality control, and assist in establishing a management information system utilizing these indicators.

#### **Laboratory Needs**

- (x) Review existing laboratory facilities and the need for additional equipment and supplies. Prepare specifications and assist with procurement.
- (xi) Prepare a routine water quality monitoring program for potable water and for stream and dam water quality related to town water supply, and assist Board staff in commencing its implementation. For new reservoirs, monitoring of stream water quality should commence before commencement of dam construction.

#### **Library**

- (xii) Determine library needs, assist with purchase of books and journal subscriptions and establishment of a technical library. Train a Board staff member to operate the library.

#### **Planning Procedures**

- (xiii) Assist the Board in the development of its medium and long term investment planning procedures and demonstrate the relation between system operation and monitoring, and system planning in a developing water supply system.

#### **Training**

- (xiv) For all of the above activities ensure that Board staff are fully trained and understand the procedures adopted so that they are able to continue to utilize them in the future.

#### **Implementation Timing and Reporting**

4. It is anticipated that the entire program of technical assistance will extend over a period of three years. All of the analysis and recommendations arising therefrom should be completed in draft form within the first six months. Following this the program of assistance would be intermittent depending on when the necessary equipment becomes available, and would involve establishment of the recommended procedures and training of Board staff in their implementation. This program, which will need to evolve as work proceeds, should

involve periods of assistance followed by periods when Board staff work alone, to be followed by further periods of follow up and assistance.

5. An inception report is required at the end of the second month, detailing the proposed work program and necessary inputs by others. Each month thereafter, a brief progress report will be required detailing significant progress and benchmarks reached, causes of delay, and points requiring clarification or decision. Reports on each investigation carried out will be required in draft form at the end of the sixth month, these reports to be finalized on completion of the relevant component. A final report will be required analyzing the effectiveness of the whole program of assistance and making recommendations for further assistance to the Board, and for suggested modification to future similar programs elsewhere.

6. Budgeted funds for this assistance are US\$1.0 million equivalent per state at present day costs, including vehicles and other normally required equipment, however each consultant should make his own estimate of the required resource inputs. The supply of special equipment such as water meters would be additional.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Improvement of Accounting, Billing and Collection, Management  
Information Reporting

Terms of Reference

Accounting

1. **Background.** The Katsina and Kaduna State Water Boards (KTSWB and KDSWB) have similar financial management systems. The systems are adequate in most respects. The KTSWB's system is completely manual, while the KDSWB is experimenting on an ad hoc basis with the use of personal computers in its accounting system. Areas that definitely need improvement are fixed assets and inventory accounting. In addition, better consolidation of district accounts and more rapid year-end closings are needed.

2. **Objective.** The objective of the consultancy services is to improve the reliability, timeliness and utility of accounting reports and strengthen internal control over fixed assets and inventory for both water boards.

3. **Scope of Work.** The scope of work includes:

- (a) review accounting practices and procedures;
- (b) assess capability of finance staff;
- (c) determine areas that can be computerized (personal computers) including fixed assets, inventory, payroll, general ledger, district accounting, consolidations, etc.;
- (d) determine and cost personal computer hardware and software needs, including availability of maintenance and support services; and
- (e) identify training sources and training programs.

Billing and Collection

4. **Background.** Billing systems for the two SWBs are similar. Bills are prepared manually in all districts of the SWBs except in Kaduna City District, where billing is contracted out to a private data processing bureau. Most of KTSWB's 21,500 water connections and KDSWB's 39,500 water connections are not metered and are billed on a flat rate basis. Plans include nearly universal metering introduced over a three year period. Collection/billing ratios are low: KTSWB collected 80% of its billings in 1990; KDSWB collected 78% of its billings in 1990.

5. **Objective.** The objective of the consultancy service is to improve the efficiency of the billing and collection system and strengthen internal control over revenues.

6. **Scope of Work.** The scope of work includes:

- (a) review existing commercial organization and operations;
- (b) determine additional commercial requirements based on metering plans;
- (c) review billing frequency, meter reading routes, collection practices;
- (d) review connection/disconnection/reconnection policies and procedures;
- (e) recommend improvements in commercial operations and procedures, including computerization (personal computers) and further use by KDSWB of private data processing bureau;
- (f) determine and cost personal computer hardware and software needs, including availability of repair and support service, and additional use of private data processing bureau;
- (g) identify training sources and training programs; and
- (h) assist the SWBs in designing a comprehensive accounts receivable collection and write-off exercise.

#### Management Information Reporting

7. **Background.** Other than periodic reports on financial results and budget performance, neither of the SWBs has comprehensive management reporting. Other information produced is presented in a number of separate reports.

8. **Objective.** The objective of the consultancy service is to develop a simple, yet complete, management reporting system and format.

9. **Scope of Work.** The scope of work includes:

- (a) review information needs (financial, technical operational) and frequency of reporting with senior management;
- (b) determine sources of information and how best to record and report the information; and
- (c) develop a management information package (sample reports at district, assistant general manager and general manager levels with recommended frequency of reporting).

**Services Required**

10. Twelve staff months of consultancy services will be required (six staff months of a financial management specialist and six staff months of a commercial (billing and collection) specialist). The SWBs will each provide 12 staff months of senior local accounting and commercial staff. The consultants will provide transport and office equipment. The SWBs will provide office space and supplies and secretarial support.

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**

**Urban Tariff Study**

**Terms of Reference**

**Background**

1. The Katsina and Kaduna State Water Boards (KTSWB and KDSWB) operate and maintain all urban water supply systems in their respective states. The KTSWB presently services about 22,000 connections to all categories of consumers, including over 800 public standposts, while the KDSWB services about 42,000 connections, including over 380 public standposts. Most connections are billed on a flat rate basis; however, the SWBs plan to introduce nearly universal consumption metering beginning in 1993.
2. The SWBs are heavily subsidized by their state governments, including subvention to cover a portion of their operation and maintenance costs, any debt servicing and investment requirements. The SWBs and the state governments have agreed to a medium term program to fully recover from revenues all operation and maintenance costs and debt servicing requirements by 1997.

**Objective**

3. The objective of the study is to develop an urban tariff structure that would:
  - allow the SWBs to meet their financial requirements per para 2 above;
  - discourage waste and excessive consumption and address the need for affordable water for the poor; and
  - be simple and economical to administer.

The study should produce good, practical recommendations for each SWBs' consideration.

**Scope of Work**

4. The scope of work includes:
  - (a) **Revenues and Financial Requirements**
    - analyze current sources of revenues and consumption by consumer categories and blocks, service mode and unmetered/metered consumers; and
    - review current and projected financial requirements, and determine average tariff to meet financial requirements.
  - (b) **Metering**
    - review metering plans;
    - review basis of charges for all categories of unmetered consumers;
    - determine for a representative sample, actual consumption for all categories of unmetered consumers;
    - determine effects on revenues and consumption of metering plans; and
    - recommend tariffs for unmetered consumers while the transition is made to nearly full metering.

- (c) **Demand Management**
  - assess the extent to which existing graduated tariffs encourage consumers to control consumption;
  - assess the extent to which existing graduated tariffs discriminate against low-income consumers; and
  - consider, based on the above assessment, whether any revisions should be made in the existing tariff structure.
  
- (d) **Public Standposts**
  - review revenues and costs;
  - review tariff levels and billing/collection arrangements;
  - study private water vending practices and charges; and
  - identify and consider options for revisions, including privatization or neighborhood control of standposts.
  
- (e) **New Connections**
  - review current charges and their effects on the SWBs' revenues and access to water supply by the poor; and
  - recommend revisions as needed.
  
- (f) **Other Services**
  - review revenues and costs of SWBs' other services; and
  - identify and recommend appropriate charging policy.
  
- (g) **Tariffs (Charges)**
  - review basis of charging for domestic, public and commercial/ industrial consumers;
  - review basis of graduated tariffs and minimum consumption blocks; and
  - assess amount of cross-subsidization among domestic, public and commercial/industrial consumers, domestic consumers at minimum block tariff and domestic consumers at higher consumption blocks, and public standpost consumers and private domestic consumers.
  
- (h) **Tariff Structure**
  - Based on work under (a) through (g) above, develop a revised tariff structure and charging policy for connections and other services.

### Services Required

5. The work requires six staff months of services of an expatriate tariff specialist and twelve staff months of services of a local counterpart financial/commercial specialist and a sociologist. The SWBs will provide transport, office space, office equipment and secretarial support.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Promotion and Hygiene Education Activities

Terms of Reference

1. A promotion and public relations program will have to be established prior to the introduction of the new water supplies (standpipes and house connections). In addition, involving the population in making improvements in water use practices, excreta disposal and sullage disposal will help to improve the sanitary condition of the urban environment. Promoting lasting changes in behavior is a long term process and health and hygiene agents need to develop the skills and capacity to sustain promotion and education activities.

Scope of the Work

2. Water board staff and the project team as well as other sector staff involved in promotion activities in the two States will be assisted in developing a promotion and public relations program for connection and management of the new water supplies. In addition, key sector staff will learn new skills and methods to assist them in improving community education and sensitization with respect to hygiene related issues. There will be two main areas of work, the water supply promotion and management program, and the hygiene education program. The scope of the work will include the following:

- (a) review of current community mobilization/sensitization practices including financial and human resources as well as equipment and training materials and media used.
- (b) review of water supply and sanitation related diseases endemic in the States and an assessment of the degree of awareness of the urban population of the causes of these diseases.
- (c) training of extension agents/health inspectors in participatory methods of interaction with the population/communities.
- (d) development of program for promotion of new water supplies with information on all aspects of (connection, metering, billing, fees/tariffs, promotion of sullage disposal for house connections, management of public standpipes etc.), development of appropriate promotion information and training materials and initiation of implementation of the program.
- (e) review of requirements for staff training, training materials, equipment and financing required and development and a proposal for funding to enable provision of improved hygiene education in urban areas.

**Roles of Consultants and Timing**

3. It is expected that the preparation of the program and the planning for improved promotion and hygiene education will take about six months. The teams in the two states will be assisted by an international consultant (3 months).

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**

**Reorganization of Rural Water Supply Sector**

**Terms of Reference**

**Background**

1. Many state, national, and international agencies have been involved in development of rural water supply facilities in Nigeria, specifically in the states of Katsina and Kaduna, and in their maintenance. Activities have been uncoordinated with the result that there has been considerable overlap and duplicated effort. The state water boards have had the major responsibility for maintenance, but have not had the resources to do this adequately. Hence, of about 1350 rural water supplies that have been developed in the two states (900 in Katsina and 450 in Kaduna), only about one third are in operation. Less than 5% of the rural population of about 5.3 million have access to safe water. It has been estimated that 20,000-25,000 water points, costing perhaps US\$100 million would be required to provide safe water to all of these people by the year 2005.

2. It is now proposed to reorganize the rural water supply sector to improve coordination amongst various participating organizations and to ensure that maintenance activities can be properly carried out to ensure sustainability. This reorganization must be consistent with the national policy and strategy currently being developed by the Federal Ministry of Water Resources. The paramount concept of the reorganization will be that the users (communities) will be the owners and managers of their own rural water supplies, with the local governments and state agencies undertaking tasks and responsibilities to facilitate such development. Development will be based on cost sharing and the users will be required to contribute a significant part (10% to 25%) of the costs, in money or in kind. The state will adopt a coordinated approach to sector development which all relevant agencies will be required to adhere to, and the private sector will be stimulated and encouraged to actively participate in sector development.

3. When the new organization is in place, rural water supply activities would start with the village (through its water supply committee) making request for water supply to the rural water supply and sanitation unit of the local government. This unit would prepare a priority list of those villages which are ready with their contributions and with an indication of the type of supply required. The list would be forwarded to the state coordinating unit which would prepare an annual state implementation plan, with budgets, resources and technical inputs required. The state unit would package the different activities required for tender and contracting, depending on financing available and other constraints imposed by the various financiers. Local government would prepare itself and the communities for implementation after an implementation schedule has been agreed. After commissioning the water supply, the water supply committee of the community would continue to collect cash contributions for maintenance and call on local area mechanics for assistance for larger repairs. Local government would be called on to arrange a specialized agency to assist for repairs that are

beyond the capacity of local mechanics. Local government would also monitor operation of the supplies by annual visits..

4. The states now wish to appoint a consultant under these terms of reference, to help establish the proposed new process for handling rural water supply. One individual consultant is proposed to assist the two states.

#### Objectives of Consultancy

5. The consultant will provide conceptual, managerial and technical support to the state coordination units (SCU) for the purpose of making the unit professionally strong enough to be able to handle coordination of the development of the state rural water supply and sanitation program. The assistance would also support the state coordination unit in implementation of a small scale project to demonstrate the use of the new approach and consolidate the new organizational methodology.

#### Scope of Work

6. The scope of work would be as follows:

- (i) Assist the SCU in preparation of detailed documentation for all project activities including drafting a state rural water supply and sanitation program document and advice on how to organize the logistics of the implementation of the program including liaison with potential financiers.
- (ii) Join the SCU in meetings with state agencies and assist and advise the SCU in drafting state policies and strategies to be adopted by the state government.
- (iii) Participate in workshops for developing state sector policies and strategies.
- (iv) Assist in defining needs for staffing, office facilities, equipment and transport for the SCU and local government rural water supply and sanitation units.
- (v) Assist the SCUs in preparation of terms of reference for short term consultancy support covering:
  - Drafting a training program at state and local government levels:
    - state and local government decision makers
    - local government unit staff
    - technicians and artisans
    - extension workers
  - Develop/facilitate training materials for use at community level covering:
    - approach to community involvement

- community management of water supply
  - skills training in construction, operation and maintenance
  - health and hygiene education/promotion
  - latrine construction
- 
- Planning limited scale community based rural water supply and sanitation activities.
  - Study for deepening hand dug wells by blasting.
  - Strengthening private sector support, including pump mechanics, well diggers, local spare parts distributors, latrine builders.
  - Planning strategies for rehabilitating defunct rural water supplies.
  - Training assistance for use of PCs for word processing, desk top publishing and program monitoring (database).
- (vi) Advise on links to the federal program, RUSAFIYA project, Training Network Center and other relevant sector activities in the state or in Nigeria.
- (vii) Assist the SCU in preparation and organization of surveys on:
- existing rural water supply facilities
  - habitation patterns
  - use of private dug wells (with the view of assessing potential for upgradability and general suitability of dug wells in the different areas)
- (viii) Assist the SCU in setting up an information management system and for preparation of planning, implementation, operation and maintenance, and monitoring guidelines.
- (ix) Assist the SCU in establishing a publicity system for the promotion of the program and sector approach.
- (x) Assist the SCU in drafting guidelines on standardization of equipment and choice of technology for different types of communities.
- (xi) Provide routine backup of SCU on a quarterly basis for planning, monitoring and general support.

