

2.2.4 Budget for Water Resources Sector (Present and Perspective)

a) Present Condition

According to the 1994 Federal Budget announced in January 10, 1994, the total budget is amounted to 110.1×10^9 Naira, decreased by 19 percent compared with the previous one, which is composed of 38.1×10^9 Naira (35%) for the recurrent expenditure, 31.0×10^9 Naira (28%) for the capital expenditure, and 41.0×10^9 Naira (37%) for the debt services payment. The Federal Budget for capital formation for the water resources sector is 1.3×10^9 Naira, showing 20 percent increase from the previous year. The total debt outstanding as of the end 1993 is reported at $1,148.8 \times 10^9$ Naira.

On the other hand, the 1993 - 1995 National Rolling Plan is the latest information which gives the JICA Team a size of budgets for State and Local Governments for the water resources sector. As far as the foreign loan is concerned, the 1994 - 96 Rolling Plan prepared by the FMWRRD has been the only source to grasp it. Providing the average figure of three years as the 1994 budget, the budget anticipated in 2020 could be estimated by applying an assumed growth rate of 3 percent per annum. Furthermore, assuming that the present budgetary condition would continue during the NWRMP period and the annual budget for the water resources sector is an average of the computed 1994 and 2020 budgets, 6.94×10^9 Naira would be worked out as an averaged annual budget during the NWRMP period, as detailed in the following:

Annual Budgetary Situation under the NWRMP

(Unit: Naira × 10⁶)

	Dam & Irrigation	Water Supply	Groundwater Development	Hydrolo- gical Work	Soil Erosion & Flood Control	Total
<u>From the Rolling Plan (3 year-budget)</u>						
FMWRRD	56	223	41	62	60	442
RBDAs	1,428	16	59	6	60	1,569
States & LGs	356	2,680	83	-	51	3,170
External Loan	3,304	4,977	-	-	-	8,281
Total	5,144	7,896	183	68	171	13,462
(%)	(38)	(59)	(1)	(1)	(1)	(100)

(Note: Detailed information is compiled on page 2-19 and 2-20)

(A) Annual Budget Allocation in 1994

1,715	2,632	61	23	57	4,488
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(B) Annual Budget Allocation in 2020 at the assumed growth rate of 3% per annum without the inflation factor

3,591	5,511	128	48	119	9,397
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(C) Annual Budget during the NWRMP Period on Average, ((A) + (B))/2

2,653	4,072	95	36	88	6,944
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Usually, an annual budget is announced together with that of the National Rolling Plan, which is called as a budget allocation, followed by budget approval, and then disbursement thereafter. It is reported that the actual disbursed amount is more or less 60 percent of the said budget allocation due to the lack of Government revenue as well as additional/extra expenses.

b) Perspective

As is explained in para. 2.2.2, the FGN has adopted the Structural Adjustment Program (SAP) recommended by IMF/World Bank, and has been carrying out to move from the Governmental initiative economy to the market-based economy. However, the performance have not satisfactorily progressed so far. Especially, the IMF is pointing out and criticizing that the 1994 Federal Budget put the SAP backward. IMF/World Bank is considering to relieve a part of the Nigerian external debt by applying the Economic Structure Adjustment Facility (ESAF: Trinidad Treaty in 1988) after confirmation of successful completion of SAP. However, they are restraining the FGN by saying there would be no possibility to apply the ESAF before 1997 under the present situation.

Notes:

(1) Federal Budget for the Water Resources Sector

(Unit: Naira × 10⁶)

Agency	Hydrology & Hydro- geology	Dam & Irri- gation	Groundwater Development	Water Supply	Soil Erosion & Flood Control	Office Building	Total
1. FMWRRD (From the 1993 - 95 Rolling Plan)							
1.1 Ministry							
Hydrological Dept.	61.5	-	41.0	-	-	-	102.5
Dam/Reservoir Dept.	-	23.0	-	-	-	-	23.0
Irrigation Dept.	-	32.9	-	-	-	-	32.9
Water Supply Dept.	-	-	-	223.3	-	-	223.3
Soil Erosion Dept.	-	-	-	-	59.8	-	59.8
Sub-total	61.5	55.9	41.0	223.3	59.8	-	441.5
1.2 RBDAs							
Anambra-Imo	0.5	61.8	12.8	5.4	23.0	8.3	111.8
Benin-Owena	0.7	45.5	9.7	-	11.6	4.5	72.0
Chad Basin	1.0	68.4	10.6	-	-	-	80.0
Cross River	0.5	47.2	6.1	-	8.1	6.4	68.3
Hadejia-Jama'are	0.6	88.9	6.5	-	-	-	96.0
Lower Benue	0.6	55.0	-	-	4.4	17.6	77.6
Niger Delta	0.7	53.5	3.3	1.2	3.8	13.4	75.9
Niger River	0.3	324.5	1.0	-	0.6	3.5	329.9
Ogun-Oshun	0.6	58.2	4.5	-	5.7	6.0	75.0
Sokoto-Rima	-	549.4	3.0	9.0	-	8.0	569.4
Upper Benue	0.6	76.0	1.0	-	2.4	3.9	83.9
Sub-total	6.1	1,428.4	58.5	15.6	59.6	71.6	1,639.8
Total (1.1 + 1.2)	67.6	1,484.3	99.5	238.9	119.4	71.6	2,081.3
2. Foreign Loan (From the FMWRRD 1994 - 96 Rolling Plan)							
Water Supply Dept.	-	-	-	136.6	-	-	136.6
Special Duty	-	-	-	4,840.0	-	-	4,840.0
Hadejia Valley Project	-	866.7	-	-	-	-	866.7
Kampe Project	-	364.3	-	-	-	-	364.3
Kagara Project	-	430.0	-	-	-	-	430.0
Upper Ogun Project	-	89.3	-	-	-	-	89.3
Kafin Zaki Project	-	1,554.0	-	-	-	-	1,544.0
Total (2)	-	3,304.3	-	4,976.6	-	-	8,280.9

(2) State Budget for the Water Resources Sector
(From the 1993 - 95 Rolling Plan)

(Unit: Naira × 10⁶)

State	Dam & Irrigation	Groundwater Development	Water Supply	Soil Erosion & Flood Control	ADP	Total
Abia	15.0	-	84.6	14.0	65.7	179.3
Adamawa	13.6	-	39.1	2.1	-	54.8
Akwa-Ibom	-	-	306.1	-	26.3	326.4
Anambra	2.0	-	47.7	3.5	8.4	61.6
Bauchi	22.5	-	106.2	-	-	128.7
Benue	1.0	-	117.6	1.0	8.0	127.6
Borno	4.9	-	258.7	2.0	74.8	340.4
Cross River	39.5	-	-	-	-	39.5
Delta	-	-	173.4	-	5.4	178.8
Edo	-	-	-	-	-	-
Enugu	5.0	-	357.7	10.0	89.1	461.8
Imo	-	-	65.7	4.5	3.3	73.5
Kaduna	5.2	-	-	-	108.9	114.1
Kano	26.0	-	50.7	-	-	76.7
Katsina	56.2	-	197.9	-	-	254.1
Kebbi	31.3	-	230.4	10.1	-	271.8
Kogi	0.5	-	-	-	15.0	15.5
Kwara	4.5	-	-	2.0	-	6.5
Lagos	2.0	80.0	258.0	-	-	340.0
Niger	9.5	-	164.4	0.6	-	174.5
Ogun	6.8	-	-	-	-	6.8
Ondo	-	-	-	-	-	-
Oshun	7.8	2.0	-	-	16.4	26.2
Oyo	-	1.1	-	-	-	1.1
Plateau	2.0	-	174.1	1.5	-	177.6
Rivers	36.7	-	-	-	10.0	46.7
Sokoto	60.8	-	-	-	-	60.8
Taraba	2.7	-	47.5	-	-	50.2
Total	355.5	83.1	2,679.8	51.3	425.3	3,595.0

It is forecasted that further FGN self-effort to improve the situation of heavy burden of external debt would become effective around year 2000 with a series of international financial assistance. It is also considered that the capital expenditure in the Federal budget would sharply increase with application of the ESAF, and then a bilateral economic assistance would be expanded as well, which is presently suspended.

2.3 DEMOGRAPHY

2.3.1 Present Population in State

In accordance with the available population census 1991, Table 2-4 summarizes the demographic condition of Nigeria in each State as well as by zonal basis. The 1991 census shows that while the Southern Zone occupies nearly half of the national population with high population density of 214 per sq.km, because the Zone includes the Lagos State which has about 5.7 million population with density of 1,723 per sq.km in 1991, the population density in the Central and Northern Zones are estimated at 55 and 75 per sq.km in 1991, respectively.

LGA wise population density shows the highest figure of 17,755 person per sq.km in Lagos-Island and Surulere of Lagos State followed by 16,450 in Mushin and Oshodi/Isolo and 10,656 in Agege of the same State, on the contrary, the lowest one of 5.6 in Gashaka of Taraba State, followed by 6.2 in Kaiama of Kwara State, and 9.2 in Borgu of Niger State. The details are compiled in Vol. 3 "Water Resource Inventory Survey".

Number of LGA by range of population density is summarized below:

Number of LGA by Population Density

Density(sq.km)	Northern Zone	Central Zone	Southern Zone	Nigeria
0-99	7 (48%) [36%]	108 (80%) [45%]	46 (17%) [19%]	241 (41%) [100%]
100-499	87 (48%) [33%]	17 (13%) [7%]	156 (57%) [60%]	260 (44%) [100%]
500-999	4 (2%) [9%]	4 (3%) [9%]	35 (13%) [82%]	43 (7%) [100%]
1000 & over	5 (2%) [11%]	5 (3%) [11%]	35 (13%) [78%]	45 (8%) [100%]
Total	183 (100%) [13%]	134 (100%) [23%]	272 (100%) [46%]	589 (100%) [100%]

2.3.2 Population Projection

In a series of discussion with the National Population Commission (NPC), it is pointed out that the 1963 population census might be not suitable as the base for future population projection, because it included overcounting of population, and the JICA Team has been provided with the results of 1952 population census, which was conducted on the basis of the former administrative structure dividing the country into three regions, the East, the North and the West.

Comparison among the said three population censuses is summarized in the following:

Population (in thousand)			Annual Growth (%)		
1952	1963	1991	1952/63	1963/91	1952/91
30,662	55,668	88,517	5.57	1.67	2.76

As obvious from the above comparison, the 1963 population extremely projected with an annual growth rate of 5.57 percent over the period between 1952 and 1963. For reference, the World Development Report 1993 published by World Bank is quoted for population and its growth rate in various countries as abstracted below:

Population and Its Growth Rate

Country	Average Annual Growth (%)			Population (in million)		
	1970/83	1980/91	91/2000	1991	2000	2025
Nigeria	2.9	3.0	2.8	99	128	217
Chad	2.1	2.4	2.6	6	7	14
Niger Rep.	2.9	3.3	3.1	8	11	24
Benin	2.7	3.2	2.9	5	6	11
Cameroon	3.0	2.8	3.1	12	16	29

Under such situation, Nigeria's future population until the year 2020 has been derived by applying the following growth rates:

	1991 - 2000	2000 - 2010	2010 - 2020
Annual Growth Rate (%)	2.70	2.60	2.50

For estimation of Zonal and State wise population distribution in future, increasing rate of population in the Central zone and the Southern zone is assumed to be highly and moderately accelerated towards the plan period of 2020, respectively, on the contrary, that in the Northern zone be decelerated as shown in Table 2-4, taking resources availability and potentiality, especially those of land and water into consideration.

Present and Projected Population

Zone/Block	Population (in thousand)				Growth Rate (%) (1991-2020)
	1991	2000	2010	2020	
N. W.	10,331	11,323	13,972	17,026	1.74
N. E.	16,767	18,599	23,045	28,209	1.81
Sub-total	27,098	29,933	37,017	45,235	1.78
C. W.	10,496	14,007	18,965	25,363	3.09
C. E.	9,667	13,515	18,262	24,376	3.24
Sub-total	20,163	27,522	37,227	49,739	3.16
S. W.	22,330	29,799	38,514	49,269	2.77
S. E.	18,926	25,257	32,642	41,757	2.77
Sub-total	41,256	55,056	71,156	91,026	2.77
Total	88,517	112,500	145,400	186,000	2.59

2.4 LAND USE SECTOR

2.4.1 Present Land Use and Soil Condition

(1) Present Land Use

According to the Satellite Image Analysis, the present land use has been obtained as summarized in Table 2-5.

