CHAPTER 12. INSTITUTIONAL AND LEGISLATION

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 12. INSTITUTION AND LEGISLATION

12.1 Present Situation

12.1.1 Historical Perspectives

While the water resources development for agriculture had all been left in hands of small-scale subsistence farmers, an organized approach towards harnessing the country's water resources for agriculture and other uses did not start until 1955 when the World Bank mentioned the need for this. In 1962, the FGN considered in the First National Development Plan (1962 - 1968) to include the water resources issues for crop irrigation and urban/rural domestic uses, under which the water resources to support food production was handled by the Irrigation Division under the FMANR, while the groundwater was done by the Geological Survey Department of Federal Ministry of Mines and Power.

In 1976, the Federal Ministry of Water Resources (FMWR) was created to formulate the national water resources development policies and coordinate their development along with 11 River Basin Development Authorities (RBDAs) set up through Decree No.25. In 1977, the FMWR was merged with the Federal Ministry of Agriculture. Again in 1979, the FMWR was created with the Federal Department of Water Resources (FDWR) as the only operational department, the 11 RBDAs as consolidated by Decree No.87 of 1979 and the National Water Resources Institute (NWRI) as established in 1979 as the parastatal. In 1984, the FMWR was for the second time merged into the Federal Ministry of Agriculture, Water Resources and Rural Development (FMAWRRD). In 1989, the FMWR was created for the third time and expanded from one department to eight departments. In late 1991, the FGN announced the re-amalgamation of the FMWR with the FMANR in a new FMAWRRD to facilitate the closer linkages between irrigation, agricultural development and erosion control. In August 1993, the FMAWRRD has been again divided into two, viz. the Federal Ministry of Agriculture and Natural Resources (FMANR) and the Federal Ministry of Water Resources and Rural Development (FMWRRD) without major change in the scope of mandate and responsibility on the former Water Resources Sector.

The water demand and use in Nigeria can be considered under :

- Water supply and sanitation
- Water for irrigated agriculture
- Water for development of the hydropower
- Inland water transportation
- Water for development of the fisheries

While the FGN is concerned with the articulation of broad policy guidelines and coordination for nationwide water supply and sanitation, the present water supply to urban and rural areas is essentially the responsibility of various State Governments. Sometimes, there are the FGN interventions, especially in rural water supply as reflected by the National Boreholes Program, the DFRRI and Better Life Programs.

As for irrigated agriculture, the FMWRRD is promoting the public irrigation projects through the RBDAs and providing the guidance and technical support to the latter, while the FMANR promote the private irrigation schemes through the State ADPs, with virtually no coordination and cooperation between the two despite their use of a common resource. Much the same is true of the smaller portfolio of the State Government funded public sector irrigation schemes.

The Federal Department of Fisheries, the FMANR is charged with the mandate of developing the Nigerian fisheries, and in line with the FGN policy, the Department does not embark upon direct fish production but executes the programs and projects which are aimed at accelerating the private sector participation in fish production, utilization and conservation.

The FMWRRD is not responsible for the formulation and implementation of policies of hydropower development, and the function rests with the Federal Ministry of Mines and Power through its major parastatal called the National Electric Power Plc (NEPA). The development of inland water transportation and navigation is the responsibility of the Federal Department of Inland Waterways (FIWD), the Federal Ministry of Transport. The NEPA and the FIWD are represented on the National Technical Committee for Water Resources.

The Federal Ministry of Works and Housing is in charge of policies on coastal erosion, urban drainage and flood control and urban-related water works except the water supply and sanitation, and its specialized agency called the Federal Environmental Protection Agency (FEPA) is responsible for the environmental protection and, to a large extent, pollution control of the surface and groundwater.

The water resources development and management in Nigeria is in the legislative concurrent list. It is a function carried out by the FGN, State Governments and Local Governments and their specialized agencies. It is commonly observed that this situation has led to less coordinated and often duplicated and confusing management strategies in order to satisfy the diverse socio-political interests and goals.

12.1.2 Organizational Structures

(1) The FMWRRD

The Water Resources Sector of the FMWRRD is the apex Federal Government institution vested with the responsibility of water resources policy formulation and development in Nigeria, although the role and structure of the Rural Development Sector that is another wing of the FMWRRD seem not to be clearly defined at this stage. The present structure was established in August 1993 as is shown in Figure 12-1.

The functions of the Water Resources Sector are:

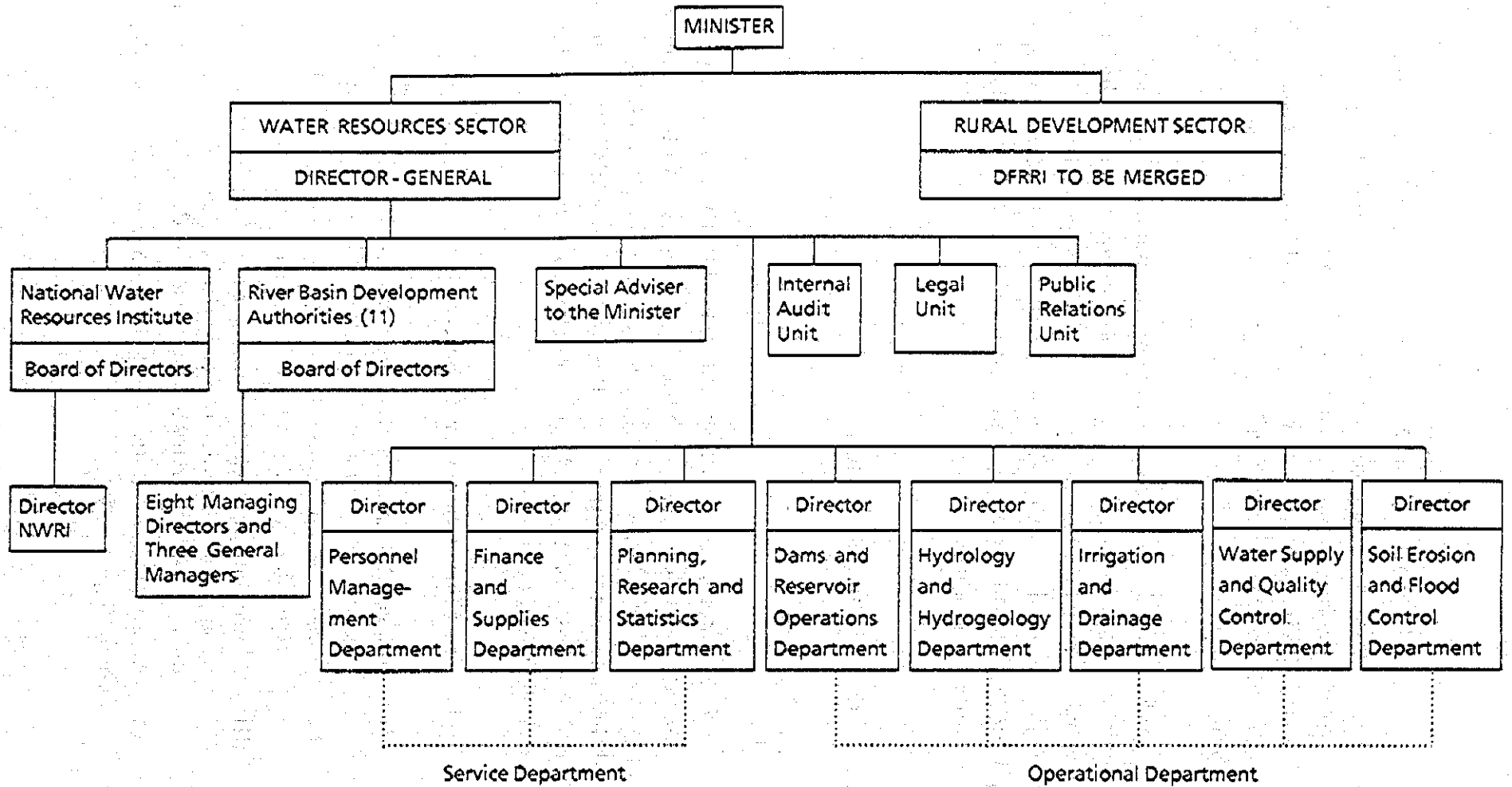
i) To formulate and implement a Water Resources Master Plan for irrigation development, including the inter-basin water transfers;

ii) To develop and support irrigated agriculture and reduce the nation's dependence on rain-fed agriculture;

iii) To promote and sustain national food security by minimizing unexpected and undesirable shortfalls in domestic food production and agro-based raw materials caused by the vagaries of weather;

iv) To collect, store, analyze and disseminate hydrometeorological and hydrological data;

FIGURE 12 - 1 ORGANIZATIONAL CHART OF THE FMWRRD



v) To support, monitor and evaluate the programs and performance of the River Basin Development Authorities (RBDAs) and the National Water Resources Institute (NWRI);

vi) To explore and develop groundwater resources;

vii) To formulate and review from time to time the National Water Legislation;

viii) To coordinate the development and utilization of water resources for irrigation and water supply;

ix) To liaise with all relevant national and international agencies on all matters relating to water resources development;

x) To support studies and research on the nation's ground and surface water resources potentials;

xi) To undertake hydrological and hydrogeological investigations;

xii) To formulate and implement national irrigation policy that is consistent with and complementary to the national agriculture policy;

xiii) To formulate and implement programs for drought, erosion and flood control;

xiv) To develop programs and policies towards surface storage schemes;

xv) To develop guiding principles for dam construction nationwide; and

xvi) To develop anti-desertification program.

(2) Structure of the Water Resources Sector, FMWRRD

This Sector operates through the following eight Departments consisting of three service Departments and five operational Departments.

Service Departments created by the 1988 Civil Service Reforms :

i) Department of Planning, Research and Statistics (PRS)

ii) Department of Finance and Supplies (F&S)

iii) Department of Personnel Management (PM)

Five Operational Departments :

i) Department of Hydrology and Hydrogeology (H & H)

ii) Department of Irrigation and Drainage (I & D)

iii) Department of Water Supply and Quality Control (WS & QC)

iv) Department of Dams and Reservoir Operations (created in 1989) (DRO)

v) Department of Soil Erosion and Flood Control (created in 1989) (SE & FC)

In is noted that the Department of Soil Erosion and Flood Control was created in 1989 in the Federal Ministry of Water Resources when it was the time for coordinating all programs and projects to ameliorate and control the soil degradation problems caused by heavy rainwater as the major agent of such degradation to come under one umbrella. It was explained that this Department was amalgamated into the FEPA with the decision to bring on the soil degradation problems under one umbrella in March 1993, but was again merged into the FMWRRD in 1994.

The detailed statutory functions of six engineering - oriented Departments as given are explained below:

(a) Department of Planning, Research and Statistics

Statutory Functions

1. Formulation, analysis, review and updating of Annual Rolling and Master Plans (of Programs and Projects) in liaison with other Departments of the Ministry, the RBDAs and the NWRI.
2. Monitoring and evaluation of water resources programs and projects undertaken by all the Departments of the Ministry, the RBDAs, and the NWRI in liaison with other Departments of the Ministry.
3. Processing and review of feasibility studies and design on water resources activities in liaison with all operational Departments, the RBDAs and the NWRI.
4. Collection and processing of Ministerial Tender Documents for the Ministerial Tender Board.

5. Coordination of the formulation and production of water resources policies on development, operations and management (including design criteria, codes of practice, standards, specifications, water tariffs, etc.) initiated by all the Departments of the Ministry.
6. Coordination of the formulation and production of water resources decree / by-laws initiated by all the Departments of the Ministry.
7. Coordination of out-reach functions (extension services) such as social mobilization, water demand generation, advisory services, promotional and support roles initiated by all the Departments of the Ministry.
8. Coordination of information management functions on water resources initiated by all the Departments of the Ministry.
9. Execution of all research and statistical activities initiated by other Departments of the Ministry.
10. Operations, organization and management of the Civil Service Reforms.
11. Establishment, operations and management of Data Bank Centre, Computer Services, Secret Registry and Library.
12. Secretariat for National Council on Water Resources (including the National Technical Committee on Water Resources).
13. Production of the Ministry's Quarterly and Annual Reports.
14. Responsible for external relations such as bilateral, multilateral, international and regional relations including LCBC, NNJC and NBA matters.

(b) Department of Hydrology and Hydrogeology

Statutory Functions

- Hydrology Division

National hydrological network programs for the establishment of a sound hydrometric database for the purpose of planning and evaluation of water resources development activities:

- Hydro/meteorological network installation and data collection, processing and dissemination.
- Sediment transport sampling and analysis.

- River stage and discharge measurement.
- Model catchment studies.
- River engineering including channel hydraulics studies for improved conveyance.
- River flow forecasting.
- Surface water evaluation.
- Hydrological assessment of inter-basin water transfer.
- Assessment of surface water contamination.
- Bilateral relationship with UNESCO-IHP, WMO, UNDP, UBA, LCBC and other international organizations involved in global hydrology.
- Hydrological network design.
- Instrumentation design, fabrication and calibration.
- Procurement of hydromet equipment.
- Hydrographic surveys.
- Surveying and leveling of hydromet stations.
- Real-time forecasting of hydrometeorological phenomena-HYDRONIGER Project.
- Urban hydrology.
- Maintenance of all hydrometric and telemetric installations.
- National hydrological mapping.

• Hydrogeology Division

Groundwater resources development programs involving the improvement of existing geophysical and hydrogeological information for identified aquifers nationwide and undertaking the comprehensive evaluation of the state of development of groundwater resources for multipurpose uses:

- Nationwide hydrogeological investigations in towns, villages and institutions for water supply schemes.
- Hydrogeological mapping of Nigeria on scales of 1:5,000, 1: 250,000 and 1:500,000 including their production and sales.
- Establishment of groundwater monitoring network and hydrogeological data acquisition.

