

value of project benefit at a discount rate of 10 percent is equalized with that of project cost incorporating several assumptions as indicated in Table 2-31, the results of the analysis are summarized in the following table:

<u>Calculated Water Rate Chargeable</u>		
	(Unit: Naira/cu.m)	
	Full Cost Recovery	OM & Replacement Recovery
<u>Urban Water Supply</u>		
- Surface Water	7.23	2.48
- Groundwater	9.44	4.49
<u>Rural Water Supply</u>		
- Surface Water	5.17	2.08
- Groundwater (Motor P.)	9.48	3.59
- Groundwater (Hand P.)	10.16	2.20

According to collected data on the prevailing water charges for domestic use with metered supply, 5.5 Naira/cu.m is being applied in Lagos, 2.2 Naira/cu.m for urban area of Enugu, and 1.75 Naira/cu.m for rural area of Enugu. In this connection, the estimated water rate for recovery of OM and replacement costs would be applicable until every beneficiary could attain satisfactory level of income by which they can afford to bear the water rate for full cost recovery.

In a sense of project sustainability from which most of the existing waterworks are presently suffering, water rate fixing policy should be further examined with combination of a flat rate charge and a volumetric charge, taken into consideration economic and social objectives, and so on.

2.7.4 Reference to the Investment Program

(1) Selection of the Best Alternative in a Project

It should be reminded that the economic analysis of a project is a quantitative technique to help guide a investment decision in a systematic fashion. Based on a comparison of the costs and benefits of a particular project or program, this analysis tries to answer the practical questions of whether an

investment is worthwhile; whether its worth could be increased by altering the design parameters such as the location, timing, technology, scale, composition or implementing method; whether the policy environment on the project is conducive to its successful implementation and operations. Thus, the economic analysis should seek to determine not only if a project can be expected to provide a satisfactory return to the Nigeria's economy, but also if there is an alternative(s) of achieving the project's objective that would offer a high return or a low investment cost.

As mentioned above, the consideration of alternative plans is an essential feature of the project feasibility study and preparation; however, the review of existing reports indicates that insufficient attention was paid to the identification and weighing of alternatives. Technical options with respect to the FGN policy on decentralization, privatisation and users participation as is examined in Chapter 12 of Vol. Two "Sector Report" should be compared with each other for selection of the best alternative. If different technology can produce the same output or benefit both in terms of quantity and quality, then the analysis could identify the least-cost alternative by comparing the investment and OM costs of each. If both benefit and cost vary among the alternatives, each alternative may be assessed separately with its cost and benefit streams, so that the alternatives with the highest net benefit could be selected.

(2) Time Preference and Discounting

An attention should be paid to proper specification of the Without and With conditions including a thorough understanding of the relationship between project input and output and their phasing over time that is a prerequisite to any economic analysis. The strict review as made for existing projects in Chapter 4, 5 and 6 of Vol. Two "Sector Report" stresses that not only is inadequate attention paid to defining the Without condition, but the tendency is to underestimate the potential difficulties in project implementation and OM that have led to the implementation delays, cost overruns, lower operating efficiency, and smaller benefits than those assumed.

To the extent possible, the decision-maker should clearly understand the basic assumptions and judgments as incorporated in the analysis of

Without and With conditions. It may be noted that a billion Naira spent today represents a greater cost or sacrifice than a billion Naira to be spent in a year from now because the money could be invested elsewhere, in the meantime, to earn a return in the form of interest or profit. The concept of "Time Preference" relates to the fact that the values received earlier are worth more than those received later, thereby, the time discounting technique is applied. This consideration has led to one of the NWRMP strategies "Appropriate Implementation of Water Resources Projects with Priority Given to Medium- and Small-Size" as stated in para. 3.1 of Chapter 3 in Vol. One "Summary and Main Text".

(3) Priorities for BMR and On-Going Projects

During the initial course of the NWRMP period, a greater part of the investment program may be those of the on-going projects. Since it is the incremental returns ignoring all sunk costs that are relevant to the decision whether or not to invest, it is sound practice as a starting point to protect the allocations to all on-going projects that are indivisible and whose implementation is well advanced. The availability of external financing tied to specific investment may restrict the choices with the decision depending upon the incremental costs to be financed locally relative to the incremental benefits.

Similar considerations may apply to maintenance, rehabilitations and output balancing projects to be included in the so-called "BMR" which change the balance of products so as to improve the use of existing capacity, and all of these projects may entail relatively small investments that yield high economic returns. Conversely, it is usually desirable to postpone the start of large-scale, indivisible projects with modest returns or projects in which there are doubts about the absorptive capacity of implementing agencies and the degree and extent of users participation. On-going projects that are divisible are also the candidates good for phasing over the long periods. By using such common-sense approaches, it is often possible to decide on a large part of the investment program without recourse to elaborate analytical techniques.

(4) Externalities

This is defined as the effects of a project that do not impose a cost or confer a benefit within the confines of the projects itself and are not included in

the project's financial accounts. An example of an external cost is downstream silting caused by the on-farm land consolidation scheme involved in the past public irrigation project. Various forms of water pollution, water storage that affects the yields of shallow wells and fisheries in the downstream wetlands, and negative side effects from irrigation projects on health are other examples.

As for external benefits, one of the most important of these is the knowledge that accrues through the learning process; specifically, the use of new local technology as encouraged through users participation in a particular project may make it easier, cheaper or less risky to apply the same technology in subsequent projects or may indirectly improve the technology in other sectors. This external effect would be one of the important objectives to be involved in the proposed Comprehensive River Basin Management Program as compiled in para. 4.3.4. of Vol. One "Summary, and Main Text". An obvious way in which this might happen is through using staff and workers with training and experience from the first project to train other people for subsequent projects. In addition, the knowledge acquired may enhance the domestic research and development capability. Other external benefits include the reduction in fertility rates through the well-arranged women-in-development scheme or lessening of urban migration through the improved living standards in rural area both to be derived from the irrigation and water supply projects.

It is usually not feasible to trace and measure all such external effects; however, an attempt should always be made to identify them, and when the externalities cannot be quantified, they should be discussed in qualitative terms. In some cases, it is helpful to internalize the externalities, viz. to combine a package of closely related activities into one project, for which an irrigation project likely to cause the waterlogging could, for example, be undertaken jointly with an appropriate drainage program, as is explained in para. 5.3.7 of Chapter 5 in Vol. Two "Sector Report". Similarly a dam project with possible adverse effects on wildlife habit could be redesigned to include appropriate remedial measures. This procedure is also convenient in case where the externalities play no role strictly speaking but where it is difficult to estimate demand or economic value of the output from the project without closely linking it to related activity. A common example is the economic

analysis of an irrigation projects where the benefits are measured in terms of the value of incremental agricultural output rather than of incremental water.

(5) Multiple Components

Many development projects contain the components dealing with several sectors or activities. One example is a multipurpose water resources project where each component should be analyzed separately through the application of appropriate cost allocation technique as explained in para. 4.4.5 of Chapter 4 and para. 12.2.2 of Chapter 12 in Vol. Two "Sector Report". Another example is the proposed Comprehensive River Basin Management Program as is compiled in Vol. One "Summary and Main Text" where rural activities may combine irrigation and water supply on the basis of proper operations of the existing reservoir, various types of farm inputs, extension services, rural roads and social infrastructure such as health clinics, schools and community centers.

For the latter case, the first task is to specify carefully the relationships among the various components. Schools, community centers and health clinics may be closely linked to agricultural productivity in one case and very loosely, if at all, in another. When the various components are significantly inter-related, neither costs nor benefits can be allocated meaningfully to individual components in the analysis, and separate economic rates of return for various components should not be calculated. The appropriate procedure is to calculate the net present value or economic rate of return of the entire package, and then to test whether it can be increased by redesigning the project to alter one or more of the components.

TABLE 2-1 STATE ADMINISTRATION

(Unit: Area in 1,000 sq.km)

From September 1987 to August 1991					After August 1991				
No.	State Name	Capital Name	Area	LGA No	No.	State Name	Capital Name	Area	LGA No
01	Lagos	Lagos	3.7	9	01	Lagos	Ikeja	3.7	15
02	Ogun	Abeokuta	17.0	12	02	Ogun	Abeokuta	17.0	15
03	Oyo	Ibadan	36.5	24	03	Oyo	Ibadan	27.1	25
					04	Osun	Osogbo	9.4	23
04	Ondo	Akure	20.8	18	05	Ondo	Akure	20.8	26
05	Bendel	Benin City	37.0	n.a	06	Edo	Benin City	19.7	14
					07	Delta	Asaba	17.3	19
06	Rivers	Port Harcourt	19.6	13	08	Rivers	Port Harcourt	19.6	24
07	Cross River	Calabar	22.0	17	09	Cross River	Calabar	22.0	14
08	Akwa Ibom		6.8	10	10	Akwa Ibom	Uyo	6.8	24
09	Imo	Owerri	11.8	28	11	Imo	Owerri	5.4	21
					12	Abia	Umuahia	6.4	17
10	Anambra	Enugu	17.2	29	13	Anambra	Awka	4.7	16
					14	Enugu	Enugu	12.5	19
11	Sokoto	Sokoto	105.4	19	15	Sokoto	Sokoto	68.1	29
					16	Kebbi	Birninkebbi	37.3	16
12	Kwara	Ilorin	57.2	12	17	Kwara	Ilorin	34.7	11
					18	Kogi	Lokoja	28.8	16
13	Benue	Makurdi	38.7	13	19	Benue	Makurdi	32.4	18
14	Niger	Minna	72.3	9	20	Niger	Minna	72.3	19
15	Plateau	Jos	53.9	14	21	Plateau	Jos	53.9	23
16	Kaduna	Kaduna	44.4	7	22	Kaduna	Kaduna	44.4	18
17	Katsina	Katsina	24.0	7	23	Katsina	Katsina	24.0	26
18	Gongola	Yola	95.1	17	24	Adamawa	Yola	38.2	15
					25	Taraba	Jalingo	56.9	12
19	Bauchi	Bauchi	66.3	14	26	Bauchi	Bauchi	66.3	23
20	Kano	Kano	45.9	20	27	Kano	Kano	21.7	34
					28	Jigawa	Dutse	24.2	20
21	Borno	Maiduguri	121.2	19	29	Borno	Maiduguri	76.0	21
					30	Yobe	Damatur	45.2	12
22	Abuja FCT	Abuja Municip.	7.0	4	31	Abuja FCT	Abuja Municip.	7.0	4
Total			923.8	(453)	Total			923.8	589

(as of June, 1993)

Note: Area by State is based on Satellite Image Analysis

TABLE 2-2 GROSS DOMESTIC PRODUCT AT 1984 CONSTANT FACTOR COST

Activity Sector	(Unit: Billion Naira)													
	Percentage Share in Total (%)							Annual Percentage Change (Growth Rate)						
	1988 (1)	1989 (2)	1990 (3)	1991 (4)	1992 ¹ (5)	1988 (6)	1989 (7)	1990 (8)	1991 (9)	1992 (10)	1989 (11)	1990 (12)	1991 (13)	1992 (14)
1. Agriculture (Crops)	24.83	26.07	27.21	28.43	29.43	31.93	31.24	30.1	30.08	29.90	4.99	4.37	4.48	3.52
2. Livestock	4.97	5.07	5.17	5.37	5.37	6.39	6.07	5.8	5.6	5.46	2.01	1.97	1.93	1.90
3. Forestry	1.47	1.11	1.20	1.23	1.26	1.89	1.33	1.3	1.4	1.28	-24.49	8.11	2.50	2.44
4. Fishing	1.00	1.59	1.70	1.77	1.84	1.29	1.91	1.9	1.9	1.87	59.00	6.92	4.12	3.95
5. Crude Petroleum	9.59	11.03	11.65	12.59	12.70	12.33	13.22	12.8	12.4	12.90	15.02	5.62	8.62	0.79
6. Mining & Quarrying	0.24	0.25	0.27	3.28	0.28	0.31	0.30	0.3	0.3	0.28	4.17	8.00	3.70	0.00
7. Manufacturing	3.73	6.84	7.36	7.90	8.49	8.65	8.20	8.2	8.3	8.63	1.63	7.60	7.34	7.47
8. Utilities	0.42	0.45	0.50	0.52	0.55	0.54	0.54	0.6	0.5	0.56	7.14	11.11	4.00	5.77
9. Building & Construction	1.58	1.64	1.73	1.80	1.87	2.03	1.97	1.9	1.9	1.90	3.80	5.49	4.05	3.89
10. Transport	2.79	2.80	2.85	2.95	3.05	3.59	3.35	3.1	3.1	3.10	0.36	1.79	3.51	3.39
11. Communication	0.25	0.25	0.26	0.24	0.25	0.32	0.30	0.3	0.3	0.25	0.00	4.00	-7.69	4.17
12. Wholesale & Retail Trade	10.73	11.15	11.49	11.86	12.27	13.80	13.36	12.7	12.6	12.47	3.91	3.05	3.22	3.46
13. Hotel & Restaurant	0.47	0.47	9.48	0.48	0.49	0.60	0.56	0.6	0.5	0.50	0.00	2.13	0.00	2.08
14. Finance & Insurance	3.72	5.19	7.88	8.20	8.52	4.78	6.22	8.7	8.7	8.66	39.52	51.83	4.06	3.90
15. Real Estate	0.25	0.25	0.26	0.26	0.27	0.32	0.30	0.3	0.3	0.27	0.00	4.00	0.00	3.85
16. Housing	1.95	1.98	2.08	2.16	2.22	2.51	2.37	2.2	2.2	2.26	1.54	5.05	3.85	2.78
17. Producers of Government Services	6.13	6.67	7.60	7.91	8.86	7.88	7.99	8.4	8.9	9.00	8.81	13.94	4.08	12.01
18. Comm., Soc. & Pers. Services	0.64	0.65	0.67	0.68	0.70	0.82	0.78	0.8	0.7	0.71	1.56	3.08	1.49	2.94
G.D.P. TOTAL	77.76	83.46	90.36	94.53	98.42	100.0	100.0	100.0	100.0	100.0	7.33	8.27	4.61	4.12
NON-OIL G.D.P.	68.17	72.43	78.71	81.94	85.72	87.67	86.78	87.11	86.68	87.10	6.25	8.67	4.10	4.61

1. ... National Planning Commission Projections.
Source: Federal Office of Statistics (FOS), Lagos.