The forest land including mangrove, tropical rain forest and woodland covers only 15 percent of entire Nigeria, which is quite lower than the so-called dangerous level of 30 percent. Especially, the forest land occupies critical level of only 2.2 percent of the territory of the Northern Zone which might have given serious effect on the micro-climate and water retention in the river basins of the Zone. the Northern Zone includes several states of Sokoto, Kebbi, Katisna, Kano, Jigawa, Yobe, Borno and Bauchi, or hydrological areas of HA-I and HA-VIII.

The agricultural land occupies about 42 percent of entire Nigeria, and the rate is almost same over the three Zones. It is considered that considerable acreage of forest land had been historically converted into the agricultural land as well as the grassland in the Zones of North and Central.

In the States of Anambra and Enugu under the Southern Zone, the bareland occupies 2,580 and 4,785 sq.km, respectively, which are 55 and 38 percent of total land of each State, showing serious problems on soil erosion. These high rates of bareland appear in sub-hydrological areas of 2, 3 and 4 of HA-V, and 1 and 3 of HA-VII.

A comparative analysis on population density for the agricultural land by using the 1991 census could provide several remarks on the present land use as follows: the Southern Zone has high population density of 5.0 persons per ha, followed by the Northern Zone's 1.8 and the Central Zone's 1.3. Especially, the eastern portion of the Southern Zone shows the highest density of 5.2 per ha, which might cause serious erosion problems in this region; on the contrary, it can be said that the Central Zone has still big potential for promotion of agricultural development, regardless of the present land productivity, and

there seems much potential on new water resource development in the eastern portion of the Zone.

The present land use by the Hydrological Area basis is detailed in Vol. 3 "Water Resource Inventory Survey".

(2) Soil Conditions

The dominant soils are the luvisols, with extensive arenosols in the north and the fluvisols in the coastal area. In addition, the gleysols and vertisols are locally important. In many soils, inorganic sources of plant nutrients are not readily available in the rooting zone of annual crops because of widespread sandy textured surface horizons, and the soils are dominated by clays that do not provide available nutrients. Most of the available nutrients are linked to the soil organic matter which concurrently plays a key role in maintaining soil physical characteristics. Loss of the soil organic matter is extremely rapid once the vegetation is cleared, which results in the deterioration of granular structure, reduced water-holding capacity, reduced infiltration rates, surface crusting and compaction, and leading to increased runoff and sheet erosion.

The above problems apply particularly to the most widespread luvisols and related lxisols which dominate the centre of the country, occur extensively to the southeast of the Benue and occupy large areas in western Nigeria. In the northeast, there are extensive areas of arenosols developed on coarse aeolian sands which are low in nutrients and very prone to wind and water erosion. In contrast, in the northwest and along the left bank of the Niger down to Koton Karfe near Lokoja, there are extensive areas of the aerisols which are heavily leached, poor in nutrients, gravelly and prone to rapid degradation.

Major valleys are marked by extensive alluvial fluvisols and gleysols which are more fertile and liable to inundation and waterlogging making exploitation problematic, and in some cases there are inherent tendencies to salinization. There are also extensive areas of the leptisols, shallow soils over rock or pan in the east, the use of which is limited to grazing and forestry, and even then strict erosion control is required. The soil type derived from sand stone is the acrisols in the Enugu area that is much liable to gully erosion once their vegetative cover is disturbed.

2.4.2 Development Potentiality and Constraints

(1) Land Availability

A comparative analysis between population density by using the 1991 census and the present land use, especially focussing on agricultural land, could provide several remarks (Table 2-6 and Figures 2-1 and 2-2):

- in connection with agricultural land per capita, the Southern Zone shows the lowest of 0.20 ha/person, on the other hand, the Northern Zone and the Central Zone 0.57 ha and 0.77 ha, respectively. For reference, according to the data provided by FAO, arable land per capita was 0.27 ha on the world-wide average. In terms of hydrological area, HA-V shows 0.13 ha/person, followed by 0.20 ha in HA-VI, and HA-I and HA-IV do 0.83 ha and 0.85 ha, respectively.
- in the Northern Zone, most effort should be made for the recovery of forest land at least to the level of 30 percent against the total land area, from viewpoints of keeping better watershed condition for the existing large scale storage dams in the long run.
- in the Central Zone, although the rate of forest land against total land is about 16 percent, proportion among forest, agricultural land and grass land per capita is in well balanced shape, compared to other two Zones (Figure 2-1).
- under the said circumstances, various efforts shall be made by each Zones:

Southern Zone: while it should keep the present rate of forest land, agricultural development should aim not to horizontally expand arable land, but to vertically increase land productivity applying proper agricultural inputs; rapid urbanization should be monitored and controlled.

Central Zone: in parallel with restoration of forest resource, further agricultural development shall be promoted through efficient use of the presently available land and water resources; preparation to absorb migrating people from overpopulated areas, especially the Southern Zone, shall be initiated by proper land use planning as well as urbanization planning with harmonization of forest restoration and conservation as well as agricultural development.

Northern Zone: further agricultural development shall be implemented through rehabilitation and efficient utilization of the existing large scale storage dams which are not functioning as originally designed; the efficient use of such dams should include more stable and safer drinking water to dwellers in not only urban area but also rural area.

(2) Population and Land Pressure

It is commonly reported that the land degradation has been serious because of a rapid growing human and animal population, resulting in the cultivation of marginal land including the depletion of grazing area and reduction of forest area, and in the reduction of fallow period resulting in the continuous cropping to an increasing degree.

The relationship between the land resources, population pressure, and the level of inputs into the farming system has been studied by FAO (Higgins and Antoine, in preparation):

- They suggested that in 1975 with the estimated total population of 65.7 million, the national population already exceeded the land's supporting capability of 54 million under the low-input traditional agriculture (viz. with bush fallowing but without chemical fertilizers and conservation).
- They also showed by using the 1987 population estimate at State level that under the low-input traditional agricultural practices only four out of 21 States and Abuja FCT could support their population, viz. Cross River, Gongola (presently, Taraba and Adamawa), Kaduna and Niger. Even assuming that farmers were able to use intermediate level inputs (agrochemicals and conservation), there would be seven States unable to support their populations, viz. Anambra (presently, Enugu and Anambra), Akwa Ibom, Imo, Katsina, Lagos, Ondo and Oyo.
- Given the low level of fertilizer use in Nigeria, the supporting capacity of large parts of the country is close to the low input level; therefore, there would be about 20 to 30 million people in excess of the land's supporting capacity at present who are mining the soil to support themselves.
- The above estimate was based upon the climatic data for the period of 1930-60. Since then, the Sahelian drought has been intensified with subsequent desertification in the north region. It may be noted that

due to the southward shift of so-called starvation front by 100 km, the potential supporting capacity in the north have decreased by 30 percent.

(3) Deforestation

It is reported that the tropical rain forests will have been destroyed by about AD 2000 with the exception of a few forest reserves in the States of Cross River, Ogun etc., and the degradation of woodland and tree and shrub savanna is being widespread. The extent and nature of forest destruction is being examined in the preparation of a Tropical Forest Action Plan for Nigeria which will have considerable bearing on land use policy and also on the broader aspects of soil and watershed management including such questions as to future management of the conservation forests and preservation in perpetuity of the remaining rain forest and wildlife population, in connection with the recommendation in the IUCN paper on the conservation of Nigeria's Biological Diversity (1988).

It may be noted that the total area of forest reserved quoted for 1978 based upon the NIRAD forest and land use survey was over 100,000 sq.km which is 10 percent of the total land area, and much of this area is in the Northern Zone with low production potential. The problem of self-sufficiency in wood products has been recognized by the FGN that has set a target of 20 percent of the total land area to be under forest; however, critical issues remain as to where and how the land is to come for additional forest reserves.

(4) Land Tenure

Under the most recent law, the Land Use Decree in 1978, all land is rested in the State Governors to be held in trust and administered for the use and common benefit of all Nigerians, and the individuals can obtain certificates of land occupancy after cumbersome process. In the rural area, the Decree is largely ignored with the prevalence of customary laws and practices, some of which may have constraints to the introduction of improved land management including the problems of security of tenure, land fragmentation, difficulties for newcomers in acquiring land, distinction between the rights to trees and land, and unfavorable legislative treatment of customary tenure for forest and grazing land. The tenorial security is believed to be and important incentive

that farmers need before their investment in any activities; however, virtually the lack of title means that the land which is the farmer's most important asset cannot be used as equity for raising credit through formal channels.

(5) Land Degradation : General

The land degradation may be defined as the loss of the ability of land under a particular form of land use to withstand or recover from the shock or stress by itself without external assistance. This involves the degradation of soil, vegetation and water resources which are closely interrelated, leading to the complete loss of the soil through erosion although it is gradual being reflected in slowly declining productivity.

"Nigeria: Land Resources Management Study" (WB/FAO-CP, 1991) has specified eleven major types of the land degradation in Nigeria together with their immediate causes:

Degradation Type	Immediate Causes
(1) Gully Erosion	Poor road design, inadequate urban drainage, cultivation on steep slopes, badly aligned footpaths, destruction of vegetative cover.
(2) Sheet Erosion	Inadequate on-farm conservation, overexposure of cultivated soil to rain splash, intensive cultivation leading to soil capping and compaction due to organic matter loss, overgrazing, destruction of tree cover.
(3) Wind Erosion	Inadequate on-farm conservation, overgrazing, destruction of tree cover.
(4) Declining Soil Fertility	Shortened bush fallow, inadequate supply of farm yard manure and inorganic fertilizers, impoverished soils, intensive cultivation.
(5) Soil Sodicity and Salinity	Inappropriate irrigation or cultivation practices.
(6) Soil Physical Deterioration	Inappropriate cultivation practices i.e. tractor cultivation of soils liable to compaction, depletion of organic matter during cultivation.
(7) Flood/Siltation	Destruction of catchment vegetation, urban drainage, inadequate coastal protection and on-farm conservation.
(8) Rangeland Degradation	Overstocking, bush burning, destruction of tree cover, increasing aridity.
(9) Deforestation, including degradation of Savanna woodland	Clearing for agriculture, over-exploitation for timber and firewood, and burning.
(10) Wetland Degradation	Clearing and drainage for agriculture, i.e. wheat cultivation, dam construction, irrigation development.
(11) Coastal Erosion	Vegetation destruction, inadequate coastal protection.

There are, however, major underlying causes, of which the land pressure, the nature of soils and the Government policies are definitely important. It has also been identified that the land degradation as the most important environmental problem facing Nigeria in terms both of its economic significance and of the area of land and the number of people it affects, Its more important immediate adverse effects would include:

- the irreversible loss of some productive land leading to increased land pressure.
- depleted water and wood supplies.
- soil fertility loss and yield decline.
- weakening food security.
- increased food, fuel and phosphate fertilizer imports.

(6) Policy Issued in the Land Resources Management

FGN has implicitly recognized that it has a responsibility for ensuring the sustainable use of the Nigeria's land resources as is evident from a number of semi-official statements because its policies and programs have a major impact on how well the land resources are used. However, some policies such as those which encourage settlement and road construction and thereby spontaneous development on fragile soils may accelerate the degradation of the country's land resources. While various incentives and land allocation policies encourage the indiscriminate expansion of large-scale mechanized farming due to a declining labor force and more efficient agricultural production as compared to that by small holders, there appear to be many cases where arable cropping has been extended into unsuitable soils without safeguards resulting in the large-scale destruction of natural vegetation, sheet erosion, decline in fertility and weed invasion. In addition, these initiatives tend to restrict the amount of land available for small farmers and limit the movement of nomadic pastoralists and herds; to this end, further negative effects may be invited.

There are a number of the policy instruments with regard to the land allocation and land use which the Government could use to implement the land resources management policies. For the land allocation, there is apparently no mandatory requirement under the present policies to undertake a review of the urban development proposals in relation to the land quality involved and the

anticipated effects on rural community and agricultural output. This should be remedied with a set of guidelines covering the zoning and gazetting of urban area boundaries and related protection areas as well as the laying-out of adequate communications, water availability and energy supplies.