- Groundwater resources availability surveys.
- Groundwater quality monitoring.
- Site geotechnical investigations of all water resources projects nationwide.
- Geophysical exploration of finite and infinite aquifers of the Basement Complex and Sedimentary Formation for the siting of productive boreholes in villages, towns and semi-urban areas nationwide.
- Preparation of annual groundwater budget.
- Compilation of geophysical map nationwide.
- Procurement of equipment, softwares, and others necessary for geophysical exportation nationwide.
- Structural mapping and fracture analyses of finite and infinite aquifer using aerial photography and Satellite imageries.
- Exploratory drilling of boreholes for quantification of groundwater reserve, abstraction rates and determination of aquifer parameters.
- Evaluation of groundwater management technique for sustainable development.
- Initiate and promote the National Groundwater By-laws.
- Evaluation of hydrogeological code of practice.
- Saline water intrusion and artificial groundwater recharge studies.
- Aquifer modeling.
- Visual hithologic, graphic and tele-logging of all exploratory boreholes and leveling of installations to mean sea level.

(c) Department of Irrigation and Drainage

Statutory Functions

1. Provision of necessary initiative, guidance and support of plans and programs of the RBDAs for irrigated agriculture as well as supervision, monitoring and effective coordination of such plans and programs.
2. Review of feasibility studies, design and construction of proposals of irrigation projects of the RBDAs.
3. Carry out studies on the scope and extent of irrigation and assist in the drawing up a master plan for irrigation development.

4. Provide necessary initiatives and support for the drawing up of a code of practice for irrigation and drainage practice.
5. Provision of technical support and guidance for formulation, periodical review and implementation of national policies regarding the planning, development and management of irrigation projects.
6. Provision of technical support and guidance for formulation, periodical review and implementation of national policies regarding compensation for irrigation.
7. Liaising with and participation in the activities of national, regional and international water resources organizations such as:
   (a) National Sub-Committee on Irrigation and Drainage
   (b) NBA
   (c) LCBC
   (d) International bodies like ICID, FAO, etc. on issues related to irrigation and drainage.
8. Assisting in the training and development of engineers and technicians and further development of irrigation and drainage technology in Nigeria by organizing seminars, workshops and conferences.

(d) Department of Water Supply and Quality Control

Statutory Functions

- Water Supply Division

  - All water supply related activities including liaison with all Federal agencies and dissemination of the Federal Government policies and guidelines to State agencies concerned with rural and urban water supply related matters.
  - All water supply matters relating to the RBDAs.
  - Small dams and boreholes for urban and rural water supply purposes.
  - Continuous assessment program for inventory of water supply data for national water supply databank and water supply yearbook.
  - All matters relating to International Drinking Water Supply and Sanitation Decade (IDWSSD).
  - National water supply master plan for water supply and sanitation.
  - National and international technical aid water supply projects.

- NCWR sub-committee on Water Supply and Sanitation.
- National and international seminars, workshops and conferences on water supply.
- Coordination of activities with other Departments of the Ministry.

- Quality Control Division

  - Water quality and pollution control measures relating to water supply in general.
  - Establishment of water quality control laboratories for monitoring and enforcement of the Federal Government guidelines and standards.
  - Point-source and non-point source pollution identification and control.
  - Assessment and analysis of the national borehole water samples.
  - Quality control monitoring of reservoirs and boreholes for the protection of human health.
  - Advice on the specifications of locally manufactured water supply devices and treatment chemicals including:
    - Water treatment chemicals
    - Water metres
    - Cast-Iron fittings
    - Ductile iron/steel pipes
    - Screens for boreholes
    - Pumps, both submersible and high lift
  - Water treatment plant, effluent quality sampling and control.
  - Development of models and sampling programs.
  - Continual review and selection of analytical methods and parameters.
  - Program modification and execution.
  - Participation and contribution to national and international seminars.

(e) Department of Dams and Reservoir Operations

Statutory Functions

- Completing all on-going major dams of the RBDAs.
- Ensuring safety and functionality of all existing dams by undertaking studies and organizing dams and reservoir safety inspection of completed dams and ensuring installation of safety devices in all on-going and proposed dams.
- Enhancing in-house capability of the RBDAs through direct labor execution of small earth dams for irrigation and water supply at village/community level by proper harnessing of both human and material resources of the respective RBDAs.
- Formulation and implementation of appropriate guidelines, policies and programs for planning, development and maintenance of dams and storage schemes undertaken by the RBDAs, SWAs and private agencies. This is facilitated by proper liaising with dam related-bodies (internal and external) such as National Sub-Committee on Dams and International Commission on Large Dams (ICOLD).
- Conducting feasibility studies on dams and reservoir operations problems.
- Organizing seminars, workshops, meetings and conferences on strategies for efficient and effective control of dams and reservoirs.

(f) Department of Soil Erosion and Flood Control

Statutory Functions

1. Formulate programs and projects towards the amelioration of all soil degradation as a result of wind, water and human activities.
2. Formulate policy that would help in the amelioration of environmental degradation.
3. Furnish, provide and maintain the necessary coordinating role for all ecological-oriented projects and programs to the extent that quality and continuity would be preserved for time and posterity.
4. Execute special projects on soil erosion and flood control along with other executing agencies.
5. Formulate policy to ameliorate drought and control desertification.

6. Undertake studies and analysis of approved amelioration programs and projects.
7. Advice and counsel foreign bodies and organizations on how best to minimize or eliminate environmental scourges of the country.

During the course of the JICA Field Work (III), it has been explained that the matters of inter-basin water transfer schemes related to the desertification control which are not clearly indicated above were already transferred to the Department of Dams and Reservoir Operations.

(3) The River Basin Development Authorities (RBDAs)

The RBDAs, Federal parastatals were created in 1976 by Decree No.25 to ensure that a nationwide systematic and consistent program of the water resources development is achieved and also envisaged as the Federal tools to stem the rapid rural/urban migration that was attendant problems in the oil boom era and to reduce the effects and devastation of nationwide erosion and flood. Over the years, 11 RBDAs have gone through some operational and structural changes to improve their relevance and efficiency as spelt out in Decree, No.35 of 1986. The present functions of RBDAs are:

1. to undertake comprehensive development of both surface and groundwater resources for multipurpose use, with particular emphasis on the provision of irrigation infrastructure and the control of flood and erosion for watershed management.
2. to construct, operate and maintain reservoir dams, dykes, polders, wells, boreholes, irrigation and drainage systems and other works necessary for the achievement of the RBDA's functions and to hand over all lands to be cultivated under the irrigation schemes to the farmers.
3. to supply water from the RBDA's completed storage schemes to all users for a fee to be determined by the RBDA concerned, with the approval of the Minister of Water Resources and Rural Development.
4. to construct, operate and maintain infrastructural services such as roads and bridges linking projects sites, provided that such services are included forming an integral part of the approved projects;
5. to develop and keep up-to-date comprehensive water resources master plan, identifying all water resources requirements in the RBDA's area of operations through adequate collection and collation of water

resources, water use, socio-economic and environmental data of the river basin.

On January 4, 1994, it was announced by the Minister of Water Resources and Rural Development that the FGN created an additional RBDA at Ilorin, Kwara State and approved the reversion of RBDAs to their former designation of "River Basin and Rural Development Authorities". With this policy, the present Niger RBDA has been splitted into two:

- Lower Niger River Basin and Rural Development Authority

  Headquarters: Ilorin
  Jurisdiction : States of Kwara and Kogi

- Upper Niger River Basin and Rural Development Authority

  Headquarters: Minna
  Jurisdiction : States of Niger and Kaduna, and Federal Capital Territory

However, since no detail has been available, this Report deals fully with the former setup of eleven River Basin Development Authorities.

(4) The National Water Resources Institute (NWRI)

The NWRI, Kaduna established in 1979 is a publicly owned and financed organization accountable to the Water Resources Sector, FMWRRD under the direct supervision of the Director-General. The enabling Decree was promulgated as Decree, No.3 of 1985 with the following major functions:

1. The promotion and development of training courses in water resources.
2. Prepare the student of sufficient proficiency in various aspects of water resources disciplines to meet the middle-level manpower needs of water resources development, as well as upgrade the technical knowledge and competence of the professionals in the water sector through short courses and seminars emphasizing new technologies.

3. Advise the Minister on nation's water resources training needs and priorities.
4. Perform the engineering functions related to such major water resources projects as may be required for flood control, river regulation, reclamation, drainage, irrigation, domestic and industrial water supply, sewage and sewage treatment.
5. Perform such ancillary services on planning of water resources management and river basin development, and produce the necessary codes of practice in water resources engineering related and suitable to Nigerian conditions.
6. Promote the establishment of a uniform national data collection system relating to surface and groundwater resources.
7. Establish and maintain a water resources library, documentation and conference center.
8. Publish or sponsor the publication of water resources journals.
9. Promote the cooperation in water resources development management with similar bodies in other countries and with international bodies in connection with water resources management and operations.
10. Carry out such other activities as are necessary or expedient for the full discharge of its functions.

(5) State Government Institutions

The State Governments have been involved in the water resources development through the following institutions:

1. The Ministries of Agriculture and Natural Resources are involved in the development of medium and small-scale irrigation projects. Since the creation of the Federal Ministry of Water Resources in 1989, some State Governments have followed suit by creating a separate Ministry for Water Resources.
2. The State Water Boards/Utility Boards are involved in the development and OM of social infrastructures for water supply, especially to urban settlements.
3. The Agricultural Development Programs (ADPs) are the State/Federal Government outfits involved in accelerated agricultural and rural infrastructural development, including the farmer-owned and - managed irrigation schemes.

(6) The National Council for Water Resources (NCWR)

The NCWR is the highest water resources policy formulating body, chaired by the Federal Minister of Water Resources and Rural Development. It has the State Government Commissioners responsible for water resources development, Chairman of DFRRI and Chairman of FCT Water Resources Agency as members. The Council first inaugurated in 1980 has a technical arm, the National Technical Committee on Water Resources (NTCWR).

The NTCWR is chaired by the Director-General of the Water Resources Sector. Meeting biannually and its membership includes: Federal Department Directors of the Water Resources Sector, Managing Directors and General Managers of RBDAs, NWRI, NEPA and State Water Boards/Corporations; Federal Department Directors of Inland Waterways and Meteorology; ADP Management Unit/Project Manager; and representatives of the universities, National Society of Engineers and the consulting industry. The NTCWR meets either to take decisions to advise the NCWR or to deliberate on strategies to adopt to implement the policy decisions taken by the NCWR.

The six Sub-Committees established for detailed implementation of the NTCWR decisions consist of experts in the respective disciplines of water resources to discuss and exchange ideas on pressing problems of the water resources development and its further promotion often setting up the working groups to carry out the field studies and submit recommendations:

- Sub-Committee on Hydrology and Hydrogeology
- Sub-Committee on Irrigation and Drainage
- Sub-Committee on Manpower
- Sub-Committee on Dams
- Sub-Committee on Water Supply and Sanitation
- Sub-Committee on Erosion and Flood Control

The policy issues originate in a form of the proposals from the various specialized agencies responsible for the water resources development. These proposals are then considered by the relevant Sub-Committees of the NTCWR, and then to the NTCWR for critical and technical analyses and to the NCWR for consideration and adoption. Such policies as are accepted are then sent to the FMWRRD to be packaged as a memorandum to the Federal Executive

Council where it is subject to the discussion for the inclusion as a national policy.

It is stressed that under the Nigerian conditions where management information systems tend to be rudimentary and the general flow of data and information is limited, these types of arrangement are important and rewarding. However, the extent to which the NCWR/NTCWR has influenced the Nigeria's irrigation policies appears to have been slight, essentially because the system has been heavily oriented toward water supply and engineering matters. Recently, the system has become involved in water pricing issues including that of water charges in public sector irrigation schemes.

(7) Regional Organizations

Water is the mobile natural resources and has never respected any frontiers drawn by the human being. Therefore, there are many problems connected with the development, use, administration and conservation of water resources shared by more than one country. Nigeria's water resources are derived from two sources: external and internal. While the internal sources are under the Nigeria's control, the external sources are not.

By the International and Bilateral Agreements and Protocols, Nigeria is allowed some way in the development of the common water with the neighbors. Nigeria is a member of the following regional bodies with common water resources interests:

1. The Niger Basin Authority (NBA)

The Niger River takes its source from Guinea and flows through Mali, Benin, Niger and Nigeria before it empties its water into the Atlantic Ocean. In 1964, under an International Agreement, nine countries whose territories lie within the Niger River Basin and its tributaries, formed the Niger Basin Commission (later Authority). The nine countries are Guinea, Mali, Niger, Ivory Coast, Burkina Faso, Nigeria, Chad, Benin and Cameroon.

The NBA has its headquarters in Niamey, Niger Republic. The principal aim of the NBA is to ensure an integrated development of the

Niger River basin in all fields of economic development, particularly in the fields of energy, water resources, agriculture, animal husbandry, fisheries, forestry, transportation, communications and industry. To date, many dams and irrigation projects have been planned and developed on the Niger River by some member countries of the Niger Basin Authority.

2. The Lake Chad Basin Commission (LCBC)

Like the Niger basin, the Lake Chad basin is shared by Nigeria, Niger, Chad and Cameroon. The LCBC was formed in 1964 by these lake-side countries to ensure the rational and equitable development of the natural resources including water resources of the Lake Chad region. Nigeria's share of the basin area is about 70,000 sq.km which is 21 percent of the entire basin. The headquarters of the LCBC is in Ndjamena, Chad.

In June 1992, the LCBC with the assistance and cooperation of UNEP, UNSO and FAO presented a Master Plan for the development and environmentally sound management of the natural resources of the Lake Chad conventional basin. The Master Plan for the Lake Chad Basin recommends, with a concept that the water resources management poses the major challenge to successful natural resource management, the following:

- To investigate the possibilities of water resources augmentation by such inter-basin water transfer as the Upper Ubangi-Chari Scheme within the context of a much larger proposed TRANSAQUA;
- To improve the water use efficiency;
- To refocus the irrigated agriculture towards food security preparedness and the water development and management on small-scale irrigation schemes;
- To reassess the water priorities taking into account the water needs of floodplain areas;
- To reevaluate existing and partially completed water resources works for downstream economic and ecological impacts.