TABLE 2 - 3 FEDERAL AND STATE BUDGET (Agriculture and Water Supply)

(Unit: Million Naira)

Name of State	Agricultural Sector							Total	Water Supply Sector
	Crop/Fertilizer	Livestock	Forestry	Fishery	NALDA	Water Resources	DFRRI		
1. Northern Zone									
a) Western Block									
Sokoto	333.3	63.7	113.6	0.8	0.0	0.0	0.0	511.4	47.7
Kebbi	68.0	2.0	1.7	0.9	0.0	0.0	0.0	72.6	64.6
Katsina	247.1	4.5	50.0	0.6	0.0	0.0	0.0	302.2	58.0
Sub-total	648.1	70.2	165.3	2.3	0.0	0.0	0.0	886.2	170.3
b) Eastern Block									
Kano	78.2	7.6	8.7	2.0	0.0	0.0	0.0	96.5	68.7
Jigawa	19.8	9.1	13.6	1.5	0.0	0.0	0.0	44.0	0.0
Yobe	105.6	4.1	38.8	0.7	0.0	0.0	0.0	149.2	1.8
Borno	126.0	3.3	19.8	1.0	0.0	0.0	0.0	150.1	0.0
Bauchi	68.0	10.0	8.1	6.0	0.0	0.0	0.0	92.1	32.4
Sub-total	397.6	34.1	89.0	11.2	0.0	0.0	0.0	531.9	102.9
c) Total	1,046.0	104.3	254.3	13.5	0.0	0.0	0.0	1,418.1	273.2
2. Central Zone									
a) Western Block									
Niger	80.5	0.4	1.2	0.5	0.0	0.0	0.0	82.6	279.0
Kwara	78.5	15.8	10.5	0.0	0.0	0.0	0.0	104.8	73.5
Kaduna	30.8	1.5	2.3	0.2	0.0	0.0	0.0	34.8	28.8
Kogi	18.6	6.4	1.6	1.6	0.0	0.0	0.0	28.2	5.1
Abuja FCT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub-total	208.4	24.1	15.6	2.3	0.0	0.0	0.0	250.4	386.4
b) Eastern Block									
Adamawa	54.9	10.3	3.4	1.0	0.0	0.0	0.0	69.6	41.1
Taraba	99.6	9.9	1.6	0.3	0.0	0.0	0.0	111.4	0.0
Plateau	24.9	2.9	2.3	1.3	0.0	0.0	0.0	31.4	0.5
Benue	54.8	7.2	6.1	5.6	0.0	0.0	0.0	73.7	37.5
Sub-total	234.2	30.3	13.4	8.2	0.0	0.0	0.0	286.1	116.6
c) Total	442.6	54.4	29.0	10.5	0.0	0.0	0.0	536.5	503.0
3. Southern Zone									
a) Western Block									
Oyo	88.3	8.4	2.4	3.9	0.0	0.0	6.0	109.0	0.0
Ogun	24.7	2.4	2.0	2.2	0.0	0.0	0.0	31.3	43.0
Osun	120.6	6.0	26.7	28.6	0.0	0.0	20.0	201.9	88.6
Lagos	60.3	11.4	2.7	30.0	0.0	0.0	0.0	104.4	165.0
Ondo	18.5	4.0	15.1	1.0	0.0	0.0	0.0	38.6	35.5
Edo	62.2	11.6	12.3	11.7	0.0	0.0	0.0	97.8	0.0
Delta	51.0	9.8	5.7	10.0	0.0	0.0	0.0	76.5	0.0
Sub-total	425.6	53.6	66.9	87.4	0.0	0.0	26.0	659.5	332.1
b) Eastern Block									
Anambra	42.7	9.9	1.2	0.6	0.0	0.0	0.0	54.4	41.1
Imo	30.4	5.0	6.7	1.8	0.0	10.0	0.0	53.9	29.6
Rivers	8.4	1.0	0.4	5.2	0.0	0.0	0.0	15.0	43.3
Enugu	63.0	20.0	6.5	11.9	0.0	0.0	0.0	101.4	51.1
Abia	41.0	13.5	8.4	4.4	0.0	0.0	20.7	88.0	80.9
Akwa Ibom	43.8	3.5	3.5	6.4	0.0	0.0	0.0	57.2	59.2
Cross River	32.0	11.0	9.0	1.5	0.0	0.0	0.0	53.5	0.0
Sub-total	261.3	63.9	35.7	31.8	0.0	10.0	20.7	423.4	305.1
c) Total	686.9	117.5	102.6	119.2	0.0	10.0	46.7	1,082.9	637.2
4. Total of State	2,175.5	276.2	385.9	143.2	0.0	10.0	46.7	3,037.5	1,413.4
5. Federal Budget	3,844.0	105.8	48.8	20.7	900.0	623.3	325.0	5,867.6	325.0
6. Grand Total	6,019.5	382.0	434.7	163.9	900.0	633.3	371.7	8,905.1	1,738.4

Data Source: Inventory Survey (Regional)

TABLE 2-4 DEMOGRAPHY

State Name	Land Area (sq. km)	1991 (Census)		2000		2010		2020	
		Popula'n (1,000)	Density (sq. km)	Popula'n (1,000)	Density (sq. km)	Popula'n (1,000)	Density (sq. km)	Popula'n (1,000)	Density (sq. km)
1. Northern Zone									
a) Western Block									
Sokoto	68,090	4,393	65	4,815	71	5,941	87	7,240	106
Kebbi	37,250	2,059	55	2,257	61	2,785	75	3,393	91
Katsina	23,950	3,879	162	4,251	177	5,246	219	6,393	267
Sub-total	129,290	10,331	80	11,323	88	13,972	108	17,026	132
b) Eastern Block									
Kano	21,680	5,638	260	6,254	288	7,749	357	9,485	438
Jigawa	24,210	2,832	117	3,141	130	3,892	161	4,765	197
Yobe	45,240	1,411	31	1,565	35	1,939	43	2,374	52
Borno	76,050	2,595	34	2,879	38	3,567	47	4,366	57
Bauchi	66,310	4,291	65	4,760	72	5,898	89	7,219	109
Sub-total	223,490	16,767	72	18,599	80	23,045	99	28,209	121
c) Total	362,780	27,098	75	29,922	82	37,017	102	45,235	125
2. Central Zone									
a) Western Block									
Niger	72,340	2,481	34	3,311	46	4,483	62	5,995	83
Kwara	34,700	1,568	45	2,093	60	2,833	82	3,789	109
Kaduna	44,390	3,968	89	5,295	119	7,170	162	9,588	216
Kogi	28,810	2,100	73	2,802	97	3,794	132	5,075	176
Abuja FCT	6,960	379	54	506	73	685	98	916	132
Sub-total	187,200	10,496	56	14,007	75	18,965	101	25,363	135
b) Eastern Block									
Adamawa	38,220	2,123	56	2,968	78	4,011	105	5,353	140
Taraba	56,860	1,480	26	2,069	36	2,796	49	3,732	66
Plateau	53,870	3,285	61	4,593	85	6,205	115	8,284	154
Benue	32,410	2,779	86	3,885	120	5,250	162	7,007	216
Sub-total	181,360	9,667	53	13,515	75	18,262	101	24,376	134
c) Total	368,560	20,163	55	27,522	75	37,227	101	49,739	135
3. Southern Zone									
a) Western Block									
Oyo	27,140	3,489	129	4,656	172	6,018	222	7,698	284
Ogun	17,030	2,339	137	3,121	183	4,034	237	5,161	303
Osun	9,390	2,203	235	2,940	313	3,800	405	4,861	518
Lagos	3,730	5,687	1,525	7,590	2,035	9,808	2,629	12,548	3,364
Ondo	20,810	3,884	187	5,183	249	6,699	322	8,569	412
Edo	19,700	2,159	110	2,882	146	3,724	189	4,764	242
Delta	17,280	2,569	149	3,428	198	4,431	256	5,668	328
Sub-total	115,080	22,330	194	29,799	259	38,514	335	49,269	428
b) Eastern Block									
Anambra	4,690	2,768	590	3,694	788	4,774	1,018	6,107	1,302
Imo	5,430	2,488	458	3,320	611	4,291	790	5,489	1,011
Rivers	19,600	3,984	203	5,317	271	6,872	351	8,791	449
Enugu	12,510	3,162	253	4,220	337	5,454	436	6,976	558
Abia	6,380	2,298	360	3,067	481	3,963	621	5,070	795
Akwa Ibom	6,780	2,360	348	3,149	465	4,070	600	5,207	768
Cross River	21,990	1,866	85	2,490	113	3,218	146	4,117	187
Sub-total	77,380	18,926	245	25,257	326	32,642	422	41,757	540
c) Total	192,460	41,256	214	55,056	286	71,156	370	91,026	473
Grand Total	923,800	88,517	96	112,500	122	145,400	157	186,000	201

Note: Land area is based on the results of satellite image analysis.

TABLE 2 - 5 PRESENT LAND USE

State Name	Forest Land				Grass - land	Agricul - ture land	Others	(sq. km)
	Mangrove	T Forest	Woodland	Total				Total
. Northern Zone								
i) Western Block								
Sokoto	-	-	1,100	1,100	24,255	36,000	6,735	68,090
Kebbi	-	-	635	635	15,370	18,145	3,100	37,250
Katsina	-	-	30	30	5,880	17,245	795	23,950
Sub-total	-	-	1,765	1,765	45,505	71,390	10,630	129,290
ii) Eastern Block								
Kano	-	-	495	495	6,540	14,095	550	21,680
Jigawa	-	-	440	440	12,340	8,490	2,940	24,210
Yobe	-	-	245	245	20,355	9,660	14,980	45,240
Borno	-	-	125	125	35,175	26,985	13,765	76,050
Bauchi	-	-	4,995	4,995	32,845	23,740	4,730	66,310
Sub-total	-	-	6,300	6,300	107,255	82,970	36,965	233,490
iii) Total	-	-	8,065	8,065	162,760	154,360	47,595	362,780
. Central Zone								
a) Western Block								
Niger	-	30	5,580	5,610	25,930	36,070	4,730	72,340
Kwara	-	480	3,480	3,960	18,760	11,660	320	34,700
Kaduna	-	-	14,465	14,465	12,810	15,975	1,140	44,390
Kogi	-	5,270	3,795	9,065	7,685	8,460	3,600	28,810
Abuja FCT	-	25	1,535	1,560	1,140	4,250	10	6,960
Sub-total	-	5,805	28,855	34,660	66,325	76,415	9,800	187,200
b) Eastern Block								
Adamawa	-	-	3,195	3,195	18,925	11,885	4,215	38,220
Taraba	-	5	10,950	10,955	19,725	15,425	10,755	56,860
Plateau	-	410	8,425	8,835	14,940	25,920	4,175	53,870
Benue	-	250	1,450	1,700	3,100	25,335	2,275	32,410
Sub-total	-	665	24,020	24,685	56,690	78,565	21,420	181,360
c) Total	-	6,470	52,875	59,345	123,015	154,980	31,220	368,560
. Southern Zone								
a) Western Block								
Oyo	-	2,140	5,565	7,705	3,790	15,605	40	27,140
Ogun	-	7,665	45	7,710	65	7,985	1,270	17,030
Osun	-	7,110	10	7,120	50	1,920	300	9,390
Lagos	-	690	-	690	-	920	2,120	3,730
Ondo	65	12,130	-	12,195	260	6,365	1,990	20,810
Edo	170	7,760	215	8,145	950	8,430	2,175	19,700
Delta	3,460	1,300	-	4,760	-	5,400	7,120	17,280
Sub-total	3,695	38,795	5,835	48,325	5,115	46,625	15,015	115,080
b) Eastern Block								
Anambra	-	620	30	650	50	1,150	2,840	4,690
Imo	-	855	-	855	-	4,070	505	5,430
Rivers	5,390	505	-	5,895	-	3,965	9,740	19,600
Enugu	-	1,210	55	1,265	70	6,385	4,790	12,510
Abia	-	790	-	790	-	5,160	430	6,380
Akwa Ibom	650	75	-	725	-	5,730	325	6,780
Cross River	665	9,095	1,160	10,920	70	9,910	1,090	21,980
Sub-total	6,705	13,150	1,245	21,100	190	36,370	19,720	77,380
c) Total	10,400	51,945	7,080	69,425	5,305	82,995	34,735	192,460
Grand total	10,400	58,415	68,020	136,835	281,080	392,335	113,550	923,800