For the land use policy, the main instruments are the control of prices, taxation and the use of incentives:

- Price controls and subsidies would powerfully affect the way in which the land resources are mobilized. For example, higher market prices of the crops due to SAP are likely to attract the traditional farming techniques resulting in little incentive to incorporate the conservation and to encourage the expansion of farming into marginal lands that may be vulnerable to degradation. The policy of high petrol and motor fuel subsidy would promote the mechanized land clearing and cultivation leading a serious land degradation and also allow the fuelwood to be transported to urban areas at less cost. In addition, current fertilizer subsidy would discourage the use of organic fertilizers that is essential for the long-term maintenance of soil structure and fertility.
- Taxes and dues may indirectly give rise to degradation as in the case when low stumpage rates encourage the over-exploitation of forest resources. Betterment taxes may need to be invoked to promote the orderly development of the urban area and control the land speculation. Most of the farmland management technologies so far discussed in Nigeria would offer at best marginal financial returns; however, the problems faced by farmers of high initial investment, immediate loss in production, delayed pay back of benefits may oppose the efforts in promoting the land conservation. Thus, the political support of using incentives or non-recoverable contributions which include pricing policies, proper design of incentives and the administrative aspects of incentive schemes need to encourage farmers to adopt the improved land management technologies.
- Social infrastructure may affect and areal land resources in many ways. The provision of rural roads would help to improve the land resources management through easy access of the input deliveries, crop marketing and by extension workers, but accelerate the access by farmers to previously isolated and fragile areas. It is stressed that the road construction urban development and mining are three off-farm activities which frequently cause serious land degradation.

2.5 SECTORAL PERFORMANCE AND PERSPECTIVE

2.5.1 Agricultural Sector

(1) Overview

The rising trend in agricultural production observed in the preceding four years continued through 1992 but at a reduced rate. This was reflected in all the sub-sectors, except fishery. At 176.8 (1984 = 100), the aggregate index of agricultural production grew by 4.5 percent compared with 5.9 percent in 1991 and an average of 6.4 percent for the period from 1988 to 1992. Crop production rose by 5.9 percent compared with 7.4 percent in the previous year while output of staple food crops grew by 6.1 percent compared with 8.1 percent in 1991. The output of major staples such as maize, millet, sorghum, rice and wheat declined by 4.0, 3.0, 3.5, 3.5 and 5.1 percent, respectively, to partially offset substantial output increase recorded by yam (20.1%), beans (17.4%) and potato (13.6%). Cash crop output also increased by 3.2 percent compared with 5.4 percent in the preceding year.

A country-wide survey of the agricultural sector conducted by the Central Bank of Nigeria (CBN), showed that the sustained growth in crop production was attributable mainly to favourable weather conditions as rainfall was timely and fairly well distributed throughout the country, except in the far north where delayed rainfall adversely affected the output of some grains.

Agricultural production was also boosted by increased efforts of extension service agencies to improve the efficiency in the procurement and distribution of essential farm inputs. For instance, in spite of persistent logistical problems, the quantity of fertilizers distributed to farmers rose by 34.8 percent to 1.41 million tonnes in 1992 over the level supplied in 1991. In order to curb the malpractices in the haulage and distribution of fertilizers, State Governments' officials were allowed to monitor the supply and transportation of their consignment from the National Fertilizers Company of Nigeria (NAFCON) to the primary distribution points.

Several steps were also taken during the year, to reduce field and postharvest losses through pest infestation. A total of 250,000 hectares of farm

land were protected nation-wide through aerial spraying with about 50,000 litres of pesticides. Furthermore, in order to synchronize research with extension services, all agricultural research institutes and colleges of agriculture were brought about under the supervision of the Federal Ministry of Agriculture. This had a favourable impact of transmitting the results of various research findings to farmers and encouraging them to adopt improved husbandry practices.

The index of livestock production increased marginally by 0.7 percent in 1992 to 120.2 (1984 = 100), in contrast to the decline of 1.6 percent in 1991. The slow growth of this sub-sector was attributable to the 3.8 percent decline in poultry production, which partially offset the respective increases of 1.6, 1.2, 0.4 and 9.2 percent in output of goat meat, lamb/mutton, beef and pork.

Fish production declined by 20.6 percent, in spite of the efforts made to stimulate production through the provision of relevant infrastructure such as fish storage facilities with loans from international financing agencies. The observed decline in the fishery sub-sector, was due largely to increasing cost of fishing inputs, especially vessels, outboard engines, spare parts and nets, which have combined to reduce the number of active full-time fishermen.

Output of forestry products continued the upward trend observed in the past four years with a further increase of 2.3 percent. This was attributable mainly to intensive exploitation, in response to increase in domestic demand and higher prices of wood products. Another notable development in the sector was the provision of a grant of 4.5 million Naira by the Federal Government, and a loan of 71 million US dollars under the World Bank Assisted Forestry II Program for the provision of seedlings and establishment of shelter belts in some Northern States.

(2) Agricultural Potential Area

The inventory survey (Regional) summarizes an agricultural potential area by State, indicating that 35.8 million hectares are recognized as an agricultural potential area which is composed of 29.0 million ha as a rainfed crop area, 2.3 million ha for rainfed tree area, 1.1 million ha for irrigated area, and 3.4 million ha for sadama (See Table 2-7). While the Northern Zone has quite a large hectarage of rainfed cropping land, followed by the Central and

the Southern Zone, the order for rainfed tree area shows reverse tendency. Irrigation potential area is ranging 280,000 to 370,000 ha over the three Zones. While much fadama area is located in the Northern Zone, available water resources especially during the dry season are quite limited.

(3) Crop Production

According to the result of the inventory survey (Regional), productivity of each crop is rather low in general, among which the Southern Zone shows slightly higher crop yields. While cropped area for root crops such as yam and cassava is larger towards the South, field crops such as sorghum, millet, groundnuts, cowpea, etc., show the opposite tendency. Rice is significantly grown in the Central Zone. Tree crops such as rubber, cocoa and oil palm are exclusively planted and produced in the Southern Zone (See Tables 2-8 and 2-9).

According to the Abstract of Statistics by FOS, agricultural production shows rather unstable trend mainly because most of all agricultural products are grown under rainfed condition. In this context, it is prerequisite to provide stable irrigation water for increased and stable agricultural production.

(4) Livestock Number

Based on the inventory survey (Regional), the number of livestock by State has been worked out, which is as shown in Table 2-10. Cattle, sheep, goats and poultry are major livestock in Nigeria, and over 90 percent of them are being fed in both the Central and Northern Zones, showing the feeding density of 131 and 96 heads per sq.km in Northern and Central Zones, respectively, while that of Southern Zone is only 10 heads per sq.km. The thick livestock density in Northern and Central Zones might have caused forest denudation and soil degradation in the area.

(5) Supply and Demand for Farm Products

Food Insecurity

"Nigeria: Strategy for Food and Nutrition Survey" WB, 1991 summarizes that although the exact number of the food insecure in Nigeria is a

subject to debate, the general consensus is that the number is relatively significant. It is also mentioned that the problems should have worsened in recent years because of overall economic stagnation associated with oil slump as a whole and of the SAP creating more hardship for some of those already in poverty or at the margin of becoming poor. In addition, the occasional droughts especially in the North have exposed many small holders at the margin to transitory food insecurity.

The above report also examines the food insecurity at State level in terms of the percentage of households spending less than the specific minimum threshold based upon bench mark figures of N 150 per month for urban households and N 100 for rural in 1989, as well as in terms of per capita calorie and protein intakes per day based upon the national consumer survey for 1985 - 86. The outcome from these examination is outlined in Table 2-11, although there is a note that the Statewide food insecurity estimates may be used for a general inter-State comparison and not for precise treatment of food insecurity:

The report concludes that the food insecurity is a serious and growing problem in many Sub-Saharan countries including Nigeria with the estimates for different years ranging from 13 to 18 percent. Farm size also may be an indicator of the food security, and the population pressure and farm fragmentation may lead toward the greater vulnerability of agricultural households. It is also explained that about 25 to 35 percent of the small holders (one ha or less) in the northern Nigeria suffer from chronic food security.

Factors Affecting the Food Security

These factors may be examined from the perspectives of food demand and supply. The demand for food depends upon its price and consumers income with particular emphasis upon such demographic factors as population density and distribution which are important determinants of the different types of food. On the supply side, the domestic production, imports, postharvest losses and industrial requirements are important. It may be noted at the outset that the relevant data are too inconsistent and unreliable to piece together a consistent picture of the behavior of the demand and supply factors affecting food security.

The food insecurity and poverty may be addressed by three broad approaches: (1) rapid economic growth at least higher than the population growth rate that allows an increase in per capita income, (2) specific policies designed to improve the real income of the poor and ensure the food availability for insecure, and (3) targeted assistance such as health and nutrition services, employment and food relief for specific vulnerable groups. In Nigeria, the first two approaches can be combined into a category of options that will improve the income distribution, and careful attention shall be paid to small holders that account for more than 90 percent of agricultural output.

Food Imports

In 1985, the FGN prohibited the import of some agricultural commodities in order to lower the cost of food imports and to boost the domestic food production. By banning the imports of maize and rice in 1985, of wheat in late 1986 and barley in 1988, the result has been to limit the volume of food available for consumption and to restrain the access to food with increased domestic food prices. While the share of imports in domestic food availability was 16 percent in 1982, it has declined rapidly falling to below 1 percent in 1988.

Overall, the impact of the SAP introduced in mid-1986 on the agricultural sector has been positive for cash crops. It is not straight forward to assess its impact on food crops, since it is complicated by the serious variations in recent Sahel drought conditions; however, it has been clear that some price adjustment due to SAP is finally showing up in food prices. In 1988, a new tariff structure was launched, while the import bans of rice, maize, barley, wheat and other food products remained to help in attaining the self-sufficiency of these crops. The impacts of bans would be different for different crops. While the import bans of maize and millet have little effect in normal years, those in drought years accord excessive rents to producers and impose hardship on consumers. For rice and wheat, these may be a case for temporary protection while adjustment in technological upgrading takes place. In March 1993, the partial lifting of the ban on wheat import was made by the need to produce cheap bread within the country.

Present and Projected Food Balance (Case Study)

In accordance with the food balance sheet prepared by FAO as demand side in terms of per capita food consumption, and the result of the inventory survey (Regional) on crop production as supply side, the present and future balance between supply and demand for some farm products is analyzed as shown in Tables 2-12 thru 2-14.

In these tables, the demand includes not only all requirement for food, seed, feed and processing, but also loss and wastage, on the other hand, the supply is limited to the domestic production, due to availability of the related information. The annual per capita food consumption is estimated at 157.7, 433.1, 15.2, 10.8, 18.5, 47.3 and 34.8 kg for cereals, starchy roots, sugar crops, pulses, oilcrops, vegetables and fruits, respectively. Furthermore, per capita consumption of cereals could be divided into 14.1, 22.5, 42.2, 20.6, 55.6 and 2.7 kg for wheat, rice, millet, maize, sorghum and others, respectively. Concerning with the projection, it is assumed that the present production level would grow by one to two percent per annum, and per capita demand would be unchanged. In any case, the projected domestic production will not be able to meet with the demand in 2020, efficient utilization of the limited land and water resources are prerequisite, putting more emphasis on crop diversification in future.

2.5.2 Urban Sector

(1) Urban Area and Population

There is no universally agreed set of criteria for determining the minimum size, the structure and the status of urban population. The official position in Nigeria has since 1963 apparently recognized and adopted certain basic structural and functional criteria in the identification and delimitation of a town or city: settlements are generally regarded as urban in Nigeria if they are physically closely built-up and inhabited by a predominantly non-agricultural population of not less than 20,000, and if functionally they perform roles as central place associated with towns in more advanced regions of the world. Such functions include, among others, those performed through commercial institutions like banks, daily markets, shopping centers and super-

markets; post-primary educational institutions; post and telegraph offices; and a State ministry hospital.

In the NWRMP, especially in the nation-wide inventory survey, the definition for urban area is set as one with a population of over 50,000, or one which has electric power, water supply and some road network, or that has a hospital or a health clinic, or a post office, or a large mosque, or has a university. On the basis of the said criteria, a State capital and two other cities are listed up as shown in Table 2-15, for which the basic information on population was obtained from 1963 Population Census, because the full details on 1991 Population Census has not been published.