The recommended action plan includes 36 projects for implementation of the Master Plan; however, any product from these projects has not reached the Study Team for consideration. It is expected that the findings to be obtained through implementation of this Master Plan be incorporated for subsequent updating and improvement of this NWRMP.

3. Nigeria/Niger Joint Commission (NNJC)

Nigeria and Niger Republic have four major drainage basins common to both countries. They are:

- The Komadogu/Yobe Basin
- Baggia/Lamido Basin
- Gada/Goulbi de Maradi Basin
- Tagwai El Fadama Basin.

The NNJC is to monitor and recommend the development options within these four basins, especially in the areas of water extraction and development. Its headquarters is in Niamey. Under the bilateral relation, there is an agreement to cooperate on scientific, technical and economic matters, since both countries have common border and therefore common water resources are rationally developed and equitably shared.

The FMWRRD contributes N 400×10^3 and N 7×10^6 annually to NBA and LCBC, respectively. To date, no data regarding the activities of and problem areas in the three regional institutions have been made available for the JICA-NWRMP Study. During the Field Work (II), the JICA Team was requested by the FMWRRD to visit the headquarters of these institutions for data collection; however, the JICA Team replied that the team members were not in a position to do so under the bilateral arrangement between the Governments of Nigeria and Japan.

12.1.3 Manpower Inventory in the Water Resources Sector

It may be mentioned that one of the aspects in the NWRMP is to assess the manpower available for the implementation of any programs related to Plan. Since the inception of Field Work (II), the JICA Team has asked FMWRRD for the manpower inventory and statistics nationwide; however, it had been identified that no data were available. As a matter of fact, the manpower inventory and statistics would give the details of water resources manpower covering the FGN, States, LGs and private sector, from which the inventory areas of surplus or deficit would be grasped, and the appropriate recommendations or implementation of the Pan would be made.

Two sources of the manpower inventory and statistics obtained were; (1) those for the Office and Departments of the FMWRRD Headquarters in Abuja as of May 1993 and (2) a draft report on "Manpower Survey in the Water Resources Sector" presented by the Skoup & Co., Ltd. in December 1993. As a matter of fact, the JICA Team may well wonder why no comprehensive manpower statistics are available in the Government sector because these should be the base for payment of the recurrent expenditures.

(1) Professional Staffing in the FMWRRD Headquarters

The professional senior staffing as of May 1993 delivered by the FMWRRD is given in Table 12-1 in comparison with the establishment as approved in 1991, and also summarized below:

Senior Staff Structure (As of May 1993)

Office/Department (Water Resources Sector)	1991 Approved Establishment	Current Strength	Vacancy Rate (%)
1. Honorable Secretary of State	37	21	43
2. Personnel Management	62	47	24
3. Finance and Supplies	44	30	47
4. Planning, Research and Statistics	55	35	36
5. Hydrology and Hydrogeology	97	51	47
6. Irrigation and Drainage	39	28	28
7. Water Supply and Quality Control	80	41	49
8. Dams and Reservoir Operations	46	8	83
9. Soil Erosion and Flood Control	40	10	75
Total	500	271	46

TABLE 12-1 SENIOR STAFF STRUCTURE BY GRADE (AS OF MAY 1993)

- FMWRRD Headquarters, Abuja -

Grade		Dept. of Planning, Research and Statistics		Dept. of Hydrology and Hydrogeology		Dept. of Irrigation and Drainage		Dept. of Water Supply and Quality Control		Dept. of Dams and Reservoirs Operations		Dept. of Soil Erosion and Flood Control	
GL	Position	Establishment	Strength	Est.	Str.	Est.	Str.	Est.	Str.	Est.	Str.	Est.	Str.
17	Director	1	1	1	1	1	1	1	1	1	1	1	1
16	Deputy Director	2	1	2	1	2	1	2	2	2	0	1	0
15	Assistant Director	2	3	2	2	2	0	2	2	2	0	1	0
14	Chief	4	2	5	3	6	2	6	0	4	0	4	0
13	Assistant Chief	6	2	12	3	2	0	5	2	2	0	6	0
12	Principal	5	4	14	9	0	1	6	0	4	0	4	0
11	Senior	0	0	0	0	0	0	0	0	0	0	0	0
10	Senior	13	3	6	0	8	0	22	3	8	0	2	0
09	Senior	9	8	49	27	12	13	20	16	4	2	8	2
08	Senior	10	8	23	19	3	11	14	14	14	3	11	6
07	Senior	2	1	2	1	2	0	7	1	5	2	2	1
Total of which:		55	35	97	51	39	28	80	41	46	8	40	10
	Professional	53	35	78	50	35	28	73	39	46	8	40	10
	Administrative	2	0	19	1	4	0	0	2	0	0	0	0

It is explained that considerable effort is being made to fill existing vacancies; for instance, (1) for the officers on salary grade level 12 and above, advertisements are made in some national dailies to attract suitable officers from both public and private sectors in Nigeria for application, shortlisting, interview and recruitment, while the officers on GL 10 to 07 are recruited from the Federal Civil Service Commission. As is clear from above, the vacancy rate in the Water Resources Sector as a whole is high, and those in two Departments of Dams and Reservoir Operations and Soil Erosion and Flood Control is particularly at critical level, so that it may be recognized that each Department could not perform its statutory functions with full responsibility.

Under the present circumstance that the change is taking place at the time when the financial constraints for the cut-back in expenditures and limit the Water Resources Sector's own activities, it may be too early to assess the Sector's performance or its objective although some observations have been made as follows:

- It has been observed that there is the general shortage of experienced staff in the public sector as a whole because this sector cannot offer such attractive salaries as those of the consulting and construction industries. As a matter of fact, the Water Resources Sector could not attempt to build up the staff capability to supervise the RBDA's activities, and it is suggested that the Water Resources Sector should rotate its staff through the RBDAs as one way of their gaining experience.
- The functions for each Department and its organizational structures so far established may be interpreted that the Water Resources Sector is directed towards the technical importance. Engineering and construction for the project facilities are not the area where the Sector's programs have run into problems. This has generally been caused by a consequence of poor planning without any detailed preparation of their feasibility based upon even poor data and inadequate handling of financial, economic, social and environmental considerations. In particular, the Sector has not initiated any effective measures to remedy this situation of poor, inadequate data, although being well-staffed with hydrologists and hydrogeologists.
- There would be a poor system of the personnel management and coordination which enlarges the bureaucratic constraints on interdepartmental activities and reduces the scope for people's participation in development. One example is less importance to agriculture in the public irrigation projects under the Water Resources

Sector. Since the long-run future of irrigation depends upon its intensification and integration of crops and livestock with agricultural inputs and related supporting services to the irrigated farmers, the Sector should have an in-house capability to assess these needs and establish the operational links with the FMANR and its research institutions.

(2) Skoup Manpower Survey in the Water Resources Sector

2.1 In accordance with the JICA Team's request for the FMWRRD, a nationwide manpower inventory work has been carried out during the period of May to December 1993 by entrusting this work to the Skoup & Co., Ltd., Enugu. The manpower inventory survey was as follows:

i) to identify all of the Federal, State and Local Government institutions and private sector agencies that are involved in water resources development.

ii) to identify the current manpower levels in each organization from salary grade level (GL) 06 and above and assess their adequacy.

iii) to obtain the manpower projections of agencies for the periods 1995, 2000, 2005 and 2010.

iv) to assess the manpower development proposals of the various organizations including funding and determine their relevance especially with the projected demands.

v) to identify the needs of relevant training and research institutions and assess their manpower position, student enrollment, projected outputs and constraints.

vi) to make appropriate recommendations for improving the manpower position to fill observed gaps.

2.2 The manpower survey was designed by using the questionnaire consisting of three sections:

Section A contains the general information about each organization with respect to name, location and ownership. The relevance of this is to find out if such organization are concentrated in urban towns or whether they have a wider geographical spread. Also, this Section attempts to find out the extent of involvement of private sector

organizations in the water resources activities and their plans for manpower development.

Section B which forms the core of the manpower survey, deals with the current and projected manpower position of each agency. It also attempts to identify the share of foreign and local inputs in manpower training and development.

Section C deals mainly with the training and research institutions. In this regard, the survey was aimed at identifying the level of training, current and projected student enrollment as well as the physical constraints to expansion of training and research in the institutions.

The target organizations and agencies to be surveyed included those of major users and trainers of water resources and manpower. Accordingly, organizations and agencies involved in the following lines of activity were identified for survey:

i)	Water supply	vii)	Sewerage
ii)	Irrigation	viii)	Pollution control
iii)	Drainage	ix)	Training
iv)	Hydro-Electric power	x)	Research
v)	Navigation	xi)	Other water related
vi)	Flood mitigation		functions not specified above.

Using this guideline, the following organizations were surveyed:

i) Federal Ministry of Water Resources and Rural Development (FMWRRD)
ii) Federal Ministry of Agriculture and Natural Resources (FMANR)
iii) Directorate for Food, Roads and Rural Infrastructure (DFRRI)
iv) National Electric Power Plc (NEPA)
v) Federal Inland Waterways Department (FIWD)
vi) River Basin Development Authorities (RBDAs)
vii) National Water Resources Institute (NWRI)
viii) State Ministries of Agriculture/Water Resources
ix) State Water Boards/Agencies (SWAs)

x) Agricultural Development Programs (ADPs)
xi) Universities/Polytechnics
xii) Other relevant Agencies

The choice of these institutions found justification in their demonstrated relevance to water resources activities and their wide geographical spread which ensured that equal weight was attached to all States in the survey.

Distribution of the questionnaire had covered 220 organizations and agencies across 29 States and FCT, and 119 sets of the questionnaire were retrieved from 27 States and FCT. It is mentioned in the Skoup Report that a number of problems were encountered during the manpower survey. The most prominent was the general strikes by various labor unions which delayed the program take-off on one hand and frustrated the questionnaire retrieval on the other hand. Some officials, both at the Federal and State levels, showed the lack of enthusiasm when approached with the questionnaires and were unwilling to cooperate for the survey. Virtually, there were no return from the CBDA, H-JRBDA and S-RRBDA in the Northern Region.

2.3 All of the field data on the 1993 manpower position collected are displayed in Table 24 "Water Resources Manpower in 1993" in Vol.3 "Water Resources Inventory Survey", which reflects a matrix of States and their corresponding organizations and agencies on the one hand and the different occupational grouping (professional class) on the other. This table indicates that some 23,996 staff of various categories from various agencies are available in the nationwide Water Resources Sector. On the basis of general information in this table, various analyses have been made being further synthesized and rearranged in different ways. Specific features derived from these analyses are given below:

- Out of the total 23,996 staff, there are 2,133 or 8.9 percent in the engineering related disciplines, 2,727 senior technological / technical officers or 11.4 percent and 4,105 or 17 percent of other unclassified staff in senior technical cadre, as shown in the following table:

Occupational Category	Number Available	%
1. SENIOR TECHNICAL (GL. 08 and above)		
Civil Engineers	537	2.2
Water Supply Engineers (Environmental, Sanitary, etc.)	169	0.7
Mechanical Engineers	326	1.4
Electrical Engineers	228	1.0
Chemical Engineers	136	0.6
Agriculture Engineers	202	0.8
Marine Engineers	19	0.1
Irrigation Engineers	156	0.7
Limnologists	2	0.0
Oceanographers	211	0.9
Surveyors	127	0.5
Chemists/Water Analysts	215	0.9
Drilling Engineers	43	0.2
Hydrologists/Geologists	286	1.2
Hydrological Engineers	31	0.1
Ecologists/Soil Scientists	115	0.5
Technologists/Technical Staff	2,727	11.4
Other Technical Staff	4,105	17.1
Sub-Total	9,635	40.3
Administrators	1,503	6.3
Accountants/Auditors	875	3.6
Other Administrative Officers	2,424	10.1
Sub-Total	4,802	20.0
2. INTERMEDIATE TECHNICAL (GL.06-07)	3,694	15.4
Technical Assistants/Technical Officers	214	0.9
Draughtsmen	132	0.6
Soil Technicians	184	0.8
Survey Assistants	250	1.0
Hydrological Assistants	792	3.3
Laboratory/Workshop Assistants	4,293	17.9
Others		
Sub-Total	9,559	39.8
Total	23,996	100.00

There are a total of 3,694 or 15.4 percent of total manpower in the intermediate technical grade (i.e. grade levels 06 - 07). Others in this grade consisting of draughtsmen, soil technicians, survey assistants, hydrological assistants, laboratory/workshop assistants account to 1,572 or 6.6 percent. Unclassified staff in this cadre also number 4,293 or 17.90 percent. Taken together, the total number of intermediate /

senior technical staff amounts to 9,559 or 39.8 percent of the total manpower surveyed.

The adequacy or otherwise of the staff categories referred to above, that is, senior technical, senior administrative/accountants etc. (grade levels 08 and above) and the senior technical (grade levels 06-07) cannot be determined without a statement on the workload of each technical category. However, it would appear to a casual observer that the administrative/accountancy cadre which provides support services for a comparatively small proportion of senior technical staff is far too many. Again, this is a matter to be determined by reference to existing workload. In other words, an acceptable ratio between the number of senior technical, senior administrative and junior staff would have to be worked out based on the program and workload envisaged in the execution of the NWRMP.

- The percentage share of manpower by States and Federal Ministries indicates that the FMWRRD has the largest number of staff, recording 2,351 out of a total strength of 23,996 or 9.8 percent. This is followed by Imo State with 1,762 or 7.3 percent, Adamawa State 1,693 or 7.1 percent, Bauchi State 1,687 or 7.0 percent and Enugu State 1,634 or 6.8 percent, while the States, Akwa-Ibom, Borno and Plateau have manpower strength of less than 100. There are 10 States having between 100 and 500 total staff strength. States with a total manpower strength of between 500 and 1,000 number 8 and those between 1,000 and 2,000 also number 8.