Note: T Forest : Tropical Rain Forest, Others include wetland, bareland, water area and urban land.
Data Source: Satellite Image Analysis

TABLE 2-6 PRESENT LAND USE AND LAND RESOURCES AVAILABILITY

	Land Use (1,000 sq. km)				Total	Land Availability (ha/person)				
	Forest Land	Grass Land	Agr. Land	Other Land		Forest Land	Grass Land	Agr. Land	Other Land	Total
(1) Administrative Division										
N. W.	1,765	45,505	71,390	10,630	129,290	0.017	0.440	0.691	0.103	1.251
N. E.	6,300	107,255	82,970	36,965	233,490	0.038	0.640	0.495	0.220	1.393
Sub-total	8,065	152,760	154,360	47,595	362,780	0.030	0.564	0.570	0.176	1.339
C. W.	34,660	66,325	76,415	9,800	187,200	0.330	0.632	0.728	0.093	1.784
C. E.	24,685	56,690	78,565	21,420	181,360	0.255	0.586	0.813	0.222	1.876
Sub-total	59,345	123,015	154,980	31,220	368,560	0.294	0.610	0.769	0.155	1.828
S. W.	48,325	5,115	46,625	15,015	115,080	0.216	0.023	0.209	0.067	0.515
S. E.	21,100	190	36,370	19,720	77,380	0.111	0.001	0.192	0.104	0.409
Sub-total	69,425	5,305	82,995	34,735	192,460	0.168	0.013	0.201	0.084	0.467
Total	136,835	281,080	392,335	113,550	923,800	0.155	0.318	0.443	0.128	1.044
(2) Hydrological Area										
HA-1	2,755	46,615	69,520	12,710	131,600	0.033	0.556	0.829	0.152	1.570
HA-2	27,380	59,745	67,020	3,955	158,100	0.297	0.648	0.727	0.043	1.715
HA-3	13,365	75,850	46,275	23,410	158,900	0.188	1.068	0.651	0.329	2.236
HA-4	14,700	13,945	39,290	5,065	73,000	0.318	0.302	0.850	0.110	1.579
HA-5	14,760	3,775	14,265	21,100	53,900	0.133	0.034	0.129	0.190	0.486
HA-6	44,250	4,675	41,015	10,560	100,500	0.220	0.023	0.204	0.053	0.501
HA-7	13,705	835	38,650	6,610	59,800	0.114	0.007	0.321	0.055	0.497
HA-8	5,920	75,640	76,300	30,140	188,000	0.037	0.473	0.477	0.189	1.176
Total	136,835	281,080	392,335	113,550	923,800	0.155	0.318	0.443	0.128	1.044

TABLE 2-7 AGRICULTURAL POTENTIAL AREA

(Unit : 1,000 ha)

State Name	Rainfed			Irrigated	Fadama	Total
	Crop	Tree	Sub-total			
1. Northern Zone						
a) Western Block						
Sokoto	2,306	180	2,486	204	80	2,770
Kebbi	0	0	0	0	0	0
Katsina	1,773	1	1,774	72	47	1,893
Sub-total	4,079	181	4,260	276	127	4,663
b) Eastern Block						
Kano	6,056	0	6,056	0	2,478	8,534
Jigawa	0	0	0	0	0	0
Yobe	2,266	0	2,266	0	5	2,271
Borno	2,403	102	2,505	0	60	2,565
Bauchi	2,677	0	2,677	3	78	2,758
Sub-total	13,402	102	13,504	3	2,621	16,128
c) Total	17,481	283	17,764	279	2,748	20,791
2. Central Zone						
a) Western Block						
Niger	1,035	310	1,345	200	50	1,595
Kwara	434	139	573	115	15	703
Kaduna	1,816	10	1,826	40	81	1,947
Kogi	320	28	348	30	6	384
Abuja FCT	129	10	139	8	15	162
Sub-total	3,734	497	4,231	393	167	4,791
b) Eastern Block						
Adamawa	189	0	189	5	39	233
Taraba	262	0	262	0	194	456
Plateau	1,124	0	1,124	0	36	1,160
Benue	1,807	0	1,807	0	142	1,949
Sub-total	3,382	0	3,382	5	411	3,798
c) Total	7,116	497	7,613	398	578	8,589
3. Southern Zone						
a) Western Block						
Oyo	783	217	1,000	45	17	1,062
Ogun	279	120	399	50	10	459
Osun	315	73	388	35	3	426
Lagos	80	100	180	20	20	220
Ondo	716	577	1,293	69	15	1,377
Edo	580	200	780	35	6	821
Delta	430	120	550	25	4	579
Sub-total	3,183	1,407	4,590	279	75	4,994
b) Eastern Block						
Anambra	120	16	136	11	3	150
Imo	122	11	133	15	2	150
Rivers	240	20	260	15	4	279
Enugu	180	9	189	14	2	205
Abia	165	11	176	16	2	194
Akwa Ibom	150	14	164	12	4	180
Cross River	268	28	296	17	5	318
Sub-total	1,245	109	1,354	100	22	1,476
c) Total	4,428	1,516	5,944	379	97	6,420
Grand total	29,025	2,296	31,321	1,056	3,423	35,800

Note : Figures in Kebbi and Jigawa are included in Sokoto and Kano, respectively.
Data Source : Inventory Survey (Regional)

TABLE 2-8 PRESENT CROP PRODUCTION (SUMMARY)

Crop	Unit	Northern Z.	Central Z.	Southern Z.	Total
1. Yam					
Area	1,000 ha	180.0	705.5	347.0	1,232.5
Production	1,000 ton	1,278.0	5,270.8	3,968.6	10,517.4
Yield	ton/ha	7.1	7.5	11.4	8.5
2. Cassava					
Area	1,000 ha	6.5	425.4	1,099.8	1,531.7
Production	1,000 ton	26.8	2,592.2	6,513.3	9,132.3
Yield	ton/ha	4.1	6.1	5.9	6.0
3. Sorghum					
Area	1,000 ha	4,210.4	1,025.7	213.0	5,449.1
Production	1,000 ton	3,335.7	1,681.0	985.7	6,002.4
Yield	ton/ha	0.8	1.6	4.6	1.1
4. Millet					
Area	1,000 ha	2,853.0	552.9	5.4	3,411.3
Production	1,000 ton	2,889.9	764.2	6.6	3,660.7
Yield	ton/ha	1.0	1.4	1.2	1.1
5. Rice					
Area	1,000 ha	388.2	941.0	307.4	1,636.6
Production	1,000 ton	274.0	1,436.9	604.8	2,315.7
Yield	ton/ha	0.7	1.5	1.4	1.4
6. Wheat					
Area	1,000 ha	40.0	14.9	-	54.9
Production	1,000 ton	28.0	0.0	-	28.0
Yield	ton/ha	0.7	0.0	-	0.5
7. Maize					
Area	1,000 ha	873.8	1,153.0	740.1	2,766.9
Production	1,000 ton	431.0	1,828.4	1,535.1	3,794.5
Yield	ton/ha	0.5	1.6	2.1	1.4
8. Soybean					
Area	1,000 ha	8.5	112.0	0.6	121.1
Production	1,000 ton	3.0	108.0	1.4	112.4
Yield	ton/ha	0.4	1.0	2.3	0.9
9. Groundnuts					
Area	1,000 ha	507.1	272.6	0.1	779.8
Production	1,000 ton	512.8	395.3	0.0	908.1
Yield	ton/ha	1.0	1.5	0.0	1.2
10. Cowpea					
Area	1,000 ha	470.9	233.7	0.7	705.3
Production	1,000 ton	517.1	167.8	1.8	686.7
Yield	ton/ha	1.1	0.7	2.6	1.0
11. Rubber					
Area	1,000 ha	-	0.8	66.5	67.3
Production	1,000 ton	-	1.6	54.0	55.6
Yield	ton/ha	-	2.0	0.8	0.8
12. Cocoa					
Area	1,000 ha	-	0.5	926.1	926.6
Production	1,000 ton	-	0.8	259.9	260.7
Yield	ton/ha	-	1.6	0.3	0.3
13. Oil Palm					
Area	1,000 ha	-	8.0	404.6	412.6
Production	1,000 ton	-	32.0	697.6	729.6
Yield	ton/ha	-	4.0	1.7	1.8

Data Source : Inventory Survey (Regional)

TABLE 2-9 PRESENT CROP PRODUCTION (1)

(Unit: Area in 1,000 ha/Production in 1,000 ton, Yield: ton/ha)