(2) Major Development Activity

The results of the inventory survey (Nation-wide) reveals that not many States of the Federation have any urban or regional development plan projection for year 2000 and 2010. In a few States, however, some information on the present plan situation as well as on the year 2000 and 2010 is available for the capital city and one or two other major cities. Although each plan does not provide any specific activities in terms of the respective investment amount, reference is made to either the allocated budget in National Rolling Plan 1992 - 1994 or the annual budget of the States as shown in Table 2-16. In Table 2-16, most of all States put highest priority onto the health and education component in their budget, and Lagos States allocated rather big amount to the water supply sub-sector. Also the sewage sub-sector was given a considerable amount of budget in the States of Lagos, Taraba, Sokoto and Yobe.

Generally, rapid urbanization without proper planning procedure might adversely affect the water resource sector, giving higher risk of land erosion resulted in not only threat of land sliding in residential areas, but also deterioration of water quality in rivers, and putting more pressure for providing water supply to dwellers.

2.5.3 Rural Sector

(1) General Description

The majority of Nigerians still live in rural areas, and farming is the major activity of rural Nigerians. Agriculture together with livestock and fishery is still main source of income in rural Nigeria, and such secondary rural activities as marketing and trading, food processing, cottage industry provide supplementary income as well. Since rural infrastructures constitute the substance of rural welfare, it is necessary not only to raise per capita income through an agricultural development, but also to provide rural basic needs.

Rural infrastructures in Nigeria can be classified into three major categories, namely, physical, social and institutional infrastructures. The main components of the physical infrastructures include:

- transportation facilities (Federal, State and LGA road, railroads, bridge, ferry service, canal, port and footpath);
- storage facilities (silo, warehouse, crib, etc.);
- processing facilities (machinery, equipment, building, etc.);
- water related facilities (dams, irrigation, flood control and drainage systems, etc.); and
- soil conservation facilities.

Social infrastructures include the following main components:

- health facilities (hospital, dispensary, maternity and health center, etc.);
- educational facilities (primary and secondary schools, teacher's training college, technical school, vocational school, etc.); and
- Rural utilities (electricity, water supply).

The main components of institutional infrastructures are:

- farmers organization (cooperative, farmers' group/association);
- community development made possible through rural self-help institution;

- financial institution (credit societies and institution, banks, post office saving bank, etc.);
- agricultural research facilities (research station, experimental farm, demonstration plot, etc.);
- agricultural extension and training facilities;
- marketing and crop/animal protection services; and
- post and telecommunication facilities.

(1) Overview

As in the previous year, activities of the Directorate of Food, Roads and Rural Infrastructure (DFRRI) and the Better Life Program (BLP) continued to exert a favourable impact on rural development.

DFRRI

The DFRRI received a total revenue allocation of 250 million Naira in 1992, representing an increase of 39.2 percent over the level in the previous year but was 17.0 percent lower than 300 million Naira allocated in 1989 and 1990, respectively. In spite of the relative cut-back in budgetary allocation, the provision of rural infrastructure recorded a steady level of improvement since 1989.

A total of 85,593 km of feeder roads were completed, inspected and accepted as at the end of December, 1992. This compared with 30,728 km and 55,576 km in 1990 and 1991, respectively. Under the Rural Water and Sanitation Program, a total of 18,680 communities benefited in 1992 while 506 communities were supplied with electricity. On Rural Housing Program, a total of 8,024 Technical Extension Workers (TEW) were engaged as trainers in various communities. With regard to food and agriculture, the Directorate supplied a total of 846,224 fruit seedlings for horticulture, 5,726 tonnes of arable crop seeds and 3,466 million fish fingerlings.

BLP

A survey conducted by CBN showed that the BLP recorded significant achievements in all its core programs. The number of women cooperatives rose

to 9,044 from 5,479 and 3,150 in 1991 and 1990, respectively, while membership also rose substantially to 379,416 from the respective levels of 377,628 and 164,370 in 1991 and 1990.

On agriculture, notable achievements were recorded in the distribution of seeds and seedlings. For instance, about 482 tonnes of seeds and 80,000 bundles of cassava cuttings were distributed to women farmers compared with 354 tonnes and 25,000 bundles in 1991. Livestock farms also increased from 194 in 1991 to 282 in 1992.

A total of 2,318 cottage industries were established compared with 1,849 and 544 in 1991 and 1990, respectively. The number of food processing mills, especially for yam, cassava, guinea corn and groundnuts rose to 411 from 281 and 70 in 1991 and 1990, respectively. The number of weaving centres also rose from 115 to 228 while Women multi-purpose centres increased from 138 in 1991 to 166.

(3) Relation between the Sector and NWRMP

At present, DFRRI is in charge of promoting the rural development activities. Out of various main components of rural infrastructures as described above, irrigation and water supply components are strongly related with the National Water Resources Master Plan Study.

Irrigation facilities which could provide assured water supply, hold the key to stabilization of the nation's food production base. The provision of controlled water supply would protect the Nigerian food system against uncontrollable and undesirable fluctuations in domestic food production. Stability in food production leads to effective food market supplies to feed the urban mass. In addition, the provision of adequate irrigation infrastructures also insures the nation against excessive and politically unacceptable dependence on food imports.

In this context, the Federal Government of Nigeria has been promoting to construct several irrigation facilities under the eleven River Basin Development Authorities, of which some are completed and the others are under construction. In addition to the big irrigation schemes, several State ministries of agriculture operate pilot irrigation schemes mainly for vegetable

production. The Agricultural Development Program (ADP) is also taking charge to assist farmers with provision of technical know-how and necessary equipment useful for small scale irrigation.

Rural residents obtain their water supplies from various sources with seasonal fluctuation, such as wells, river/stream, rain and so on. Most of these water quality is far beyond the acceptable level, which has a direct bearing in spreading certain water-borne diseases. Therefore, the strategy also should be to improve the quality and source of water supplies in these areas in order to reduce the incidence of such diseases.

2.5.4 Industrial Sector

(1) Overview

There was a deceleration in the rate of growth of industrial output during 1992. At 143.3 (1985 = 100), the aggregate index of industrial production rose by 3.2 percent compared with 6.2, 4.5 and 14.9 percent in 1991, 1990 and 1989, respectively. Manufacturing production grew by 2.6 percent compared with 9.3 percent in the previous year while mining output (including petroleum) rose by 3.6 percent compared with 4.3 percent.

The continued deceleration in the sector's output growth rate over the years was traceable partly to the lull in manufacturing activities, occasioned by high cost of foreign exchange for the procurement of basic raw materials and machinery spares for the maintenance and replacement of aged machinery and equipment. This situation was accentuated by the massive importation and smuggling of wide range of manufactured products in the country.

(2) Major Industrial Zone

The industrial sector of Nigeria is dominated mainly by processing activity and the production of consumer goods, while the capital goods sub-sector is still very small. The Nigerian industrial sector can be roughly divided into three components, namely, the heavy or capital goods industry, the light industry consisting of food processing and non-food processing, and the traditional industry by using the locally produced materials.

Table 2-17 indicate the number of major producing center by component, giving most of heavy and light industrial centers are located in the Southern Zone, number of producing center for traditional industry is well scattered in these three Zones.

(3) Industrial Production Value

Table 2-18 summarizes value of major industrial production on the basis of the industrial statistics furnished by Federal Office of Statistics. Out of total production amount of about 41.0 billion Naira, 75 percent or about 30.7 billion Naira was occupied by the crude oil sub-sector, followed by 25 percent or 10.2 billion Naira by the manufacturing sub-sector. The Southern Zone occupied 91.5 percent or 37.5 billion Naira, of which 91 percent was registered in Lagos State, and the other Zones did only small amount ranging from 1.7 to 1.8 billion Naira.

In the manufacturing sub-sector, food and beverage component occupied 27.5 percent or 2.8 billion Naira of the total produced amount in the component, followed by 18.6 percent or 1.9 billion Naira of the textile and 16.9 percent or 1.7 billion Naira of the chemical component. Again, the Southern Zone occupied about 66 percent or 6.7 billion Naira in the sub-sector, followed by the Central Zone with 18 percent or 1.8 billion Naira and the Northern Zone 16 percent or 1.7 billion Naira.

In terms of per capita production value, the following remarks can be obtained:

- the total production value per capita in the Southern Zone was extremely high as 903.7 Naira which is over 10 times of the Central and the Northern Zone's 88.2 and 63.0 Naira, respectively, especially, Lagos State shows the figure of 6,018.6 Naira per capita; and
- although per capita production value in the manufacturing sub-sector of the Southern Zone decreased to 163.5 Naira, it is still double of the Central and the Northern Zone's 87.5 and 62.7 Naira, respectively.

2.6 POLICIES AND OBJECTIVES OF THE WATER RESOURCES SECTOR

2.6.1 National Perspective Plan

(1) Introduction

The National Planning Commission (NPC) provided, in January 1993, the JICA Team with "A Pre-Plan Vision Document Towards A Perspective Development Plan for the Federal Republic of Nigeria" that had been circulated to various Government agencies. The document indicates :

- The Perspective Plan, unlike the previous plans, should not be a mere compilation of various projects and projection of the Government investment expenditure, but should aim at an internally consistent and integrated set of guidelines with an attempt to articulate attainable goals, targets and objectives in broad terms between the time it is launched and to the following 20 to 25 years.
- There are already on-going policies and projects as well as the current Rolling Plan, which will serve as useful take-off points in determining the content and strategies for the Perspective Plan as envisaged in this Pre-Plan Vision Document and a detailed plan document that would be based on it. Therefore, the Perspective Plan is based on the country's past experience in development planning efforts.
- Following the formulation of the Perspective Plan, a three tier system of the national planning will be established:
 - ° 20-year Perspective Plan that provides a clear vision of where the economy should be at the end period and an appropriate set of the policies and programs that would lead to achievement of the desired goal.
 - ° A three-year Rolling Plan which is subject to the annual modification to cope with the rapid changes of resource profile of the economy.
 - ° An Annual Budget which draws its aspiration and programs from the Rolling Plan.

(2) Endemic constraints on the Development Process

The problems and needs in the Water Resources have been examined in the relevant Chapters for each sector in detail. In this paragraph, some of the fundamental problems which may hamper effective development and efficient management of the nation's water resources are summarized below in connection with the description in absence of the needed management capacity to transform the nation's enormous resources potential into real wealth in the above introduced "A Pre-Vision Document":

(a) A Variant of the So-Called "Dutch Disease"

- In the Nigerian context, this manifests itself in various forms which are best characterized as "National Cake-showing Syndrome" or "External Dependency Syndrome".
- The Government is seen as a provider of amenities regardless of tax effort or contribution to the Government revenue or the national cake. This illusion has been strengthened by enormous rent earnings from oil revenue, access to foreign borrowing, which allows the Government to totally neglect any serious income tax drive.
- The nation's Federation Account has become the major source for financing all tiers of the Government with little or no reference to matching funds from the Local or State Governments by way of their effort.
- Every single administration has focussed on national revenue sharing formula for disbursing funds from the Federation Account to the neglect of any consideration of how to generate funds from the Local and State Governments to swell the account.
- "Dutch Disease" has been most injurious to domestic productive capacity creation and development, encouraged the resources wastage discouraged accountability and promoted the nepotism and institutionalized corruption. This mismanagement of domestic resources has been extended to foreign borrowing whereby the State Governments are allowed to finance non-revenue yielding projects.

(b) "Inferiority Complex", a negative form of the modernizing closely related to "External Dependency Syndrome"

- Ranking anything domestic as "Inferior" hampers the exploitation of domestic resources potential to their fullest.