  The high number in Imo State is explained by the large number of institutions of higher learning which responded to the questionnaires. For Adamawa, Bauchi and Enugu States, the large staff strength is accounted for by staff of the State Water Boards and DFRRI. Kano State with a total reported staff strength of 1,513 or 6.3 percent is dominated by staff of the Ministry of Rural and Community Development, the State Water Board and a private agency, the Water Resources and Engineering and Construction Agency (WRECA).

- Manpower resources in the FMWRRD, the RBDAs and the NWRI, Kaduna are presented in Table 12-2 which reveals that the engineering core in the FMWRRD including two parastatals is dominated by civil engineers who make up 58 or 33 percent of the 172 engineers. It further shows that 48 or 29 percent of these civil engineers are employed in the parastatals with the Niger RBDA topping the list with 8 civil engineers, closely followed by the Benin-Owena RBDA which employs seven civil engineers. Additionally, the Table 12-2 shows that hydrologists and hydrogeologists form the largest number (147 or 18 percent) of technical staff (827). Of the 147 hydrologists / hydrogeologists, 97 are engaged in the FMWRRD while 50 are employed by the parastatals. Furthermore, Table 12-2

TABLE 12-2 1993 MANPOWER IN FMWRRD AND TWO PARASTATALS

CI/E = Civil Engr
ME/E = Mechanical Engr
WS/E = Water Supply Engr
EL/E = Electrical Engr
CH/E = Chemical Engr
AG/E = Agric. Engr
Oceano = Oceanographer
MA/E = Marine Engr
IR/E = Irrigation Engr
Surv = Surveyor
Limno = Limnologist
W/Analyst = Water Analyst
DR/E = Drilling Engr
Hydro/Geol = Hydrologist/Geologist
Technol = Tecnologist
Tech Staff = Technical Staff
Admin = Administrator
Acct = Accountant
Aud = Auditor
Soil Tech = Soil Technician
Soil Sc = Soil Scientist
Tech Asst = Technical Assistant
Lab = Laboratory
W/shop = Workshop
HY/E = Hydro Engr
Ecol = Ecologist

	PARASTATALS										FMWRRD									TOTAL
	A-IRBDA	B-ORBDA	CRBDA	LBRBDA	NDBDA	NRBDA	O-ORBDA	UBRBDA	NWRI	SUB-TOTAL	PM	F&S	PRS	H&H	I&D	WS&QC	SE&PC	DRO	SUB-TOTAL	
CI/E	6	7	5	2	2	8	4	1	6	41	-	-	1	-	-	-	1	6	8	49
WS/E	1	-	-	-	-	1	1	1	-	4	-	-	1	-	-	9	-	-	10	14
ME/E	-	2	1	-	1	1	4	-	1	10	-	-	-	-	-	1	-	1	2	12
EL/E	1	-	1	-	1	2	1	-	-	6	-	-	-	-	-	-	-	-	0	6
CH/E	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	0	1
AG/E	1	4	1	2	-	3	3	-	4	18	-	-	3	-	-	-	8	-	11	29
MA/E	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0	0
IR/E	2	1	3	4	1	4	6	4	-	25	-	-	1	-	19	-	1	1	22	47
Limno	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0	0
Oceano	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0	0
Surv	3	2	3	2	2	2	1	-	-	15	-	-	-	3	-	-	1	-	4	19
Chem./W. Analyst	-	6	3	-	3	-	1	-	6	19	-	-	-	-	-	8	-	2	10	29
DR/E	-	2	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-	0	3
Hydro/Geol	2	11	4	2	2	4	6	2	6	39	-	-	12	81	-	4	-	-	97	136
HY/E	-	-	-	-	-	-	-	-	-	0	-	-	1	-	-	-	-	1	2	2
Ecol/Soil Sc	6	3	2	2	-	12	2	-	1	28	-	-	-	-	-	-	2	-	2	30
Technol/Tech	-	-	22	65	12	17	6	17	5	144	-	-	4	3	5	6	-	-	18	162
Other Staff	3	11	-	60	8	50	11	87	-	230	-	-	11	-	-	-	-	-	11	241
Sub-total	25	49	45	139	32	104	46	112	31	583	0	0	34	87	24	28	13	11	197	780
Admin	23	14	18	14	18	16	14	3	3	123	42	4	-	-	2	-	3	-	51	174
Acct/Aud	10	5	12	10	11	27	19	4	6	104	-	14	-	-	-	-	-	-	14	118
Other Admn Staff	-	11	3	-	-	23	16	14	4	71	-	4	21	-	-	-	-	1	26	97
Sub-total	33	30	33	24	29	66	49	21	13	298	42	22	21	0	2	0	3	1	91	389
Tech Asst/Tech Off.	106	10	5	20	37	28	-	88	20	314	-	-	-	17	8	5	-	3	33	347
Draughtsmen	1	2	1	3	3	1	1	1	1	14	-	-	-	1	-	-	-	-	1	15
Soil Tech	-	2	8	3	-	3	-	1	1	18	-	-	-	-	-	-	-	-	0	18
Surv Assts	3	2	21	2	4	2	9	3	-	46	-	-	-	-	-	-	-	-	0	46
Hydro Assts	4	30	3	2	-	1	6	2	-	48	-	-	-	2	-	-	-	-	2	50
Lab/W/Shop Assts	-	22	3	1	-	7	4	3	3	43	-	-	-	-	-	-	-	-	0	43
Others	186	18	13	-	-	29	41	162	-	449	17	-	3	22	-	3	3	1	49	498
Sub-total	300	86	54	31	44	71	61	260	25	932	17	0	3	42	8	8	3	4	85	1,017
TOTAL	358	165	132	194	105	241	156	393	69	1,813	59	22	58	129	34	36	19	16	373	2,186

SOURCE: MANPOWER SURVEY IN THE WATER RESOURCES SECTOR (1993) by SKOUP CO. LTD.
Note: There were no returns from CBDA, H-JRBDA & S-RRBDA.

indicates a predominance of administrative officers (188) over engineering staff. There was no response from three RBDAs, namely, Chad Basin, Hadejia-Jama'are and Sokoto-Rima.

When this Table is compared with Table 12-1 as provided previously, there is a considerable difference in the FMWRRD manpower. At the same time, the manpower of RBDAs in this Table has been compared with that of 1991 as is compiled in the report "Monitoring of the RBDAs" by Skoup Co., Ltd. in September 1991 resulting in the presentation of Table 12-3. The big difference in the period of 1991 to 1993 may be interpreted by the fact that a partial commercialization policy for RBDAs is generally in progress, while there would be some distortion.

- As for the available manpower in selected Ministries and agencies including the institutions of higher learning and the two private sector agencies, the analysis shows that the SWAs top the list of civil engineers (207), water supply engineers (45), mechanical engineers and even electrical engineers. On the other hand, the ADPs show a high level of employment of the professionals in their core areas of agricultural and irrigation engineering. Paradoxically, the NEPA is second to the SWAs in the engagement of electrical engineers, activity area where the NEPA still holds a monopoly.

2.4 The Skoup survey of the manpower resources in the Water Resources Sector represents the first comprehensive attempt to examine the issue of manpower availability in the whole sector, while an earlier but undated, survey by the British Council considered only manpower needs and training requirements for irrigation in Nigeria. The outcome of this initial attempt which may not have truly reflected the level of resources committed to the exercise in physical terms, has created some insight into the various conditions that will guarantee success of future efforts in manpower auditing.

For any data to be relevant, tney must be current. For them to be current, they must be updated periodically. The water resources development requires the constant updating of available data and filling of data gaps on the various parameters and elements that affect decision making. The need for a periodic updating of manpower resource data, and indeed, the manpower survey cannot be over emphasized. Specifically, the result of this first effort should be regarded as "Foundation Data" which should be subjected to positive

TABLE 12-3 CHANGE OF MANPOWER (1991-1993) IN THE RIVER BASIN DEVELOPMENT AUTHORITIES

Item	A-I (B)		B-O (C)		C (A)		C-R (C)		H-J (A)		L B (B)		N D (C)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Professional	37	25	20	49	NA	NA	34	45	14	NA	33	139	58	32
Admins./Fin.	281	33	68	30	NA	NA	132	33	578	NA	117	24	392	29
Intermediate Technical	138	300	29	86	NA	NA	137	54	52	NA	184	31	293	44
Total	456	358	117	165	880	NA	303	132	644	NA	344	194	743	105

Item	N R (B)		O-O (B)		S-R (A)		U B (B)		Total	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Professional	19	104	83	46	122	NA	72	112	NA	NA
Admins./Fin.	158	66	384	49	268	NA	210	21	NA	NA
Intermediate Technical	163	71	234	61	381	NA	211	260	NA	NA
Total	340	241	701	156	771	NA	493	393	5,782	NA

(1): "Monitoring of the RBDAs"by Skoup Co. Ltd., in Sep. 1991.

(2): "Manpower Survey in the Water Resources Sector" by Skoup Co. Ltd. in Dec. 1993.

(A), (B), and (C): category of the RBDAs in terms of cessation of subventions under the TCPC. Refer to para. 12.4.4.

and continuous review and update. This continuous updating and review should be undertaken at regular intervals by the Planning, Research and Statistics Department of the FMWRRD which should establish, without delay, to create a procedure for regular and systematic manpower data collection, analysis, storage and retrieval.

12. 1. 4 Problems and Needs in the Water Resources Sector

(1) The World Bank Policy Paper: "Water Resources Management" (1993) compiles the information that (1) 22 countries today have renewable water resources of less than 1,000 cu.m per capita, a level commonly taken to indicate a severe scarcity of water, and (2) additional 18 countries have less than 2,000 cu.m per capita on average, being dangerously little in years of short rainfall. The situations in Nigeria are given below:

	Water Resources Potential	In 1991				In 2020			
		Population	Withdrawal	A/B	C/A	Population	Withdrawal	A/D	E/A
	(10^9 cu.m)	(10^6)	(10^9 cu.m)	(10^3 cu.m)	(%)	(10^6)	(10^9 cu.m)	(10^3 cu.m)	(%)
	-A-	-B-	-C-			-D-	-E-		
	-Surface Water-								
	267.30	-	2.71	3,020	1.00	-	20.21	1,437	7.56
	-Ground Water-								
	51.93	-	0.26	587	0.50	-	3.92	279	7.55
Total	319.23	88.5	2.97	3,607	0.93	186.0	24.13	1,716	7.56

It appears that the water resources situations per capita in Nigeria will be in the category of (2) as mentioned above probably in the 2010s. Since water is critical for the survival of human and animals, the FMWRRD should assume the central responsibility for its overall management, and his actions, when not properly formulated or implemented, often cause serious misallocations and waste of the water resources.

(2) It may be summarized from the organizational and legislative point of view that three problems related to the water-related activities are of particular concern: (1) fragmented public sector management which has neglected the inter-dependencies among the FGN and State agencies and

jurisdictions; (2) reliance on the overextended FGN and State agencies which have neglected the financial accountability, users participation and pricing while not delivering services effectively to the users in general and to the poor in particular; and (3) public investments and regulations which have neglected the water quality, human health and environmental consequences.

It is commonly understood that water moves through an intricate hydrological cycle of rainfall, infiltration, runoff and evapotranspiration that makes the water activities highly interdependent and results in the numerous externalities from various uses of surface and groundwater. Taking into account the water's special characteristics as well as the economics of scale and limited sources of water as a whole, it would be rather difficult to apply the unregulated markets to deliver water efficiently or to allocate it among sectors; hence, the potential for monopoly control would be high. Many of these problems on externalities and pricing would be corrected by appropriate Government policies that use market forces and incentives including taxes, regulations, enhancement of competitive pressures and so on, and other problems such as public goods and inadequate private investments may warrant the public sector ownership and control of specific activities.

As a matter of fact, the FMWRRD is facing the growing problems of addressing the water resources in a comprehensive manner under the situation that each type of water use is managed by a separate Department or agency - for example, domestic water supply, hydropower, inland fisheries and navigation - each responsible for its own operations and independent of the others. Issues related to the quantity and quality of water as well as the health and environmental concerns are also considered separately, as are the matters related to surface and groundwater. Resolving the problems of uncoordinated and fragmented decision making is particularly difficult in the FMWRRD, where the States have jurisdiction over water in their territory. In these cases, each State may develop the same water source without considering any impact on other States. This detachment may lead to critical situations where different agencies are developing the same water source for different uses within an interdependent water resources system.

Given that water is essential for life when it is scarce, the government generally tends to base the water allocations on political and social considerations rather than on purely economic criteria. It is common that the

government involvement reflects the understandable concern that exclusive reliance on unregulated markets would not work, resulting in heavy dependence on centralized command and control administrations for developing and managing the water resources and excessive reliance on government agencies to develop, operate and maintain the water systems; however, this would stretch too thin the government's limited implementing capacity, and the users would tend not to be consulted or involved in planning and managing the water resources. The result may lead to a vicious cycle of unreliable projects which produce the services not to meet the consumers' needs and for which they are unwilling to pay. In addition, the absence of financial discipline and accountability for the performance along with the political interference in decisions on allocations and pricing are generally reflected in repetition of the problems: inefficient operations, inadequate maintenance, financial losses and unreliable service delivery. It appears in Nigeria that pricing water below its economic value is prevalent and expanding the supply is politically expedient; therefore, pricing and demand management have received much less attention. The preference for expanding supply has led to the investments in infrastructure that could have been avoided or postponed and that have increased the pressure on water-dependent ecosystems.