State Name	Yam			Cassava			Sorghum			Millet		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
1. Northern Zone												
a) Western Block												
Sokoto	0.0	0.0	-	0.0	0.0	-	1,101.0	1,073.7	1.0	546.5	533.0	1.0
Kebbi	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Katsina	0.0	0.0	-	0.0	0.0	-	392.1	490.0	1.2	180.2	437.0	2.4
Sub-total	0.0	0.0	-	0.0	0.0	-	1,493.1	1,563.7	1.0	726.7	970.0	1.3
b) Eastern Block												
Kano	0.0	0.0	-	0.0	0.0	-	1,913.0	780.0	0.4	1,437.0	758.0	0.5
Jigawa	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Yobe	180.0	1,278.0	7.1	0.0	0.0	-	151.1	180.0	1.2	140.0	238.0	1.7
Borno	0.0	0.0	-	0.0	0.0	-	567.3	692.0	1.2	446.7	749.4	1.7
Bauchi	0.0	0.0	-	6.5	26.8	4.1	85.9	120.0	1.4	102.6	174.5	1.7
Sub-total	180.0	1,278.0	7.1	6.5	26.8	4.1	2,717.3	1,772.0	0.7	2,126.3	1,919.9	0.9
c) Total	180.0	1,278.0	7.1	6.5	26.8	4.1	4,210.4	3,335.7	0.8	2,853.0	2,889.9	1.0
2. Central Zone												
a) Western Block												
Niger	111.4	822.0	7.4	76.1	672.0	8.8	95.0	401.0	4.2	187.4	158.0	0.8
Kwara	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kaduna	73.3	311.0	4.2	12.3	37.0	3.0	342.3	429.0	1.3	128.4	216.0	1.7
Kogi	40.0	540.0	13.5	45.0	500.0	11.1	0.0	0.0	-	4.0	6.0	1.5
Abuja FCT	21.8	57.9	2.7	0.0	0.0	0	24.0	62.0	2.6	8.7	3.0	0.3
Sub-total	246.5	1,730.9	7.0	133.4	1,209.0	9.1	461.3	892.0	1.9	328.5	383.0	1.2
b) Eastern Block												
Adamawa	2.1	15.5	7.4	1.6	6.4	4.0	59.2	85.0	1.4	7.5	12.9	1.7
Taraba	4.6	35.0	7.6	1.1	5.0	4.5	39.8	60.0	1.5	18.4	31.0	1.7
Plateau	128.8	965.9	7.5	93.3	392.0	4.2	262.4	360.0	1.4	135.4	230.1	1.7
Benue	323.5	2,523.5	7.8	196.0	979.8	5.0	203.0	284.0	1.4	63.1	107.2	1.7
Sub-total	459.0	3,539.9	7.7	292.0	1,383.2	4.7	564.4	789.0	1.4	224.4	381.2	1.7
c) Total	705.5	5,270.8	7.5	425.4	2,592.2	6.1	1,025.7	1,681.0	1.6	552.9	764.2	1.4
3. Southern Zone												
a) Western Block												
Oyo	19.9	347.7	17.5	90.1	1,036.0	11.5	15.0	725.0	48.3	0.0	0.0	-
Ogun	8.7	152.5	17.5	34.1	391.0	11.5	1.7	81.0	47.6	0.0	0.0	-
Osun	6.5	113.8	17.5	31.9	367.0	11.5	1.1	53.0	48.2	0.0	0.0	-
Lagos	8.3	144.4	17.4	1.9	22.0	11.6	0.0	0.0	-	0.0	0.0	-
Ondo	26.6	465.0	17.5	51.9	597.0	11.5	0.2	12.0	60.0	0.0	0.0	-
Edo	37.2	651.3	17.5	53.0	609.0	11.5	195.0	114.7	0.6	0.0	0.0	-
Delta	7.3	126.9	17.4	6.0	67.5	11.3	0.0	0.0	-	0.0	0.0	-
Sub-total	114.5	2,001.6	17.5	268.9	3,089.5	11.5	213.0	985.7	4.6	0.0	0.0	-
b) Eastern Block												
Anambra	22.0	150.0	6.8	20.0	210.0	10.5	0.0	0.0	-	1.0	1.4	1.4
Imo	122.8	613.0	5.0	282.2	2,000.0	7.1	0.0	0.0	-	0.5	0.6	1.2
Rivers	11.7	117.0	10.0	26.7	42.8	1.6	0.0	0.0	-	0.4	0.8	2.0
Enugu	40.0	360.0	-	50.0	150.0	3.0	0.0	0.0	-	0.8	0.9	1.1
Abia	38.0	445.0	11.7	66.0	91.0	1.4	0.0	0.0	-	0.0	0.0	-
Akwa Ibom	20.0	120.0	6.0	21.0	200.0	9.5	0.0	0.0	-	1.8	1.1	0.6
Cross River	18.0	162.0	9.0	365.0	730.0	2.0	0.0	0.0	-	0.9	1.8	2.0
Sub-total	232.5	1,967.0	8.5	830.9	3,423.8	4.1	0.0	0.0	-	5.4	6.6	1.2
c) Total	347.0	3,968.6	11.4	1,099.8	6,513.3	5.9	213.0	985.7	4.6	5.4	6.6	1.2
Grand total	1,232.5	10,517.4	8.5	1,531.7	9,132.3	6.0	6,449.1	6,002.4	1.1	3,411.3	3,660.7	1.1

Note: Figures in Kebbi and Jigawa are included in Sokoto and Kano, respectively.
Data Source: Inventory Survey (Regional)

TABLE 2 - 9 PRESENT CROP PRODUCTION (2)

(Unit: Area in 1,000 ha/Production in 1,000 ton, Yield: ton/ha)

State Name	Rice			Wheat			Maize		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
1. Northern Zone									
a) Western Block									
Sokoto	263.2	83.0	0.3	28.0	16.0	0.6	562.4	39.0	0.1
Kebbi	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Katsina	66.5	64.0	1.0	12.0	12.0	1.0	94.4	202.0	2.1
Sub-total	329.7	147.0	0.4	40.0	28.0	0.7	656.8	241.0	0.4
b) Eastern Block									
Kano	0.0	0.0	-	0.0	0.0	-	153.1	112.0	0.7
Jigawa	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Yobe	0.0	0.0	-	0.0	0.0	-	25.0	28.0	1.1
Borno	45.7	101.0	2.2	0.0	0.0	-	19.1	21.0	1.1
Bauchi	12.8	26.0	2.0	0.0	0.0	-	19.8	29.0	1.5
Sub-total	58.5	127.0	2.2	0.0	0.0	-	217.0	190.0	0.9
c) Total	388.2	274.0	0.7	40.0	28.0	0.7	873.8	431.0	0.5
2. Central Zone									
a) Western Block									
Niger	90.5	201.0	2.2	0.0	0.0	-	207.9	266.0	1.3
Kwara	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kaduna	89.7	12.0	0.1	14.9	0.0	0.0	480.5	961.0	2.0
Kogi	50.0	50.0	1.0	0.0	0.0	-	30.0	26.4	0.9
Abuja FCT	15.3	40.0	2.6	0.0	0.0	-	19.7	55.0	2.8
Sub-total	245.5	303.0	1.2	14.9	0.0	0.0	738.1	1,308.4	1.8
b) Eastern Block									
Adamawa	12.2	26.0	2.1	0.0	0.0	-	0.4	0.9	2.3
Taraba	22.6	50.0	2.2	0.0	0.0	-	0.1	0.1	1.0
Plateau	61.6	79.9	1.3	0.0	0.0	-	214.4	279.0	1.3
Benue	599.1	978.0	1.6	0.0	0.0	-	200.0	240.0	1.2
Sub-total	695.5	1,133.9	1.6	0.0	0.0	-	414.9	520.0	1.3
c) Total	941.0	1,436.9	1.5	14.9	0.0	0.0	1,153.0	1,828.4	1.6
3. Southern Zone									
a) Western Block									
Oyo	15.3	68.6	4.5	0.0	0.0	-	120.0	300.0	2.5
Ogun	9.6	43.2	4.5	0.0	0.0	-	70.0	175.0	2.5
Osun	3.7	16.7	4.5	0.0	0.0	-	61.0	152.5	2.5
Lagos	5.0	22.5	4.5	0.0	0.0	-	5.0	12.0	2.4
Ondo	28.1	81.5	2.9	0.0	0.0	-	104.7	261.8	2.5
Edo	13.4	60.4	4.5	0.0	0.0	-	93.0	232.5	2.5
Delta	20.0	90.0	4.5	0.0	0.0	-	27.0	28.2	1.0
Sub-total	95.1	382.9	4.0	0.0	0.0	-	480.7	1,162.0	2.4
b) Eastern Block									
Anambra	55.0	70.0	1.3	0.0	0.0	-	15.0	23.0	1.5
Imo	6.4	11.9	1.9	0.0	0.0	-	128.2	192.0	1.5
Rivers	3.2	4.9	1.5	0.0	0.0	-	24.6	23.0	0.9
Enugu	45.0	50.1	1.1	0.0	0.0	-	25.0	22.1	0.9
Abia	50.0	55.0	1.1	0.0	0.0	-	36.0	66.0	1.8
Akwa Ibom	40.0	11.1	0.3	0.0	0.0	-	23.0	25.0	1.1
Cross River	12.7	18.9	1.5	0.0	0.0	-	7.6	22.0	2.9
Sub-total	212.3	221.9	1.0	0.0	0.0	-	259.4	373.1	1.4
c) Total	307.4	604.8	2.0	0.0	0.0	-	740.1	1,535.1	2.1
Grand total	1,636.6	2,315.7	1.4	54.9	28.0	0.5	2,766.9	3,794.5	1.4

Note: Figures in Kebbi and Jigawa are include in Sokoto and Kano, respectively.
Data Source: Inventory Survey (Regional)

TABLE 2 - 9 PRESENT CROP PRODUCTION (3)

(Unit: Area in 1,000 ha/Production in 1,000 ton, Yield: ton/ha)

State Name	Soybean			Groundnuts			Cowpea		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
1. Northern Zone									
a) Western Block									
Sokoto	0.0	0.0	-	65.8	26.0	0.4	85.0	55.0	0.6
Kebbi	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Katsina	8.5	3.0	0.4	72.0	47.0	0.7	161.9	141.0	0.9
Sub-total	8.5	3.0	0.4	137.8	73.0	0.5	246.9	196.0	0.8
b) Eastern Block									
Kano	0.0	0.0	-	75.8	117.0	1.5	180.2	273.0	1.5
Jigawa	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Yobe	0.0	0.0	-	121.0	133.0	1.1	0.0	0.0	-
Borno	0.0	0.0	-	161.9	178.1	1.1	0.0	0.0	-
Bauchi	0.0	0.0	-	10.6	11.7	1.1	43.8	48.1	1.1
Sub-total	0.0	0.0	-	369.3	439.8	1.2	224.0	321.1	1.4
c) Total	8.5	3.0	0.4	507.1	512.8	1.0	470.9	517.1	1.1
2. Central Zone									
a) Western Block									
Niger	0.0	0.0	-	23.0	94.0	4.1	73.0	43.0	0.6
Kwara	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kaduna	0.0	0.0	-	0.0	0.0	-	39.9	44.0	1.1
Kogi	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Abuja FCT	10.9	8.0	0.7	13.1	39.0	3.0	17.5	15.0	0.9
Sub-total	10.9	8.0	0.7	36.1	133.0	3.7	130.4	102.0	0.8
b) Eastern Block									
Adamawa	0.0	0.0	-	23.0	25.3	1.1	35.0	23.6	0.7
Taraba	0.0	0.0	-	26.1	31.0	1.2	17.2	9.0	0.5
Plateau	0.0	0.0	-	34.2	37.5	1.1	0.0	0.0	-
Benue	101.1	100.0	1.0	153.2	168.5	1.1	51.1	33.2	0.6
Sub-total	101.1	100.0	1.0	236.5	262.3	1.1	103.3	65.8	0.6
c) Total	112.0	108.0	1.0	272.6	395.3	1.5	233.7	167.8	0.7
3. Southern Zone									
a) Western Block									
Oyo	0.5	1.1	2.2	0.1	0.0	0.0	0.3	0.8	2.7
Ogun	0.0	0.0	-	0.0	0.0	-	0.1	0.3	3.0
Osun	0.0	0.0	-	0.0	0.0	-	0.1	0.2	2.0
Lagos	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Ondo	0.1	0.3	3.0	0.0	0.0	-	0.1	0.3	3.0
Edo	0.0	0.0	-	0.0	0.0	-	0.1	0.2	2.0
Delta	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Sub-total	0.6	1.4	2.3	0.1	0.0	0.0	0.7	1.8	2.6
b) Eastern Block									
Anambra	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Imo	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Rivers	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Enugu	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Abia	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Akwa Ibom	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Cross River	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Sub-total	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
c) Total	0.6	1.4	2.3	0.1	0.0	0.0	0.7	1.8	2.6
Grand total	121.1	112.4	0.9	779.8	908.1	1.2	705.3	686.7	1.0

Note: Figures in Kebbi and Jigawa are include in Sokoto and Kano, respectively.
 Data Source: Inventory Survey (Regional)

TABLE 2-9 PRESENT CROP PRODUCTION (4)

(Unit: Area in 1,000 ha/Production in 1,000 ton, Yield: ton/ha)

State Name	Rubber			Cocoa			Oil Palm			Coconut		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
1. Northern Zone												
a) Western Block												
Sokoto	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Kebbi	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Katsina	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Sub-total	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
b) Eastern Block												
Kano	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Jigawa	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Yobe	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Borno	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Bauchi	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Sub-total	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
c) Total	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
2. Central Zone												
a) Western Block												
Niger	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Kwara	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kaduna	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Kogi	0.8	1.6	2.0	0.5	0.8	1.6	8.0	32.0	4.0	1.0	2.3	2.3
Abuja FCT	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Sub-total	0.8	1.6	2.0	0.5	0.8	1.6	8.0	32.0	4.0	1.0	2.3	2.3
b) Eastern Block												
Adamawa	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Taraba	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Plateau	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Benue	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Sub-total	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
c) Total	0.8	1.6	2.0	0.5	0.8	1.6	8.0	32.0	4.0	1.0	2.3	2.3
3. Southern Zone												
a) Western Block												
Oyo	0.0	0.0	-	195.0	40.1	0.2	37.5	21.8	0.6	0.0	0.0	-
Ogun	1.1	0.4	0.4	16.3	3.1	0.2	15.5	9.3	0.6	0.0	0.0	-
Osun	0.0	0.0	-	167.0	33.0	0.2	9.0	6.2	0.7	0.0	0.0	-
Lagos	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Ondo	0.5	0.4	0.8	482.4	92.0	0.2	62.1	40.0	0.6	0.0	0.0	-
Edo	15.0	10.5	0.7	0.1	0.2	2.0	127.0	76.2	0.6	0.0	0.0	-
Delta	35.0	29.0	0.8	0.0	0.0	-	45.0	27.0	0.6	0.0	0.0	-
Sub-total	51.6	40.3	0.8	860.8	168.4	0.2	296.1	180.5	0.6	0.0	0.0	-
b) Eastern Block												
Anambra	0.8	1.5	1.9	2.0	15.0	7.5	11.0	44.0	4.0	0.5	1.4	2.8
Imo	3.3	2.0	0.6	0.7	1.5	2.1	24.1	72.3	3.0	1.5	1.8	1.2
Rivers	1.5	3.2	2.1	0.6	0.9	1.5	15.0	6.2	0.4	0.1	0.9	9.0
Enugu	5.0	2.8	0.6	1.5	2.1	1.4	10.0	41.6	4.2	0.5	1.7	3.4
Abia	1.0	2.5	2.5	50.0	61.0	1.2	20.0	160.0	8.0	1.0	2.3	2.3
Akwa Ibom	2.5	1.3	0.5	1.0	1.5	1.5	20.0	160.0	8.0	3.0	2.5	0.8
Cross River	0.8	0.4	0.5	9.5	9.5	1.0	8.4	33.0	3.9	4.0	3.2	0.8
Sub-total	14.9	13.7	0.9	65.3	91.5	1.4	108.5	517.1	4.8	10.6	13.8	1.3
c) Total	66.5	54.0	0.8	926.1	259.9	0.3	404.6	697.6	1.7	10.6	13.8	1.3
Grand total	67.3	55.6	0.8	926.6	260.7	0.3	412.6	729.6	1.8	11.6	16.1	1.4