- Foreign ones that are totally alien to the domestic culture and context such that they lead to less than efficient use of productive resources.
 - Preference for imported goods and raw materials leading to huge import bills, while abundant domestic raw material resources potential remain under-utilized.
- Most things "traditional" are equated with inferiority, for which the imported technology is substituted rather than serving as a basis for adapting and integrating imported technology to meet local needs. The concept of technology transfer is, therefore, misconstrued as wholesale importation of foreign technology to displace the inferior domestic technology, with little attention by the public sector or private firms to local R & D which is essential for effective exploitation of the domestic resources and to adopt and adapt the imported technology to the Nigerian conditions.
 - The lack of the institutional protection of property or provision for adequate rewards or incentives for effort, productivity, creativity and inventiveness. These are crucial in promoting the technological progress as well as the entrepreneurial spirit and right environment for market forces to thrive. The prevailing incentives have been known to promote the wrong type of work ethic which emphasizes the minimum effort for maximum and quickest return and prefers the investment in quick profit yielding trade and commerce to investment in the production of goods and services and long-term risky enterprises capable of increasing the company's productive capacity. The imitation effect of this pseudo-entrepreneurial class whose conspicuous consumption patterns are hardly related to effort is a negative one on efficient use of the resources.

(c) Degradation of the Nigerian Environment

- This phenomenon as one of the very serious constraints to the development process has started to threaten the productive base in terms of unmitigated deforestation, desertification, land impoverishment and degradation caused by various forms of industrial activity. The need to halt these developments and avoid their future adverse consequences is obvious.

(d) Constraints Associated with Project Approach to Planning that Characterized all Previous Plans to Date:

- Projects have been pursued as ends in themselves almost to the complete neglect of the key beneficiaries as well as the most crucial element in the development process-human beings.
- This misplaced emphasis on projects can be attributed to a number of factors:
 - First is the preponderant role of the public sector and the public sector projects in all previous plans. The private sector was given a subsidiary role relative to the public sector. Very little or no attention was paid at all to household units as agents of production even if in a general sense they were viewed as ultimate beneficiaries of public sector projects and activities by firms in their role as the consumers of goods and services.
 - Another possible explanation of this overemphasis on projects stems from the various non-classical inspired growth theories which identify capital, and by extension capital projects as the determinants of growth. Since the Government was a major earner of foreign exchange, its investment programs under an import substitution development strategy focussed primarily on project finance.
 - Another part-manifestation of this misplaced emphasis on large-scale projects in the modernization process was the complete neglect of the informal sector both in the rural and urban areas, which accounts for the largest bulk of the country's labor force and the largest concentration of production activities of household units. The nature of the neglect was such as to leave the activities of this sector out of official national accounts statistics.
 - It is being discovered that the projects do not necessarily result in sustainable growth, if the human factor in development is neglected. This has been empirically established in the case of Nigeria where enormous investment or capital projects during a decade of oil boom made very little or no impact on the development process.
 - Another part-manifestation of this neglect of human element in the development process is the lack of significant progress in the demographic transition over the past 30 year plan period. This relative neglect of the informal sector has resulted in rural-urban, and more recently urban-rural migration, that are compounding the demographic constraints on the development process.

In addition, the Pre-Vision Document points out the major constraints on the nation's resources management capacity to do with the complex ethnic and religious plurality, which often makes it difficult to achieve any national planning discipline and constantly pitches the micro-nationalistic interest against national goals and objectives.

(3) Objectives of the Plan

(a) Broad Objectives

A framework of the Perspective Plan calls for the undertaking of new initiative in quest by the Nigerian society to ensure the overall well-being of the people through sustained improvement in their living standards. The vision to achieve at the end of the Plan period (2010) is that every person shall have access at affordable prices to the basic needs and minimum requirements such as food, shelter, clean water, health, nutrition and sanitation. In other words, the Plan will be well-interpreted and a Human-Centred Development Plan where the citizens are only seen as ultimate beneficiaries of any development effort mobilizing their energy, creativity and vitality as the means of promoting development.

Within overall framework of the Plan, four broad objectives such as (1) attainment of balanced growth, (2) alleviation of poverty, (3) achievement of self-reliance and (4) maintenance of environmental quality would be pursued over the Plan period.

(b) Specific Objectives

(i) Reducing the Incidence of Poverty

In the Plan, attention will be paid to the extent to which growth can be translated into improving the rural poor and urban employed; thereby, emphasis will be placed upon partial indicators of welfare which can be considered along the growth in per capita income, to measure the rate of progress in raising the general level of economic welfare relating to employment, income distribution and meeting basic needs. In particular, the social welfare programs will aim at the creation of more purchasing power through rural employment and related programs as well as the creation of

community assets such as drinking water points and primary health facilities among others.

(ii) Quality of Life and Meeting Basic Needs

The 1990 Human Development Report by the UNDP placed Nigeria in the 24th position from the bottom among 130 countries in terms of human development. The goal of the Plan will include the eradication of poverty, ignorance, illiteracy and preventable diseases as well as the provision of basic needs for majority of the citizens by the end of the Plan period. Anticipated targets of seven selected indicators as compiled in the Plan document are compiled in Figure 2-3.

The broad strategy for achieving the above targets will be made up of two elements :

- Public spending in social services inclusive of water will need to be increased in both absolute and relative terms.
- Policies aimed at ensuring the economic growth with equity will be implemented in tackling the issues of regional and rural-urban disparities.

(iii) Achievement of Self-Reliance

With the context of an open economy, absolute or total self-sufficiency is not realistic. The areas left for possible consideration could include :

- a) The control of commanding heights or key sectors of the economy by the Nigerians.
- b) The diversification of foreign ties and trade and reliance on foreign investment and external aid.
- c) Self-sufficiency in the provision of food and other basic needs.

Given the growing trend of global interdependence based upon wide spread acceptance of the liberalization deregulation of economic activities in the competitive marketing atmosphere, there would be little scope for wholesale pursuance of i) and ii), while a realistic available option in Nigeria would be iii) and i) + ii) in modified terms.

At any rate, the human resources development, one of the most important components of any growth strategy to provide domestic productive base and achieve self-reliance, should be defined broadly so as to include not only the skill development but the development in decision making capability. Such improvement may come from the citizens' ability to participate in the development process by way of planning and implementing by themselves the programs and projects in areas which affect them, resulting in the promotion of self-reliance in thinking. While the decentralization of administration by the Government is a step in the correct direction, this process should be strengthened and its scope be expanded to promote meaningfully the people's participation in the development process.

(iv) Maintenance of Environmental Quality

In Nigeria, there is a serious impact on the environment as a result of the inadequate environmental consideration in the indiscriminate exploitation and related development of the resources. Examples are the increased erosion rate from extensive deforestation to permit rapid urbanization and farmland expansion, the flood problems with sand filling of marshes and other wetlands in certain urbanized areas, the excessive withdrawal of groundwater in coastal areas to allow the intrusion of salt water in domestic water supplies. The overriding objective and policy during the Plan period are to introduce an efficient environmental management system including the following major programs:

- Environmental assessment to improve the required database in order to facilitate the policy formulation and management.
- Environmental protection to promote environmentally the sound patterns of economic development and life styles, in line with appropriate legislations.
- Environmental education to enhance the environmental awareness of the people.

(v) Other Specific Considerations

Other considerations include (1) private market versus centralized bureaucracy, (2) pluralizing versus homogenizing tendencies, (3) participatory democracy versus authoritarian rule, (4) focussing on the informal sector and

(5) enhancing the capacity of household units. Closely related with the NWRMP is the item "Focussing on the Informal Sector".

Nigeria had adopted the Import Substitution Industrialization Policy since 1960 which was focussed upon predominantly urban-based large-scale capital-intensive formal sector development; as a result, vast majority of households in both rural and urban informal sector was neglected. Since it is necessary to bring the informal sector most dynamic in the economy to the center stage of the development process, the Plan calls for the Rural Oriented Small Holder (ROSH) Development Strategy with an attempt to upgrade the institutions that serve the informal sector and also to focus on small to medium enterprises particularly being complementary to agricultural development.

(4) Priority Programs Proposed in the Plan

Given the nature of this document, the Pre-Plan Vision presents the general principles and broad outline of feasible plan strategy and its implications for the selection of particular projects and program options among alternatives, with emphasis not only on purely long-term economic prospects but also on the ancillary factors of demographical, political and social conditions:

(a) Agricultural Development Strategy

Since over 70 percent of the population rely on agriculture for subsistence and it is essential for food security purpose, there is the need for reinvigorating production in agriculture and removing the imbalance resulting from undue focus on urban development at the expense of rural development. Sustainable growth in agriculture is imperative to the country's drive towards the domestic sourcing of raw materials in manufacturing and also the creation of more primary and secondary agricultural-related employment opportunities. Two propositions will be underpinned during the Plan period.

(i) Small Holder Private Production Strategy Effectively Backed by Market-Oriented Agricultural Policies

At this stage, over 90 percent of the crop production is undertaken by small holders. Major problem of the low productivity could be solved if the

necessary investment for supporting infrastructure in agricultural research and extension, irrigation practices, fertilizer distribution, credit institutions, marketing and transport services is properly realized. There is the strong probability when taking into account the nature of small holders who are more willing to take the economic and climatic risks, the subject strategy in which the technological change and commercialization are the major elements would achieve the long-term development objectives of higher per capita income and living standard.

(ii) Agriculture-cum-Informal Sector Centred Development Strategy

This offers a better prospect for a broad-based and sustainable economic growth particularly when attention is paid on widening the economic linkages between agriculture and non-agriculture sectors as the basis for a dynamic industrial development. In any case, the policies and linkages that would raise the agricultural and informal sector incomes on a sustainable basis are of extreme importance giving top priority. It has been reviewed that the failure of previous Government-led Green Revolution attempts in Nigeria would be connected to the ineffective complementarity between agricultural commercialization and technological change. Needless to say, the development of rural infrastructure inclusive of extension services, adult education and vocational training, roads and water supply for domestic use, irrigation, fisheries and other needs to boost the rural sector productivity should be promoted in this strategy based on small-scale, rural and informal sector expansion.

In addition, the Pre-Plan Vision involves the following considerations :

- The agricultural development strategy as mentioned above is not to be applied when the large-scale farming is neglected. The constraints militating against the viability of large-scale farming will be critically reviewed to identify the policy defects or program implementation difficulties for future improvement. It is also envisioned that the economy undergoes development and growth, small-scale farming will give ways to large-scale farming in the long-run leading to the maximization of the productivity in overall agricultural sector.
- Direct Government participation in agriculture has been the failure in terms of its impact on food supply. Involvement of the

Government is to facilitate the expansion of productive capacity and marketing channels with the strengthening of more effective forward and backward linkage with the manufacturing sector. This is critical in increasing the rural sector output and income substantially and alleviating the poverty incidence.

(b) Infrastructure Development Strategy

Since existing water supply, electricity, transport, telecommunication services are of poor quality with low capacity utilization, infrastructure development is an essential pre-requisite for facilitating the future development and growth process. While the basic thrust of this strategy is to facilitate the ROSH Development Strategy as introduced previously, the Plan would emphasize a concept of balancing the modernization and rehabilitation (BMR) for existing infrastructural facilities.

(c) Other Strategies

Other strategies proposed in the Plan include, those of Industrial Development, Manpower Development (Education and Health) and Balance of Payment, in which there would be no implication to be incorporated into the NWRMP.

(5) Plan Implementation

The Perspective Plan to be formulated cannot attain its stated objective unless the programs and policies are effectively implemented. The Plan envisions that gradually greater burden of its implementation will be borne by the private sector with the enlightened partnership on mutual understanding, while the efficiency with which the private sector can implement the Plan will depend among others upon the Government providing the policy environment and insulating the economy from adverse shocks. For this, particular emphasis will be placed upon improving the capability of informal sector for contributing more efficiently to the national economic growth.

The implementing capability of the Government in its gradually shrinking role would have to be improved during the Plan period:

- The interdependence of various sectoral programs.
- The reduction of dependence on public sector investment and promotion of private sector for increased sector growth.
- The transfer of divisible components of public sector investment programs to the Local Governments.
- The increased involvement of public officials to prepare the sector programs on the basis mentioned above.

In addition, the Pre-Plan Vision Document calls for improvement in the implementing capability of the planning process :

- Strengthening the capability of various Ministries for preparation of the interdependent sectoral programs.
- Improvement of the personnel management system to reduce the bureaucratic constraints on interdepartmental coordination and cooperation and to widen the scope of people's participation in development.
- Improvement in the ability of public officials for the identification of various constraints to development in their respective sectors or fields and enhancement in their capabilities in solving problems.
- Strengthening of the institutions to facilitate more effective cooperation and greater people's participation.