**Qualification of Consultant**

7. The consultant must have a minimum of ten years professional experience of which at least five years is with related projects in developing countries, hold a recognized degree and be fluent in English.

**Project Duration and Consultancy Time Required**

8. The project duration is 3 to 4 years. The consultancy support required will be part time, expected to be about 4 to 6 months the first year, 3 to 4 months the second and third year. The consultant would be expected to visit the project on approximately a quarterly basis.

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTI STATE WATER SUPPLY PROJECT**

**Updating of Water Resources Master Plan**

**Terms of Reference**

**Background and Objectives**

1. The State Water Board has recently prepared a feasibility study for the purpose of identifying a water supply project for World Bank financing. Inherent to this project is a thorough review and updating of two master plan documents prepared some years ago. The first was prepared in 1973 and included Katsina emirate only. The other was completed in 1979, and included all of present Kaduna and Katsina states, except for the area of the earlier study. A number of their recommendations are no longer relevant, as certain developments have proceeded along different lines than originally proposed. This has thus reduced or changed options for further water projects.
2. Since creation of Katsina State in September, 1987, the new government entities have established their own priorities, which further render the earlier documents of reduced usefulness for planning purposes.
3. Within the State, several federal and state agencies are responsible for the development and utilization of water resources for improvement of community health, irrigation, cattle watering, rural development and urban potable water supply. Funding for development of these resources has come from a variety of state, national, bilateral, and multilateral sources. The state has designated the State Water Board as the main agency responsible for supply of potable water to urban areas. It and other federal and state agencies have also constructed open wells and boreholes in rural areas, and fund emergency water supplies in response to drought and other disaster conditions, and rural water supply is likely to be devolved to communities and local government authorities.
4. There are no perennial rivers in the Katsina State and little perennial flow in Kaduna State, but several major dams have been constructed to supply water for irrigation and urban water supply.

**Scope of the Work**

5. The role of the Consultant is primarily to update the information and recommendations of the existing master plan documents and to provide a framework in which water resources can be developed for the next twenty years. Inasmuch as there are always competing demands for limited funding and for limited water resources, it is essential to develop a plan to maximize the benefits to the greatest overall good, while eliminating or minimizing conflicts between the various users. The work will cover the two states of Kaduna and Katsina, but separate reports are required on each state. The consultant should particularly liaise with FMWR and ensure compatibility of his work with the National Water Resources Master Plan.

6. More particularly, the Consultant will carry out the following activities:
- (a) review the existing master plan documents;
  - (b) consolidate all available information on water resources, rural and urban supplies, irrigation, mapping, etc.;
  - (c) update the sources and data base on water resources to the latest information available on:
    - (i) rainfall;
    - (ii) wind;
    - (iii) insolation;
    - (iv) evapotranspiration;
    - (v) long-term climatic changes (desertification);
    - (vi) surface water hydrology;
    - (vii) erosion; and
    - (viii) present utilization of water resources for all purposes.

Data should be collected in a form suitable for inclusion in the national water resources data base which will be developed under the National Environmental Plan.

- (d) inventory all facilities used for exploitation of water resources;
- (e) assess present and future needs for water resources for:
  - (i) irrigation;
  - (ii) rural potable water supply;
  - (iii) urban potable water supply;
  - (iv) cattle and other domestic animals;
  - (v) construction;
  - (vi) reforestation; and
  - (vii) other.
- (f) identify and estimate costs at pre-feasibility level of major works to develop water resources for further urban, rural, irrigation, and other purposes. This particularly includes Turo Dam where a study of its safe yield is needed;
- (g) recommend methodologies to assure adequate collection, storage, processing, and dissemination of water resource data, including computerization of existing and new data, etc.;
- (h) develop use of computers as management tools for human and financial resources, including hardware, software, training, and updating and usage manuals;
- (i) study and recommend alternative methods of evaluating water resource potential, e.g., by river basin, by water balance studies, etc.;
- (j) describe present practices of sanitation and identify additional needs;

- (k) evaluate additional water and funding needed for satisfactory hygiene and sanitation; and
- (l) evaluate institutional requirements:
  - (i) Management Structure;
  - (ii) Board of Directors;
  - (iii) Changes in I.G.A, Districts, Divisions, HQ;
  - (iv) System Dem. nds;
  - (v) Consumer Demands; and
  - (vi) Financial Status re: Subsidies/Revenues.
- (m) evaluate training aspects:
  - (i) assessment of the present and future manpower needs;
  - (ii) assessment of the present manpower complement with respect to their:
    - Education
    - Skills
    - Age
    - Needs.

The Consultancy will be for a period of 12 months.

#### Reporting Requirements

7. The consultant shall prepare monthly progress reports which outline activities in each major element related to the assignment, identify milestones achieved and difficulties encountered, indicate consultant personnel levels over the period, and indicate activities planned for the next period. Each of the personnel of the consultant team will prepare a report related to his area of assignment. These will be submitted to the Consultant Team Leader for compilation and then submitted to the General Manager.

8. On a quarterly basis, the Consultant shall prepare a comprehensive statement of progress which will be submitted to the General Manager. It will provide information on the main activities in which the consultant has been involved during the previous three months, comparing planned and actual accomplishments. A statement of budget position and anticipated cash flow for the remainder of the assignment shall be included. Time inputs of all consultant personnel who worked on the assignment during the period shall be identified and compared to planned and anticipated manpower requirements. Requirements for the next quarter will be forecast. Any manpower, equipment, or other constraints shall be identified and possible solutions proposed.

9. A draft final report will be prepared and submitted at the end of Month 10 for review by the Client. By the end of the following month, the Client will discuss with the Consultant those modifications needed in order to finalize the document.

10. The final report will be submitted by the end of Month 12, taking into consideration the modifications discussed and agreed upon with the Client.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Environmental Sanitation Component

Terms of Reference

Background

1. Environmental sanitation (sullage disposal, drainage, human and solid waste management) in urban areas is fast becoming a major issue of the 1990s, as urban populations continue to grow at high rates and the need for provision of adequate services becomes more pressing. Of the eight project towns and urban areas in Katsina and Kaduna States, Katsina city and Funtua have estimated populations of over 100,000 each and the others have populations in the region of 50,000 (1991). Some of the project towns will be receiving their first distribution system, whilst others will be extending existing ones. In either case there is a need to ensure that the water being brought into the towns does not create an additional environmental burden.
2. Management of sanitation is divided up among several agencies although the limits of responsibility are not clearly defined. The key agencies are the urban planning authorities, the ministries of health, and the LGAs. Several others play limited roles. Both states have environmental sanitation committees or task forces which comprise staff of all the agencies involved with sanitation management. Both States have edicts covering various aspects of environmental sanitation, but there are no clear guidelines on management practices and options.
3. There are two main ways in which sullage (kitchen and bath water) currently is disposed of. Where houses are enclosed in walled compounds, the majority of owners make a hole in one of their walls and drain their sullage out into the adjacent pathway where it eventually finds its way into public drains which are often blocked by garbage, weeds and sediment. Those homes which do not have walled compounds tend to dispose of their sullage on site either by surface spreading or in seepage pits. Off site disposal results in ponded water and muddy pathways that make walking difficult and allow mosquitos to breed. Human waste is disposed of primarily by traditional pit latrines in the poorer neighborhoods, and by septic tanks/vaults with soakaways in others. In addition there are some institutional improved latrines. The conservancy system and the open air are also options which are being phased out. There is no sewerage in any of the project towns although there are a few package sewage treatment plants in Katsina town. Garbage is a problem only in the big towns where limited collection systems have been established. Otherwise it is generally dumped at official or unofficial sites. Environment day, the last Saturday of each month, is usually a good opportunity to clean street drains and to remove garbage piles from the immediate neighborhood. Existing water sources are surface waters, open wells, standpipes and house connections. Surface waters and well water are often polluted and management of standpipe sites is usually inadequate.

### Objective and Design of the Component

4. The primary objective of the environmental sanitation component is to reduce possible adverse environmental effects caused by the water which will be brought into the towns by the project. In order to achieve this: (i) provision will be made for wastewater disposal and management of new water points; (ii) extension agents will be trained to better promote improved environmental sanitation; (iii) planning activities will be carried out to improve existing domestic sanitation management practices including human waste, sullage disposal, stormwater drainage, and solid waste. In doing this, special attention will be paid to increasing the skills of sector staff and local consultants in working on sanitation issues.

5. The water boards will ensure that standpipes sites include appropriate drainage (soakaways or trenches for the wastewater produced at the water point) and that house connections have appropriately dimensioned soakaways or trenches. It is assumed that households which have multiple taps will have adequate wastewater disposal through septic tanks and infiltration trenches. Sound management of standpipes to ensure that the water points are not vandalized and that the surrounds are kept clean can be achieved by several means to be decided upon by the States. Sub-contracting or franchising of the standpipes to private citizens to sell water, or putting in place a workable maintenance and management system which will be the responsibility of the LGA or the water board, are two options.

6. The promotion and hygiene education activities will include providing additional training skills and tools to health inspectors and extension agents so that they can promote the new water supplies and encourage better water use practices and proper disposal of sullage including on-site soakaways and the upkeep of community drains. Sanitation planning will consist of first reviewing existing conditions, institutional arrangements, policy and legislative provisions, technology choice, financing and the willingness of the population to pay for services, social and cultural conditions. Subsequently additional work will result in recommendations on policies, guidelines and actions that can be taken to improve environmental sanitation conditions in the two States.

7. The sanitation planning, promotion and hygiene education activities in the component will be implemented concurrently in both states by a full time, multi-disciplinary team of sector personnel and two long term consultants (engineer and community development expert) based in a lead agency. The team will be supported by an advisory committee comprising sector agencies involved in environmental sanitation management in the State and short term local and international consultants. Subsequent to completion of the activities described in the component, the local teams will be in a position to continue planning activities, assisting other urban areas in the states and coordinating and monitoring implementation of new projects. Detailed terms of reference for each member of the team as well as the consultants will be prepared in an initiating workshop (where additional technical assistance will be provided by the Regional Water and Sanitation Group in Abidjan). Activities common to both states will be supported and coordinated through joint workshops.

8. In order to assist state governments to better manage sanitation services, it will be necessary for them to develop clear guidelines and policies on the responsibilities of the various institutions involved in the sub-sector, as well as on technology choice, financial and legislative issues and on the role of the population. It is important that the guidelines for

management of the sanitation (human solid waste management, sullage disposal, and storm water drainage) services are prepared by state officials who will be responsible for updating them. These terms of reference therefore describe the work to be done and indicate where consultants will be required to assist the states in implementation. A team of state officials from the urban planning agencies, state ministries of health, local government and long term consultants, will be based at the respective urban planning agencies, (KUPDA and KASUPDA) and will be equipped to conduct a study to develop the guidelines.

### Sanitation Management Guidelines

#### Scope of Work

9. The main phases of the work to be conducted in each State which will lead to recommendations to be adopted by Government, are as follows:

- (a) review of existing sanitation conditions in urban and rural areas in the State including levels of service, and coverage;
- (b) detailed analysis (organizational structure, human and financial resources, equipment, roles) of the institutions (public and private including NGOs) involved in providing sanitation services;
- (c) sanitation survey including information on types of excreta and sullage systems used by the population, water supply sources, how much they pay for collection and disposal of solid and human waste and other related services, how such services are organized, preferences and thoughts about existing alternative services, determination of the willingness to pay for improved services. The survey will be based on representative sampling in rural and urban areas in the State and will require preparation of a questionnaire, definition of a sampling procedure, identification and training of enumerators and their supervisors and development of a database to process the results;
- (d) review of actual financing mechanisms for services (loans, subsidies, etc.) and options for cost recovery and review of existing State policies, legislation, edicts, regulations within the context of Federal requirements, and on the basis of actual need within the State;
- (e) review of current technologies used and recommendations on criteria for technology choice for the collection, treatment and disposal of human and solid waste, sullage, and stormwater; and
- (f) recommendations for new policy decisions and guidelines on institutional, financial and technical, aspects reviewed in order to improve management of services to be acted on by State Government.

### Roles of Consultants, Timing, and Reporting

10. It is expected that the study will take six months. Two long term local consultants (part of the project team) will be responsible for coordinating activities between the two states, providing technical assistance to the teams and assisting with report writing. A consultant will be required for 2 months to assist with the sanitation survey and additional input will be required from short term local consultants.

### Sullage Disposal, Drainage and Sanitation Plans

11. The additional standpipes and house connections to be introduced into the urban areas as a result of the project will need to be better managed than the ones currently in place. Furthermore, improved treatment and disposal of the wastewater produced is needed. Solid waste management is an important aspect to consider since poor management often contributes to drainage and wastewater disposal problems. Some information needed for these planning activities, will already exist from the management guidelines study (paras 7-9).

### Scope of the Work

#### Analysis of the Existing Situation

12. A review will be made of actual sanitation services in Katsina city and Funtua. For each town the following will be conducted:

- (a) An overview of existing water supply and sanitation facilities in all areas of the town (domestic, commercial, industrial). Completed, current and planned waste treatment and disposal facilities (and projects) will also be reviewed and assessed. Determination of the current needs for sanitation and the deficiencies in sanitation services throughout the town.
- (b) Determination of the costs of the different levels of sanitation service, who pays for services and what are the current financing mechanisms.
- (c) Review of the status, operation and responsibilities of agencies and organizations involved in the provision of sanitation services in the town including their institutional, human resource, operation and maintenance capabilities and financial situation.
- (d) Review of the current involvement of the private sector NGOs and the population in sanitation services, for example septic tank emptying, construction of on-site excreta disposal and soakaway systems, collection of garbage, cleansing of drains, and an assessment for the capacity of the private sector for participation improving sanitation services.
- (e) Examination of housing types and densities, demographic, socio-economic and industrial growth patterns and population growth projections.