Note: Figures in Kebbi and Jigawa are include in Sokoto and Kano, respectively.
Data Source: Inventory Survey (Regional)

TABLE 2 - 10 LIVESTOCK NUMBER

State Name	Cattle	Sheep	Goats	Pig	Camel	Donkey(*1)	Poultry
1. Northern Zone							
a) Western Block							
Sokoto	1,307,159	2,370,962	2,472,115	142,000	6,948	154,000	3,390,000
Kebbi	1,700,000	1,200,000	2,600,000	0	11,000	205,500	0
Katsina	1,130,000	787,000	1,500,000	2,800,000	4,800	200,000	2,800,000
Sub-total	4,137,159	4,357,962	6,572,115	2,942,000	22,748	559,500	6,190,000
b) Eastern Block							
Kano	1,776,000	6,000,000	4,575,000	0	0	0	0
Jigawa	0	0	0	0	0	0	0
Yobe	1,700,000	1,440,000	2,188,000	0	17,000	160,000	1,883,000
Borno	1,027,000	985,000	1,000,000	0	10,000	110,000	1,541,000
Bauchi	2,927,756	3,761,708	5,086,574	157,300	0	15,031	9,601,792
Sub-total	7,430,756	12,186,708	12,849,574	157,300	27,000	285,031	13,025,792
c) Total	11,567,915	16,544,670	19,421,689	3,099,300	49,748	844,531	19,215,792
2. Central Zone							
a) Western Block							
Niger	1,165,000	847,000	955,000	81,000	0	0	1,554,000
Kwara	1,776,774	713,350	826,600	210,000	12	6,000	862,000
Kaduna	1,648,000	1,413,000	1,444,000	361,000	0	160,000	3,685,000
Kogi	5,293	829	1,008	1,387	0	0	13,621
Abuja FCT	1,200,000	1,920,000	2,500,000	150,000	50	0	1,500,000
Sub-total	5,795,067	4,894,170	5,726,608	803,387	62	166,000	7,614,621
b) Eastern Block							
Adamawa	3,412,718	2,799,463	2,525,086	459,543	0	66,257	3,108,678
Taraba	2,844,891	1,479,938	1,964,430	242,404	0	61,270	5,080,614
Plateau	1,054,000	964,000	1,866,000	535,000	0	28,000	2,941,000
Benue	n. a	n. a	n. a	n. a	n. a	n. a	n. a
Sub-total	7,311,609	5,243,401	6,355,516	1,236,947	0	155,527	11,130,292
c) Total	13,106,676	10,137,580	12,082,124	2,040,334	62	321,527	18,744,913
3. Southern Zone							
a) Western Block							
Oyo	76,500	152,000	127,000	25,000	0	0	2,500,000
Ogun	31,921	95,872	130,392	14,159	0	0	1,580,000
Osun	15,000	22,000	47,000	12,000	0	0	420,000
Lagos	11,100	5,610	8,500	23,777	0	0	1,285,517
Ondo	41,253	134,989	226,458	72,447	0	0	317,854
Edo	13,000	14,900	7,000	28,000	0	0	150,000
Delta	8,500	7,500	19,000	22,000	0	0	65,000
Sub-total	197,274	432,871	565,350	197,383	0	0	6,318,371
b) Eastern Block							
Anambra	1,780	480	3,331	3,735	0	0	725,219
Imo	2,108	1,375	919	3,248	0	0	405,510
Rivers	1,500	403	1,489	2,353	0	0	143,417
Enugu	2,477	1,340	1,580	9,286	0	0	949,392
Abia	2,790	421,200	280,800	14,379	0	0	1,156,269
Akwa Ibom	5,230	252	7,000	2,811	0	0	353,800
Cross River	2,794	2,300	1,500	2,375	0	0	167,508
Sub-total	18,679	427,350	296,619	38,187	0	0	3,901,115
c) Total	215,953	860,221	861,969	235,570	0	0	10,219,486
Grand Total	24,890,544	27,542,471	32,365,782	5,375,204	49,810	1,166,058	48,180,191

Data Source: Inventory Survey (Regional)

TABLE 2-11 FOOD INSECURITY AT THE STATE LEVEL

States	Percentage Spending Less than Minimum Threshold		Per Capita Calorie (KCAL) and Protein (g) Intakes per Day			
			Urban		Rural	
	Urban	Rural	Calorie	Protein	Calorie	Protein
Lagos	18	28	2,105	69	1,917	60
Ogun	44	36	1,855	39	1,867	38
Oyo	24	10	2,026	57	2,135	58
Ondo	30	29	2,025	46	2,298	50
Bendel	35	31	2,024	48	1,799	41
Rivers	37	16	1,767	44	1,779	33
Cross River	20	12	2,155	55	1,887	30
Imo	15	20	2,262	52	1,753	34
Anambra	17	9	2,062	45	1,976	34
Kwara	30	22	2,021	61	2,029	52
Niger	17	18	2,584	67	2,387	58
Benue	21	9	2,156	56	2,040	50
Gongola	26	17	2,285	69	2,083	59
Plateau	18	21	2,011	56	1,929	52
Kaduna	13	17	2,132	60	1,911	48
Bauchi	36	16	2,176	61	2,367	58
Borno	17	15	2,105	67	2,133	56
Kano	11	13	2,232	63	2,340	61
Sokoto	11	15	2,517	63	2,313	60
					Calorie (kcal)	Protein
					2,200	63.0
					2,192	53.8

TABLE 2 - 12 FOOD BALANCE SHEET (SUMMARY - 1)

Year : 1991

(Unit : 1,000 tons)

Products	Northern Zone	Central Zone	Southern Zone	Nigeria
<u>Starchy Roots</u>				
Production	1,332	10,455	16,995	28,781
Demand	11,737	8,734	17,867	38,338
Balance	-10,405	1,721	-872	-9,557
<u>Cereals</u>				
- Wheat				
Production	28	0	-	28
Demand	383	284	580	1,247
Balance	-355	-284	-580	-1,219
- Rice				
Production	274	1,437	605	2,316
Demand	610	454	930	1,994
Balance	-336	983	-325	322
- Millet				
Production	2,890	764	7	3,661
Demand	1,145	851	1,741	3,737
Balance	1,745	-87	-1,734	-76
- Maize				
Production	432	1,828	1,535	3,795
Demand	556	415	848	1,819
Balance	-124	1,413	687	1,976
- Sorghum				
Production	3,336	1,681	985	6,002
Demand	1,505	1,122	2,294	4,921
Balance	1,831	599	-1,309	1,081
- Others				
Production	0	0	0	0
Demand	74	56	110	240
Balance	-74	-56	-110	-240
- Total				
Production	6,959	5,711	3,132	15,802
Demand	4,273	3,182	6,503	13,958
Balance	2,686	2,529	-3,371	1,844
<u>Oil Crops</u>				
Production	516	503	1	1,020
Demand	500	372	765	1,637
Balance	16	131	-764	-617

Note : Production figure is referred to the result of Inventory Survey (Regional).
Demand includes all requirement for food, seed, feed and processing, as well as loss and wastage.

TABLE 2 - 12 FOOD BALANCE SHEET (SUMMARY - 2)

Year : 2020		(Unit : 1,000 tons)			
Products	Northern Zone	Central Zone	Southern Zone	Nigeria	
Starchy Roots					
Production	2,365	18,566	30,180	51,111	
Demand	19,593	21,542	39,422	80,557	
Balance	-17,228	-2,976	-9,242	-29,446	
Cereals					
- Wheat					
Production	43	0	-	43	
Demand	638	702	1,283	2,623	
Balance	-594	-702	-1,283	-2,580	
- Rice					
Production	422	2,213	932	3,567	
Demand	1,016	1,119	2,048	4,183	
Balance	-594	1,094	-1,116	-616	
- Millet					
Production	4,451	1,177	11	5,639	
Demand	1,909	2,100	3,843	7,852	
Balance	2,542	-923	-3,832	-2,213	
- Maize					
Production	665	2,815	2,364	5,844	
Demand	932	1,025	1,875	3,832	
Balance	-267	1,790	489	2,012	
- Sorghum					
Production	5,137	2,589	1,517	9,243	
Demand	2,515	2,766	5,062	10,343	
Balance	2,622	-177	-3,545	-1,100	
- Others					
Production	0	0	0	0	
Demand	122	133	246	501	
Balance	-122	-133	-246	-501	
- Total					
Production	10,718	8,794	4,824	24,336	
Demand	7,132	7,845	14,357	29,334	
Balance	3,586	949	-9,533	-4,998	
Oil Crops					
Production	916	893	2	1,811	
Demand	837	920	1,684	3,441	
Balance	-79	-27	-1,682	-1,630	

Note: Production figure is referred to the result of Inventory Survey (Regional).
Demand includes all requirement for food, seed, feed and processing, as well as loss and wastage.

TABLE 2 - 13 ESTIMATED FOOD DEMAND IN 1991 (1)

Total Foods

State name	Popula'n (1,000)	(Unit: 1,000 tons)						
		Cereals	Starchy Roots	Sugar Crop	Pulses	Oilcrops	Vegeta- bles	Fruits
1. Northern Zone								
a) Western Block								
Sokoto	4,393	692	1,903	67	47	81	208	153
Kebbi	2,059	324	892	31	22	38	97	72
Katsina	3,879	612	1,680	59	42	72	183	135
Sub-total	10,331	1,628	4,475	157	111	191	488	360
b) Eastern Block								
Kano	5,638	888	2,442	86	61	104	267	196
Jigawa	2,832	447	1,227	43	31	52	134	99
Yobe	1,411	223	611	21	15	26	67	49
Borno	2,595	409	1,124	39	28	48	123	90
Bauchi	4,291	678	1,858	65	46	79	203	149
Sub-total	16,767	2,645	7,262	254	181	309	794	583
c) Total	27,098	4,273	11,737	411	292	500	1,282	943
2. Central Zone								
a) Western Block								
Niger	2,481	392	1,075	38	27	46	117	86
Kwara	1,568	246	679	24	17	29	74	55
Kaduna	3,968	626	1,719	60	43	73	188	138
Kogi	2,100	332	910	32	23	39	99	73
Abuja FCT	379	60	164	6	4	7	18	13
Sub-total	10,496	1,656	4,547	160	114	194	496	365
b) Eastern Block								
Adamawa	2,123	336	919	32	23	39	100	74
Taraba	1,480	232	641	22	16	27	70	52
Plateau	3,285	519	1,423	50	35	61	155	114
Benue	2,779	439	1,204	42	30	51	131	97
Sub-total	9,667	1,526	4,187	146	104	178	456	337
c) Total	20,163	3,182	8,734	306	218	372	952	702
3. Southern Zone								
a) Western Block								
Oyo	3,489	550	1,511	53	38	65	165	121
Ogun	2,339	369	1,013	36	25	43	111	81
Osun	2,203	347	954	33	24	41	104	77
Lagos	5,687	896	2,463	86	61	105	269	198
Ondo	3,884	612	1,682	59	42	72	184	135
Edo	2,159	340	935	33	23	40	102	75
Delta	2,569	405	1,113	39	28	48	122	89
Sub-total	22,330	3,519	9,671	339	241	414	1,057	776
b) Eastern Block								
Anambra	2,768	436	1,199	42	30	51	131	96
Imo	2,488	392	1,078	38	27	46	118	87
Rivers	3,984	629	1,725	61	43	74	188	139
Enugu	3,162	499	1,369	48	34	58	150	110
Abia	2,298	362	995	35	25	43	109	80
Akwa Ibom	2,360	372	1,022	36	25	44	112	82
Cross River	1,866	294	808	28	20	35	88	65
Sub-total	18,926	2,984	8,196	288	204	351	896	659
c) Total	41,256	6,503	17,867	627	445	765	1,953	1,435
Grand Total	88,517	13,958	38,338	1,344	955	1,637	4,187	3,080