2. 6. 2 Water Resources Sector Policy

(1) Introduction

The current policies of the FMWRRD which is the apex Federal institution vested with the responsibility of water resources policy formulation and development may be found in:

- The Water Resources Decree, No. 101 of 1993 embodying the policies and strategies of a coordinated water resources use and control passed into law on 23 August 1993 waiting its enactment for a long time since a proposal on draft legislation with the FAO assistance made in 1986. It may be considered that current inactive performance of the Water Resources Sector has come from the lack of comprehensive legislation which is most importantly required to undertake its statutory

functions for efficient management of the nation's water resources, in other words, the FMWRRD had no formal backing for its mandate to assess, monitor and control the nation's water resources. It is expected that from now on, each of the professional senior staff will be reinvigorated to implement his mandated responsibility with more spirit and high morale.

- The River Basins Development Authorities Decree, No. 35 of 1987 which superseded the River Basins Development Authorities Act, No. 87 of 1979.
- Ministerial Briefings and Pronouncements by the Honorable Minister of Water Resources and Rural Development.
- The Federal Environmental Protection Decree of 1988 which established the FEPA charged with the full legal responsibility of controlling and monitoring the state of the Nigerian environment, particularly contains the provisions prohibiting the indiscriminate disposal of waste in the lagoons and water, as well as the Environmental Impact Assessment Decree, No. 86 of 1992 to guide the activities or development projects for which the EIA is mandatory in Nigeria.

(2) FMWRRD Perspective Plan

(a) General

The former FMAWRRD presented in May 1992 "A Perspective Plan for Agricultural Development in Nigeria: 1990 - 2005" (revised draft). The NPC explained to the JICA Team that this document would be one of the reference materials to prepare a detailed document of the National Perspective Plan. The FMAWRRD's Plan consists of 22 Chapters, in which reference is made to Chapter X "Policies and Programs for Water Resources and Irrigation Development". It may be noted that there should be the description of present problems and future targets in general manner which have appeared in the past literatures. The following are a summary of the FMAWRRD's Plan (1990 - 2005) with respect to the perspective of the irrigation sub-sector.

(b) Irrigation Sub-Sector

While it is difficult to obtain the accurate data on food crops in Nigeria, some insight would be gained by examining whatever data can be assembled

from various sources. It may be observed that the average area under most food crops declined in 1975 - 80 period being relative to their levels in the 1970 - 74 period; however, there was a significant increase in the area under maize, sorghum, millet, rice and wheat in the 1981 - 85 period.

The FMAWRRD Perspective Plan : 1990 - 2005 (revised draft, 1992) clearly mentions:

- The underlying rationale for the programs proposed for the food crop sub-sector is the same as that of the current agricultural policy for Nigeria and the accompanying strategies for implementation. The overriding rationale for all food crop programs is the drive for the attainment of self-sufficiency in the production of most food crops by 1992 and as soon as possible after 1992 for others. To this end, the food production targets are set for the 1990 - 2005 plan period, the annual crop outputs required to meet these targets are projected, and the various production inputs to meet the crop output targets are quantified. In addition, the food crop production system under different ecological conditions is suggested with relevant cost-return relations for major crops. Finally, the programs are proposed to give the expression to various development requirements for the food crop sub-sector.
- The underlying assumption for setting the food crop output targets is based at the average minimum calorie intake and the minimum crude protein requirement of 2,500 kcal per capita per day and 65 grams per capita per day, respectively by the year 2005. In addition, the requirement for industrial use, seed and leakages in the form of export, post-harvest losses and the sort are provided, and the total of direct consumption and non-consumption requirements constitutes the gross food crop output as shown below:

Crop	Gross Food Output		Annual Growth Rate, 1990-2005 (%)	FMANR-PRS* 1990 Production (10 ³ ton)
	1990 (10 ³ ton)	2005 (10 ³ ton)		
Maize	1,469	3,413	5.8	1,796
Millet	4,197	7,472	3.9	1,575
Sorghum	3,697	7,196	4.5	2,577
Rice	756	2,727	8.9	1,693
Wheat	303	3,496	17.6	-
Cowpea	1,385	2,534	4.1	1,357
Soybean	146	245	3.5	96
Cassava	13,680	26,172	4.4	15,604
Yam	9,887	17,274	3.8	10,992
Sugarcane	920	13,465	19.6	-

Note: * "Digest of Agricultural Statistics" (Dec., 1991)

While the FMAWRRD gives the output of most crops at the annual growth rate of 4 to 6 percent with the average of 5.1 percent for all food crops, it is quite evident that special effort be required to achieve the national self-sufficiency in the production of rice, wheat and sugarcane at very high annual rates of output growth. This continues that the self-sufficiency in food crop production should be seen in aggregate terms rather than in terms of each crop viewed in isolation because of a high degree of the consumption alternatives.

- In accordance with the new agricultural policy, most of the activities associated with primary food crop production will be left to the private sector including small-, medium-, and large-scale farmers, traders, service agencies and investors. The government will enlarge its roles in the provision of infrastructure, extension services and production incentives in the form of input supply, credit, crop insurance and others; however, most of these activities will be the primary responsibility of the private sector with the selective government intervention where appropriate. On the other hand, the Chapter for Irrigation in its Plan (1990 - 2005) gives the target areas to be put under irrigation as shown below:

(Unit: 10³ ha)

Type	1985	1990	2004
Formal			
Federal Government	30.5	940.0	1,880
State Government	5.6	30.0	960
Informal	433.9	500.0	100.0
Total	470.0	1,470.0	2,940.0

Major explanations on the above are:

- The 1995 target for formal is based upon the 1985 nationwide irrigation survey where those figures are approximately given as the "Potential Irrigable Areas" which can be brought under irrigation without building new dams. The 2004 target is based upon the need to take at least 10 percent of the arable land area under irrigation by that year.
- Informal irrigation using small pumps depends upon rivers and streams for water sources and can irrigate only small areas close to river banks. In line with the formal irrigation development, the informal irrigation area should gradually become less important because of its limited scope.

- Private, large-scale irrigation development is not involved because the evidence suggests that the private sector is not ready to invest significantly in irrigation during the 1990 - 2005 period.
- It is noted as a whole that while the irrigation area is expected to grow at an average rate of 12.1 percent per annum between 1989 and 1995, it will grow at 8 percent per annum from 1996 to 2004. There is, however, no explanation of the relations between food crop production programs and irrigation expansion scheme as well as between the fadama scheme in the FDA and the formal one in the Water Resources Sector.

(c) Remarks

In the FMAWRRD Perspective Plan (revised draft), there is no description of the sub-sectors of water supply and quality control, and soil erosion and flood control which are related with two Departments of the Water Resources Sector. Chapter IX "Policies and Programs for Rural Development" deals with the rural water supply and irrigation. As far as the rural supply is concerned, the following are explained:

- Current Situation in 1987

As much as 60 percent of the households in rural areas depend on streams and 30 percent on private wells. In addition 2 percent draw their water from boreholes. The situation is quite desperate in the riverine areas where the proportion of households that are dependent on streams even exceeds 90 percent. For instance, in Anambra and Cross River States, the percentage of households that depend on streams is as high as 91 percent. The percentage is 89 percent in Ogun, 80 percent in Benue, 77 percent in Plateau, 75 percent in Niger, 73 percent in Imo, 73 percent in Oyo and 71 percent in Kwara. In many instances, the rural people also have to trek long distances to fetch water. The streams and private wells particularly stand the danger of being contaminated especially during the rainy season, and this exposes a very large proportion of the rural population to diseases which quite often reduce their effective time available for work and in turn affect their productivity.

- Perspective (1990 - 2005)

The role of social infrastructure like better housing, water and electricity supplies and health and educational facilities in improving the productivity of the rural poor has been discussed. Considering the

existing low infrastructural base of rural areas, it is proposed that at least 30 percent of the rural population should have access to potable water within their own villages, and 15 percent of the villages should be receiving electricity on a regular dependable basis during the perspective plan period.

(3) The NCWR's 7th Meeting

The seventh meeting held in November 1992 chaired by the Minister of FMWRRD was attended by the Commissioners and high level officials in charge of the water resources in 30 States and Abuja FCT as well as by the international organizations such as World Bank, FAO, UNDP and JICA as observers. The followings are the titles of Memoranda submitted by the NCWR:

- | | | |
|---------------------|---|--|
| Memo NCWR (29)/1/1 | - | Memorandum on Bye-Law for Regulation, Monitoring and Supervision of Dams and Reservoirs in Nigeria. |
| Memo NCWR (92)/1/2 | - | Memorandum on Nationwide Dam Inventory. |
| Memo NCWR (92)/1/3 | - | Memorandum on Standardization and Local Fabrication of Hydrometric Equipment. |
| Memo NCWR (92)/1/4 | - | Memorandum on the Role of Water Supply Agencies viz - a - viz Water Resources in the States and the Federal Capital Territory. |
| Memo NCWR (92)/1/5 | - | Memorandum on the National Water Supply Policy. |
| Memo NCWR (92)/1/6 | - | Information Memo on the National Water Rehabilitation Fund Project. |
| Memo NCWR (92)/1/7 | - | Information Memo on End of IDWSSD-1990 |
| Memo NCWR (92)/1/8 | - | Information Memo on the Activities of the Sub-Committee on Water Supply and Sanitation. |
| Memo NCWR (92)/1/9 | - | Memorandum on the First Biennial National Hydrology Symposium. |
| Memo NCWR (92)/1/10 | - | Memorandum on Harmonization of Operational Hydrology. |

Memo NCWR (92)/1/11	-	Memorandum on the National Water Resources Assessment.
Memo NCWR (92)/1/12	-	Summary Report on the Proceedings of the Meeting of the Sub-Committee on Hydrology and Hydrogeology.
Memo NCWR (92)/1/13	-	Memorandum on Standardization and Local Fabrication of Hydrometric equipment.
Memo NCWR (92)/1/14	-	Memorandum on National Policy on Compensation and Resettlement.
Memo NCWR (92)/1/15	-	Memorandum on the Re-Organization of the National Technical Committee on Water Resources.
NCWR (92)/1/16	-	Information Memo on the Preparation of the National Water Resources Master Plan for Nigeria.
NCWR (92)/1/17	-	Information Memo on the Activities of the Sub-Committee on Dams.
NCWR (92)/1/18	-	Information Memo on the Activities of the Sub-Committee on Water Supply and Sanitation.
NCWR (92)/1/19	-	Information Memorandum on the Activities of the Sub-Committee on Hydrology and Hydrogeology.
NCWR (92)/1/20	-	Information Memorandum on the Activities of the Sub-Committee on Irrigation and Drainage.
NCWR (92)/1/21	-	Information Memo on the Activities of the National Manpower Development Sub-Committee.

Aside from other items which are to be examined and subsequently incorporated into the NWRMP, prompt attention has been paid to the NCWR (92)/1/5 where the national water supply policy is discussed as given below:

o Policy Objectives

The centre-piece of Nigeria's water supply policy shall be the provision of potable water in sufficient quantity and quality to all by the year 2015. This could be achieved through the following phases:

- i) Improvement of the present inadequate level of services to cover 50 percent of the population by the year 1995.

- ii) Extension and supply of water to 80 percent of the population in the year 2005.
- iii) Provision of potable water to all by the year 2015.
- iv) Improvement of the present inadequate level of services to 120 lpcd, 90 lpcd and 60 lpcd to urban, semi-urban and rural areas respectively.

- **Policy Strategies**

In order to attain the above objectives, the Government shall:

- i) rehabilitate and/or expand the existing systems and develop new ones, undertake nationwide water resource survey with a view to determine its adequacy or otherwise;
- ii) undertake equitable but economic distribution of available water resources;
- iii) ensure improved management practice, abstraction and treatment techniques and control of water resources pollution;
- iv) encourage rapid manpower development through adequate funding of existing relevant training institutions such as NWRI, Universities, Polytechnic, Technical and Vocational Colleges and in-house training capabilities of the existing agencies;
- v) encourage, within the national industrialization policy, local manufacture of equipment and water treatment chemical;
- vi) establish water supply agencies which shall be made to operate on commercial basis; and
- vii) encourage fund research, development and studies in the water supply sub-sector

- **Policy Instruments**

The instruments for the operation of water supply policy shall be the various Federal, State and Local Government laws and bye-laws establishing the RBDAs, State and Local Government water agencies and their respective water supply regulations and water quality standards.