- (f) Review of neighborhood, topographical and drainage maps and aerial photographs of the town and environmental considerations including soil and groundwater conditions.
- (g) Review legal and policy guidelines as well as options for enforcement of regulations.

#### Technology Options

13. A proposal will be made of appropriate technology options for different areas of town based on the criteria for choice developed in the management study and on the willingness of the population to pay for services.

- (a) Identification and proposal of feasible technology options for each area/zone of the town to meet sanitation needs taking into account institutional, financial, human resource, legal, policy and social and cultural considerations and using the criteria developed in the management study.
- (b) Comparison of technological options for collection, treatment and disposal taking into consideration the costs of the different alternatives as well as other relevant factors and propose feasible options for the different areas of the city including assessing of rehabilitation, upgrading and service expansion options.

#### Financing Options

14. Options for financing services in the town will be proposed.

- (a) Review the mechanisms for financing the different services and identify the most suitable cost recovery mechanisms, determine the levels of subsidy required, determine the need for credit to individual homeowners and propose suitable administrative procedures for loans (such as through commercial banks and or revolving funds).

#### Institutional Options

15. The results of the management study will be the basis for institutional recommendations on management of sanitation services in the towns.

- (a) Review the options for institutional support and organization (public, private, the population) for the different technology choices proposed for the town.
- (b) Review the existing human resource capacity and propose solutions for providing adequate human resources for management and implementation of the plan. All training requirements (immediate and future) should also be included.

### Implementation Strategy

16. Preparation of a package of projects and activities (sanitation plan) to be financed by the population, State and Federal Governments with the assistance of external financing as appropriate, including an implementation schedule and investment plan. An on-going planning process will be identified for each service level.

### Sullage Disposal and Drainage

17. The four towns and urban areas which will be receiving new or additional water supplies are Zonkwa, Kwoi, Birnin Gwari, and Ikara. An analysis of the existing sullage disposal and drainage systems will be made and recommendations made on improvements required in the management of the systems. The recommendations will include: the roles to be played by public and private institutions as well as the population being served; description of new or improved systems to be constructed and training requirements for artisans and the population; community organization, promotion and sensitization activities; financing requirements from government, population and external sources.

### Roles of Consultants, Timing and Supervision

18. The planning process in Katsina will take about 12 months, and will begin at the end of the management study. Several consultants will be required to assist the team for periods of up to two months each. There will be three supervision missions. A sanitation plan will be available at the end of the 12 months. In Kaduna, it is expected that the planning process will take about three months and will also begin at the end of the management study. An international consultant (1 month) and local consultants will assist the project team.

FEDERAL REPUBLIC OF NIGERIA  
FIRST MULTISTATE WATER SUPPLY PROJECT  
Implementation Schedule

PROJECT COMPONENT	1992	1993	1994	1995	1996	1997	1998	1999
Katsina town completion of distribu	PPPP	IIIIIIII	IIIIIIII	IIII				
Malumfashi Dam remedial work	PPPP	IIIIIIII	IIIIIIII					
Funtua new system		PPPPPPP	IIIIIIII	IIIIIIII	IIIIIIII	IIII		
Daura expansion	PP	PPPIII	IIIIIIII					
Ikara system completion	PPPP	IIIIIIII	IIIIIIII	IIII				
Kwoi new system	PPPP	PPPIII	IIIIIIII	IIIIIIII	IIII			
Zonkwa new system	PPPP	PPPIII	IIIIIIII	IIIIIIII	IIII			
Rural Water Supply rehabilitation			PPPPPII	IIIIIIII	IIII			
Supply of operational equipment		PPPII	IIIIIIII	IIII				
Metering and leak detection program	PPPP	IIIIIIII	IIIIIIII	IIIIIIII				
Technical assistance								
- improvement of operations	PPPIII	IIIIIIII	IIIIIIII	IIIIIIII	II			
- improvement of accounting etc.	PPPPP	IIIIIIII						
- tariff study	PPPP	IIIIII						
- public relations program		PPPIII	II					
- rural water supply reorganizat	PP	PIIIII	IIIIIIII	IIIIIIII	IIIIII			
- water resources master plan		PPPPP	IIIIIIII					
- sanitation and drainage plan		PPPIII	IIIIIIII					
- design studies			PPPP	IIIIIIII	IIIIIIII			
- training		IIIIIIII	IIIIIIII	IIIIIIII	IIIIIIII	IIIIIIII	IIII	
Project management	IIIIIIII	IIII						
Construction supervision	PPPIII	IIIIIIII	IIIIIIII	IIIIIIII	IIIIIIII	IIIIIIII		

PPPPPP Procurement period  
IIIIII Implementation period

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Project Implementation Program

1. SWBs appoint consultants for completion of engineering design and construction supervision. July 1, 1992
2. SWBs appoint consultants to assist with improving operational efficiency of the Boards under agreed terms of reference (Annex 2.3). July 1, 1992
3. SWBs establish special accounts. July 1, 1992
4. SWBs submit their previous year unaudited accounts May 31, 1992 and annually
5. SWBs submit previous year audit report. June 30, 1992 and annually
6. SWBs review current year compliance with action plan and monitoring indicators (para. 3.08) and propose tariff increases and other measures for following year. Oct. 31, 1992 and annually
7. State Governments act on proposed tariff increases and budgeted counterpart funds for following year. Dec. 31, 1992 and annually
8. SWBs appoint consultants to assist with improving accounting, billing, collection and MIS. Jan. 1, 1993
9. SWBs appoint consultants for tariff study and public standpipe charging policy review. Jan. 1, 1993
10. SWBs commence leakage detection and repair program under NWRP. Jan. 1, 1993
11. SWBs commence comprehensive three year metering program under NWRP. Jan. 1, 1993
12. SWBs appoint public health expert to advise on snail and mosquito control and other health matters. Jan. 1, 1993
13. SWBs appoint consultant to assist with reorganization of rural water supply sector. April 1, 1993
14. SWBs implement programs to improve efficiency of operation in accordance with consultants' recommendations. July 1, 1993
15. SWBs commence implementation of accounting, billing and collection and management information reporting. July 1, 1993

16. **SWBs implement dam inspection and maintenance program.** July 1, 1993
17. **SWBs implement program to improve routine maintenance.** July 1, 1993
18. **SWBs implement improved investment planning procedures.** July 1, 1993
19. **SWBs commence public relations program.** July 1, 1993
20. **SWBs initiate training programs in accordance with NWRP manpower study and recommendations.** July 1, 1993
21. **SWBs appoint consultants to prepare proposals for improved wastewater disposal.** July 1, 1993
22. **SWBs establish unit to monitor environmental impact of dam construction.** July 1, 1993
23. **SWBs effect new tariff policy including billing at public standpipes.** Jan. 1, 1994
24. **SWBs appoint consultants to prepare state-wide water resources master plan.** Jan. 1, 1994
25. **SWBs, State and Federal Governments and Bank participate in mid-term review of project and implement the results thereof.** Nov. 30, 1994
26. **SWBs implement program to recompense downstream farmers for losses due to dam construction.** Jan. 1, 1995

FEDERAL REPUBLIC OF NIGERIA  
MULTI-STATE WATER SUPPLY PROJECT  
KATSINA STATE

Table 1. KATSINA TOWN - COMPLETION OF ONGOING PROJECT  
Detailed Cost Table

	Totals Including Contingencies US\$					
	1992	1993	1994	1995	1996-99	Total
<b>I. INVESTMENT COSTS</b>						
A. CONSTRUCT. SPILLWAY GATES	0.0	34.5	48.1	37.5	0.0	120.1
B. TRANSMISSION MAIN, 15.3KM						
PIPE SUPPLY	0.0	991.4	1035.0	0.0	0.0	2026.4
CONSTRUCTION	0.0	0.0	874.7	910.6	0.0	1785.3
Sub-Total	0.0	991.4	1909.6	910.6	0.0	3811.6
C. PUMPING STATIONS						
BUILDINGS	0.0	98.8	103.3	0.0	0.0	202.1
MECH & ELECT EQUIPMENT	0.0	0.0	592.4	616.7	0.0	1209.0
Sub-Total	0.0	98.8	695.6	616.7	0.0	1411.1
D. ELEVATED STORAGE	0.0	287.1	399.5	312.0	0.0	998.5
E. DISTR. SYSTEM PIPE SUPPLY						
27.6KM OF 250MM DIA	0.0	950.5	992.6	0.0	0.0	1943.1
17.3KM OF 200 MM DIA	0.0	461.4	481.8	0.0	0.0	943.3
9.2KM OF 150MM DIA	0.0	187.4	195.7	0.0	0.0	383.1
10.6KM OF 100MM DIA	0.0	162.3	169.4	0.0	0.0	331.7
Sub-Total	0.0	1761.7	1839.5	0.0	0.0	3601.2
F. INSTALL. 64.7 KM PIPELINE	0.0	0.0	1428.0	1486.6	0.0	2914.6
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>3173.4</b>	<b>6320.3</b>	<b>3363.4</b>	<b>0.0</b>	<b>12857.1</b>
<b>Total</b>	<b>0.0</b>	<b>3173.4</b>	<b>6320.3</b>	<b>3363.4</b>	<b>0.0</b>	<b>12857.1</b>

Table 2. FUNTUA - NEW PROJECT  
Detailed Cost Table

	Totals Including Contingencies US\$							
	1992	1993	1994	1995	1996	1997	1998-99	Total
<b>I. INVESTMENT COSTS</b>								
A. DAM AND INTAKE	0.0	0.0	2632.9	2741.0	1426.4	0.0	0.0	6800.3
B. TREATMENT PLANT -20ML/d								
BUILDING AND CIVIL WORKS	0.0	0.0	1244.9	2592.3	1348.8	0.0	0.0	5186.0
MECH & ELECT WORKS	0.0	0.0	0.0	1276.5	2657.4	1382.9	0.0	5316.7
Sub-Total	0.0	0.0	1244.9	3868.7	4006.2	1382.9	0.0	10502.7
C. PUMPING STATIONS								
CIVIL WORKS	0.0	0.0	69.3	144.2	75.1	0.0	0.0	288.6
MECH & ELECT WORKS	0.0	0.0	0.0	574.4	1195.8	622.3	0.0	2392.5
Sub-Total	0.0	0.0	69.3	718.6	1270.9	622.3	0.0	2681.2
D. TRANSMISSION PIPELINE								
PIPES AND FITTINGS	0.0	0.0	2665.6	2775.0	0.0	0.0	0.0	5440.6
PIPELINE INSTALLATION	0.0	0.0	0.0	2498.0	2599.5	0.0	0.0	5097.5
Sub-Total	0.0	0.0	2665.6	5272.9	2599.5	0.0	0.0	10538.0
E. DISTRIBUTION SYSTEM								
PIPE SUPPLY	0.0	0.0	924.7	962.7	0.0	0.0	0.0	1887.4
PIPE INSTALLATION	0.0	0.0	0.0	486.1	1011.7	526.3	0.0	2024.1
RESERVOIR	0.0	0.0	0.0	959.1	998.2	519.2	0.0	2476.5
Sub-Total	0.0	0.0	924.7	2407.9	2009.9	1045.5	0.0	6388.0
F. LAND PURCHASE	838.7	0.0	0.0	0.0	0.0	0.0	0.0	838.7
<b>Total INVESTMENT COSTS</b>	<b>838.7</b>	<b>0.0</b>	<b>7537.4</b>	<b>15009.2</b>	<b>11312.9</b>	<b>3050.7</b>	<b>0.0</b>	<b>37748.9</b>
<b>Total</b>	<b>838.7</b>	<b>0.0</b>	<b>7537.4</b>	<b>15009.2</b>	<b>11312.9</b>	<b>3050.7</b>	<b>0.0</b>	<b>37748.9</b>

- Values scaled by 1000.0 4/17/1992 9:00

FEDERAL REPUBLIC OF NIGERIA  
MULTI-STATE WATER SUPPLY PROJECT  
KATSINA STATE  
Table 3. MALUMFASHI  
Detailed Cost Table

Totals Including Contingencies						
US\$						
	1992	1993	1994	1995	1996-99	Total
<b>I. INVESTMENT COSTS</b>						
<b>A. DAM REHABILITATION</b>						
DAM REPAIRS	0.0	1725.9	1803.5	913.4	0.0	4442.8
DAM INTAKE	0.0	46.6	48.7	50.7	0.0	145.9
Sub-Total	0.0	1772.5	1852.2	964.1	0.0	4588.8
<b>Total INVESTMENT COSTS</b>	0.0	1772.5	1852.2	964.1	0.0	4588.8
<b>Total</b>	0.0	1772.5	1852.2	964.1	0.0	4588.8

Table 4. DAURA - SYSTEM EXPANSION  
Detailed Cost Table

Totals Including Contingencies							
US\$							
	1992	1993	1994	1995	1996	1997-99	Total
<b>I. INVESTMENT COSTS</b>							
<b>A. BOREFIELD</b>							
B. STORES & WORKSHOPS	0.0	49.9	69.5	54.3	0.0	0.0	173.7
C. SYSTEM STORAGE	0.0	0.0	0.0	25.3	26.4	0.0	51.7
<b>D. DISTRIBUTION SYSTEM</b>							
PIPE SUPPLY	0.0	0.0	162.1	168.7	0.0	0.0	330.8
INSTALLATION	0.0	0.0	0.0	170.5	177.4	0.0	347.9
Sub-Total	0.0	0.0	162.1	339.2	177.4	0.0	678.7
<b>Total INVESTMENT COSTS</b>	0.0	49.9	279.3	468.5	203.8	0.0	1001.6
<b>Total</b>	0.0	49.9	279.3	468.5	203.8	0.0	1001.6

Table 5. RURAL WATER SUPPLY REHABILITATION  
Detailed Cost Table

Totals Including Contingencies						
US\$						
	92-93	1994	1995	1996	97-99	Total
<b>I. INVESTMENT COSTS</b>						
<b>A. BOREHOLE REHABILITATION</b>						
B. HANDPUMP REPLACEMENT	0.0	115.3	149.6	125.0	0.0	389.9
C. MAINTENANCE EQUIPMENT	0.0	50.5	70.1	54.7	0.0	175.2
D. SPARE PARTS	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	0.0	165.8	219.6	179.7	0.0	565.0
<b>Total</b>	0.0	165.8	219.6	179.7	0.0	565.0