TABLE 2 - 13 ESTIMATED FOOD DEMAND IN 1991 (2)

Cereals

(Unit: 1,000 tons)

State name	Popula'n (1,000)	Wheat	Rice	Mellet	Maize	Sorghum	Others	Total
1. Northern Zone								
a) Western Block								
Sokoto	4,393	62	99	185	90	244	12	692
Kebbi	2,059	29	46	87	42	114	6	324
Katsina	3,879	55	87	164	80	216	10	612
Sub-total	10,331	146	232	436	212	574	28	1,628
b) Eastern Block								
Kano	5,638	79	127	238	116	313	15	888
Jigawa	2,832	40	64	120	58	157	8	447
Yobe	1,411	20	32	60	29	78	4	223
Borno	2,595	37	58	110	53	144	7	409
Bauchi	4,291	61	97	181	88	239	12	678
Sub-total	16,767	237	378	709	344	931	46	2,645
c) Total	27,098	383	610	1,145	556	1,505	74	4,273
2. Central Zone								
a) Western Block								
Niger	2,481	35	56	105	51	138	7	392
Kwara	1,568	22	35	66	32	87	4	246
Kaduna	3,968	56	89	167	82	221	11	626
Kogi	2,100	30	47	89	43	117	6	332
Abuja FCT	379	5	9	16	8	21	1	60
Sub-total	1,0496	148	236	443	216	584	29	1,656
b) Eastern Block								
Adamawa	2,123	30	48	90	44	118	6	336
Taraba	1,480	21	33	62	30	82	4	232
Plateau	3,285	46	74	139	68	183	9	519
Benue	2,779	39	63	117	57	155	8	439
Sub-total	9,667	136	218	408	199	538	27	1,526
c) Total	20,163	284	454	851	415	1,122	56	3,182
3. Southern Zone								
a) Western Block								
Oyo	3,489	49	79	147	72	194	9	550
Ogun	2,339	33	53	99	48	130	6	369
Osun	2,203	31	50	93	45	122	6	347
Lagos	5,687	80	128	240	117	316	15	896
Ondo	3,884	55	87	164	80	216	10	612
Edo	2,159	30	49	91	44	120	6	340
Delta	2,569	36	58	108	53	143	7	405
Sub-total	22,330	314	504	942	459	1,241	59	3,519
b) Eastern Block								
Anambra	2,768	39	62	117	57	154	7	436
Imo	2,488	35	56	105	51	138	7	392
Rivers	3,984	56	90	168	82	222	11	629
Enugu	3,162	45	71	133	65	176	9	499
Abia	2,298	32	52	97	47	128	6	362
Akwa Ibom	2,360	33	53	100	49	131	6	372
Cross River	1,866	26	42	79	38	104	5	294
Sub-total	18,926	266	426	799	389	1,053	51	2,984
c) Total	41,256	580	930	1,741	848	2,294	110	6,503
Grand Total	88,517	1,247	1,994	3,737	1,819	4,921	240	13,958

TABLE 2 - 14 PROJECTED FOOD DEMAND IN 2020 (1)

Total Foods

State Name	Popula'n (1,000)	(Unit: 1,000 tons)						
		Cereals	Starchy Roots	Sugar Crop	Pulses	Oilcrops	Vegeta- bles	Fruits
1. Northern Zone								
a) Western Block								
Sokoto	7,240	1,143	3,136	110	78	134	342	252
Kebbi	3,393	535	1,470	52	37	63	160	118
Katsina	6,393	1,008	2,769	97	69	118	302	222
Sub-total	17,026	2,686	7,375	259	184	315	804	592
b) Eastern Block								
Kano	9,485	1,495	4,108	144	102	175	449	330
Jigawa	4,765	751	2,064	72	51	88	225	166
Yobe	2,374	373	1,028	36	26	44	112	83
Borno	4,366	689	1,891	66	47	81	207	152
Bauchi	7,219	1,138	3,127	110	78	134	341	251
Sub-total	28,209	4,446	12,218	428	304	522	1,334	982
c) Total	45,235	7,132	19,593	687	488	837	2,138	1,574
2. Central Zone								
a) Western Block								
Niger	5,995	945	2,596	91	65	111	284	209
Kwara	3,789	597	1,641	58	41	70	179	132
Kaduna	9,588	1,513	4,153	146	104	177	454	334
Kogi	5,075	801	2,198	77	55	94	240	177
Abuja FCT	916	145	397	14	10	17	43	32
Sub-total	25,363	4,001	10,985	386	275	469	1,200	884
b) Eastern Block								
Adamawa	5,353	843	2,318	81	58	99	253	186
Taraba	3,732	588	1,616	57	40	69	177	130
Plateau	8,284	1,307	3,588	126	89	153	392	288
Benue	7,007	1,106	3,035	107	76	130	331	244
Sub-total	24,376	3,844	10,557	371	263	451	1,153	848
c) Total	49,739	7,845	21,542	757	538	920	2,353	1,732
3. Southern Zone								
a) Western Block								
Oyo	7,698	1,215	3,334	117	83	142	364	268
Ogun	5,161	814	2,235	78	56	95	244	180
Osun	4,861	766	2,105	74	52	90	230	169
Lagos	12,548	1,979	5,435	191	136	232	594	437
Ondo	8,569	1,352	3,711	130	93	159	405	298
Edo	4,764	751	2,063	72	51	88	225	166
Delta	5,668	894	2,455	86	61	105	268	197
Sub-total	49,269	7,771	21,338	748	532	911	2,330	1,715
b) Eastern Block								
Anambra	6,107	963	2,645	93	66	113	289	213
Imo	5,489	866	2,377	83	59	102	260	191
Rivers	8,791	1,387	3,807	134	95	163	416	306
Enugu	6,976	1,100	3,021	106	75	129	330	243
Abia	5,070	799	2,196	77	55	94	240	176
Akwa Ibom	5,207	821	2,255	79	56	96	246	181
Cross River	4,117	650	1,783	63	44	76	195	143
Sub-total	41,757	6,586	18,084	635	450	773	1,976	1,453
c) Total	91,026	14,357	39,422	1,383	982	1,684	4,306	3,168
Grand Total	186,000	29,334	80,557	2,827	2,008	3,441	8,797	6,474

TABLE 2-14 PROJECTED FOOD DEMAND IN 2020 (2)

Cereals

(Unit: 1,000 tons)

State Name	Popula'n (1,000)	Wheat	Rice	Millet	Maize	Sorghum	Oters	Total
1. Northern Zone								
a) Western Block								
Sokoto	7,240	102	163	306	149	403	20	1,143
Kebbi	3,393	48	76	143	70	189	9	535
Kalsina	6,393	90	144	270	132	355	17	1,008
Sub-total	17,026	240	383	719	351	947	46	2,686
b) Eastern Block								
Kano	9,485	134	213	400	195	527	26	1,495
Jigawa	4,765	67	107	201	98	265	13	751
Yobe	2,374	33	53	100	49	132	6	373
Borno	4,366	62	98	184	90	243	12	689
Bauchi	7,219	102	162	305	149	401	19	1,138
Sub-total	28,209	398	633	1,190	581	1,568	76	4,446
c) Total	45,235	638	1,016	1,909	932	2,515	122	7,132
2. Central Zone								
a) Western Block								
Niger	5,995	85	135	253	123	333	16	945
Kwara	3,789	53	85	160	78	211	10	597
Kaduna	9,588	135	216	405	198	533	26	1,513
Kogi	5,075	72	114	214	105	282	14	801
Abuja FCT	916	13	21	39	19	51	2	145
Sub-total	25,363	358	571	1,071	523	1,410	68	4,001
b) Eastern Block								
Adamawa	5,353	75	120	226	110	298	14	843
Taraba	3,732	53	84	157	77	207	10	588
Plateau	8,284	117	186	350	171	461	22	1,307
Benue	7,007	99	158	296	144	390	19	1,106
Sub-total	24,376	344	548	1,029	502	1,356	65	3,844
c) Total	49,739	702	1,119	2,100	1,025	2,766	133	7,845
3. Southern Zone								
a) Western Block								
Oyo	7,698	109	173	325	159	428	21	1,215
Ogun	5,161	73	116	218	106	287	14	814
Osun	4,861	69	109	205	100	270	13	766
Lagos	12,548	177	282	530	258	698	34	1,979
Ondo	8,569	121	193	362	177	476	23	1,352
Edo	4,764	67	107	201	98	265	13	751
Delta	5,668	80	128	239	117	315	15	894
Sub-total	49,269	696	1,108	2,080	1,015	2,739	133	7,771
b) Eastern Block								
Anambra	6,107	86	137	258	126	340	16	963
Imo	5,489	77	124	232	113	305	15	866
Rivers	8,791	124	198	371	181	489	24	1,387
Enugu	6,976	98	157	294	144	388	19	1,100
Abia	5,070	71	114	214	104	282	14	799
Akwa Ibom	5,207	73	117	220	107	290	14	821
Cross River	4,117	58	93	174	85	229	11	650
Sub-total	41,757	587	940	1,763	860	2,323	113	6,586
c) Total	91,026	1,283	2,048	3,843	1,875	5,062	246	14,357
Grand Total	186,000	2,623	4,183	7,852	3,832	10,343	501	29,334

TABLE 2 - 15 URBAN CENTER AND POPULATION

(Unit: Population in 1,000)

State Name	State Capital			Other Big City 1			Other Big City 2		
	City Name	L.G.A	Popul.	City Name	L.G.A	Popul.	City Name	L.G.A	Popul.
1. Northern Zone									
a) Western Block									
Sokoto	Sokoto	Sokoto	89.8	Gusau	Gusau	69.2	Kaura-Namo	Kaura-Namo	29.0
Kebbi	Birnin Keb	Birnin Keb	26.5	Argungu	Argungu	21.0	Yelwa	Tauri	8.0
Katsina	Katsina	Katsina	90.5	Funtua	Funtua	22.4	Daura	Daura	20.1
Sub-total			206.8			112.6			57.1
b) Eastern Block									
Kano	Kano	Kano	295.4	Gwarzo	Gwarzo	13.5	Dambatta	Dambatta	16.4
Jigawa	Dutse	Dutse	8.6	Gumel	Gumel	24.7	Hadejia	Hadejia	23.5
Yobe	Damaturu	Damaturu	11.7	Potiskum	Nangere	31.0	Nguru	Nguru	49.2
Borno	Maiduguri	Maiduguri	140.0	Biu	Biu	21.4	Dikwa	Dikwa	n.a.
Bauchi	Bauchi	Bauchi	37.8	Gombe	Gombe	47.3	Azare	Katagum	27.4
Sub-total			493.5			137.9			116.5
c) Total			700.3			205.5			173.6
2. Central Zone									
a) Western Block									
Niger	Minna	Chanchage	60.0	Bida	Bida	55.0	Kontagora	Kontagora	24.6
Kwara	Ilorin	Ilorin	208.5	Offa	Offa	86.4	Lafiaji	Edu	31.6
Kaduna	Kaduna	Kaduna	149.9	Zaria	Zaria	166.2	Kafanchan	Jama's	7.7
Kogi	Lokoja	Lokoja	25.0	Idah	Idah	27.7	Ankpa	Ankpa	n.a.
Abuja FCT	FCT	FCT	n.a.	n.a	n.a	n.a	n.a	n.a	n.a.
Sub-total			443.4			335.3			63.9
b) Eastern Block									
Adamawa	Yola	Yola	8.3	Mubi	Mubi	28.1	Numan	Numan	19.6
Taraba	Jalingo	Jalingo	18.2	Takum	Takum	n.a.	Wukari	Wukari	n.a.
Plateau	Jos	Jos North	90.4	Keffi	Keffi	31.7	Lafia	Lafia	53.7
Benue	Makurdi	Makurdi	54.0	Gboko	Gboko	27.1	Katsina-Ala	Katsina-Ala	6.0
Sub-total			170.9			86.9			79.3
c) Total			614.3			422.2			143.2
3. Southern Zone									
a) Western Block									
Oyo	Ibadan	Ibadan	622.4	Ogbomosho	Ogbomosho	319.9	Oyo	Oyo	112.3
Ogun	Abeokuta	Abekouta	187.3	Ijebu-Ode	Ijebu-Ode	68.5	Shagamu	Shagamu	51.4
Osun	Osogbo	Osogbo	209.0	Ilesha	Ilesha	165.8	Ife	Ife	130.1
Lagos	Ikeja	Ikeja	9.1	Ikorodu	Ikorodu	81.0	Badagry	Badagry	8.5
Ondo	Akure	Akure	71.1	Ondo	Ondo	n.a.	Owo	Owo	80.4
Edo	Benin City	Oredo	100.7	Auchi	Etsako W.	20.1	Irua	Esan C.	5.7
Delta	Asaba	Oshimlli	26.0	Sapele	Sapele	61.0	Warri	Warri S.	5.3
Sub-total			1,225.6			716.3			393.7
b) Eastern Block									
Anambra	Awka	Awka	48.2	Onitsha	Onitsha N.	163.0	Ihiala	Ihiala	40.2
Imo	Owerri	Owerri	26.0	Okigwe	Okigwe	n.a	Nkwerre	Nkwerre	21.2
Rivers	Port Hrc.	Port Harc.	179.6	Opobo	Bonny	35.5	Nembe	Brass	25.0
Enugu	Enugu	Enugu N.	138.5	Abakaliki	Abakaliki	31.2	Nsukka	Nsukka	26.2
Abia	Umuahia	Umuahia	28.8	Aba	Aba S.	131.0	Bende	Bende	n.a
Akwa Ibom	Uyo	Uyo	33.2	Kot Ekpe.	Ikot Ekpe.	38.1	Oron	Oron	34.2
Cross River	Calabar	Calabar	76.4	Ugep	Yakurr	44.9	Ogoja	Ogoja	n.a
Sub-total			530.7			443.7			146.8
c) Total			1,756.3			1,160.0			540.5
Grand total			3,070.9			1,832.7			857.3