Federal

The Federal Legislation on water supply are the decrees establishing the River Basin Development Authorities, NWRI, and DFRRI. The Federal Government should enact the Water Resources Legislation.

States

Various enabling Acts in setting up the State Water Supply Agencies.

LGAs

At Local Government levels, the various bye-laws setting up water supply outfits and water supply regulations.

It may be noted that this policy is almost the same as that of the Memo NCWR (90) 2/1 "Proposed National Water Supply Policy" submitted to the NCWR meeting in 1990 under the circumstance that the NCWR is called upon to note that the work commenced on this policy since 1986 and to approve this document for adoption by the Federal and State Governments. It is also mentioned that there may be some discrepancy of the policy between the Pre-Plan Vision for National Perspective Plan and that of NWRC.

2.6.3 Water Resources: Economics and Policies

(1) General

When water is plentiful relative to the demand, the water policies, rules and regulations are simple and tend to be only casually enforced. As the population grows and the economies expand, the water resources sector evolve from an "Expansionary" phase to a "Mature" phase. And, at a certain point during the expansionary phase, the financial and environmental costs of developing new water supplies begin to exceed the economic benefits in the least productive or marginal uses of existing supplies. The reallocation of existing supplies rather than the capture of unclaimed supplies, therefore, becomes the least cost method to maximize the benefits. It may be mentioned that the water resources sector in Nigeria is still in the course of the expansionary phase except for the mature phase covering the Hadejia-Yobe river basin in particular.

The water resources sector in the mature phase is characterized by rising marginal costs of providing water and increasing inter-dependencies among users. In this phase, the conflicts over scarcities and external costs

arise, viz. the external costs result when one user interferes with another's supply, for instance, when an upstream user pollutes a river and raises the cost for downstream users. These conflicts eventually become so complex that elaborate management systems are needed to resolve the disputes and allocate water among the different users and economic sectors.

Developing the effective water resources sector policy is troublesome for a number of reasons:

- First, water has unique physical properties, complex economic characteristics and important cultural features which distinguish from all other resources.
- Second, the water resources management is administratively complicated since it involves legal, environmental, technological, socio-economic and political considerations. It is common in most of the societies that the political considerations dominate the decisions on water resources use; nonetheless, most policy options are framed and discussed in the economic terms.

(2) Linking the Water Resources Sector with the National Economy

The economic policy-makers generally tend to confront the policy issues one at a time, stating the policy objectives in a single dimensional terms. This approach presents the difficulty because a policy aimed at achieving a single objective usually has unintended and unrecognized consequences. Thus, the water managers and policy makers need to assess an entire range of the Government interventions to understand fully the economic, social and environmental impacts on a given sector, region or group of people.

Improving the water resources management requires recognizing how the overall water resources sector is linked to the national economy. Equally important is to understand how alternative economic policy instruments influence the water resources use across the different economic sectors as well as between local, regional and national levels and among households, farms and firms. It is frequently criticized that many of the water managers have failed to recognize the connection between the macroeconomic policies and their impact on, for instance, the technical areas such as irrigation.

Both of the macroeconomic and sectoral policies that are not aimed specially at the water resources sector can have a strategic impact on the resource allocation and aggregate demand in the economy. An overall development strategy and application of the macroeconomic policies including fiscal, monetary and trading ones directly and indirectly affect the demand and investment in water-related activities. The most obvious example is the Government fiscal policy on expenditures for irrigation, flood control or dam. For example, as a result of currency depreciation, the export of high-valued, water-consuming crops may increase, and if export taxes are reduced, the farmers are provided with a greater incentive to invest in export crops as well as in the irrigation.

The national development strategies can directly influence the water resources allocation and use in other ways. In the case of a food self-sufficiency strategy, the Government may subsidize the water-intensive inputs to encourage the farmers to produce more rice. By providing the financial incentives for rice growers, the Government is influencing the demand for public water resources and private irrigation investment through the price policies, a part from the direct effects on water use resulting from such price policies, the increased demand for irrigation water has inter-sectoral, intrasectoral, distributional and environmental implications. The agricultural sector is provided with an economic advantage in access to water over the industrial sector (inter-sectoral); water used for rice gains over that for other crops (intrasectoral); rice growers with more land and access to water gain over those with less land and water (distributional); and increased fertilizer and pesticide use are likely to affect the water quality (environmental). The sectoral policies also affect the water use and allocation in non-agricultural sectors in a variety of ways.

With the continuing importance of the SAP, Nigeria is implementing fundamental changes in the macroeconomic and sectoral policies, and typical adjustment programs call for a greater reliance on markets, more open trade, fiscal austerity and phasing out of producer and consumer subsidies. The budget-reducing measures imply the increased competition between and within the sectors for funding new water projects, and in these situations, the overall economic, social and environmental implications of choices should be carefully addressed taking into account additional opportunity cost of each project. When the water scarcity keeps some farmers on uneconomical land such as

steep watersheds, the Government suffers twice: one in terms of the reduced production compared with what would be possible with irrigation; and again in terms of erosion and resources depletion resulting in shortening the life of existing hydraulic works.

In addition, the pressure due to the adjustment program may increase not only to modify the investment allocations but also to recognize and accommodate new demands for water. The direct implications for water managers would include fewer capital investments in new water projects, the elimination of subsidies, increased efforts to recover the cost and more emphasis on the demand management to improve the efficiency of existing supplies.

(3) Strengthening the Policies on Land Use and Management

Integrating the land use policies and practices with the water resources management in a river basin is important for formulating the national strategies to manage the water resources. The proper management of upstream watershed is crucial for sustaining water projects, water quality, and aquatic ecosystems and biodiversity. Incentives and programs are needed to improve the land management practices in watersheds and to restore and protect the environmental resources in flood plains and wetlands.

Every means of the efforts should be intensified to achieve the flood control with nonstructural measures that are less costly and more effective in preventing the disasters of flood and soil erosion, than the more expensive structural measures. These include a combination of market incentives and regulatory policies to reduce the pollution, soil erosion, waterlogging, and flood runoff. The aim is to require the land users to bear the costs that their land management practices impose on others and to encourage the cost-effective management practices that control surface and groundwater pollution and foster soil conservation through technical assistance, market incentives and educational programs.

The Government subsidies that induce the activities harmful to the environment or that encourage the wasteful use of water should be eliminated, and the mining activities that seriously damage the water resources should be regulated and controlled. In addition, when the input levels to meet the

growing demand for food are increased, special measures such as integrated pest management and protection of groundwater recharge areas should be implemented to prevent the water contamination from agro-chemicals.

In future, the groundwater will be increasingly important in water management and development particularly for rural water supply and private irrigation. Its management should be integrated with the surface water management in a river basin system, with an emphasis to be placed upon an appropriate land-based programs that use the cost-effective best-management practices to protect the quality of groundwater in vulnerable geological areas, well fields and recharge areas. The measures should be taken to prevent the overpumping of coastal aquifers as well as aquifers underlain by saline aquifers from the irreversible salt water contamination. To restore the polluted groundwater and to prevent further contamination, appropriate environmental standards for safe transport, storage, and disposal of hazardous and toxic wastes should be established and enforced.

2.7 PROJECT ANALYSIS AND PRIORITIZATION

2.7.1 Prices

(1) Movement of Prices

Agricultural Commodities

The lull in the World Commodity Markets continued during the year 1992, especially with respect to Nigeria's major agricultural export commodities. The all-commodities world price index, computed in US dollars, declined by 3.1 percent to 62.0 (1985 = 100) in 1992. On the average, this represented a decline of 8.8 percent per year between 1988 and 1992. The dollar price of cocoa declined by 5.4 percent below the 1991 level. Coffee price in dollar terms, also fell sharply by 20.3 percent, but copra and palm oil recorded increases of 41.4 and 16.3 percent, respectively (Table 2-19).

Weak international demand for agricultural export commodities, occasioned by the recession in most developed / consumer countries, coupled with the general state of oversupply and the inability to conclude most commodity agreements largely contributed to the weakening of the world market prices of most commodities. In Naira prices, however, the index increased by 66.5 percent to 946 (1985 = 100) as a result of the sharp depreciation of the Naira exchange rate. The Naira prices of all the commodities monitored showed increases ranging from 11.4 percent for groundnut oil to 153.8 percent for copra (Table 2-20).

Producer prices of Nigeria's major agricultural commodities showed significant increases during the year following the sharp decline in the Naira exchange rate. For instance, the average producer price of cocoa rose by 25.5 percent to 12,745 Naira per ton, while the prices of benniseed, groundnut, palm kernel, soybean and rubber increased by 63.8, 9.0, 125.4, 33.2 and 136.2 percent, respectively. However, the producer price of cotton declined by 9.2 percent to 3,778 Naira per ton, owing to increased availability of imported substitutes (Table 2-21).

The rural market retail prices of all the selected food crops recorded substantial increases. On the average, prices of maize, sorghum, millet, rice and cowpea rose by 66.2, 28.7, 68.8, 67.1 and 15.5 percent, respectively (Table 2-22). The increases were attributable mainly to rising cost of production and transportation. Another factor was the increased demand pressure especially from export / smuggling to neighbouring countries as well as consumption by local industries, as substitutes for a variety of raw materials which were hitherto imported. Significant inter-State price differentials were observed in such commodities as yams, rice, maize and beans, due largely to high transportation cost and marketing margins.

Government concern over rising prices resulted in periodic interventions in the supply and marketing of food during the year. For instance, a Presidential Task Force was set up to procure and distribute grains and vegetable oils throughout the country. The government also lifted the ban on wheat importation in the fourth quarter.

Crude Oil

Crude oil prices fluctuated downwards in the international market during 1992 owing to persistent over-supply and slack in demand. The spot price of Nigeria's reference crude, the Bonny Light (37° API), averaged US\$18.00 per barrel during the first quarter of the year. It rose gradually through the second quarter to US\$21.05 per barrel in June and thereafter declined steadily to US\$20.83 and US\$18.71 in October and December, respectively. Thus, the spot price of the Bonny Light averaged US\$19.84 per barrel, representing a decline of 2.8 percent compared with a fall of 17.8 percent in 1991. The average prices of the competing crudes, the U.K. Brent and the West Texas Intermediate (WTI), also fell by 3.2 and 4.1 percent to US\$19.28 and US\$20.54 per barrel, respectively, compared with the respective declines of 18.4 and 16.6 percent in 1991.

Consumer Price Index

The rate of domestic inflation which dropped sharply in 1990 picked up during the second quarter of 1991 and continued through 1992. Data from the Federal Office of Statistics (FOS) showed that the average all-items composite consumer price index (CPI) for the twelve-month period, January - December 1992 stood at 478.4 (1985 = 100). This represented an inflation rate of 44.6 percent compared with 13.0 percent in the preceding year (Table 2-23).

The continued pressure on the price level during the year was attributed mainly to the huge government fiscal deficit financed wholly by the CBN which resulted in excess liquidity in the banking system. Another contributory factor was the substantial depreciation of the Naira exchange rate (which contributed to the significant increases in virtually all prices).

The food index rose by 46.5 percent compared with 11.9 percent a year ago. Although there was good harvest of staples during the year, food prices reacted sharply to the high costs of farm inputs and transportation (Table 2-23).

The trend in price movements was the same in both urban and rural areas. However, the increase was more pronounced in the urban centres. The average all-items urban consumer price index stood at 514.3 (1985 = 100), representing an increase of 49.5 percent compared with 17.8 percent in 1991. All components recorded higher prices in the urban centres than in the rural

areas except accommodation, fuel and light and other services (Tables 2-24 and 2-25). The rural index at 471.4 (1985 = 100) also increased by 43.6 percent. This was accounted for mainly by transportation cost whose index rose by 31.6 percent compared with 6.8 percent a year earlier.

(2) Economic Price for Project Analysis

All prices to be used in an economic analysis of the identified and / or proposed plans / projects, should be valued as their real value to the Nigerian national economy. While internationally traded goods and services shall be estimated on the basis of their border prices possibly derived from prevailing international market prices, those traded domestically are measured by subtracting taxes and interest from and adding government subsidy to their prevailing market prices.