- Values scaled by 1000.0 4/

FEDERAL REPUBLIC OF NIGERIA  
MULTI-STATE WATER SUPPLY PROJECT  
KATSINA STATE  
Table 6. INSTITUTIONAL STRENGTHENING  
Detailed Cost Table

Totals Including Contingencies								
US\$								
	1992	1993	1994	1995	1996	1997	1998-99	Total
<b>I. INVESTMENT COSTS</b>								
A. IMP. BILLING & COLLECTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B. COMPUTERIZATION & MIS	0.0	39.0	54.3	42.4	0.0	0.0	0.0	135.7
C. TARIFF STUDY	0.0	0.0	0.0	0.0	67.3	70.0	0.0	137.3
<b>D. OPERATIONAL EFFICIENCY</b>								
TECHNICAL IMPROVEMENTS	0.0	0.0	274.0	285.3	296.9	103.0	0.0	959.1
DAM MAINT. & INSPECTION	0.0	0.0	0.0	31.7	33.0	0.0	0.0	64.7
LIBRARY DEVELOPMENT	0.0	0.0	50.7	0.0	0.0	0.0	0.0	50.7
LABORATORY DEVELOPMENT	0.0	0.0	180.9	0.0	0.0	0.0	0.0	180.9
PUBLIC RELATIONS PROGRAM	0.0	0.0	30.4	31.7	0.0	0.0	0.0	62.1
Sub-Total	0.0	0.0	536.1	348.6	329.9	103.0	0.0	1317.5
E. RURAL WATER SUPPLY	0.0	30.0	31.3	16.3	0.0	0.0	0.0	77.6
F. UPDATE WTR RES.MSTR PLAN	0.0	0.0	0.0	126.8	132.0	0.0	0.0	258.9
G. PREPARATION NEW PROJECT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H. SANITATION/DRAIN STRATEGY	0.0	0.0	0.0	116.1	120.8	0.0	0.0	237.0
I. TRAINING	0.0	24.9	26.1	27.1	28.2	29.4	0.0	135.8
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>93.9</b>	<b>647.7</b>	<b>677.4</b>	<b>678.3</b>	<b>202.4</b>	<b>0.0</b>	<b>2299.7</b>
<b>Total</b>	<b>0.0</b>	<b>93.9</b>	<b>647.7</b>	<b>677.4</b>	<b>678.3</b>	<b>202.4</b>	<b>0.0</b>	<b>2299.7</b>

Table 7. PROJECT ADMINISTRATION  
Detailed Cost Table

Totals Including Contingencies									
US\$									
	1992	1993	1994	1995	1996	1997	1998	1999	Total
<b>I. INVESTMENT COSTS</b>									
A. PROJECT MANAGEMENT	82.8	171.4	179.3	93.3	97.0	100.9	104.9	109.3	939.1
B. CONSTRUCTION SUPERVISION	0.0	523.9	547.3	569.8	593.0	617.0	641.9	486.1	3978.9
<b>Total INVESTMENT COSTS</b>	<b>82.8</b>	<b>695.4</b>	<b>726.6</b>	<b>663.0</b>	<b>690.0</b>	<b>717.9</b>	<b>746.8</b>	<b>595.4</b>	<b>4917.9</b>
<b>Total</b>	<b>82.8</b>	<b>695.4</b>	<b>726.6</b>	<b>663.0</b>	<b>690.0</b>	<b>717.9</b>	<b>746.8</b>	<b>595.4</b>	<b>4917.9</b>

Table 8. OPERATIONAL EQUIPMENT  
Detailed Cost Table

Totals Including Contingencies								
US\$								
	1992	1993	1994	1995	1996	1997	1998-99	Total
<b>I. INVESTMENT COSTS</b>								
A. TOOLS & EQUIPMENT	0.0	629.3	656.8	113.9	118.6	123.4	0.0	1642.0
B. WORKSHOP AND TOOLS	0.0	0.0	84.4	87.8	122.0	0.0	0.0	294.2
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>629.3</b>	<b>741.2</b>	<b>201.8</b>	<b>240.5</b>	<b>123.4</b>	<b>0.0</b>	<b>1936.2</b>
<b>Total</b>	<b>0.0</b>	<b>629.3</b>	<b>741.2</b>	<b>201.8</b>	<b>240.5</b>	<b>123.4</b>	<b>0.0</b>	<b>1936.2</b>

- Values scaled by 1000.0 4/17/1992 9:00

FEDERAL REPUBLIC OF NIGERIA  
MULTI-STATE WATER SUPPLY PROJECT  
KADUNA STATE  
Table 1. ZONKWA  
Detailed Cost Table

Totals Including Contingencies US\$							
	1992	1993	1994	1995	1996	1997-99	Tot
<b>I. INVESTMENT COSTS</b>							
A. DAM AND INTAKE	0.0	3005.0	4185.7	3268.2	0.0	0.0	10459
B. PUMPING STATIONS							
CIVIL WORKS	0.0	0.0	142.7	297.2	154.6	0.0	594
MECHANICAL & ELECT WORKS	0.0	0.0	0.0	254.7	265.1	0.0	519
Sub-Total	0.0	0.0	142.7	551.9	419.7	0.0	1114
C. WATER TREATMENT PLANT							
BUILDING & CIVIL WORKS	0.0	0.0	270.6	563.6	293.2	0.0	1127
MECHANICAL & ELECT WORKS	0.0	0.0	0.0	733.4	763.3	0.0	1496
Sub-Total	0.0	0.0	270.6	1297.0	1056.5	0.0	2624
D. TRANSMISSION PIPELINE							
PIPES & FITTINGS	0.0	0.0	245.9	255.9	0.0	0.0	501
PIPELINE INSTALLATION	0.0	0.0	0.0	209.6	218.1	0.0	427
Sub-Total	0.0	0.0	245.9	465.6	218.1	0.0	929
E. DISTRIBUTION SYSTEM							
PIPE SUPPLY	0.0	0.0	876.0	912.0	0.0	0.0	1788
PIPE INSTALLATION	0.0	0.0	0.0	747.1	777.5	0.0	1524
RESERVOIR	0.0	0.0	0.0	876.1	911.7	0.0	1787
Sub-Total	0.0	0.0	876.0	2535.2	1689.3	0.0	5100
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>3005.0</b>	<b>5720.9</b>	<b>8117.8</b>	<b>3383.6</b>	<b>0.0</b>	<b>20227</b>
<b>Total</b>	<b>0.0</b>	<b>3005.0</b>	<b>5720.9</b>	<b>8117.8</b>	<b>3383.6</b>	<b>0.0</b>	<b>20227</b>

Table 2. KWOI  
Detailed Cost Table

Totals Including Contingencies US\$							
	1992	1993	1994	1995	1996	1997-99	Total
<b>I. INVESTMENT COSTS</b>							
A. DAM AND INTAKE	0.0	1346.2	1875.3	1464.2	0.0	0.0	4685.7
B. PUMPING STATION							
CIVIL WORKS	0.0	0.0	81.2	169.1	88.0	0.0	338.3
MECHANICAL & ELECT WORKS	0.0	0.0	0.0	694.5	722.8	0.0	1417.2
Sub-Total	0.0	0.0	81.2	863.6	810.7	0.0	1755.5
C. TRANSMISSION PIPELINE							
PIPES & FITTINGS	0.0	0.0	380.3	395.9	0.0	0.0	776.3
PIPELINE INSTALLATION	0.0	0.0	0.0	323.3	336.4	0.0	659.7
Sub-Total	0.0	0.0	380.3	719.2	336.4	0.0	1436.0
D. WATER TREATMENT PLANT							
BUILDING & CIVIL WORKS	0.0	0.0	623.9	1299.0	676.0	0.0	2598.8
MECHANICAL & ELECT WORKS	0.0	0.0	0.0	896.3	932.9	0.0	1829.2
PIPES & FITTINGS	0.0	0.0	333.5	347.2	0.0	0.0	680.7
PIPELINE INSTALLATION	0.0	0.0	0.0	284.6	296.2	0.0	580.8
Sub-Total	0.0	0.0	957.4	2827.1	1905.1	0.0	5689.6
E. DISTRIBUTION SYSTEM							
PIPE SUPPLY	0.0	0.0	1475.7	1536.3	0.0	0.0	3012.0
PIPE INSTALLATION	0.0	0.0	0.0	1258.4	1309.6	0.0	2568.1
RESERVOIR	0.0	0.0	0.0	1154.8	1201.8	0.0	2356.7
Sub-Total	0.0	0.0	1475.7	3949.5	2511.5	0.0	7936.7
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>1346.2</b>	<b>4770.0</b>	<b>9823.6</b>	<b>5563.7</b>	<b>0.0</b>	<b>21503.5</b>
<b>Total</b>	<b>0.0</b>	<b>1346.2</b>	<b>4770.0</b>	<b>9823.6</b>	<b>5563.7</b>	<b>0.0</b>	<b>21503.5</b>

Values scaled by 1000.0 4/17/1992 8:06

FEDERAL REPUBLIC OF NIGERIA  
MULTI-STATE WATER SUPPLY PROJECT  
KADUNA STATE  
Table 3. IKARA - NEW PROJECT  
Detailed Cost Table

	Totals Including Contingencies					Total
	US\$					
	1992	1993	1994	1995	1996-99	
<b>I. INVESTMENT COSTS</b>						
A. DAM AND INTAKE	0.0	252.8	264.1	0.0	0.0	516.9
B. WATER TREATMENT PLANT						
BLDG AND CIVIL WORK	0.0	165.9	0.0	0.0	0.0	165.9
MECH & ELECT WORKS	0.0	3217.3	0.0	0.0	0.0	3217.3
Sub-Total	0.0	3383.2	0.0	0.0	0.0	3383.2
C. TRANSMISSION PIPELINE						
PIPES & FITTINGS	0.0	385.2	402.1	0.0	0.0	787.4
PIPE INSTALLATION	0.0	0.0	333.3	347.0	0.0	680.3
Sub-Total	0.0	385.2	735.4	347.0	0.0	1467.6
D. DISTRIBUTION SYSTEM						
PIPE SUPPLY	0.0	538.0	561.7	0.0	0.0	1099.7
PIPE INSTALLATION	0.0	0.0	466.6	485.7	0.0	952.3
RESERVOIR	0.0	859.9	898.3	0.0	0.0	1758.3
Sub-Total	0.0	1398.0	1926.5	485.7	0.0	3810.2
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>5419.2</b>	<b>2926.0</b>	<b>832.7</b>	<b>0.0</b>	<b>9177.9</b>
<b>Total</b>	<b>0.0</b>	<b>5419.2</b>	<b>2926.0</b>	<b>832.7</b>	<b>0.0</b>	<b>9177.9</b>

Table 4. RURAL WATER SUPPLY REHABILITATION  
Detailed Cost Table

	Totals Including Contingencies					Total
	US\$					
	92-93	1994	1995	1996	97-99	
<b>I. INVESTMENT COSTS</b>						
A. BOREHOLE REHABILITATION	0.0	75.8	105.3	77.9	0.0	258.9
B. HANDPUMP REPLACEMENT	0.0	45.5	63.1	49.3	0.0	157.9
C. SPARE PARTS	0.0	101.1	105.2	0.0	0.0	206.3
D. MAINTENANCE EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>222.4</b>	<b>273.6</b>	<b>127.2</b>	<b>0.0</b>	<b>623.1</b>
<b>Total</b>	<b>0.0</b>	<b>222.4</b>	<b>273.6</b>	<b>127.2</b>	<b>0.0</b>	<b>623.1</b>

- Values scaled by 1000.0 4/17/1992 8:06

FEDERAL REPUBLIC OF NIGERIA  
MULTI-STATE WATER SUPPLY PROJECT  
KADUNA STATE  
Table 5. INSTITUTIONAL STRENGTHENING  
Detailed Cost Table

	Totals Including Contingencies							Total
	US\$							
	1992	1993	1994	1995	1996	1997	1998-99	
<b>I. INVESTMENT COSTS</b>								
A. IMP. BILLING & COLLECTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B. COMPUTERIZATION & MIS	0.0	39.0	54.3	42.4	0.0	0.0	0.0	135.7
C. TARIFF STUDY	0.0	0.0	0.0	0.0	67.3	70.0	0.0	137.3
D. OPERATIONAL EFFICIENCY								
TECHNICAL IMPROVEMENTS	0.0	0.0	274.0	285.3	296.9	103.0	0.0	959.1
DAM MAINT. & INSPECTION	0.0	0.0	0.0	31.7	33.0	0.0	0.0	64.7
LIBRARY DEVELOPMENT	0.0	0.0	50.7	0.0	0.0	0.0	0.0	50.7
LABORATORY DEVELOPMENT	0.0	0.0	180.9	0.0	0.0	0.0	0.0	180.9
PUBLIC RELATIONS PROGRAM	0.0	0.0	30.4	31.7	0.0	0.0	0.0	62.1
Sub-Total	0.0	0.0	536.1	348.6	329.9	103.0	0.0	1317.5
E. RURAL WATER SUPPLY	0.0	30.0	31.3	16.3	0.0	0.0	0.0	77.6
F. UPDATE WTR RES.MSTR PLAN	0.0	0.0	0.0	126.8	132.0	0.0	0.0	258.9
G. PREPARATION NEW PROJECT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H. SANITATION/DRAIN STRATEGY	0.0	0.0	0.0	82.9	86.3	0.0	0.0	169.2
I. TRAINING	0.0	24.9	26.1	27.1	28.2	29.4	0.0	135.8
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>93.9</b>	<b>647.7</b>	<b>644.2</b>	<b>643.7</b>	<b>202.4</b>	<b>0.0</b>	<b>2231.9</b>
<b>Total</b>	<b>0.0</b>	<b>93.9</b>	<b>647.7</b>	<b>644.2</b>	<b>643.7</b>	<b>202.4</b>	<b>0.0</b>	<b>2231.9</b>