Data Source : Inventory Survey (Nation Wide) on the basis of 1963 population census.

TABLE 2 - 16 URBAN DEVELOPMENT ACTIVITY

(Unit: Million Naira)

State Name	State Capital	Other Major City		Budget Allocation for Various Activities							
		A	B	Housing	Water Supply	Sewage System	Power Supply	Road	Waste Dispose	Health/Educat.	Other Public Es
1. Northern Zone											
a) Western Block											
Sokoto	Birnin	Argungu	Yelwa	61.1	64.6	1.5	30.6	-	-	116.0	57.4
Kebbi	Sokoto	Gusau	Kaura-Namo	12.1	47.7	162.0	53.5	-	-	635.2	143.7
Katsina	Katsina	Funtua	Daura	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-total				73.2	112.3	163.5	84.1	-	-	751.2	201.1
b) Eastern Block											
Kano	Kano	Gwarzo	Dambatta	11.9	68.7	22.9	36.9	-	-	133.2	-
Jigawa	Dutse	Gumel	Hadejia	-	-	-	-	-	-	88.0	-
Yobe	Damaturu	Potiskum	Nguru	10.0	1.0	145.7	12.0	-	-	127.3	-
Borno	Maiduguri	Biu	Dikwa	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bauchi	Bauchi	Gombe	Azare	18.0	64.8	26.5	-	-	-	271.4	245.1
Sub-total				39.9	134.5	195.1	48.9	-	-	619.9	245.1
c) Total				113.1	246.8	378.6	133.0	-	-	1,377.1	446.2
2. Central Zone											
a) Western Block											
Niger	Minna	Bida	Kontagora	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kwara	Horin	Offa	Lafiaji	1.7	73.5	-	47.3	-	-	151.4	50.1
Kaduna	Kaduna	Zaira	Kafanchan	4.4	28.8	1.8	31.3	21.8	-	39.0	52.0
Kogi	Lokoja	Idah	Ankpa	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abuja FCT	FCT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-total				6.1	102.3	1.8	78.6	21.8	-	190.4	102.1
b) Eastern Block											
Adamawa	Yola	Mubi	Numan	18.0	13.3	5.2	n.a.	38.2	24.2	94.6	-
Taraba	Jalingo	Takum	Wukari	94.0	90.5	750.0	-	84.4	15.8	14.5	1.3
Plateau	Jos	Keffi	Lafia	1.0	31.5	14.0	n.a.	-	-	102.0	-
Benue	Makurdi	Gboko	Katsina-Ala	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-total				113.0	135.3	769.2	-	122.6	40.0	211.1	1.3
c) Total				119.1	237.6	771.0	78.6	144.4	40.0	401.5	103.4
3. Southern Zone											
a) Western Block											
Oyo	Ibadan	Ogbomosho	Oyo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ogun	Abeokuta	Ijebu-Ode	Shagamu	3.6	43.1	7.0	6.1	-	-	65.9	-
Osun	Osogbo	Ilesha	Ife	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lagos	Ikeja	Ikorodu	Badagry	120.0	2,165.0	200.0	67.6	-	-	535.0	-
Ondo	Akure	Ondo	Owo	5.4	35.5	5.1	42.8	-	-	201.8	-
Edo	Benin City	Auchi	Irrua	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Delta	Asaba	Sapele	Warri	7.3	-	4.9	29.3	-	-	136.9	-
Sub-total				136.3	2,243.6	217.0	145.8	-	-	939.6	-
b) Eastern Block											
Anambra	Awka	Onitsha	Ihiala	3.4	41.1	1.7	6.8	-	-	100.0	-
Imo	Owerri	Okigwe	Nkwere	17.4	29.5	12.2	15.0	-	-	98.4	72.4
Rivers	Port Harc.	Opobo	Nembe	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Enugu	Enugu	Abakaliki	Nsukka	4.8	51.1	8.6	70.6	n.a.	-	147.6	-
Abia	Umuahia	Aba	Bende	40.0	80.9	-	90.0	-	-	158.3	-
Akwa Ibom	Uyo	Ikot Ekpa.	Oron	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cross River	Calabar	Ugep	Ogoja	9.0	22.0	14.0	68.0	123.0	-	91.3	-
Sub-total				74.6	224.6	36.4	249.4	123.0	-	595.6	72.4
c) Total				210.9	2,468.2	253.4	395.2	123.0	-	1,535.2	72.4
Grand total				443.1	2,952.6	1,403.0	606.8	267.4	40.0	3,307.8	622.0

Data Source: Inventory Survey (Nation-wide)

TABLE 2 - 17 MAJOR INDUSTRIAL ZONE BY COMPONENT

(Unit : Number of Production Center)

Component	Southern Zone	Central Zone	Northern Zone
1. Heavy Industry			
- Cement	4	-	2
- Oil Refinery	2	-	-
- Glassworks	1	-	-
- Sawmill	3	-	-
- Sugar Refinery	-	2	-
- Ginnery	-	2	1
- Leather Tannery	-	-	4
- Bricks, Ceramic	4	-	-
2. Light Industry			
- Food Processing	19	4	7
- Non-Food Processing			
a. Textiles	3	1	2
b. Oil refinery	2	-	-
c. Plastics	2	1	-
d. Tanning leather	-	-	2
e. Soap	2	-	1
f. Cigarettes	2	-	-
g. Vehicle assembling	1	1	-
h. Paper	-	1	-
i. Shoe	6	-	2
3. Traditional Industry			
- Leather Work	2	9	7
- Blacksmithery	6	10	7
- Brass Work	2	1	2
- Glass Work	-	1	-
- Cloth Weaving	5	6	7
- Grass Weaving	1	4	5
- Raffia & Cane Work	4	-	-
- Wood Work	7	3	1
- Clay Work	5	8	3

Data Source : Nigeria in Maps (James C. Nwafor and J. O. C. Onyemelukwe, 1982)

TABLE 2-18 INDUSTRIAL PRODUCTION

(Unit: Million Naira)

Name of State	Mining/Quarrying			Manufacturing					Others	Total	
	Crude Petro.	Others	Sub-total	Food/Bever.	Textile	Chemical	Feb. Metal	Others			Sub-total
1. Northern Zone											
a) Western Block											
Kebbi	-	-	-	8	-	-	1	60	69	-	69
Sokoto	-	-	-	17	1	-	1	127	146	-	146
Katsina	-	-	-	3	35	-	1	549	588	3	591
Sub-total	-	-	-	28	36	-	3	736	803	3	806
b) Eastern Block											
Kano	-	-	-	179	129	72	25	54	459	3	462
Jigawa	-	-	-	90	65	36	13	27	231	1	232
Yobe	-	-	-	9	2	-	6	6	23	-	23
Borno	-	-	-	16	3	-	11	12	42	-	42
Bauchi	-	-	-	10	2	-	100	30	142	-	142
Sub-total	-	-	-	304	201	108	155	129	897	4	901
c) Total	-	-	-	<u>332</u>	<u>237</u>	<u>108</u>	<u>158</u>	<u>865</u>	<u>1,700</u>	<u>7</u>	<u>1,707</u>
2. Central Zone											
a) Western Block											
Niger	-	-	-	7	-	-	-	6	13	-	13
Kwara	-	-	-	154	1	6	3	29	193	2	195
Kaduna	-	-	-	70	390	2	74	56	592	2	594
Kogi	-	-	-	206	-	8	4	40	258	2	260
Abuja FCT	-	-	-	2	-	-	-	-	2	-	2
Sub-total	-	-	-	439	391	16	81	131	1,058	6	1,064
b) Eastern Block											
Adamawa	-	-	-	26	-	-	-	5	31	-	31
Taraba	-	-	-	18	-	-	-	3	21	-	21
Plateau	-	2	2	221	21	5	-	65	312	2	316
Benue	-	1	1	273	1	10	5	54	343	2	346
Sub-total	-	3	3	538	22	15	5	127	707	4	714
c) Total	-	<u>3</u>	<u>3</u>	<u>977</u>	<u>413</u>	<u>31</u>	<u>86</u>	<u>258</u>	<u>1,765</u>	<u>10</u>	<u>1,778</u>
3. Southern Zone											
a) Western Block											
Oyo	-	-	-	10	2	1	43	18	74	-	74
Ogun	-	5	5	147	25	47	82	55	356	-	361
Osun	-	-	-	6	1	1	27	11	46	1	47
Lagos	30,639	-	30,639	777	1,091	709	496	470	3,543	40	34,222
Ondo	-	-	-	1	-	-	1	80	82	-	82
Edo	-	-	-	62	2	14	12	238	328	8	336
Delta	-	-	-	73	3	16	14	284	390	10	400
Sub-total	30,639	5	30,644	1,076	1,124	788	675	1,156	4,819	59	35,522
b) Eastern Block											
Anambra	-	1	1	105	37	21	56	81	300	2	303
Imo	-	-	-	56	7	7	8	13	91	24	115
Rivers	-	14	14	53	28	707	57	52	897	5	916
Enugu	-	1	1	120	42	24	63	94	343	2	346
Abia	-	-	-	52	7	7	7	11	84	22	106
Akwa Ibom	-	-	-	35	1	28	6	76	146	2	148
Cross River	-	2	2	2	3	4	-	56	65	-	67
Sub-total	-	18	18	423	125	798	197	383	1,926	57	2,001
c) Total	<u>30,639</u>	<u>23</u>	<u>30,662</u>	<u>1,499</u>	<u>1,249</u>	<u>1,586</u>	<u>872</u>	<u>1,539</u>	<u>6,745</u>	<u>116</u>	<u>37,523</u>
4. Ground Total	<u>30,639</u>	<u>26</u>	<u>30,665</u>	<u>2,808</u>	<u>1,899</u>	<u>1,725</u>	<u>1,116</u>	<u>2,662</u>	<u>10,210</u>	<u>133</u>	<u>41,008</u>

Data Source: Federal Office of Statistics

TABLE 2-19 INDICES OF AVERAGE WORLD PRICES (CIF) IN DOLLARS OF
NIGERIA'S MAJOR AGRICULTURAL COMMODITIES (1985 = 100)