In case of some commodities, reference can be made to "The World Bank's Price Prospects for Major Primary Commodities". In calculation of the irrigation benefit, rice and maize are selected as representative crops of which projected prices in year 2000 at 1993 constant prices are calculated at US\$273 (5% broken, f.o.b. Bangkok) and US\$113 (US No.2 yellow, f.o.b. Gulf ports) per ton, respectively.

2.7.2 Prioritizing Criteria

In order to prioritize various plans and projects identified formulated in the NWRMP in which the respective plan / project contains specific and different characteristics among each other, a set of criteria should be established taking the following factors into consideration:

- availability of fundamental data and information;
- size of both total and unit project cost;
- cost effectiveness;
- required implementation period;
- gestation period for benefit accrual;
- urgency of project implementation;
- enthusiasm of local people;
- water resource availability (existing + potential);

- absorption capacity of agricultural land; and
- negative impact on environment.

For establishment of a prioritizing criteria, firstly the respective factors mentioned above are given a certain weight among themselves, and secondly the respective factors are divided into several categories with their points as summarized in Table 2-26.

2.7.3 Economic Evaluation and Financial Analysis of the Project

(1) General Description

“Water Policies and Agriculture” (FAO, 1993) gives a certain discussion on the water economics as mentioned below:

(a) Economic Attributes of Water Use

Water provides four types of important economic benefits: (1) commodity benefits; (2) waste assimilation benefits; (3) aesthetic and recreational benefits; and (4) fish and wildlife habitats. Individuals derive commodity benefits from water by using it for drinking, cooking and sanitation. Farms, businesses and industries obtain commodity benefits by using water in productive activities. These commodity benefits represent private good uses of water which are rivals in consumption (e.g. one person's or industry's water use precludes or prevents its use by others). Government policies and regulations that concentrate on improving market access and competition are important means for improving the productive and allocative efficiency of the commodity uses of water. The second and increasingly important economic benefit of water is waste disposal. Water bodies have a significant, but ultimately limited, assimilative capacity, meaning that they can process, dilute and carry away wastes.

Recreation and aesthetic benefits and fish and wildlife habitats were once regarded as luxury goods outside the concern of governments. At this stage, these two types of benefit are gaining increased attention. In developed countries, more and more people are focusing their recreational activities around lakes, rivers and seas. In developing nations, as incomes and leisure

time grow, water-based recreation is becoming increasingly popular and an adequate supply of good-quality water helps provides a basis for attracting the tourist trade. Examples are cruises on the Nile in Egypt and visits to the Iguazú Falls on the Brazil-Argentina border. Likewise, information and knowledge about how humans have an impact on ecosystems have raised concern about the fish and wildlife benefits provided by water. Fish and wildlife habitats are related to both commodity and recreational uses.

Waste assimilation and recreational and aesthetic values are closer to being public goods than private goods. Public goods are non-rivals in consumption - one person's use does not preclude use by others. For example, the enjoyment of an attractive water body does not deny similar enjoyment to others. Non-rival goods require large amounts of resources to exclude unentitled consumers from using the good. Exclusion costs are frequently very high for water services such as flood control projects and navigation systems. Goods and services that are non-rivals in consumption are normally better suited to public sector interventions, including ownership, provision and regulation.

(b) Prices and Surface Water Allocation

In practice, market forces rarely establish prices for water. Instead, prices are set by publicly owned supply agencies or regulated private utilities. Water prices ("rates" in public utility jargon) have an impact on both efficiency and equity as well as influencing agency revenues. The charging scheme for recovering costs and allocating water is a decision variable for the supplying or regulating agency. Rate-setting can be evaluated within a multiple objective framework in which allocative efficiency, equity of income distribution and fairness in apportioning costs all play a role in evaluating pricing policies. The secondary criteria of simplicity, administrative feasibility and stability are also taken into account.

The most commonly employed pricing policy for water is a flat rate charge, designed primarily to recover costs. Flat rates are not set according to the volume received, although a proxy for volume usually provides the basis for the charge. In agriculture, the most frequent basis for a water charge or service fee is the area irrigated. For residential use in the industrialized societies, flat rate charges have been based on the number of residents, the number of rooms,

the number and type of water-using fixtures or measures of property value. Flat rates are criticized because they do not include incentives for rationing water in line with willingness to pay. Such schemes are, however, simple to administer and assure the supplier adequate revenue. The high cost of installing and monitoring meters is suggested as being the main reason for continuing the flat rate approach. This argument is convincing in cases where water is plentiful, supply costs are low and managers doubt the rationing effects of volumetric pricing. In other cases, water managers are turning to volumetric pricing to address water scarcity problems and the high costs of developing new supplies.

Policy-makers who are primarily interested in allocative efficiency (maximizing net social product) as the goal for a pricing scheme advocate marginal cost pricing. The marginal cost represents the incremental cost of supplying a good or service. The marginal cost is a schedule of costs related to quantity and typically rises as further increments are supplied. When water prices are set at the marginal cost, rational consumers demand additional water only as long as willingness to pay (demand) exceeds the incremental costs. In theory, marginal cost pricing yields the most economically efficient allocation.

A number of obstacles are encountered in the application of marginal cost pricing. One problem is the variety of definitions of the appropriate marginal cost concept, particularly whether to use a short-run (variable cost) concept or a long-run, full-cost approach. A long debate ensued from the "short-run marginal cost" pricing proposal which emerged from welfare economists' work in the 1930s. For example, Coase⁴¹ strongly objected setting utility prices at short-run marginal costs, especially where marginal costs are below average costs (thereby incurring a deficit and requiring a public subsidy). Coase also criticized the absence of a market test to determine whether users are willing to pay the full cost of supplying the commodity; the redistribution of income to favour users of decreasing-cost industrial products; and the impetus towards centralization of the economy.

Most of these criticisms can be dealt with by a multipart pricing system: the first part sets marginal price equal to marginal cost while the second part levies an assessment to recover those costs that exceed marginal costs. Even so, multipart schedules often fail to reflect the economic concept of

opportunity costs correctly, focusing instead on recovering historical or embedded costs. The relevant opportunity costs include both the cost of securing incremental supplies of water and the value of water in alternative uses.² Opportunity costs should be determined after adjusting prices to allow for distortions brought about by government interventions in pursuit of other objectives. In economic jargon, "shadow prices" must be used.³

The average cost pricing principle calls for recovering all costs by charging for each unit according to the average cost of providing all units. It is simple and easy to understand, as well as fair and equitable. Beneficiaries pay only the resource costs incurred on their behalf. The desired signals to users are provided, although not in as precise a way as with multipart pricing. Here, too, often only historical costs, not opportunity costs, serve as the basis for calculating average costs.

The ability-to-pay principle rests heavily on the equity criterion. Water charges are dependent on income or wealth rather than on costs. This principle is the most common basis for setting irrigation rates throughout the world and is also regularly applied to village water supplies in developing countries. Economists who view water as a commodity tend to be critical of the ability-to-pay approach. Since charges bear little relation to costs, no allocative test of willingness to pay is provided. This ability-to-pay concept is inherently subjective and political pressures frequently influence the formula in ways that distribute wealth from taxpayers to water users.

In many places throughout the world, water is scarce enough to justify the tangible and intangible costs of establishing formal pricing systems. Flat rates could satisfy cost repayment requirements in the absence of serious shortages. However, when the signals of water scarcity are absent, pressures arise for structural solutions (more construction to capture, store and deliver water) to satisfy incorrectly perceived water "needs".

The inevitability of scarce water supplies suggests the eventual adoption of multipart rate schemes that reflect the real or opportunity costs of water and other resources required for service provision. The literature describing the most desirable form for water markets and the literature dealing with water pricing have converged on the notion of a pricing system that

reflects the opportunity cost of water via the mechanism of transferable water entitlements.*⁴

(c) Opportunity Cost of Water

An important tool that can be derived from the comprehensive analytical framework is the opportunity cost of water. It provides a measure of the scarcity value of water to society, thus highlighting any cross-sectoral differences in value, taking into account society's multiple objectives and water's multiple uses and interdependencies. If economic criteria alone are employed, water should be allocated to a given use when the opportunity cost is lower than the value of the selected use. Determining the opportunity cost of water requires information about, and analysis of, future demand, supply options, investment alternatives, and the economic costs of pollution and other environmental damage. In turn, the opportunity cost can help to guide the price structure for sales to decentralized distribution entities, to evaluate the economic viability of investment proposals, to establish the magnitude of the penalties to be imposed on polluters, and to guide cross-sectoral allocations of water.

- *1 R. Coase. 1971. The theory of public utility pricing and its applications. *Bell J. Econ.*, 1: 113-128.
- *2 G.M. Meier. 1983. Pricing policy for development management. EDI Series in Economic Development. Baltimore, The Johns Hopkins University Press.
- *3 L. Small and I. Carruthers. 1991. Farmer-financed irrigation. Cambridge, UK, Cambridge University Press.
- *4 See, for example, P.K. Sampath. 1992. Issues in irrigation pricing in developing countries. *World Dev.*, 20 (7): 967-977; and A. Randall. 1981. Property entitlements and pricing policies for a maturing water economy. *Aust. J. Agric. Econ.*, 25: 1952-212.

(2) Project Benefits

The primary objective of NWRMP is to firstly review and evaluate development potentiality of nationwide water resources including the existing water use facilities, and then to establish an action plan focussing the short-term range and a long-term master plan towards year 2020 through demand forecast by mainly irrigation sector and water supply sector.

Since plans / projects to be identified in the NWRMP would focus on an irrigated agricultural development scheme and a water supply scheme, the benefit arising from irrigation sector is measured as net incremental production value of crops between "with" and "without" project cases. On the other hand, that of water supply sector is done as willingness to pay by a beneficiary.

(3) Irrigation Sector

(a) General Description

In connection with the projects identified in the irrigation and drainage sector, preliminary evaluation has been made from economic/financial viewpoints. In Nigeria, since the prevailing unstable political condition may affect her economic situation, especially valuing Nigerian currency, Naira to an internationally founded currency like U.S. Dollar is chaotic, the latest official exchange rate has been applied in a series of the analysis on pricing goods and services.

(b) Irrigation Benefit

As mentioned in para. (2) a project benefit of the irrigation sector is measured as net incremental production value of crops between "with" and "without" project cases. In order to simplify and to match with the accuracy under several calculation processes, paddy, maize and vegetables are selected as a representative crop in the benefit calculation. Taken into consideration an availability of water by different zone, an incremental crop Net Production Value (NPV) is assumed by type of project and zone as shown in Table 2-27, of which calculation bases are given in Table 2-28.

(c) Evaluation of the Proposed Projects

By applying the following assumptions on the project benefit discussed in the above as well as the project cost which is discussed in Chapter 5 of this Sector Report, an internal economic rate of return (ERR) and a net present worth value at 10 percent discount rate are calculated as shown in Table 2-30.

Bases for ERR Calculation

Particulars	Unit	Medium-Scale Dam	Pumps	Tubewell
Construction Period	Year	4	3	2
OM Cost (% of Initial Investment Cost)	%	1	3	2
Replacement Cost				
- (% of Initial Investment Cost)	%	-	50	90
- Recurrent Interval	Year	-	10	10
Gestation Period	Year	3	3	3

In accordance with the data furnished by Central Bank of Nigeria (CBN), while an interest rate of time deposit applied in merchant banks was 35.1 percent in December, 1992, an annual inflation rate measured by consumer price index between 1985 and 1992 was 25 percent, and thus the roughly estimated real interest rate of 10.1 percent could be used as a cut-off rate (opportunity cost of capital) to judge economic viability of the proposed project.

Under the said condition, those ERRs except for the dam project in Northern Zone and the pump project in Central Zone are over the said cut-off rate, showing their economic viability. Although the two cases of which the respective IRR is lower than the cut-off rate, these two project would be justified when the secondary and the other benefits are taken into consideration.

(4) Water Supply Sector

As stated hereinbefore, an evaluation of this sector would be carried out by applying the willingness-to-pay approach. In this study, several water rates have been roughly calculated for the proposed new construction schemes of both surface and groundwater at the year 2020 on the national averages, with two alternative cases, namely, full cost recovery, and recovery of OM cost and replacement cost.

The above preliminary analysis could suggest future pricing of water in this sector, taking into consideration financial situation of beneficiaries and its perspectives. In order to work out a water rate by which a present worth