Table 6. PROJECT ADMINISTRATION  
Detailed Cost Table

	Totals Including Contingencies							Total	
	US\$								
	1992	1993	1994	1995	1996	1997	1998	1999	
<b>I. INVESTMENT COSTS</b>									
A. PROJECT MANAGEMENT	35.7	166.0	173.7	40.2	41.8	43.5	45.2	47.1	593.1
B. CONSTRUCTION SUPERVISION	0.0	535.1	559.2	582.1	605.8	630.2	655.5	447.3	4015.1
<b>Total INVESTMENT COSTS</b>	<b>35.7</b>	<b>701.1</b>	<b>732.8</b>	<b>622.3</b>	<b>647.6</b>	<b>673.7</b>	<b>700.7</b>	<b>494.3</b>	<b>4608.2</b>
<b>Total</b>	<b>35.7</b>	<b>701.1</b>	<b>732.8</b>	<b>622.3</b>	<b>647.6</b>	<b>673.7</b>	<b>700.7</b>	<b>494.3</b>	<b>4608.2</b>

Table 7. OPERATIONAL EQUIPMENT  
Detailed Cost Table

	Totals Including Contingencies				Total
	US\$				
	1992	1993	1994	1995-99	
<b>I. INVESTMENT COSTS</b>					
A. TOOLS & EQUIPMENT	0.0	892.4	931.4	0.0	1823.8
<b>Total INVESTMENT COSTS</b>	<b>0.0</b>	<b>892.4</b>	<b>931.4</b>	<b>0.0</b>	<b>1823.8</b>
<b>Total</b>	<b>0.0</b>	<b>892.4</b>	<b>931.4</b>	<b>0.0</b>	<b>1823.8</b>

- Values scaled by 1000.0 4/17/1992 8:07

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Summary of Major Procurement Packages

	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>No. of Packages</u>	<u>Procurement Method</u>
	-----US\$1,000-----				
<b>Katsina State Water Board</b>					
Maintenance tools/equipment	332.8	1778.2	2111.0	multiple	ICB, LCB & shopping
Completion of Katsina system	2612.3	10297.5	12909.8	1	ICB
Funtua dam	1922.1	5580.5	7502.6	1	"
Funtua water treatment/pumping	2562.8	11062.2	13625.0	1	"
Funtua storage and distribution	4144.1	12582.3	16726.4	1	"
Malumfashi dam rehabilitation	1197.5	3401.1	4598.6	1	"
Borefield construction	25.8	146.5	172.3	1	"
New Daura system	149.3	538.6	687.9	1	"
Rural water supply	74.5	423.6	498.1	several	LCB
Consultancies	294.7	1821.9	2116.6	multiple	Cons. guidelines
Construction supervision	1173.3	3729.1	4902.4	1	" "
Training	31.6	89.6	121.2	-	-
<b>TOTAL</b>	<b><u>14520.8</u></b>	<b><u>51451.1</u></b>	<b><u>65971.9</u></b>		
<b>Kaduna State Water Board</b>					
Maintenance tools/equipment	215.8	1630.0	1845.8	multiple	ICB, LCB & shopping
Zonkwa dam	2317.2	8116.9	10434.1	1	ICB
Zonkwa supply system	2064.8	7768.6	9833.4	1	"
Kwoi system complete	4500.2	17004.3	21504.5	1	"
Ikara treatment plant	656.2	3359.1	4015.3	1	"
Ikara supply system	1141.9	4066.1	5208.0	1	ICB
Rural water supply	138.7	485.8	624.5	several	LCB
Consultancies	271.0	1794.0	2065.0	multiple	Cons. guidelines
Construction supervision	1371.2	3168.9	4540.1	1	" "
Training	31.7	89.7	121.4	-	-
<b>TOTAL</b>	<b><u>12708.7</u></b>	<b><u>47483.4</u></b>	<b><u>60192.1</u></b>		
<b>FMWR</b>					
Project preparation	0.0	2000.0	2000.0	several	Cons. Guidelines

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**

**Summary of Consultant Requirements**

<u>Description</u>	<u>Timing</u>	<u>Estimated Man-months</u>	<u>Firm/Individual</u>
<b><u>KATSINA</u></b>			
1. Improve efficiency of operation	1992-1995	65	Firm
2. Project management and construction supervision	1992-1997	1010	Firm
3. Water resources master plan	1994	17	Firm
<b><u>KADUNA</u></b>			
1. Improve efficiency of operation	1992-1995	65	Firm
2. Project management and construction supervision	1992-1997	990	Firm
3. Water resources master plan	1994	17	Firm
<b><u>TWO STATES JOINTLY</u></b>			
1. Improvement of accounting, billing and MIS procedures including computerization	1993	12	Firm
2. Tariff study	1993	18	Firm
3. Public relations and hygiene education	1993-1994	6	Individual
4. Rural water supply reorganization	1993-1996	12	Individual
5. Sanitation strategy and drainage plans	1993-1994	35	Firm & Individual
<b><u>FMWR</u></b>			
1. Project Preparation	1993-4	140	Firm

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Disbursement Schedule  
(US\$ million)

<u>IDA Fiscal Year and Quarter</u>	<u>Quarterly Disbursement</u>	<u>Cumulative Disbursement</u>	<u>Percent of Total Loan</u>	<u>Standard Profile Africa Water Sector</u>
<u>FY 1993</u>				
First Quarter	-	-	0	0
Second Quarter	3.2 <sup>1/</sup>	3.2	3.2	-
Third Quarter	0.9	4.1	4.0	3
Fourth Quarter	1.3	5.4	5.3	-
<u>FY 1994</u>				
First Quarter	2.1	7.5	7.4	6
Second Quarter	2.5	10.0	9.9	-
Third Quarter	2.8	12.8	12.7	14
Fourth Quarter	2.9	15.7	15.5	-
<u>FY 1995</u>				
First Quarter	5.1	20.8	20.6	22
Second Quarter	6.1	26.9	26.6	-
Third Quarter	6.2	33.1	32.8	34
Fourth Quarter	6.3	39.4	39.0	-
<u>FY 1996</u>				
First Quarter	7.1	46.5	46.0	46
Second Quarter	7.6	54.1	53.6	-
Third Quarter	7.5	61.6	61.0	58
Fourth Quarter	7.5	69.1	68.4	-
<u>FY 1997</u>				
First Quarter	5.6	74.7	74.0	70
Second Quarter	4.7	79.4	78.6	-
Third Quarter	4.7	84.1	83.3	78
Fourth Quarter	4.7	88.8	87.9	-
<u>FY 1998</u>				
First Quarter	2.7	91.5	90.5	86
Second Quarter	1.7	93.2	92.3	-
Third Quarter	1.7	94.9	94.0	94
Fourth Quarter	1.7	96.6	95.6	-
<u>FY 1999</u>				
First Quarter	1.5	98.1	97.1	98
Second Quarter	1.1	99.2	98.2	-
Third Quarter	0.7	99.9	98.9	100
Fourth Quarter	0.7	100.6	99.6	-
<u>FY 2000</u>				
First Quarter	0.4	101.0	100.0	-

<sup>1/</sup> Initial deposit of US\$3.2 million to special accounts.

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**  
**Supervision Plan**

The IDA input into the table below is in addition to regular needs for the review of progress reports, procurement actions, correspondence, etc., estimated to require 12 staff weeks per year for the first three project years, and 8 per year thereafter. In addition each water board would submit quarterly progress reports.

<u>Approximate dates of input (mo/yr)</u>	<u>Activity</u>	<u>Expected Skill Requirements</u>	<u>Staff Weeks</u>
7/92	Supervision Mission (Project Launch)	Engineer, Financial/ Institutional Specialist, Analyst, Procurement, Disbursements, Rural Water Supply.	10
11/92	Supervision Mission SWB performance review	Engineer, Financial/ Institutional Specialist, Analyst.	6
2/93	Supervision Mission with special emphasis on technical assistance and efficiency improvement.	Engineer, Financial/ Institutional Specialist, Analyst, Sanitation, Training.	8
7/93	Supervision Mission	Engineer, Financial/ Institutional Specialist, Analyst, Procurement, Rural Water Supply, Disbursements, Environment.	12
11/93	Supervision Mission with special emphasis on implementing results of technical assistance studies. SWB performance review	Engineer, Financial/ Institutional Specialist, Analyst, Rural Water Supply, Sanitation, Training.	10
2/94	Supervision Mission	Engineer, Financial/ Institutional Specialist, Analyst.	7
7/94	Supervision Mission	Engineer, Financial/ Institutional Specialist, Analyst Environment.	7 8

11/94	Supervision Mission and mid term review SWB performance review	Engineer, Financial/ Institutional Specialist, Analyst.	9
3/95 to 98	Supervision Missions	Engineer, Financial/ Institutional Specialist.	5
11/95 to 98	Supervision Mission SWB performance review	Engineer, Financial/ Institutional Specialist, Analyst	7
3/99	Supervision and PCR preparation	Engineer, Financial/ Institutional Specialist, Analyst.	8

FEDERAL REPUBLIC OF NIGERIA  
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FIRST MULTISTATE WATER SUPPLY PROJECT  
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Summary of State Government Receipts & Expenditures  
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(Naira Millions)

	KATSINA		KADUNA	
	ACTUAL 1990	BUDGET 1991	ACTUAL 1990	BUDGET 1991
Statutory Revenue From Federation Account	646.7	763.0	386.7	756.6
Internal Revenue	61.8	82.8	154.4	300.0
Capital Receipts	56.5	253.4	277.1	453.0
<b>Total Receipts</b>	<b>765.0</b>	<b>1099.2</b>	<b>818.2</b>	<b>1509.6</b>
Current Expenditures	334.1	564.1	420.4	709.8
Capital Expenditures	418.0	535.1	395.0	799.8
<b>Total Expenditures</b>	<b>752.1</b>	<b>1099.2</b>	<b>815.4</b>	<b>1509.6</b>
State Water Board (SWB) Financing	27.9	41.6	120.7	118.4
% SWB Financing of Total Receipts	3.6	3.8	14.8	7.8

FEDERAL REPUBLIC OF NIGERIA  
-----  
FIRST MULTISTATE WATER SUPPLY PROJECT  
-----  
Katsina State Subvention to SWB  
-----  
(Naira 000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Counterpart Financing	24,760	71,251	76,578	77,357	72,505	67,000	35,500	0	0
Recurrent Subvention	16,819	19,261	14,097	(2,901)	(27,994)	(65,675)	(100,134)	(140,697)	(170,732)
Debt Service	0	1,818	12,392	35,259	64,030	91,179	161,161	220,688	224,656
<b>Total SWB Subvention</b>	<b>41,579</b>	<b>92,330</b>	<b>103,067</b>	<b>109,715</b>	<b>108,541</b>	<b>92,504</b>	<b>96,527</b>	<b>79,991</b>	<b>53,924</b>
Estimated State Receipts	1,099,219	1,264,102	1,390,512	1,529,563	1,682,520	1,850,772	2,035,849	2,239,434	2,463,377
% Subvention to Receipts	3.8%	7.3%	7.4%	7.2%	6.5%	5.0%	4.7%	3.6%	2.2%

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Total SWB subvention includes effect of recent Naira devaluation, while the effect on estimated receipts has not been determined. Estimated state receipts are thus very conservatively stated.

FEDERAL REPUBLIC OF NIGERIA  
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FIRST MULTISTATE WATER SUPPLY PROJECT  
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Kaduna State Subvention to SWB  
-----  
(Naira 000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Counterpart Financing	6,686	58,825	61,489	61,879	59,453	56,700	57,800	0	0
Recurrent Subvention	16,748	4,434	(34,052)	(75,270)	(134,372)	(197,371)	(251,388)	(318,905)	(352,147)
Rural Water Supply Subvention	1,937	2,441	2,947	0	0	0	0	0	0
Debt Service	93,954	134,876	193,790	213,749	240,538	263,960	326,086	379,820	381,831
<b>Total SWB Subvention</b>	<b>119,325</b>	<b>200,576</b>	<b>224,174</b>	<b>200,358</b>	<b>165,619</b>	<b>123,289</b>	<b>112,498</b>	<b>60,915</b>	<b>29,684</b>
Estimated State Receipts	1,509,525	1,781,201	2,188,459	2,972,972	3,417,127	3,758,840	4,134,724	4,548,196	5,003,016
% Subvention to Receipts	7.9%	11.3%	10.2%	6.7%	4.8%	3.3%	2.7%	1.3%	0.6%

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Total SWB subvention includes effect of recent Naira devaluation, while the effect on estimated receipts has not been determined. Estimated state receipts are thus very conservatively stated.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Assumptions Used in Financial Analysis

Katsina State Water Board

1. Volume of water sold has been derived from engineering projections.
2. Unaccounted-for-water declines from 44% in 1991; 42% in 1992; 38% in 1993; 34% in 1994; 30% in 1995; 27% in 1996; 25% in 1997; and 24% onward.
3. Bad debt allowance is assumed to be 16% in 1991 and 1992; 14% in 1993; 12% in 1994; and 10% onward.
4. Connection fees and other revenues have been estimated as the ratio of 1991 connection fees and other revenues to 1991 water sales times water sales for each year.
5. Salaries and wages grow at the rate of inflation.
6. The cost of chemicals and power increases in proportion with the change in volume of water produced plus inflation.
7. Maintenance and materials grow in line with inflation plus 5%.
8. Administrative expenses grow with inflation.
9. Depreciation has been calculated on a straight line basis at the rate of 3.3% annually.
10. Interest expense is calculated at 15% per annum on the project loan.
11. Rural water supply expenses grow with inflation plus 5% until such time as the rural operations are spun-off from the SWAs.
12. Debt service principal equals principal payment on IDA credit of US\$49.2 million to KTSWB payable in Naira over 19 years, starting in 1998 at 15% interest (para. 11 above)
13. Investment program includes all SWAs' investment including project, NWRP and other investments.