The instutional arrangement thus needs be developed that encourage the water- related agencies to coordinate and establish mutually agreed upon priorities and policies for investment, regulation, and allocation, especially for the management of river basins. An alternative would be to strengthen the function of existing National Council for Water Resources (NCWR) who could have the responsibility for reviewing and recommending changes in investments and management to promote the overall water resources strategy and achieve the consistency within each river basin. To coordinate the activities at the national level, the NCWR may need to belong to the National Planning Commission and have adequate authority to monitor and review the water activities and to enforce the consistency with the national strategies taking into account an important principle in assigning responsibility that the policy, planning, and regulatory functions should be separated from the operational functions at each level of the Government.

(3) Nigeria has generally paid little attention to the water quality and pollution control or does not have the capacity to enforce existing legislation. Many public investment projects have adversely affected the water quality and

contributed to the degradation of aquatic ecosystems. In part, this has resulted because the piecemeal evaluations of water resources projects have overlooked the cumulative environmental degradation and the interactions within the ecosystem have not been adequately considered. The misuse of land particularly in agriculture, forestry and mining has resulted not only in the sedimentation of water courses and water pollution but also in poverty. When water is diverted for irrigation and other uses, its downstream areas that support sensitive water-dependent ecosystems including wetlands have become less able to fulfill their valuable functions such as filtering pollutants and supporting biodiversity. Important river fisheries have been, eliminated by such diversions, and important estuaries have been impaired by lower flows. These have occurred when traditional riverine communities have not participated in planning and implementing projects and when their needs have not been incorporated in them.

Against this background of mismanagement and waste, population is growing rapidly and with it the demand for water. The population growth and urbanization are the key factors underlying the most enormous growth in water demand and increased environmental degradation. This will also increase the demand for food supply, and thus for new and improved systems of irrigated agriculture. The population growth, majority of which will occur in urban areas will expand the demand for water of quality suitable for domestic and industrial use and for waste treatment; however, existing systems of the urban water supply and sanitation in Nigeria already fail to provide adequate services, and thus the problems posed by pollution are likely to grow. The costs of urban water supply and irrigation will increase even further when adequate sanitation and drainage facilities are included as essential parts of these investments. These developments as outlined above will pose a great challenge for the FMWRRD in appropriate management of the water resources in the coming decades.

12.2 DECENTRALIZATION, PRIVATISATION AND USERS PARTICIPATION

12.2.1 General

The primary roles of the public institutions in the water resources sector are (1) to define and implement a strategy for managing the water resources; (2) to provide an appropriate legal, regulatory and administrative framework; (3) to guide intersectoral allocations; and (4) to develop the water resources in the public territory. The strategy should spell out the priorities for providing water services; establish the policies on water rights, water pricing and cost recovery, public investment and the role of private sector in water development; and institute the measures for environmental protection and restoration.

Investments, policies and regulations in part of a river basin or in one sector affect the activities throughout the basin; therefore, these decisions need to be formulated in the context of a broad strategy which takes the long-term view, incorporates the assumptions of actions and reactions of all participants in water resources management and fully considers the ecosystems and socio-economic structures that exist in a river basin. Although this is an indicative planning process for dealing with the cross-sectoral and inter-linkage issues, the goal is to ensure the sustainability of water environment for multiple uses as an integral part of the Nigeria's economic development process. While the level of complexity of the strategy may differ among regions or States depending upon their problems, resources, priorities and capabilities, its execution and management should involve the public sector, private enterprises and water users groups.

Although the comprehensive analytical approach provides a framework for managing the water resources, it does not require a centralized delivery of the services. On the contrary, where the local management capabilities make it feasible, increasing the reliance or decentralized mechanisms changes the nature of the Government's work. It is commonly reiterated that the public finance theory and welfare economics provide an analytical framework for examining the public and private good characteristics of water resources activities as well as other attributes determining the efficiency of market forces. The provision and some of the production of pure public goods are essentially the responsibility of the Government, while pure

private goods can be handled efficiently by markets; however, most of the water activities are not strictly public or private goods, and these frequently require some forms of the Government regulation or involvement if the resources are to be used efficiently. Instead of distributing water, the Government should focus on establishing the incentives to ensure that water is distributed in the desired quality and at the lowest possible price that reflects its value taking into account the special needs of the poor.

In Nigeria, the development and management of water resources have been dominated by the Government, because it was believed that only the Government was able to handle the large investments and operations necessary for irrigation and water supply systems and that the crucial role played by water justified the Government control. The fiscal crisis that began in the mid-1980s, however, demonstrated the weakness of much of this argument. It has been observed that the deteriorating irrigation systems and the inadequate water supply infrastructures throughout Nigeria have exposed the serious institutional deficiencies of many Government agencies responsible for water resources. These include the lack of motivation and accountability of agency staff, high levels of political interference, and inadequate concerns for the needs of users; consequently, the users are not motivated to share in the costs of investment and maintenance or to pay for the services.

Solving these problems requires many inter-related reforms. One approach gaining the support is to increase the use of the private sector through concessionaire contracts, management contracts, private ownership, and participation by the users and communities in managing the water resources. This approach can introduce appropriate incentives which provide a sense of responsibility for water systems, improve the accountability and concern for users needs, constrain the political interference, increase the efficiency, and lower the financial burden on Government. As a matter of fact, the users and private sector participation in water management is not new. The communal irrigation systems have existed for generations in many of the Asian countries, while the development of private wells has been a major source of the irrigation expansion for the past two decades; however, the idea has generally been resisted by the vested bureaucratic interests or has been rejected due to the lack of confidence in the capacity and incentives of the private sector; however, the continued decline in the performance of irrigated agriculture and the

inadequacy of water supply systems have brought this top-down approach under great scrutiny that are frequently examined in the NCWR meetings.

12.2.2 Decentralization

Water's special features make it difficult to rely exclusively upon the market forces to perform this function. For retail water distribution, for example, the high fixed costs of piping systems for connecting households impart a tendency towards natural monopoly; hence, the prices it left to themselves may be too high. If the private firms are to be relied upon, the regulations governing pricing or mechanisms for ensuring competitive pressures should be warranted as are the mechanisms to protect aquatic ecosystems. If the public entities are to be relied upon, it is considered important that the financial autonomy and public participation are essential.

In fact, the programs that transfer existing Government-managed water system to private firms, financially autonomous utilities and water users associations are being implemented in many of other countries, particularly in the Asian countries where the tradition of farmer-managed water service systems is centuries old. As a matter of fact, the recent countries' experiences suggest that there are indeed many scopes for achieving more efficient patterns of the water use through the reliance on decentralized mechanisms to deliver the required services.

12.2.3 Accountability and Financial Autonomy

Setting prices at the right level is not enough, and the prices need to be paid if they are to enhance the efficient allocation of water resources. It has been commonly analyzed that the non-payment and non-collection of water fee reflect two problems: (1) weak incentives to collect and (2) limited willingness to pay due to poor services. In many cases of Nigeria, the record of non-and poor-collections may be attributed to (1) the luck of political determination to enforce collection and (2) the limited motivation of agencies to collect because they are not required to cover their costs; subsequently, the failure to recover the costs and reinvest in the systems has led to a vicious cycle whereby the service is declining with collection as spare parts and essential input materials

run out, and the consumers have in turn become less willing to pay for the poor-quality services provided. Conversely the high collection rates often reflect the decentralized management and enforced financial autonomy and accountability of water entities, that in turn deliver the high-quality services for which consumers are willing to pay.

The lessons of experience suggest that an important principle in restructuring the public services agencies such as RBDAs and SWAs in Nigeria is their conversion into financially autonomous entities with the effective authority to charge and collect the water fees as well as the freedom to manage without political interference. And, these entities need to work under a hard budgetary constraint which enhances the incentives for efficiency and revenue generation. It may be noted that the hard budgetary constraint unlocks the incentives to collect fees and to provide services that consumers and farmers want. In the context of pricings which cover the costs, the water metering for urban, industrial and agricultural users, and the ability of measuring how much water individuals and firms receive and of charging them accordingly should play an important role in accountability, and political independence of the water agencies serving these users.

12.2.4 Users Participation

The participation of users in managing and maintaining the water facilities and operations usually brings many benefits. It is of great importance that the local participation in planning, operating and maintaining the irrigation facilities and waterworks to supply water and sanitation increases the strong likelihood that these may be well-maintained and contribute to the community cohesion and empowerment in such ways that can spread to other development activities. This justifies the need to consistently promote the organization and strengthening of water users associations as a means to enhance the participation and effectiveness in water management. In addition, the Government benefits directly; financial and management burdens on the Government that result from administering the water allocation can be reduced through the users participation in both urban and rural areas. Depending upon the social context and local conditions, such users participation can progressively increase in intensity over the project cycle,

from the consultation at the design stage to the actual operation and management of some parts of the system.

12.2.5 Gender Issues

The critical role that women play in the planned change of development is currently accepted: since the importance of environmentally sustainable development is becoming an integral part of the development practice, the changes required to achieve the development practices that are sustainable may fall disproportionately on the shoulders of women. The women in Nigeria are often the primary resource managers and labor force participants in the agriculture, fisheries, forestry, energy and water and sanitation sectors, while such women are at once the victims of environmental degradation, the perpetrators of environmental degradation through desperation or ignorance, and potentially the best agents for planned changes in development practices for a more sustainable development.

In each key economic sector of Nigeria, women play key role. The deterioration of environment in these sectors changes the economics and the quality of their lives most directly.

(1) Agriculture

In Nigeria, women are the main agents in agriculture producing the majority of food. Additionally, they are the manager of storage, use and disposal of water and waste in agriculture and collect water used to irrigate crops. They make the key decisions on what to grow and what inputs, such as fertilizer, may be used. However, without secure access to land, short-term decision detrimental to the long-term fertility of the land is being taken. Traditional allocations of land have been disrupted by population pressure, so that women are being forced to clear traditional common land in fragile hill areas to produce essential family food where yields are lower and erosion rates are higher.

(2) Water and Sanitation

Women together with their children bear the prime responsibility of fetching it, storing it, cooking with it and disposing of it. In parts of Nigeria, water and its uses may account for as much as one-third of a women's work day. Emphasis to date has been on establishing rather than sustaining the water supply system's work and need to be included in design, maintenance, education and training and broader management control. Lack of a clean, reliable and convently located water source has major implications for village economic development and community health. The water quality in the urban systems-piped household connections, sewers, etc. are also equally critical since women have no alternatives in the urban setting to bad water resulting from improper disposal of waste matters through ignorance and lack of options.

Women are in an optimum position to begin the process of changing the attitudes and practices for improved environmental quality and managed/sustained development patterns. Improved opportunities for women and greater involvement of women in the design, implementation and maintenance of projects can contribute in several ways to sustainable development; including:

i) Improvement in the women's economic position lessens the pressure on common property resources which are suffering excessive depletion from women attempting to provide the basic subsistence to families.

ii) Improving the women's economic position and choices modifies the incentives for bearing children since the reduction in birth rates is essential for relieving the environmental pressure in the resource poor areas.

iii) Poor women are the prime users of common property-forest resources for multiple purposes contributing to deforestation, soil erosion and desertification Community wood lot and social forestry programs have traditionally excluded women and have not responded to community priorities. Assuring women in securing access to exploit common lands is increasingly proving to be more successful and quickly responsive to sound environmental management of land and forests by the poor than the regulations passed to restrict exploitation.

iv) In all regions, women generally have the control of and responsibility for subsistence food crop production from garden

plots and small livestock. Their specialist knowledge of food crop production and of multipurpose free varieties is important for agricultural and irrigation extension, since one objective of an environmental policy is to maintain the biodiversity and promote the integrated cropping systems; hence, the Government, extension services should be oriented to women's needs and expertise.

It may be noted that the recognition of the crucial role that women play in water management at the household level has recently led to a successful story of the water supply and sanitation projects such as those in Kenya and Bangladesh which demonstrate the merits of women's participation. Both the projects recognized that women would not automatically become involved, and a determined effort was necessary to ensure their participation, while both emphasized community participation and included the primary roles for women, but not to the exclusion of men. In addition, these projects resulted in savings for both the Government and the villages.

- Kenya: A project to develop and install a system for hand pumps began in 1983. Early problems prompted the organizers to bring in a local NGO specializing in developing self-help water systems and focusing on women's participation. Women were trained as extension workers and in community organizing and development. Both men and women were trained for the appropriate maintenance and repairs, and the local NGO motivated village men and women to organize themselves into a water committee being responsible for maintenance and repairs. By 1988, all of the pumps in 135 village water committees established were functioning. Both men and women had gained greater self-confidence and had an increased respect for and acceptance of women in public decision-making.

- Bangladesh: A program was created to install hand pumps and latrines. The sub-project was designed to be community-based, with a strong emphasis upon the inclusion of women from the beginning in selecting sub-project sites. They helped to cure the cement for the platforms and were trained to maintain both the pumps and the latrines, and women were also the main focus of the hygiene education program. 90 percent of the households used the hand pump for practically all domestic use, and virtually all of the adult population said they used the latrines regularly.

12. 2. 6 Water Users Associations

The hierarchical Government control system is remarkably typical in the development and management of large-and medium-scale irrigation projects. In Nigeria, the Government has designed and built the irrigation systems based upon its needs without consulting those who use the system. The weakness of this approach has been in maintaining these systems over the long term. It has been pointed out that the irrigation agencies have concentrated upon building new systems at the expense of maintaining existing ones; therefore, once built, many agencies are not able to perform the necessary OM. The agencies that levy a water charge to pay for OM have difficulty collecting it because the farmers are unwilling to pay for poor service, and the subsequent Government subsidies to pay for OM are often diverted to pay for new construction.

For these and other reasons, the movement to include the farmers in irrigation management is recently seen in Nigeria as a favorable way to stabilize most of the irrigation systems.