Kaduna State Water Board

1. **Similar assumptions apply to Katsina State Water Board and Kaduna State Water Board. The exceptions are listed below.**
2. **Bad debt allowance has been calculated as follows: 22% in 1991; 16% in 1992; 14% in 1993; 12% in 1994; and 10% in 1995 onward.**
3. **Interest includes interest expense on a previous IBRD loan plus 15% interest on the project loan.**
4. **Debt service principal includes principal payments on a previous IBRD loan that matures in 1999 and an IDA credit of US\$45.1 million to KDSWB payable in Naira over 19 years, starting in 1998 at 15% interest.**

FEDERAL REPUBLIC OF NIGERIA  
-----  
FIRST MULTISTATE WATER SUPPLY PROJECT  
-----  
Katsina State Water Board  
-----  
Income and Cash Flow Statements  
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	-----ACTUAL-----		BUDGET 1991	-----PROJECTED-----							
	1989	1990		1992	1993	1994	1995	1996	1997	1998	1999
----- (NAIRAS 000) -----											
INFLATION RATE AVG LOCAL				20.0%	15.0%	12.5%	10.0%	10.0%	10.0%	10.0%	10.0%
AVG. WATER TARIFF/m <sup>3</sup>	1.190	1.648	1.978	2.516	3.727	5.598	7.736	9.249	10.314	12.273	13.500
TARIFF INCREASE NOMINAL (%)					48%	50%	38%	20%	12%	19%	10%
TARIFF INCREASE REAL (%)					29%	34%	26%	9%	1%	8%	0%
VOLUME OF WATER PRODUCED	12316	12844	13213	13153	14308	17344	18043	24083	28572	30625	33322
UNACCOUNTED FOR WATER (%)	44%	44%	44%	42%	38%	34%	30%	27%	25%	24%	24%
VOLUME SOLD (m <sup>3</sup> /d <sup>3</sup> )	6897	7154	7373	7629	8943	11534	12702	17557	21572	23214	25258
WATER SALES	8208	11791	14985	19193	33329	64567	98263	162380	222488	284905	340991
BAD DEBT EXPENSE	2462	2358	2398	3071	4666	7748	9826	16238	22249	28491	34099
NET WATER SALES	5746	9433	12587	16122	28663	56819	88436	146142	200240	256415	306892
CONNECTION FEES	151	133	253	324	563	1090	1659	2742	3756	4810	5757
OTHER REVENUES	778	1228	213	275	478	926	1410	2330	3192	4088	4892
TOTAL REVENUES	6675	10794	13055	16722	29704	58836	91505	151213	207188	265313	317541
SALARIES AND WAGES	5741	6525	6335	7602	8742	9835	10819	11900	13091	14400	15840
CHEMICALS	2633	7512	12180	14549	18201	24821	28403	41703	54423	64168	76800
POWER	1677	2834	5561	6643	8310	11333	12968	19040	24848	29297	35064
MAINTENANCE & MATERIALS	4105	6547	3860	4864	5873	6937	8013	9254	10689	12346	14259
ADMINISTRATIVE EXPENSES	1356	1368	1938	2326	2674	3009	3310	3641	4005	4405	4846
OTHER EXPENSES	0	0	0	0	0	0	0	0	0	0	0
TOTAL CASH EXPENSES	15512	24786	29874	35983	43801	55935	63511	85538	107054	124616	146809
OPERATING INCOME BEF DEP	-8837	-13992	-16819	-19261	-14097	2901	27994	65675	100134	140697	170732
DEPRECIATION	586	2680	3965	5991	8510	12093	22347	32057	49963	66801	67495
OPERATING INCOME	-9423	-16672	-20784	-25252	-22607	-9192	5647	33618	50171	73896	103237
INTEREST	163	244	105	381	6642	29657	68009	103421	123100	132548	131289
SUPPLY EXPENSE	2506	2944	0	0	0	0	0	0	0	0	0
OPERATIONS	-9586	-16918	-20889	-25633	-29249	-38850	-62362	-69803	-72930	-58672	-28052
PRINCIPAL	-8837	-13992	-16819	-19261	-14097	2901	27994	65675	100134	140697	170732
INTEREST	0	0	0	0	0	0	0	0	0	8086	9345
GENERATION	163	244	105	381	6642	29657	68009	103421	123100	132548	131289
PROGRAM	-9000	-14238	-16924	-19642	-20739	-26757	-40015	-37746	-22967	63	30098
RENT SUBVENTION	5086	13600	24760	48047	211952	509983	587525	359520	117520	22856	19237
NTION	14276	14343	16924	19642	20739	26757	40015	37746	22967	0	0
S	2506	2944	0	0	0	0	0	0	0	0	0
INTEREST	11607	11153	16819	19261	14097	0	0	0	0	0	0
STATE CAPITAL SUBVENTION	163	244	105	381	6642	26757	40015	37746	22967	0	0
INVESTMENT PROGRAM	5086	13600	24760	16458	41929	113982	137984	80090	9748	0	0
PRINCIPAL	5086	13600	24760	16458	41929	113982	137984	80090	9748	0	0
FEDERAL GRANT	0	0	0	0	0	0	0	0	0	0	0
IBRD PASSED AS LOAN	0	0	0	5084	78397	228466	282897	189262	73128	15383	13030
IBRD PASSED AS GRANT	0	0	0	26505	91626	167535	166644	90168	34644	7473	6207
IBRD TOTAL	0	0	0	31589	170023	396001	449541	279430	107772	22856	19237
NET CASH FLOW	5276	105	0	0	0	0	0	0	0	63	30098

FEDERAL REPUBLIC OF NIGERIA  
FIRST MULTISTATE WATER SUPPLY PROJECT

Katsina State Water Board

Balance Sheet

For Year Ended 12/31

(Naira 000)

	-----ACTUAL-----					-----PROJECTED-----					
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Net Fixed Assets	48827	69620	132369	182418	270530	379000	857549	913060	1860715	1816770	1768512
Work-In-Progress	60906	66714	24760	16767	132097	521517	608146	880098	0	0	0
Net Current Assets	111	6724	6724	6724	6724	6724	6724	6724	6724	6787	36895
<b>Net Assets</b>	<b>113744</b>	<b>143058</b>	<b>163853</b>	<b>205909</b>	<b>409351</b>	<b>907241</b>	<b>1472419</b>	<b>1799882</b>	<b>1867439</b>	<b>1823557</b>	<b>1805397</b>
Capital Grant	114410	144256	185940	248545	402839	711113	1055756	1263760	1331119	1338592	1344799
Revaluation Reserve	5038	5038	5038	5038	5038	5038	5038	5038	5038	5038	5038
Accumulated Deficit	-5704	-6236	-27125	-52758	-82007	-120857	-183219	-253022	-325952	-384604	-412656
<b>Capital</b>	<b>113744</b>	<b>143058</b>	<b>163853</b>	<b>200825</b>	<b>325870</b>	<b>595294</b>	<b>877575</b>	<b>1015776</b>	<b>1010205</b>	<b>959026</b>	<b>937181</b>
IBRD Loan	0	0	0	5084	83481	311947	594844	784106	857234	864531	868216
<b>Liabilities</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5084</b>	<b>83481</b>	<b>311947</b>	<b>594844</b>	<b>784106</b>	<b>857234</b>	<b>864531</b>	<b>868216</b>
<b>Total Capital &amp; Liabilities</b>	<b>113744</b>	<b>143058</b>	<b>163853</b>	<b>205909</b>	<b>409351</b>	<b>907241</b>	<b>1472419</b>	<b>1799882</b>	<b>1867439</b>	<b>1823557</b>	<b>1805397</b>

FEDERAL REPUBLIC OF NIGERIA  
-----  
FIRST MULTISTATE WATER SUPPLY PROJECT  
-----  
Kaduna State Water Board  
-----  
Income and Cash Flow Statements  
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	-----ACTUAL-----		BUDGET	-----PROJECTED-----								
	1989	1990		1991	1992	1993	1994	1995	1996	1997	1998	1999
------(NAIRAS 000)-----												
INFLATION RATE AVG LOCAL				20.0%	15.0%	12.5%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
AVG. WATER TARIFF/m3	0.477	1.120	1.232	1.790	2.779	3.594	4.579	5.509	6.315	7.440	8.184	
TARIFF INCREASE NOMINAL (%)					55%	29%	27%	20%	15%	18%	10%	
TARIFF INCREASE REAL (%)					35%	15%	16%	9%	4%	7%	0%	
VOLUME OF WATER PRODUCED	66917	65158	70665	74227	86096	85092	84231	85636	91638	94745	95279	
UNACCOUNTED FOR WATER (%)	40%	44%	41%	41%	40%	35%	30%	25%	25%	25%	25%	
VOLUME SOLD (m3)	40150	36293	41975	44165	51830	55480	59130	64313	68912	71248	71650	
WATER SALES	19167	40664	51713	79073	144036	199390	270739	354287	435200	530106	586403	
BAD DEBT EXPENSE	5606	8262	11377	12652	20165	23927	27074	35429	43520	53011	58640	
NET WATER SALES	13561	32402	40336	66421	123871	175463	243665	318859	391680	477096	527763	
CONNECTION FEES	0	0	450	688	1253	1735	2356	3083	3787	4613	5103	
OTHER REVENUES	908	863	228	349	635	879	1194	1562	1919	2337	2585	
TOTAL REVENUES	14469	33265	41014	67458	125759	178077	247214	323504	397386	484046	535451	
SALARIES AND WAGES	7312	8288	10982	13178	15155	17050	18755	20630	22693	24962	27458	
CHEMICALS	12821	14560	20050	25273	33711	37483	40814	45644	53728	61104	67593	
POWER	12074	16668	17235	21724	28978	32220	35083	39236	46184	52525	58103	
MAINTENANCE & MATERIALS	3328	4782	5369	6765	8169	9649	11145	12872	14868	17172	19834	
ADMINISTRATIVE EXPENSES	8441	3294	4126	4951	5694	6406	7046	7751	8526	9378	10316	
TOTAL CASH EXPENSES	43976	47592	57762	71892	91707	102807	112843	126133	145998	165141	183304	
OPERATING INCOME BEF DEP	-29507	-14327	-16748	-4434	34052	75270	134372	197371	251388	318905	352147	
DEPRECIATION	35423	34694	22404	23680	29666	36676	41999	61874	78162	78860	79426	
OPERATING INCOME	-64930	-49021	-39152	-28113	4386	38593	92373	135497	173226	240045	272721	
INTEREST	38770	39011	38324	50979	72752	94134	125442	149600	152542	149390	135446	
RURAL WATER SUPPLY EXPENSE	1003	1770	1937	2441	2947	0	0	0	0	0	0	
NET INCOME	-103623	-88032	-77476	-79092	-68365	-55541	-33069	-14104	20684	90655	137275	
CASH FROM OPERATIONS	-29507	-14327	-16748	-4434	34052	75270	134372	197371	251388	318905	352147	
DEBT SERVICE PRINCIPAL	48881	48991	55630	83005	121663	126989	134958	143155	151773	168252	179011	
DEBT SERVICE INTEREST	38770	39011	38324	50979	72752	94134	125442	149600	152542	149390	135446	
INTERNAL CASH GENERATION	-117158	-102329	-110702	-138418	-160363	-145854	-126028	-95385	-52927	1263	37690	
INVESTMENT PROGRAM	8646	8829	146686	154864	261472	370292	472441	244675	22394	19505	14526	
STATE RECURRENT SUBVENTION	41507	51316	57009	57854	41647	18865	0	0	0	0	0	
RWS SUBVENTION	1080	1770	1937	2441	2947	0	0	0	0	0	0	
OPERATIONS	1657	10535	16748	4434	0	0	0	0	0	0	0	
INTEREST	38770	39011	38324	50979	38700	18865	0	0	0	0	0	
STATE CAPITAL SUBVENTION	54052	820	62316	85435	201221	199594	231463	170657	53773	0	0	
INVESTMENT PROGRAM	5171	8829	6686	2430	79558	72605	105435	75272	846	0	0	
PRINCIPAL	48881	48991	55630	83005	121663	126989	126028	95385	52927	0	0	
FEDERAL GRANT	0	0	140000	140000	0	0	0	0	0	0	0	
IBRD PASSED AS LOAN	0	0	0	317	125666	217874	285317	137542	17696	15836	11794	
IBRD PASSED AS GRANT	0	0	0	12117	56248	79813	81689	31861	4052	3669	2732	
IBRD TOTAL	0	0	0	12434	181914	297687	367006	169403	21548	19505	14526	
NET CASH FLOW	-30245	-3792	0	0	0	0	0	0	0	1263	37690	

FEDERAL REPUBLIC OF NIGERIA  
-----  
FIRST MULTISTATE WATER SUPPLY PROJECT  
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Kaduna State Water Board  
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Balance Sheet  
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For Year Ended 12/31  
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(Naira 000)  
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	-----ACTUAL-----					-----PROJECTED-----					
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Net Fixed Assets	544196	504903	539310	953630	1353126	1399069	1597025	2499734	2444168	2384991	2320202
Work-In-Progress	43389	56810	146686	281047	200240	487913	720399	491	289	111	0
Net Current Assets	5822	9237	9237	9237	9237	9237	9237	9237	9237	10500	48190
<b>Net Assets</b>	<b>593407</b>	<b>570950</b>	<b>695233</b>	<b>1243914</b>	<b>1562603</b>	<b>1896219</b>	<b>2326661</b>	<b>2509462</b>	<b>2453694</b>	<b>2395602</b>	<b>2368392</b>
Capital Grant	178875	190286	392045	1121224	1417393	1715665	2028817	2231335	2289160	2292829	2295561
Revaluation Reserve	27143	27143	27143	27143	27143	27143	27143	27143	27143	27143	27143
Accumulated Deficit	-362445	-500024	-577500	-656592	-724957	-780498	-813567	-827671	-806987	-716332	-579057
<b>Capital</b>	<b>-156427</b>	<b>-282595</b>	<b>-158312</b>	<b>491775</b>	<b>719579</b>	<b>962310</b>	<b>1242393</b>	<b>1430807</b>	<b>1509316</b>	<b>1603640</b>	<b>1743647</b>
IBRD Loan	460637	471813	416183	750992	841877	932762	1083121	1077508	943231	790815	623598
State Government Loan	288048	380585	436215	0	0	0	0	0	0	0	0
Federal Government Loan	1147	1147	1147	1147	1147	1147	1147	1147	1147	1147	1147
<b>Liabilities</b>	<b>749832</b>	<b>853545</b>	<b>853545</b>	<b>752139</b>	<b>843024</b>	<b>933909</b>	<b>1084268</b>	<b>1078655</b>	<b>944378</b>	<b>791962</b>	<b>624745</b>
<b>Total Capital &amp; Liabilities</b>	<b>593405</b>	<b>570950</b>	<b>695233</b>	<b>1243914</b>	<b>1562603</b>	<b>1896219</b>	<b>2326661</b>	<b>2509462</b>	<b>2453694</b>	<b>2395602</b>	<b>2368392</b>