- One possible approach is to increase the users participation which improve the information flow, establishes a sense of the ownership, and gives the farmers proper incentives to ensure the system sustainability. At present, these concepts are lacking in almost all of the Government-managed systems, and farmers appear to believe that they are not responsible for maintaining it because they had no say in the original design and planning of these systems. Many examples indicate that when the knowledge and experience of farmers are adequately involved in planning, developing and operating an irrigation system, its performance improves with a positive sense that the farmers are more willing to contribute to the upkeep if they have a stake in the system.
- Another approach is to encourage the farmers to develop irrigation privately through communal systems or individually developed wells with the establishment of adequate credit system, both of which have contributed significantly to the development of irrigation in many of the developing countries. The following examples show four different approaches in introducing the private sector incentives:

a) Forming the water users associations:

Many examples demonstrate the effectiveness of water users associations in managing small-scale irrigation systems and tertiary canal networks where the associations to either already existed or were newly developed. A good example is seen in the Philippines where a half of the irrigated area is under the farmer-owned and-managed communal irrigation systems. Since the 1930s, the government has helped to construct and rehabilitate these systems, and in the mid-1970s, the National Irrigation Administration (NIA) began a unique participatory system. The process consisted of introducing an irrigation community organizer who acts a catalyst providing guidance and advice into a community to encourage the farmers to cooperate in OM. The farmers participate in all aspects of new development and rehabilitation, and a formal, legally recognized water users association is organized to carry on OM after the NIA withdrawal. While the procedures governing the association appear complex but work satisfactorily, there is no proof that the agricultural performance of these communal systems improves significantly after these changes; however, the farmers assigned are very supportive, and OM costs are met entirely by the beneficiaries.

As mentioned above, the Government can play an important role in fostering the users participation by providing the technical training for water users associations and community or institutional organizers. In addition, it has been common in many developing countries that local and national NGOs are undertaking a wide range of the water-related functions, from developing projects for rural water supply and small-scaled and minor irrigation to fostering the water users associations for water management purposes. Many NGOs stem from the local initiatives and operate as the independently funded and self-managed groups; therefore, they may bring, fresh views, new ideas and participatory working methods to other areas of the development policy and practice. Much of their success is attributed to their local knowledge as well as their interest in and experience of local conditions. They have been particularly active in promoting the interests of poor and disadvantaged groups through articulate and forceful advocacy and service provision. In addition, the local base of

NGOs may allow them to reach vulnerable or remote groups which are exceptionally difficult to reach with the conventional public schemes. Inputs from international NGOs will further strengthen the participation of local communities.

Water is not an easy sector in which to promote the cooperation, but the potential pains are high, which makes the renewed effort worthwhile. Resolution of many water allocation and development problems requires a common willingness to forego personal benefit for the social good. The Government efforts to promote the personal sacrifice through the policies and regulations that require self-restraint, such as water rationing or optimum groundwater pumping regimes, have seldom proved effective. On the other hands, the NGOs with their close local contracts and skills in group mobilization and cohesion, can provide the institutional leadership required to bring about the socially optimum solutions. It is stressed that the support and direct involvement of NGOs need to be consolidated through an appropriate institutional framework.

b) Transferring control to water users association

Transferring the Government-owned and- managed systems to the water users associations is more complicated because the farmers may be reluctant to take on what they perceive to be the Government responsibility. Many of the systems need to be rehabilitated before the farmers will take them over; however, these transfers may lower the financial burden on the Government and increase the farmer's sense of ownership.

In the Philippines, the NIA has tried to emulate the communal system within the national irrigation system, for which it is solely responsible. After a similar training process, the NIA starts a three-stage process of contracting with the water users associations to perform various levels of OM and collect the service fees. In the first stage, it contracts with the association to carry out OM under its supervision. In the second stage, the association collects the irrigation service fees, and the incentives are provided to achieve the target collection rate. In the final stage, the responsibility is transferred to

the association for all except the storage, diversion and conveyance works. As of 1989, 581 formal contracts covering 140×10^3 ha had been signed for OM of main system and collection of irrigation service fees, and only 35 contracts for full transfer had been signed. Overall results have been favorable with the majority of associations fulfilling their contracts, and it is considered that the apparent key to the process is the initial introduction of a catalyst to start the process.

c) Introducing the irrigation service fees:

This item can be controversial. Often the fees go directly to the Government which then doles out money according to its own budget. The farmers' incentive to pay the fees may relate directly to the service received. If they do not see their money being used to improve the irrigation system, they are unlikely to pay.

An example in the Philippines illustrates the direct link between the willingness to contribute, the participation and the service delivery. When the NIA gained its autonomy in 1974, its main source of revenue was the irrigation service fees which was intended to cover OM costs.

The fees are based upon a certain quantity of paddy, the income from which has been protected from inflation. While the NIA has had more success in cutting costs than in raising revenues, many farmers resist paying the fees because the service is poor in many areas and they oppose paying for the irrigation system over which they have no control. It is hoped that once farmers have a stake in the system and see the service improve, then the cost recovery will likewise improve.

d) Developing the well irrigation:

In many areas, the groundwater is the major source of water for irrigation. The most extensive use of groundwater resources is probably observed in South Asia, particularly India, Pakistan and Bangladesh. The Government was often the initial investor in tubewell development, but was unable to effectively operate and maintain them causing them to fall into disrepair and disuse. Farmers invested in tubwells in spite of the Government with greater success,

while the major concern with this development is the possibility of aquifer depletion and local monopoly pricing and the inability of private owners to integrate the management of surface and groundwater. It is general that the farmers with larger holdings and access to capital are the typical buyers of tubewells; however, the water markets have become common in areas with private tubewells, and the poor farmers have been willing to pay often high prices for water rather than rely on the Government tubewells.

12.2.7 Private Sector Participation

The important role of the private sector in promoting appropriate technologies suited to the local conditions, facilitating the marketing and input supplies and direct participation in the development itself is self-evident.

Establishing the institutional and regulatory arrangements that foster the efficient water supply systems is much complicated by the potential for natural monopolies in collecting, purifying and delivering water. In addition, many households which are mainly poor still lack the access to decent water supplies with much less appropriate sanitation. In Nigeria, the performance of water and sanitation organizations is poor, and the maintenance is a chronic problem. Many systems are plagued by high levels of the unaccounted-for water due to the failure to repair leaks or replace old pipes, the presence of illegal connections and the lack of meters.

In the urban water supply systems, the private sector participation was limited, because the private ownership of water systems tends to have natural monopoly positions given the high fixed costs associated with water piping systems, and the suitable regulations are necessary to ensure that prices and investments are appropriate. However, in the past few year, the interest in private sector participation has burgeoned, and various innovative forms have emerged. Four types of contracting arrangements are most commonly used in the urban water systems:

- With the service contracts, a public water agency hires a private firm to provide specific services such as reading meters, billing and collecting, and operating production facilities.

- A management contract lets a contractor assume overall responsibility for operating and maintaining the water supply system with the freedom to make day-to-day management decisions.
- Under the lease contract, a private firm rents the facilities from a public agency and assumes the responsibility for OM. The lessee finances the working capital and replacement of capital components with a limited economic life, while the public agency is responsible for fixed assets.
- With the concessionaire contracts, a private firm finances the investments in fixed assets in addition to the working capital. Assets are owned by the firm for the period of the concession and are transferred back to the public agency at the end of this period.

For the sewerage systems even in the countries with a long history of private sector participation as, for example, in France, the concessionaire contracts are relatively rare. The predominant form of private involvement in the sewerage systems is the public investment coupled with a private management contract typically for ten years.

These arrangements as already observed in several developing countries are designed to use the competitive market forces to improve the water management. Some examples in Chile, Côte d' Ivoire, Guinea, etc. demonstrate the potential role for the private sector in providing water supplies; however, a proper regulatory framework should exist for the private sector to be willing to take the risk of investing, even for service contracts. This is perhaps the greatest challenge facing the developing countries, and the World Bank is currently trying to help with the research and technical assistance to develop these frameworks.

For the rural water supply, the link between the community participation in project development, users responsibility for OM and the quality of service has been demonstrated by the success of a few rural water supply programs in Africa and South America. Several donors have been involved in the community-managed rural water supply projects with the limited Government support.

Private investment in irrigation is an extension of the push for users participation; however, the privatisation requires an appropriate environment.

It is observed that the most impressive results from privatisation come from Bangladesh where the government has increasingly withdrawn from the sale of tubewells and pumps through a series of import program credits in the 1980s. Since allowing the private involvement after some initial hesitancy and setbacks, sales of such equipment as mentioned above have considerable grown.

The private sector involvement and users participation in the water resources management are not new; however, they are still resisted. Unfortunately, the water resources agencies in Nigeria tend to impose their will on users deciding the schedules and maintenance as suits their needs, and this may result either in inaction on the part of, the agency due to the lack of fund or technical capacity, or invasion on the part of water users at the expense of equity and efficiency. This inability of most of the Government agencies to satisfy the service demands calls for a drastic reform and a different approach. The explanations as made above demonstrate the willingness of the private sector and users to play a larger role in managing the water resources and improving the water use. It is stressed that the users participation and private sector involvement can provide the necessary incentives for stabilizing the irrigation and water supply systems and for improving their performance, and these can add the flexibility, transparency and accountability as well as lessen the financial and administrative burden on the Government. Resistance, however, will continue, but the greater private sector and users participation offers an effective means to decentralize the water resources management and to increase the users responsibility for managing and financing the water resources projects.

12.3 WATER RESOURCES DECREE, NO.101 OF 1993

12.3.1 Legal Framework

The decree was drafted and submitted to the Council of Ministers in February 1988 for consideration and approval and subsequently for promulgation. By the Council Conclusion 12 of February 1988, the Federal Ministry of Justice was directed to draft a final decree after the inputs were received from the interested parties. The Decree was promulgated on 23 August 1993 by the FGN and reached FMWRRD for ready reference at the end of January 1994. The Decree, No.101 of 1993 is composed of the following 21 Sections:

Section

1. Vesting of rights and control of water in the Federal Government.
   - all water in any water-course affecting more than one State as described in Schedule to this Decree.
2. Rights to take and use of water.
3. Acquisition for rights to use or take water.
4. Control of groundwater.
5. Administration of provisions of Decree.
6. Master plan.
7. Power to withhold release of fund.
8. Power of the Secretary (viz. the Minster at this stage).
9. Unlawful diversion of water, etc.
10. Application for licence.
11. Issuing of licence.
12. Power to order removal of hydraulic work.
13. Licence fee.
14. Power to impose fees, rates and charges.
15. Power of fix and levy rates.
16. Recovery of unpaid money.
17. Delegation of power.
18. Penalties.

19. Regulations (for the due administration of the provisions of this Decree).

20. Interpretation
- "Public Authority" includes the Secretary or any member of the civil service of the Federation, State or Local Government or of any commission, authority or statutory corporation established by the Government of the Federation, State or Local Government.

21. Citation.

The Sections 1 and 3 clearly stipulate that:

- The right to the use and control of all surface and groundwater and of all water in any water course affecting more than one State as described in the Schedule to this Decree is by virtue of this Decree and, without further assurance, vested in the FGN.
- Any person or any public authority may acquire a right of use or take water from any water course or any groundwater described in the Schedule to this Decree for any purpose in accordance with the provisions of this Decree and any regulations made pursuant thereto.

The Schedule as mentioned above is as follows:

Source 1 (HA-I) — Niger River from the border to the Kainji outlet, including:
- Sokoto Rima River.
- All the Niger tributaries crossing the border to Benin Republic.
- Sokoto sedimentary HGA.

Source 2 (HA-II) — Niger River from the Kainji outlet to the confluence with the Benue River, including:
- Kaduna River
- Gurara River
- All the Niger tributaries crossing the border to the Benin Republic.
- Upper Niger sedimentary HGA.

Source 3 (HAs-III & IV) Benue River from the border to the confluence with the Niger River, including:

- Gongola River.
- Pai-yul River.
- Wase River.
- Shemankar River.
- Dep River.
- Mada River.
- All the Benue tributaries crossing the border to the Republic of Cameroons.
- Benue Sedimentary HGA.

Source 4 (HA-V) Niger River from Lokoja to the Niger Delta including all water tributaries or influent thereto or diffluent therefrom, including:

- Anambra River.
- Imo River.
- Akwa-Ibom River.
- Aboine River.

Source 5 (HA-VI) All littoral water courses from the border with the Benin Republic to the mouth of the Foreados River, including:

- Oshun River.
- Ogun River.
- Shasha River.
- Owena River.
- Ogun/Oshun sedimentary HGA.

Source 6 (HA-VIII) All water courses influent to the Lake Chad, including Chad sedimentary HGA.

Source 7 (HA-VII) The Cross River in Nigeria and all water tributaries or influent thereto or diffluent therefrom, including the Cross River sedimentary HGA.

12. 3. 2 Regulations Required for Water Resources Administration

(1) Introduction

As a matter of fact, the Water Resources Decree is giving the FMWRRD a basic foundation to perform the public administration of the water resources management. It is stressed that a series of the Regulations in accordance with Section 19 should be urgently prepared and enforced for due administration of Provisions of this Decree, which shoud be one of the important work items in the National Water Master Action Plan (2000).

During the course to implement the NWRMP towards the year 2020, it is forecasted that the fundamental and far-reaching problems will arise as the demands on the nation's water resources approach the limit of the resources available, and the increasing population density and expanding urbanization and industrialization may impose the pollution loads on surface and groundwater that cause substantial further reductions in the quantity suitable for most uses. No less than the economic well-being of society and the health of its surrounding environment will be more vulnerable to the water resources management decisions made by the FMWRRD under these conditions.

Nigeria is moving from a phase where the water development dominated activities in the Water Resources Sector to that where more sophisticated water management and facility OM dominate. The rate and magnitude of these changes affecting the Water Resources Sector will enforce major new initiatives; indeed, as more pressing needs in water management are addressed, several basic institutional principles with respect to laws, customs, organizations and all that are associated will evolve. And, the administration of resources allocation, long-term and real-time management and the financing of essential activities will follow similar paths.