FEDERAL REPUBLIC OF NIGERIA  
-----  
FIRST MULTISTATE WATER SUPPLY PROJECT  
-----  
Katsina State Water Board  
-----  
Action Plan - Performance Indicators  
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	1991	1992	1993	1994	1995	1996	1997	1998	1999
	-----	-----	-----	-----	-----	-----	-----	-----	-----
Production (m3 000)	13,213	13,153	14,308	17,344	18,043	24,083	28,572	30,625	33,322
Sales (m3 000)	7,373	7,629	8,943	11,534	12,702	17,557	21,572	23,214	25,258
Unaccounted-for-water (%)	44%	42%	38%	34%	30%	27%	25%	24%	24%
Water Sales (N 000)	14,985	19,193	33,329	64,567	98,263	162,380	222,488	284,905	340,991
Collections (N 000)	12,587	16,122	28,663	56,819	88,436	146,142	200,240	256,415	306,892
Collections/Water Sales (%)	84%	84%	86%	88%	90%	90%	90%	90%	90%
Recurrent Cost Coverage (%)	44%	46%	68%	105%	144%	177%	194%	213%	216%
Recurrent/Debt Coverage (%)	44%	46%	59%	69%	70%	80%	90%	100%	110%
Chemical Volume/m3 Produced 1)									
Electricity kwh/m3 Produced 1)									
Number of Connections	21,400	22,100	22,900	26,400	31,700	37,300	50,000	56,600	64,200
Number of Metered Connections	-	-	7,000	16,000	29,000	36,000	50,000	56,600	64,200
Number of Standpipes	850	880	930	1,040	1,150	1,310	1,670	1,760	1,890
Number of Employees	690	690	690	690	690	690	690	690	690
Number of Employees/1000 Conn.	32	31	30	26	22	18	14	12	11
Staffweeks of Training 2)									

- 1) Indicators will be developed by consultants during project implementation.  
2) Indicators will be developed after training study carried out under NWRP.

FEDERAL REPUBLIC OF NIGERIA  
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FIRST MULTISTATE WATER SUPPLY PROJECT  
-----  
Kaduna State Water Board  
-----  
Action Plan - Performance Indicators  
-----

	1991	1992	1993	1994	1995	1996	1997	1998	1999
	-----	-----	-----	-----	-----	-----	-----	-----	-----
Production (m3 000)	70,665	74,227	86,096	85,092	84,231	85,636	91,638	94,745	95,279
Sales (m3 000)	41,975	44,165	51,830	55,480	59,130	64,313	68,912	71,248	71,650
Unaccounted-for-water (%)	41%	41%	40%	35%	30%	25%	25%	25%	25%
Water Sales (N 000)	51,713	79,073	144,036	199,390	270,739	354,287	435,200	530,106	586,403
Collections (N 000)	40,336	66,421	123,871	175,463	243,665	318,859	391,680	477,096	527,763
Collections/Water Sales (%)	78%	84%	86%	88%	90%	90%	90%	90%	90%
Recurrent Cost Coverage (%)	71%	94%	137%	173%	219%	256%	272%	293%	292%
Recurrent/Debt Coverage (%)	27%	33%	44%	55%	66%	77%	88%	100%	108%
Chemical Volume/m3 Produced 1)									
Electricity kwh/m3 Produced 1)									
Number of Connections	45,600	48,000	52,600	60,000	69,500	79,100	85,600	91,300	95,400
Number of Metered Connections	-	-	16,000	36,000	63,000	75,000	85,600	91,300	95,400
Number of Standpipes	400	420	470	540	670	880	1,120	1,250	1,280
Number of Employees	1,662	1,662	1,662	1,470	1,470	1,470	1,470	1,470	1,470
Number of Employees/1000 Conn.	36	35	32	25	21	19	17	16	15
Staffweeks of Training 2)									

- 1) Indicators will be developed by consultants during project implementation.  
2) Indicators will be developed after training study carried out under NWRP.

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FEDERAL REPUBLIC OF NIGERIA  
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FIRST MULTISTATE WATER SUPPLY PROJECT  
-----  
Katsina State Water Board  
-----  
Water Tariffs - 1992  
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CONSUMER CATEGORY -----	RATE -----
Metered (Per M3)	
Domestic	
Up to 30 M3	1.20
30-100 M3	1.50
Over 100 M3	1.80
Public Institutions	
Federal Government	1.50
State Government	1.50
Local Government	1.20
Industrial/Commercial	
Up to 500 M3	3.50
500-1000 M3	5.00
Over 1000 M3	6.00
Raw Water	0.50
Unmetered (Per Month)	
House with One Tap	35.00
House with Internal Water	40.00
House with Internal Water and Garden	65.00
Water Tanker (1000 gallons)	15.00

FEDERAL REPUBLIC OF NIGERIA  
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FIRST MULTISTATE WATER SUPPLY PROJECT  
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Kaduna State Water Board  
-----  
Water Tariffs - 1992  
-----

CONSUMER CATEGORY	RATE
-----	-----
Metered (Per M3)	
Domestic	
Up to 30 M3	1.01
30-1000 M3	1.57
Public Institutions	1.01
Industrial/Commercial	
Up to 5000 M3	5.00
5000-10000 M3	5.50
Over 10000 M3	6.00
Tanker Supply	
Domestic	10.00
Industrial/Commercial	50.00
Raw Water	2.00
Unmetered (Per Month)	
House with One Tap	30.00
House with 1 or 2 bedrooms	55.00
House with 3+ bedrooms	
in high/med density areas	75.00
House with 3+ bedrooms	
in low density areas	100.00

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Summary of Environmental Assessment of Funtua Dam

1. The following are the main points made by consultants who carried out the environmental assessment of Funtua Dam.
  - (a) The construction of a dam on River Gwaigwaye to impound the required raw water for the proposed water supply scheme is the only economically viable option. This conclusion was based on review of the results of previous studies carried out on the project area and environmental assessment.
  - (b) The location selected for the construction of the dam has no bearing of any importance, whether archaeologically, historically, culturally, biologically, or geologically. Also, it is not enriched with any environmental resources for future exploitation.
  - (c) It is strongly recommended that the construction base camp should be planned on a permanent basis for future use as a housing and operational base for the maintenance and operation staff. Such approach would enhance a favorable environmental appearance.
  - (d) Construction materials needed for the provision of the dam are abundantly available within the reservoir area. All efforts should be made to use these materials. Borrowing materials from areas outside the reservoir should be avoided.
  - (e) Practically, there are no existing policy, legislation, administrative framework or established organization in Katsina to monitor environmental impact. It is proposed to establish a new environmental monitoring unit directly under the control of the Governor's office in Katsina. Man-power required for this unit may be obtained from the various government organizations. However, the Federal Environmental Protection Agency (FEPA) has prepared guidelines for the whole country. Though these guidelines are at preliminary stage and have not been properly tested, they could be adopted with the necessary modifications for Katsina State.
  - (f) Extensive cultivation is practiced in the catchment area and as a result vegetation cover is generally removed leaving behind only scattered trees. The area is prone to excess sediment transport into the reservoir. Adequate dead storage capacity (at least 20% of the storage capacity) should be allowed in the design to sustain the lifetime of the reservoir.

- (g) No special type of species were encountered in the catchment area. Domesticated animals are in existence. A few wild animals of common type i.e. hyena, leopard, monkeys and antelopes exist in the hilly and forestry areas, and do not have any danger of extinction.
- (h) Sewerage disposal in the catchment area is predominately the pit-latrine system which does not directly threaten the quality of impounded water. Action may be taken to modify the system to ventilated improved pit-latrines.
- (i) Agro-based chemicals are extensively used in the catchment area for cultivation. Necessary legislation may be introduced to limit their use.
- (j) Funtua Textile Mills located within the catchment area is known to discharge its waste effluents into the river system without any treatment. Action may be taken to treat this wastage before discharging into the river, or to direct it from the catchment.
- (k) The field survey confirmed that no established settlements would be affected by the construction of the dam. However, resettlement of scattered settlers is required. The resettlement process should proceed much earlier than the reservoir impoundment in order to avoid payment of compensation for crops within the reservoir area.
- (l) It is estimated that about 2,500 economic trees within the reservoir area have to be uprooted and disposed. Some of these trees are mature and can be cut and sold for lumber while the rest can be sold for firewood.
- (m) The use of the reservoir water for multiple purpose should be discouraged. Limited angling may be considered. In addition, limited tourist facilities may be provided.
- (n) An environmental monitoring unit consisting of about eight members is recommended to monitor environmental aspects during construction. This team could be obtained from the Katsina State Government functionaries. About ten visits to the site during construction would be needed.
- (o) A panel of experts comprising three members is proposed for review of the dam design and monitoring of construction. These experts can be selected from the following disciplines related to the construction of the dam: General Engineering/Hydraulics, Hydrology and Geotechnics/Geology.
- (p) New settlements should be sited well clear of the reservoir.
- (q) Other reservoirs constructed in the area have resulted in a significant increase in the incidence of malaria, bilharzia, and yellow fever.

2. These recommendations have been incorporated into the Environmental Mitigation Plan, Annex 4.3.

**FEDERAL REPUBLIC OF NIGERIA**

**FIRST MULTISTATE WATER SUPPLY PROJECT**

**Summary of Environmental Assessment of Zonkwa Dam**

1. An environmental assessment of anticipated environmental impacts of the dam has been made by consultants. Specific impacts are classified as either positive or negative and assessed. Mitigation measures are identified and mitigation plans to reduce potentially significant adverse effects to acceptable levels are proposed by the consultants.
2. The study shows that the positive impacts are:
  - (a) The site for the proposed project was acquired by the KDSWB in 1980, full compensation has been paid to the landowners and farmers, the acquired area has been demarcated and since there are no settlements within the acquired area, it would not incur any resettlement costs.
  - (b) The dam has potential for multi-purpose use such as water supply, irrigation, fisheries and recreation. In the design of the consultants, allowance was only made for domestic, industrial and livestock uses.
  - (c) Zonkwa town and the surrounding villages have no pipe borne water supply. The project would ensure adequate and reliable water supply. It would also improve the sanitary conditions of the town and reduce the incidence of some of the water borne and water related diseases such as dysentery, diarrhea, and typhoid.
  - (d) The project would cause an improvement in the local economy during the construction and the operation stages by providing employment opportunities.
  - (e) By attracting the establishment of small and medium scale processing and manufacturing industries it would improve the local economy and provide more job opportunities.
  - (f) The development of fish within the lake would not only be a source of income but also an alternative source of protein.
3. Among the negative impacts of the Zonkwa dam are:
  - (a) Loss of agricultural land by the impoundment of water in the reservoir area of 102 hectares.
  - (b) Disturbance of biota within the inundated area. However none of the plant nor animal species is an endangered species as they are the normal entities within the savannah region.

- (c) Malaria is already endemic in the area. There is a likelihood that the impoundment of water behind the dam would cause an increase in the incidence of the disease.
4. The possible mitigation measures are:
- (a) Afforestation of the reservoir rim to encourage the recovery of the biota. Trees to be planted should be evergreen trees of economic value.
  - (b) Seeding the reservoir with fingerlings of tilapia and mud fish to control the population of mosquito larvae.
5. Necessary measures to improve the environmental quality of the area are:
- (a) Rehabilitation and proper organization of the facilities for disposal of waste water, solid wastes and storm water runoff to prevent the pollution of the reservoir.
  - (b) Regrassing and afforestation of the valley slopes to minimize erosion and sedimentation of the reservoir.
  - (c) Encouragement of good agricultural practices such as contour tillage, and proper use and management of fertilizers and pesticides to minimize any harmful environmental impacts on the lake.
6. Measures to minimize social conflict within the area should include:
- (a) demarcation and establishment of grazing tracks leading to possible watering sites around the reservoir rim;
  - (b) fencing of farmlands along the grazing tracks to prevent livestock encroachment; and
  - (c) as an alternative to (a) watering points can be provided downstream of the bridge to avoid contamination of the reservoir by animal droppings and prevent livestock encroachment on farmlands around the reservoir.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Environmental Mitigation Plan

To minimize the environmental impacts of construction of dams at Funtua and Zonkwa, the State Water Boards would implement the following:

- (i) employ a public health specialist to advise on means to minimize the risk of increasing malaria and bilharzia, by reducing the habitat for mosquitos and snails; and to minimize other risks of disease;
- (ii) develop and implement a catchment management plan to minimize the impacts of activity in the catchment, particularly the use of biocides and fertilizers, and activities which would increase erosion and subsequent sedimentation of the reservoir;
- (iii) develop and implement a water quality monitoring program for water flowing into the dams, and reservoir water itself, commencing well before construction starts to give adequate baseline data;
- (iv) review dam design to ensure that proper allowance has been made for sediment storage (including where possible some actual sediment measurements) and to confirm spillway capacity;
- (v) monitor the effect on downstream farmers of changed river regime following construction of the dam;
- (vi) establish a three person monitoring unit to regularly monitor environmental impacts during dam construction;
- (vii) utilize the construction camp for operation and maintenance staff after completion of the dam, and ensure that it is designed accordingly;
- (viii) incorporate appropriate clauses into contracts to ensure minimization of impacts during construction; and
- (ix) clear impoundment area prior to reservoir filling.

These activities are included in the Project Implementation Program (Annex 2.11) where appropriate (items i, v, and vi). Items ii and iii are incorporated into the terms of reference for efficiency improvement (Annex 2.3) and items iv and vii to ix will be incorporated into the work of the consultant for construction supervision and into contract specifications.