The proposed approach to assessment, development and management of the freshwater as is examined in the previous Chapters involves the proper understanding that the freshwater is a finite and vulnerable resources and the integration of sectoral water plans and programs should be made within the framework of national economic and social policy. A more integrated and broader approach to the water sector, policies and issues is important because of water's special nature as a unitary resources. Rainwater, rivers, groundwater

and polluted water are all part of the same resources; thus, the water use in one part of the system alters the resources base and affects the water users in other parts.

Water policies, legislations, regulations, projects and administrative actions overlook these linkages. As is seen in the FGN structure, the water resources sector activities are separately organized and administered: one department is in charge of the public financed irrigation and another of the private irrigation; a second oversees the water supply and sanitation; a third manages the hydropower activities; a fourth supervises the inland navigations; a fifth directs the environmental policy including the control of water quality. These fragmented bureaucracies make the uncoordinated decisions reflecting individual agency responsibilities that are independent of each other, and different departments tend to develop the same water resources within an interdependent system for different and competing uses. This project-by-project and department-by-department approach should no longer be adequate for addressing the water resources issues.

To help resolve the growing number of water resources issues, the FMWRRD is increasingly being called upon to review and explain the conditions, problems and progress in the overall water resources sector. This integrated approach requires the FMWRRD to understand not only the water cycle including rainfall, distribution, ecosystem interactions and natural environment and land-use changes, but also the diverse inter-sectoral development needs for water resources.

During the course of the NWRMP Study, it has been observed that inadequate and unreliable data constitute a serious constraint to examining the nationwide water resources plans and strategies. In order to make sound decisions about water management especially in the context of investment projects and real-time management of the resources at the level of the basin or watershed, a considerable amount of information will be required, although the appropriate degree of detail and sophistication of information systems needs to be determined in the context of the river basin. In general, the current data concerning the water supply and demand conditions that are critical for efficient day-to-day management should be consolidated, and a long-term demand forecast is needed as are adequate assessments of the water resources and environmental impacts.

To meet these information needs, the FMWRRD should:

a) define the information requirements for national water resources taking particular account of the multiple demands for water;

b) review the institutional arrangements linking the providers and users of data;

c) identify and implement appropriate mechanisms for funding the hydrological services, where such arrangements are required to provide proper financial resources;

d) select appropriate technologies for collecting data particularly on water quality and groundwater, and for implementing the user-friendly data management systems;

e) strengthen a national databank for the information on water resources; and

f) define the human resources needed for hydrological information systems and provide education and training to meet those needs.

(2) Scope of the Regulations

It is important to identify three areas of pertinent Government actions: legislative, operational and regulatory where effort should be applied to improve the resource management capability:

- The legislative area creates the legal basis for all activities, and its history reflects the nation's response to changing conditions. It includes: legislated policies, regulations and authorization and funding of basic programs and projects. The identified need for many of these may originate in the Government bureaucracy, and much of their content may be formulated there as well. The fate of programs, however, is ultimately determined through the legislative process, hence, political process.
- The operational area includes the data collection, planning, design, construction and OM. The primary actions are carried out in accordance with the authorization invoked by the legislative body. All actions deal with the phases of programs to utilize and manage the resources. In Nigeria, the Government line agencies at various levels dominate the operational area, while the non-Governmental bodies would not always play the roles that expand as the actions move towards the OM phase.

- The regulatory area constitutes the framework for guiding the program actions and measuring the results in conformity with certain standards. This includes monitoring activities and conditions, and enforcement of established decrees, regulations and specific-purpose agreements bearing on the resource use. Those commonly to be enacted may pertain to rights to the resources; real-time allocation; appropriateness of resource use; quality effects of any use; facilities configuration; safety of facilities and environmental impacts. All of the water users are responsible in complying with the regulations, but the Government institutions should carry the regulatory responsibility to assure the adherence.

Urgent attention should be paid to, among others, clear demarcation of the Federal responsibilities; preparation of river registers; hydrological monitoring and surveillance with the establishment of basic reference control points (BRCPs) over major rivers and monitoring wells for critical groundwater withdrawing areas in terms of quantity and quality; preparation of proper initiation and implementation procedures on irrigation, waterworks, sewerage, multipurpose dams and so on; establishment of appropriate coordination system for water resources activities and watershed management programs among the agencies concerned; and institutional arrangement for enforcing the Decree within the FMWRRD.

The principles of sound water resources institutions are generally presented under four grouping: (1) resources ownership, allocation and rights; (2) standards, regulations and administrative rules; (3) Government and non-Governmental responsibilities and organization; and (4) financial. The good reference is made to the World Bank Technical Paper Number 191 "Water Resources Institutions: Some Principles and Practices" (1992) for subsequent discussion and examination of this subject in more detail to be made by the FMWRRD, from which major contents are introduced below:

- <u>Some Principles for Sound Water Resources Institutions</u>

1. Considerations when Examining Institutional Principles:
   - The dominant role of the political process
   - The nature of water institutions
   - Reasons for differences among countries
   - Primary areas of Government action

- A basis for change

2. Resource Ownership, Allocation and Rights:
   - Water allocation objectives
   - Water allocation mechanisms
   - Water rights systems
   - Interstate water rights agreements in Federal systems
   - International water rights agreements
   - Land-use rights
   - Acquisition of key sites

3. Standards, Regulations and Administrative Rules:
   - Rules for administering water- and land-use rights
   - Environmental quality standards and regulations and rules for their administration
   - Dam safety standards and regulations and rules for administration
   - Service quality standards and regulations and rules for administration
   - Financial and management standards for regulations for administration

4. Government and Non-Governmental Responsibilities and Organization:
   - Participants in the resources area
   - Government functions to meet its responsibilities
   - Structure and flexibility
   - Organization
   - Linkage of water- and land-use management
   - Linkage of water quantity and quality management
   - Linkage of surface and groundwater management
   - Linkage of agency jurisdiction to geographical and political bounds
   - Separation of line (operations) and regulatory functions
   - Separation of functions in the environmental area
   - Separation of the line functions
   - Public participation in advice and oversight

- Basin water entities
- Water services as utilities
- Assigning planning responsibilities
- Assigning line agency responsibilities
- Assigning service functions to beneficiary entities
- Assigning regulatory functions
- Assigning data collection functions

5. Financial:
   - Project cost and allocation among purposes
   - Service cost components
   - Cost recovery
   - Service charge mechanisms
   - Funding capital expenditures
   - Funding OM expenditures and government guarantee of
   - Full OM funding

- The Application of Principles

1. Resources Ownership and Allocation:
   - Ownership
   - Water allocation
   - Water allocation and land-use rights
   - Surface water rights systems
   - Groundwater rights systems

2. Interstate and International Water Agreements:
   - Regulatory water quality and pollution control standards
   - Land-use regulation to control pollution
   - Pollution fees

3. Organization and Responsibilities:
   - Resource ownership responsibilities
   - Linking quality and quantity
   - Linking water and land use
   - Separating operating from regulatory entities
   - Basin agencies
   - Service entities structured as utilities

- Bulk water services

4. Water Charges and Financing:
   - Utilities independent of government budgets
   - Cost of service
   - Water service pricing
   - Service subsidies
   - Business principles

(3) Some Considerations in the NWRMP Study

During the final course of the JICA Field Work (III) since January 1994, a study of the legislative aspect to be involved in the NWRMP was commenced upon organizing a small group in the FMWRRD. First, a thorough review on the laws in Japan including (1) "River Law" under the Ministry of Construction, (2) "Land Improvement Law" (so-called Irrigation Law) under the Ministry of Agriculture, Forestry and Fisheries, (3) "Water Works Law" under the Ministry of Health and Welfare, (4) "Sewerage Law" under the Ministry of Construction, and (5) "Multipurpose Dam Law" under the Ministry of Construction was made as examples of the Regulations to be involved in the draft water resources decree although the socio-political situations in Nigeria are quite different from those of Japan. At the end of January 1994 when a text of the Water Resources Decree, No.101 of 1993 was delivered, some of the basic items had been brought into the group study.

Various issues relating to the Decree for examination included:

a) Scope of the Rivers as Described in the Schedule:

It is defined that any water courses crossing the international borders and affecting more than one State are included in the Schedule; however, many questions on rivers and hydrogeological areas as compiled in the Schedule were raised. Accordingly, the following comments were made:

- The water courses under the Decree, to be clearly demarcated on the products under the JICA-SIA.
- The administration of any water course within one State to be done by the State concerned with appropriate reporting to

FMWRRD for overall coordination. This will be directed by the FMWRRD Regulation.

In addition, the proposed river administration system was suggested as given below:

- An integrated resources operations and management of a particular river basin should be promoted with the principle of the unity of this river system from its upper reaches to its river mouth. Three types of the river administrators under the ultimate authority of the Federal Minister in accordance with the Government system should be designated for each of the three sections in the river system:

River Class	River Administrator
A	Federal Minister
B	State Governor(s)
Others	LGA Chairmen or Community Heads

- In connection with the river administrative system, a budgetary system establishing uniform rates of the expenditures by each of the river administrators on various river works for the general public should appropriately be formulated. The proportions of such project costs to be borne by the FGN are shown below as an example:

River Class	Scale of Project	FMWRRD Rate of Subsidy
A	Large	3/4
B	Ordinary	2/3
Others	Ordinary & Small Repair	1/2 ~ 1/3

b) Water Use Rights and Related Issues:

Legislation is required to coordinate the private rights with the public rights and many other interests because the problem of ownership is paramount. There may be some of the stipulations:

- The river area and the river water cannot be the object of private right.
- Only the river water cannot be privately owned in a sense that this is just a declaration of the inalienability of flowing water which is a legal aspect of the hydrological cycle. This means that the river is at most a combination of river water and river area, but by no means a unity of the two in the strict sense of

property law. There are two sorts of the public domain, (1) one is natural or the public domain in its natural state, and (2) the other is man-made or is the public domain by decision of a public authority. Virtually, the rivers are deemed to be the former, although many parts of them are actually man-made; in this light, there should be reasonable limitations to the liability of public administrations in the management of the rivers which are naturally dangerous.

At any rate, any person who intends to construct, reconstruct or remove a structure on the land within a river area is to obtain the permission of the river administrator.

It can be observed in the water use history of any country that the principle of "First in Time, First in Right" (priority in respect to time) has been overwhelmingly predominant from the time immemorial, although there are the cases of "Priority to Upstream Users" (priority in respect of place); indeed, there have been many cases of equitable distribution among water users, old/new and upstream/downstream. It may be noted that within the limited scope of the water resources, the water use right is by no means absolute and exclusive, but should be vested only for a specified purpose and an explicit amount of water as actually needed in terms of beneficial and reasonable use.

As a matter of fact, older customary water use rights mainly for agriculture in wetland areas exist for several decades; however, these would be difficult to comprehend and protect, and some parts of them may be subject to fall into abeyance. Another aspect is that the water use rights could originally be divided into two: (1) comprehensive rights granted to the managers/operators of such large water source works as dams and diversion weirs, and (2) a limited right granted to water users for practical purposes. The latter has to ask the former for actual water use, which would remain under the overall disposal of the river administrator. At any rate, the organization and rationalization of water use rights are, therefore, important tasks for the future river administration. For example, the River Law in Japan stipulates the following:

(Purposes)

Article 1. The Purpose of this Law are to contribute to the land conservation and development of the country and thereby to maintain public security and promote public welfare, by administering rivers comprehensively to prevent occurrence of damage due to floods, high tides,

etc., utilize rivers properly and maintain the normal functions of the river water.

(Permission for Use of River Water)

Article 23. Any person who intends to use the water of a river shall obtain the permission of the river administrator as may be provided for in detail by Ministry of Construction Ordinance.

(Permission for Construction etc. of Structure)

Article 26. Any person who intends to construct, reconstruct or remove a structure on the land within a river area shall obtain the permission of the river administrator as may be provided for in detail by Ministry of Construction Ordinance.

Generally speaking, as a result of the economic growth and advance in living standards, a vast amount of the river water will be drawn and consumed, and even if it returns it will be heavily contaminated. Moreover, the waterfronts on river beds and along riversides are being devastated in the course of urbanization. In other words, many rivers particularly in the Southern region in Nigeria would loose their original beauty. In addition, the people's aspiration for waterfront access may be enhanced for a better quality of their life. There is a complicated issue on the nature of such rights of access as the legal status of public access to public waterways, whether they are public or private rights. In Japan, access to the waterfronts resembling "Rights of Environment" is currently being recognized as one of the major objectives in river administration to promote environmental policies such as to guarantee an adequate quantity of river water, to make the river water clean and to enhance the accessibility of beautiful riverine landscapes; however, the standard of such administration has not yet been established.

c) An Example of the River Registers:

In accordance with Article 12 of the River Law in Japan "A river administrator shall prepare a set of registers of the rivers he administers and keep it in custody", the form in Japan was shown to the study group because the river registers should be a pre-requisite for the river administration in conformity with the Water Resources Decree:

- The Register of the Present River Conditions:

- Name of the main and tributaries with the designation dates.
- Drawings with the river sections in km and the hydrological information at basic reference control points (BRCPs) including max., 95-day, 185-day, 275-day, 355-day, and min. & ave. discharges and annual runoff.
- Outline of the river administration facilities including the name, location, completion year, structure and capacity, and reference drawings.
- Outline of the licenses on river use including the item, name of the person having a license, location, issuing date & number, effective period, and reference drawings.