FEDERAL REPUBLIC OF NIGERIA

FIRST MULTISTATE WATER SUPPLY PROJECT

Calculation of ERR

1. The primary calculation of ERR has been based on conservative values of what people are known to pay for water at lower consumption levels, and on expected tariffs after the project is completed at higher consumption levels (₦4 per cubic meter in March 1992 prices). Typically, people pay 20 kobo for a 20 liter can of water from vendors, and use about one and a half cans per person per day, equivalent to ₦10 per cubic meter for 30 lcd. There is also anecdotal evidence of people paying as much as five times this amount in some areas, and the equivalent of ₦250 to ₦500 per cubic meter for about 10 lcd in the dry season, however this has not been incorporated into the analysis due to uncertainty about its extent and applicability to the towns in question. Certainly it would raise ERR well above the figures quoted, but the extent is not known, and hence the analysis gives only a minimum measure of ERR. The demand curve adopted thus passes through ₦10 per cubic meter at 30 lcd and ₦4 per cubic meter at 90 lcd, and a straight line has been adopted. This demand curve has been taken to represent the value of water to the consumer.

2. The average value of the water delivered by each system has been calculated depending on characteristics of the consuming population. Water consumed through public standpipes, at 20 lcd, has all been valued at ₦10 per cubic meter. Industrial water use has been valued at ₦13 per cubic meter, the anticipated industrial tariff at the end of the project. Water resulting from the project and consumed through house connections (HCs) has been valued at an average figure depending on whether or not there is an existing supply in the town. Where there is no existing supply, the average value under the whole demand curve has been adopted (₦8 per cubic meter). Where there is an existing supply, the current average per capita supply through house connections has been calculated, and the average value of the demand curve between that amount and 90 lcd has been adopted as the average value of water delivered through house connections. Average value of house connection water thus calculated and average value of domestic water taking account of the portion expected to be delivered through standpipes are as follows:

Town	Value (₦/cu.m.) (HC water)	Value (₦/cu.m.) (All domestic water)
Katsina	5.8	7.7
Malumfashi	8.0	9.6
Daura	5.8	7.7
Funtua	5.8	7.7
Kaduna	4.7	6.6
Ikara	8.0	9.6
Zonkwa	8.0	9.6
Kwoi	8.0	9.6

3. Costs have been based on present day costs (March 1992 prices including physical contingencies). Adjustments have been made to exclude duties, for a shadow pricing conversion factor of 0.85 on local costs. The cost stream has been based on the projected expenditure pattern for the project with the addition of incremental operation and maintenance costs.

4. The above values applied to projections of water use from the project (difference in water use with and without the project), derived as at Annex 2.2, provide the benefit stream used to calculate ERR. Benefits have been extended to 30 years after project completion. Cost and benefit streams are shown in the attached table.

5. The alternative calculation of ERR based on productivity increase and health benefits has been based on the number of beneficiaries, also summarized at Annex 2.2. Average GDP of about US\$316 has been taken as the basic measure of productivity, an increase of 5% being valued at US\$15.8 per person per year. Health care costs were taken as 7.8% of GDP and a reduction of 10% in health care costs would be valued at US\$2.5 per person per year. The extent to which this is additive to the benefit calculated from consumers' willingness to pay, and even the extent to which consumers' perceptions of the value of water represents its real value to them, have not been addressed.

FEDERAL REPUBLIC OF NIGERIA  
FIRST MULTISTATE WATER SUPPLY PROJECT  
ECONOMIC COST AND BENEFIT STREAMS

KATSINA STATE

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Sales without project (MLD)	15.1	15.1	16.5	20.3	23.0	20.6	22.5	24.9	25.3	25.6	26.0	26.4	26.8	27.0	27.0
Sales with project (MLD)	15.1	15.1	16.5	20.3	26.1	27.9	42.6	53.4	57.8	63.3	68.2	70.2	72.4	73.0	73.3
Sales due to project (MLD)	0.0	0.0	0.0	0.0	3.1	7.3	20.1	28.5	32.6	37.6	42.2	43.8	45.7	46.0	46.3
Value incremental sales	0.0	0.0	0.0	0.0	10.3	25.2	67.3	95.7	109.5	126.9	142.5	147.9	154.2	155.3	156.3
Investment cost (economic)	0.0	0.0	10.8	67.9	213.9	252.0	142.4	38.3	0.0	53.0	53.0	0.0	0.0	0.0	0.0
Incremental production (MLD)	0.0	0.0	0.0	0.0	5.2	10.6	28.3	38.2	43.5	50.2	56.3	58.4	60.9	61.3	61.8
Incremental annual O&M cost	0.0	0.0	0.0	0.0	3.2	6.6	16.8	22.9	26.1	30.2	33.8	35.0	36.4	36.6	36.7
Total costs	0.0	0.0	10.8	67.9	217.1	258.6	159.2	61.2	26.1	83.2	86.8	35.0	36.4	36.6	36.7
Net benefits	0.0	0.0	-10.8	-67.9	-206.8	-233.4	-91.9	34.5	83.4	43.7	55.7	112.9	117.8	118.7	119.6

KADUNA STATE

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Sales without project (MLD)	95.9	101.1	106.7	112.5	118.7	122.1	127.6	136.7	140.3	140.3	140.3	140.3	140.3	140.3	140.3
Sales with project (MLD)	95.9	101.1	106.7	112.5	118.7	125.9	137.4	149.6	155.6	156.3	156.7	157.0	157.1	157.3	157.5
Sales due to project (MLD)	0.0	0.0	0.0	0.0	0.0	3.8	9.8	12.9	15.3	16.0	16.4	16.7	16.8	17.0	17.2
Value incremental sales	0.0	0.0	0.0	0.0	0.0	11.4	30.3	41.1	49.7	52.1	53.5	54.7	55.3	55.9	56.5
Investment cost (economic)	0.0	0.0	0.0	138.2	184.4	233.5	109.7	3.6	0.0	42.0	48.0	0.0	0.0	0.0	0.0
Incremental production (MLD)	0.0	0.0	0.0	0.0	0.0	5.3	12.8	16.7	19.7	20.6	21.1	21.5	21.7	21.9	22.1
Incremental annual O&M cost	0.0	0.0	0.0	0.0	0.0	0.2	0.3	1.6	2.2	2.4	2.5	2.5	2.6	2.6	2.7
Total costs	0.0	0.0	0.0	138.2	184.4	233.7	110.5	5.2	2.2	44.4	50.5	2.5	2.6	2.6	2.7
Net benefits	0.0	0.0	0.0	-138.2	-184.4	-222.3	-80.2	35.9	47.5	7.7	3.0	52.2	52.7	53.3	53.8

Note: Net benefits show small increase beyond year 2004.  
Monetary values in million Naira, constant 1991 prices.

**FEDERAL REPUBLIC OF NIGERIA**  
**FIRST MULTISTATE WATER SUPPLY PROJECT**

**Documents Available in the Project File**

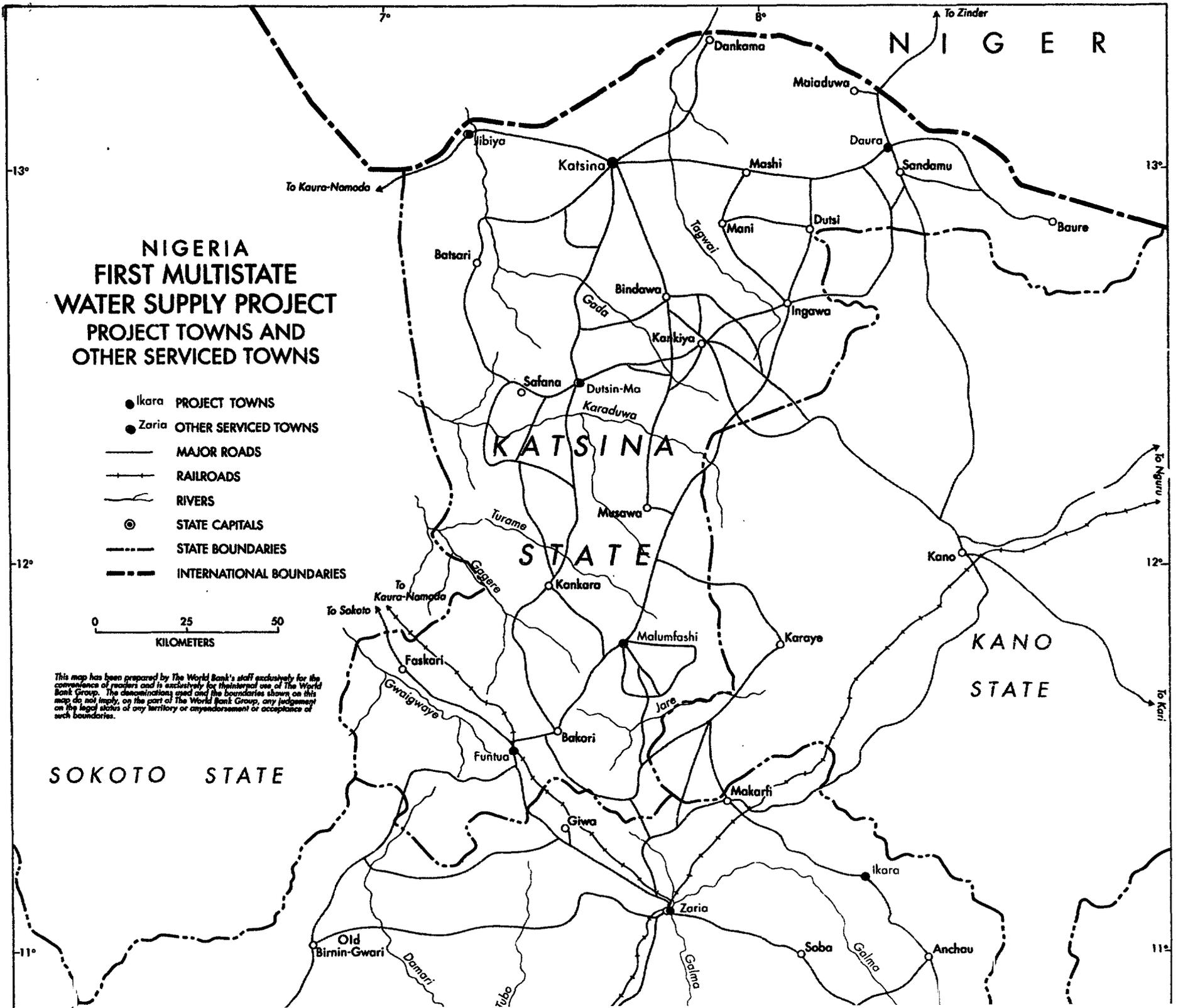
**A. Reports and Studies Related to the Project**

1. Katsina State Water Board, Feasibility Study, Multistate Water Supply Project, Final Report by Wardrop Engineering Inc. (May 1990)
2. Kaduna State Water Board, Rehabilitation Study, Final Report by Wapdeco (Feb. 1991)
  - Vol 1. Zaria Water Supply Scheme
  - Vol 2. Birnin Gwari Water Supply Scheme
  - Vol 3. Kafanchan/Kagoro Water Supply Scheme
  - Vol 4. Manchok Water Supply Scheme
  - Vol 5. Zonkwa Water Supply Scheme
  - Vol 6. Kachia Water Supply Scheme
  - Vol 7. Kwoi Water Supply Scheme
  - Vol 8. Ikara Water Supply Scheme
  - Vol 9. Management Study
3. Katsina State, Multistate Water Supply Project, Review and Recommendations for Rural Water Supply Component by Stoveland Consult. (Sept. 1990) (Vol. 1, Report; Vol. 2 appendices)
4. Kaduna State, Multistate Water Supply Project, Review and Recommendations for Rural Water Supply Component by Stoveland Consult. (Sept. 1990) (Vol. 1, Report; Vol. 2 appendices)
5. Rural Water Supply and Sanitation, Katsina, Results of discussions, Stoveland Consult. (June 1991)
6. Rural Water Supply and Sanitation, Kaduna, Results of discussions, Stoveland Consult. (June 1991)
7. Funtua Water Supply Extension (Gwaigwaye Option), Environmental Impact Assessment by Enplan Group (June 1991)
8. Environmental Impact Assessment of Zonkwa Dam; Report by Ahmadu Bello University Consultancy Services (October 1991)

**9. Standard Bid Document for Execution of Contracts  
(June 1990) D42639**

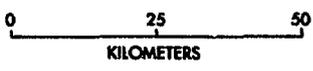
**B. Financial and Economic Analysis**

- 1. Katsina State Water Board Audited Accounts for 1990**
- 2. Kaduna State Water Board Audited Accounts for 1990**
- 3. Memo to files, First Multistate Water Supply Project, Cost Estimates - complete COSTAB printout**
- 4. Memo to files, First Multistate Water Supply Project, Demand Projections.**
- 5. Financial sensitivity working papers.**



# NIGERIA FIRST MULTISTATE WATER SUPPLY PROJECT PROJECT TOWNS AND OTHER SERVICED TOWNS

- Ikara PROJECT TOWNS
- Zaria OTHER SERVICED TOWNS
- MAJOR ROADS
- +— RAILROADS
- ~ RIVERS
- ⊙ STATE CAPITALS
- - - STATE BOUNDARIES
- - - - INTERNATIONAL BOUNDARIES



*This map has been prepared by The World Bank's staff exclusively for the convenience of readers and is exclusively for the internal use of The World Bank Group. The denominations used and the boundaries shown on this map do not imply, on the part of The World Bank Group, any judgement on the legal status of any territory or any endorsement or acceptance of such boundaries.*

SOKOTO STATE

KATSINA STATE

KANO STATE

NIGER

13°

13°

12°

12°

11°

11°

To Kaura-Namoda

To Zinder

To Nguru

To Keri

To Sokoto

To Kaura-Namoda

Gwairigwaye

Old Birnin-Gwari

Batsari

Katsina

Mashi

Daura

Sandamu

Baure

Mani

Maiaduwa

Bindawa

Dutsi

Ingawa

Kankiya

Safana

Dutsin-Ma

Karaduwa

KATSINA

Mesawa

STATE

Kankara

Kano

Malumfashi

Karaye

Faskari

To Kaura-Namoda

Gwairigwaye

Jere

Bakori

Makarfi

Funtua

Giwa

Ikara

Zaria

Soba

Galina

Anchau

Damari

Tubo

Galina