• The Register of Water Use:
- License on water use including the name of river, facility, purpose, name of the person having a license, location of water use, diversion amount, major river works with structure, capacity, completion year & appurtenant facilities, issuing date & number with effective period & incidental conditions, change of the license if any, and reference drawings.
- Dam inventory including the name, owner, purpose:
  - dam body - - - river name, location, type, foundation geology, and dam dimensions including height of crest & overflow section, crest length, slopes and dam volume.
  - reservoir - - - area of catchment & inundation, total & effective storage, water level including flood, full water, control & min., and backwater distance in flood and ave. flow.
  - appurtenant facilities including spillway, emergency spillway, outlet, fishway, observation & monitoring, communication, warning system, and others.
  - date of issuing the license & effective period, name of an engineer for OM, construction period with contractor name, date of starting the water use, change of the license if any, and reference drawings.

d) Cost Allocation in Multipurpose Water Resources Projects:

- The Need for Cost Allocation

Whenever the financial responsibility of a projects is divided, its total cost should be distributed among responsible groups. In this connection, it is duly required to divide the cost of a multipurpose water resources project among the respective project purposes such as irrigation, hydropower, flood control, domestic water supply, fisheries and others. The procedure for dividing total financial cost among the responsible parties is called "Cost Allocation". Once a formula for allocating the cost is established, it needs to be incorporated into a legally binding cost-sharing agreement.

- The Separable Costs-Remaining Benefits Method

The method commonly adopted in many countries for making the cost allocation is known as the Separable Costs-Remaining Benefits Method. This method is a procedure for the equitable distribution of the cost of a multipurpose projects among the purposes served. Briefly, it provides for (1) assigning to each purpose its separable cost, i.e., the added cost of including the purpose in the projects; and (2) assigning to each purpose a share of the remaining or residual joint cost in proportion to the remaining benefits, i.e., the benefits (as limited by alternative cost) less the separable cost. Thus, the method provides for an equitable sharing of the savings from multipurpose development among the various purposes included.

- Definition of Terms

(1) Alternate Cost

The alternate cost for each purpose is defined as the lowest cost of achieving the same or equivalent benefits in single purpose structures that will accrue to each purpose in the multipurpose structure.

(2) Separable Cost

The separable cost for each project purpose is the difference between the cost of multipurpose structure and the cost of the structure with that purpose omitted. In calculating separable costs, each purpose should be treated as if it were the last increment of a multipurpose project. This will show the added costs of increased size, changes in design, or other factors that would be necessary to add the purpose to the project.

(3) Specific Cost

This cost for each project purpose consists of the cost of facilities that exclusively serve only one project purpose. Special intake works need for irrigation, but not for flood protection.

(4) Joint Cost

This is the difference between the cost of the multipurpose structure and the sum of the separable costs (or specific costs) for each purpose.

- Description of the Method

The following steps are normally involved:

S-1: Estimate the total cost of the multipurpose structure.

S-2: Estimate the benefits for each purpose.

S-3: Estimate the alternate cost of achieving the benefits shown in S-2.

S-4: Determine the maximum alternative justifiable expenditure for achieving benefits which is equal to the lesser value of S-2 and -3.

S-5: Estimate the separable cost for each purpose.

S-6: Determine the remaining benefits which are equal to the difference between S-4 and -5.

S-7: Determine the joint cost which is the difference between the total cost of the multipurpose project and the total of the separable cost for all project purposes. The joint cost is then allocated to each purpose in the same proportion as the remaining benefits for each purpose are to the total remaining benefits for all purposes.

S-8: Determine the total allocated cost for each purpose by adding the separable cost to the allocated joint cost.

- Example of Cost Allocation

It should be noted that this Method will allocate the costs to purposes so that each purpose is economically justified, provided that two requirements of project formulation are met:

- Overall ERR is favorable.
- The cost of adding each purpose as the last increment (separable cost) does not exceed the benefits derived therefrom.

Data applying to a dual-purpose structure are shown below. OM costs are the capitalized values in all cases.

- Basic Data -

(Unit: ₦×10⁶)

Item	Flood Protection	Domestic Water Supply	Total
Benefits	50.0	45.5 (equal to Alt. Cost)	
Alternate Construction Costs	35.0 (1)	40.0 (2)	
Alternate OM Costs	5.0 (1)	5.5 (2)	
Separable Construction Costs	21.0 (3)	28.0 (4)	
Separable OM Costs	2.5 (3)	3.0 (4)	
Total Construction Costs			62.0 (5)
Total OM Costs			8.0 (5)

(1) Alternate is a system of flood control embankment.
(2) Alternate is a system of wells and pumps.
(3) Cost of elements of dual-purpose structure which can be omitted if flood protection is not provided.
(4) Cost of elements --- if domestic water is not supplied.
(5) Applying to the dual-purpose structure.

- Computation -

(Unit: ₦×10⁶)

Item	Flood Protection	Domestic Water Supply	Total
1. Benefits	50.0	45.5 (1)	95.5
2. Alternate Costs			
Construction	35.0	40.0	75.0
OM	5.0	5.5	10.5
Sub-total	40.0	45.5	85.5
3. Benefits Limited by Alternate Cost (lesser of 1 or 2)	40.0	45.5	85.5
4. Separable Costs			
Construction	21.0	28.0	49.0
OM	2.5	3.0	5.5
Sub-total	23.5	31.0	54.5
5. Remaining Benefits (3 - 4)	16.5	14.5	31.0
6. Allocated Joint Costs			
Construction	6.9 (4)	6.1 (5)	13.0 (2)
OM	1.3 (6)	1.2 (7)	2.5 (3)
Sub-total	8.2	7.3	15.5
7. Total Allocated			
Construction	27.9 (8)	34.1 (9)	62.0
OM	3.8 (10)	4.2 (11)	8.0
Total	31.7	38.3	70.0

(1) For purpose of benefit calculation, it is considered that water is worth at least its cost to a municipality.

(2) Total cost (62.0) - Separable cost (49.0) = 13.0

(3) Total cost (8.0) - Separable cost (5.5) = 2.5

(4) $16.5 \times 13.0/31.0 = 6.9$

(5) $14.5 \times 13.0/31.0 = 6.1$

(6) $16.5 \times 2.5/31.0 = 1.3$

(7) $14.5 \times 2.5/31.0 = 1.2$

(8) $21.0 + 6.9 = 27.9$

(9) $28.0 + 6.1 = 34.1$

(10) $2.5 + 1.3 = 3.8$

(11) $3.0 + 1.2 = 4.2$

e) Relation with the Navigable Waterways Decree, No.56 of 1988:

The Navigable Water ways Decree was promulgated on December 25, 1988 under the jurisdiction of the Inland Waterway Department (FIWD) of the Federal Ministry of Transport. This Decree has two important articles as given below which proper coordination should be made between the Water Resources Decree, No.101 of 1993:

i) The right of land usage for improvement of navigability and provision of infrastructure shall cover areas on both banks of the waterway which would be submerged in a flood of 100 years return period.

ii) In case of waterway with steep banks where such floods have no overbank flow, the right of way shall include the area of land along the waterway measured 100 m perpendicular distance from the edge of the channel.

iii) Notwithstanding the provision of the Constitution of the Federal Republic of Nigeria 1979 as amended, the Land Use Act 1978 or any other Land Laws, the FIWD shall have right to all lands within the right-of-way of a declared waterway to use such lands in the interest of navigation.

iv) No person, firm, State or corporation may obstruct a declared waterway, take sand, gravel or stone from any declared waterways, or erect permanent structures within the right-of-way or divert water from a declared waterway, without the consent of the FIWD and the approval of the Minister.

12.3.3 Related Administrative Reform

(1) Department of Water Administration

It should be properly understood that subsequent major role and responsibility of the Water Resources Sector, FMWRRD are to coordinate the development and management of both available surface and groundwater in a well-defined manner in line with the promulgation of the Federal Water Resources Decree in 1993. Taking into account the future role and work load in the Federal administration of relevant water resources matter as a whole with a sense that enforcing the Decree is quite different from its promulgating, it is

recommended to create newly a competent Department of Water Administration which should be equipped with the technical and managerial background to enforce the Water Resources Decree to a fully practical extent.

As a matter of fact, the Department of Water Administration should be positioned as a cornerstone of other operational departments in the Water Resources Sector, FMWRRD which would be established in a form of enlarging and amalgamating the functions of existing Department of Hydrology and Hydrogeology that are not directly related to the public administration of nation's water resources but to merely the technical-oriented matters including observation, collection, processing, storage and dissemination of the hydrological data. It is also recommended to provide the Department of Water Administration with the following three Divisions to be managed by Deputy Directors:

(a) Water Use Coordination in charge of the enforcement of the Water Resources Decree in a full capacity as a Federal secretariat.

(b) Hydrology and Hydrogeology that is responsible for the unitary administration in terms of the quantity and quality of nation's water resources as the apex Federal body, while it is suggested that the NWRI is entrusted with the responsibility of technical coordination for hydrological observation work and subsequent data processing and dissemination. It may be noted that enforcing the Water Resources Decree will be realized with a strong tie of the hydrological information.

(c) Environmental Management that is responsible for the central coordination of environmental impact assessment on the programs and projects related to the Water Resources Sector keeping close contacts with the FEPA and also for the central authorization of various watershed management programs which are mostly undertaken by the agencies outside the Water Resources Sector, FMWRRD.

(2) Regional Water Administration Offices

In line with the above-mentioned arrangement, it is also proposed to strengthen the regional water resources administration. When the Water

Resources Decree is fully enforced through the issuance of related Regulations, the day-to-day operations on the water resources administration will be increased to a large extent nationwide, and it would be almost impossible for only the FMWRRD Headquarters to perform this responsibility because of the size of the country. The Federal water resources administration will include the direct responsibility for those of the sections of major and inter-State rivers and inter-State hydrogeological areas, and also the supervising responsibility for those under the State Governments. There are two alternatives for this arrangement:

- Alternative (1) by existing RBDAs:

  This work may be allocated to 11 RBDAs under the proper coordination of the FMWRRD; therefore, the RBDAs will be in-charge of the assessment, exploitation, storage and management of raw water (surface and groundwater) within their catchment areas including construction of dams, granting of abstraction licence and supply of raw water, and also will manage all of the State-run water resources projects within the territory of each RBDA. The RBDAs, however, are expected to be self-sustaining in their present mandates under on-going partial commercialization; therefore, it is quite impossible to include the functions related to the regional water resources administration in non-revenue yielding manner within the responsibility of the RBDAs.

- Alternative (2) by the proposed Regional Water Administration Offices.

Taking into account the nature and capacity of the RBDAs such as being divested of non-commercial functions as well as probable conflicts between the project implementation body and the public water administration, more emphasis may be given to the Alternative (2) where the subject role will be given to the present Area Offices after substantial upgrading towards the establishment of new Regional Water Administration Offices.

There are presently 13 Area Offices throughout the country which are maintained by the FMWRRD as its reference points in their zones of operations. However, the functions of these Area Offices have not been clearly defined, and they have no capacity to perform the current duties in terms of staff expertise. It is proposed that the Regional Administration Offices to be

under the jurisdiction of the proposed Department of Water Administration be equipped with a long list of their functions:

- undertaking of the regional water administration at the field level in conformity of enforcement of the Water Resources Decree under his jurisdictional area.
- routine monitoring of the RBDAs.
- routine liaison with the State Government agencies on their water resources activities.
- undertaking of the hydrological and hydrogeological investigations including the observation and collection of hydro-meteorological data and the installation and maintenance of hydromet stations and instruments under the technical coordination of the NWRI and the administrative management of the Department of Water Administration.
- any other duties assigned by the FMWRRD Headquarters.

It may be suggested to take into account a predicted work load during the NWRMP Period that four Regional Water Administration Offices to be managed at a deputy director level with two sub-divisions such as (1) Water Administration and (2) Hydrology and Hydrogeology would be established for each of the following RBDA's jurisdictional zones:

Zone 1 - Sokoto-Rima, Upper Niger, Lower Niger
Zone 2 - Hadejia Jama'are, Chad Basin, Upper Benue
Zone 3 - Lower Benue, Cross River, Anambra-Imo, Niger Delta
Zone 4 - Ogun-Oshun, Benin-Owena

In the HA-VIII, there has been an intense pressure for the agreement between the States of Kano and Borno whereby the former should guarantee an annual flow of $1{,}350 \times 10^6$ cu.m at Gashua that is equivalent to the long-term mean flow during the period of 1964-73; however, the figure itself has become meaningless in the context of existing large reservoirs and the level of public water abstraction for irrigated agriculture in the upper Hadejia basin and partly due to the recent Sahelian drought. Under this situation, it is imperative to make a proper water coordination throughout the Lake Chad Basin (HA-VIII) as a whole to formulate an integrated policy for this basin which will be implemented by the H-J RBDA, the CBDA, ADPs, SWAs and

independent organizations. The proposed Regional Water Administration Office will play an administrative role for this issue as a Federal secretariat under the guidance and supervision of the FMWRRD headquarters. In addition, this Office will keep in touch with the issue of inter-basin water transfer schemes such as Hawal.

12.4 Restructuring of FMWRRD and Two Parastatals

12.4.1 General

The present institutions in the Water Resources Sector, FMWRRD as described under 12.1 of this Chapter, have made the JICA Team feel that the outcome of various projects so far achieved would depend upon the quality of the institutions, and the institutional development (in the sense of increasing the ability of institutions to set clear development and management objectives and work effectively with their human, financial and other resources towards meeting them) would be difficult for the Water Resources Sector, FMWRRD with a rather short and unfortunate history. As a matter of fact, the Water Resources Sector typically suffers from serious shortages of skilled and experienced staff as are partly shown by high vacancy rate, inadequate wages and salaries that are compared with those of the private consulting and construction industries, and a counterproductive policy environment. An important implication on the future organization of the Water Resources Sector, FMWRRD is the promulgation of the Water Resources Decree as emphasized in para. 12.3 of this Chapter, from which the FMWRRD will undertake its mandated responsibility for the effective control and efficient management of the nation's water resources.

Bearing these factors in mind, the JICA Team has reached a conceptual view of the Federal administration system and related State systems that should reinvigorate all activities related with the Water Resources Sector in line with proper operations and effective implementation of the NWRMP. Figure 12-2 explains the proposed organization of the FMWRRD.

FIGURE 12 - 2 PROPOSED ORGANIZATION CHART OF THE FMWRRD