	1988	1989	1990	1991	1992	Percentage Change Over Preceding Year				Annual Growth Rate 1988/1992
						1989	1990	1991	1992	
All Commodity	87	71	54	64	62	-18.4	-23.9	18.5	-3.1	-6.7
Benniseed	-	-	-	-	-	-	-	-	-	-
Cocoa	77	63	46	58	55	-18.2	-27.0	26.1	-5.2	-5.4
Coffee	119	95	74	69	55	-20.2	-22.1	-6.8	-20.3	-17.4
Copra	124	107	74	87	123	-13.7	-30.8	17.6	41.4	3.6
Cotton	174	145	176	161	122	-16.7	21.4	-8.5	-24.2	-9.9
Groundnut Oil	81	104	131	131	84	28.4	26.0	0.0	-35.9	4.6
Ginger	51	41	50	53	47	-19.6	22.0	6.0	-11.3	-0.7
Groundnut	95	-	-	-	-	-	-	-	-	-
Palm Kernel	111	107	81	106	100	-3.6	-24.3	30.9	-	-
Palm Oil	112	90	72	86	132	-19.6	-20.0	19.4	16.3	-1.0
Soybean	178	182	135	133	-	2.2	-25.8	-1.5	-0.8	-6.5
Rubber	188	152	142	-	-	-19.1	-6.6	-	-	-

TABLE 2-20 INDICES OF AVERAGE WORLD PRICES (CIF) IN NAIRA OF
NIGERIA'S MAJOR AGRICULTURAL COMMODITIES (1985 = 100)

	1988	1989	1990	1991	1992	Percentage Change Over Preceding Year				Annual Growth Rate 1988/1992
						1989	1990	1991	1992	
All Commodity	354	382	388	568	946	7.9	1.6	46.4	66.5	27.9
Benniseed	-	-	-	-	-	-	-	-	-	-
Cocoa	311	311	328	511	834	0.0	5.5	55.8	63.2	28.0
Coffee	446	624	529	609	848	39.9	-15.2	15.1	39.2	17.4
Copra	498	706	532	733	1,860	41.8	-24.6	37.8	153.8	39.0
Cotton	649	960	1,265	1,431	1,880	47.9	31.8	13.1	31.4	30.5
Groundnut Oil	328	686	940	1,118	1,246	109.1	37.0	18.9	11.4	39.6
Ginger	194	267	359	460	694	37.6	34.5	28.1	50.9	37.5
Groundnut	391	-	-	-	-	-	-	-	-	-
Palm Kernel	426	707	581	921	-	66.0	-17.8	58.5	-	-
Palm Oil	475	591	514	751	1,553	24.4	-13.0	46.1	106.8	34.5
Soybean	722	1,209	972	1,174	2,047	67.5	-19.6	20.8	74.4	30.0
Rubber	755	1,012	997	-	-	34.0	-1.5	-	-	-

TABLE 2-21 AVERAGE PRICES OF SELECTED CASH CROPS

(Unit: Naira/ton)

	1988	1989	1990	1991 ¹	1992 ²	Percentage Change Over Preceding Year				Annual Growth Rate 1988/1992
						1989	1990	1991	1992	
Benniseed	2,000	5,120	4,410	5,979	9,792	-156.0	-13.9	35.6	63.8	48.8
Cocoa	11,000	10,100	8,500	10,158	12,745	-8.2	-15.8	19.5	25.5	3.7
Coffee	6,000	7,464	6,680	8,760	N/A	24.4	-10.5	31.0	-	N/A
Copra	N/A	N/A	N/A	N/A	N/A	-	-	-	-	-
Cotton	4,500	2,433	2,600	4,163	3,778	-45.9	6.9	60.1	-9.2	-4.5
Groundnut	2,250	4,775	4,320	6,280	6,843	112.2	-9.5	45.4	9.0	32.1
Ginger	1,500	2,873	3,480	N/A	9,695	91.5	21.1	-	-	59.4
Palm Kernel	1,000	1,800	2,000	2,525	5,692	80.0	11.1	26.3	125.4	54.5
Palm Oil	1,500	1,310	1,160	N/A	9,200	-12.7	-11.5	-	-	57.4
Soybean	2,000	4,030	4,920	3,960	5,275	101.5	22.1	-19.5	33.2	27.4
Rubber ³	1,500	2,000	1,395	5,300	12,520	33.3	-30.3	279.9	136.2	70.0

¹ Revised ² Provisional ³ 100% dry lump-top quality

Source: Annual Report 1992, CBN

TABLE 2-22 AVERAGE RURAL MARKET PRICES OF SOME STAPLE FOOD CROPS IN SELECTED STATES

State/Crop	(Naira per ton)						
	Yam (White)	Maize (Shelled)	Sorghum	Millet	Rice (Milled)	Cowpea (White)	Groundnut (Shelled)
Adamawa							
1988	1,940	1,393	N/A	1,511	4,182	4,022	3,550
1989	2,500	2,500	2,050	2,007	7,300	5,400	3,500
1990	1,432	1,262	1,293	1,497	4,425	4,585	3,772
1991	-	3,320	4,150	3,583	10,345	9,043	3,900
1992	5,632	4,737	4,844	5,154	11,738	7,701	N/A
Akwai Ibom							
1988	1,020	2,022	N/A	1,700	3,887	4,016	5,500
1989	2,123	6,260	-	-	7,206	6,223	N/A
1990	3,260	3,870	-	-	7,490	8,170	5,400
1991	-	4,315	4,650	-	7,000	7,125	N/A
1992	4,534	5,798	-	-	15,355	10,508	N/A
Anambra							
1988	1,446	1,227	N/A	207	1,751	2,090	3,430
1989	1,500	2,064	-	-	3,464	3,742	N/A
1990	2,170	2,280	-	-	5,780	5,700	5,400
1991	N/A	3,460	2,700	3,165	6,233	7,073	N/A
1992	3,855	5,723	N/A	10,344	11,271	8,925	N/A
Edo							
1988	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1989	650	1,910	-	-	4,000	4,250	4,410
1990	1,800	1,500	-	-	7,250	5,270	4,990
1991	-	3,898	2,775	3,847	7,698	8,600	4,600
1992	13,611	8,162	-	-	15,127	11,533	N/A
Benue							
1988	1,450	1,684	N/A	1,725	3,790	3,425	4,550
1989	2,240	2,570	2,170	2,610	7,450	6,830	4,410
1990	1,560	1,620	1,840	2,140	6,030	5,520	4,990
1991	-	2,645	3,333	2,948	5,537	6,873	4,600
1992	5,335	2,890	3,010	3,640	7,711	5,340	N/A
Cross River							
1988	2,460	1,898	N/A	1,700	3,600	3,983	5,250
1989	2,500	5,500	-	-	7,250	5,503	-
1990	4,650	3,830	-	-	6,250	5,660	-
1991	-	3,220	-	-	7,288	7,485	-
1992	9,533	11,086	-	-	16,333	10,333	-
Lagos							
1988	4,400	1,123	N/A	N/A	6,608	3,569	3,400
1989	3,000	2,500	-	-	5,450	6,600	5,250
1990	3,520	2,290	2,000	-	6,700	7,270	4,600
1991	-	3,900	4,816	4,806	8,940	10,300	4,800
1992	N/A	4,540	7,292	-	13,523	12,006	N/A
Niger							
1988	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1989	2,500	1,250	N/A	N/A	N/A	N/A	N/A
1990	2,090	1,510	1,790	1,800	6,200	4,920	4,800
1991	-	2,323	2,635	2,885	6,513	6,570	6,925
1992	3,586	4,041	4,180	4,898	10,081	8,362	N/A
Ogun							
1988	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1989	2,000	2,500	1,500	1,500	5,000	6,000	5,000
1990	1,600	1,750	2,000	1,600	7,500	5,000	4,820
1991	-	3,708	4,173	3,340	7,235	7,668	4,700
1992	3,689	5,592	-	5,595	13,220	8,712	N/A
Ondo							
1988	1,370	1,593	N/A	2,000	2,903	3,759	5,575
1989	4,500	2,000	-	-	8,000	5,000	5,200
1990	1,800	1,500	-	-	7,250	5,270	4,500
1991	-	3,023	3,763	2,860	7,863	8,588	4,650
1992	3,648	3,984	-	-	13,775	9,250	N/A
Plateau							
1988	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1989	3,220	2,031	2,349	2,265	8,099	5,555	5,972
1990	1,432	1,262	1,293	1,497	4,425	4,585	3,772
1991	-	2,690	3,480	2,850	8,330	7,640	3,500
1992	6,000	4,100	4,063	4,091	10,532	7,900	N/A
National Average							
1988	2,012	1,563	N/A	1,263	3,817	3,552	4,465
1989	2,430	2,735	2,017	2,096	6,322	5,420	4,729
1990	2,301	2,061	1,703	1,707	6,300	5,632	4,433
1991 ¹	-	3,318	3,648	3,365	7,544	7,915	4,797
1992 ²	5,942	5,514	4,678	5,681	12,606	9,145	N/A

¹ Revised
² Provisional

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Source: Annual Report of CBN, 1992

TABLE 2-23 COMPOSITE CONSUMER PRICE INDEX (1985 = 100)

	1988	1989	1990	1991	1992	Percentage Change over Preceding Year				Annual Growth Rate
						1989	1990	1991	1992	1988/1992
All Items	181.2	272.7	292.8	330.9	478.4	50.5	7.4	13.0	44.6	27.5
Food	195.3	298.1	309.2	345.9	506.8	52.6	3.7	11.9	46.5	26.9
Drinks, tobacco & kola	137.6	212.1	267.4	305.3	460.2	54.1	26.1	14.2	50.7	35.2
Clothing & footwear	162.5	243.2	305.5	376.4	498.4	49.7	25.6	23.2	32.4	32.3
Accomd., fuel & light	138.7	181.0	206.0	226.3	298.3	30.5	13.8	9.9	31.8	21.1
Household goods, etc.	179.2	290.9	328.3	411.3	617.9	62.3	12.9	25.3	50.2	36.3
Medical/Health expense	154.7	192.5	240.2	290.3	443.6	24.4	24.8	20.9	52.8	30.1
Transportation	151.2	247.4	291.3	314.5	440.7	63.6	17.7	8.0	40.1	30.7
Recreation, entertainment education & culture	165.7	228.2	263.1	307.1	405.9	37.7	15.3	16.7	32.2	25.1
Other services	142.5	193.9	231.5	287.3	412.2	36.1	19.4	24.1	43.5	30.4

TABLE 2-24 URBAN CONSUMER PRICE INDEX (1985 = 100)

	1988	1989	1990	1991	1992	Percentage Change over Preceding Year				Annual Growth Rate
						1989	1990	1991	1992	1988/1992
All Items	176.5	270.2	291.9	343.9	514.3	53.1	8.0	17.8	49.5	30.7
Food	191.0	293.8	303.9	358.6	546.3	53.8	3.4	18.0	52.3	30.0
Drinks, tobacco & kola	144.3	247.0	297.3	360.1	570.1	71.2	20.4	21.1	58.3	41.0
Clothing & footwear	147.7	216.8	289.3	351.1	487.6	46.8	33.4	21.4	38.9	34.8
Accomd., fuel & light	138.0	175.6	203.6	232.3	302.6	27.2	15.9	14.1	30.3	21.7
Household goods, etc.	160.4	269.7	316.0	380.0	569.3	68.1	17.2	20.3	49.8	37.3
Medical/Health expense	160.3	212.0	265.0	348.2	622.4	32.3	25.0	31.4	78.7	40.4
Transportation	166.9	320.3	381.2	415.9	624.2	91.9	19.0	9.1	50.1	39.1
Recreation, entertainment education & culture	167.1	255.5	299.6	377.0	542.1	52.9	17.3	25.8	43.8	34.2
Other services	144.2	225.7	249.9	315.0	431.7	56.6	10.7	26.1	37.0	31.5

TABLE 2-25 RURAL CONSUMER PRICE INDEX (1985 = 100)

	1988	1989	1990	1991	1992	Percentage Change over Preceding Year				Annual Growth Rate
						1989	1990	1991	1992	1988/1992
All Items	182.2	273.3	293.4	328.3	471.4	50.0	7.4	11.9	43.6	26.8
Food	196.2	299.0	310.2	343.5	499.4	52.4	3.7	10.7	45.4	26.3
Drinks, tobacco & kola	136.1	206.9	263.0	297.2	444.0	52.0	27.1	13.0	49.4	34.4
Clothing & footwear	164.6	248.0	308.4	381.0	500.4	50.7	24.4	23.5	31.3	32.0
Accomd., fuel & light	139.1	182.2	206.6	224.8	296.9	31.0	13.4	8.8	32.1	20.9
Household goods, etc.	182.0	294.7	330.6	417.2	627.0	61.9	12.2	26.2	50.3	36.2
Medical/Health expense	154.8	188.2	234.5	276.8	402.7	21.6	24.6	18.0	45.5	27.0
Transportation	142.7	207.8	242.4	258.9	340.8	45.6	16.7	6.8	31.6	24.3
Recreation, entertainment education & culture	165.5	219.8	251.9	285.8	364.1	32.8	14.6	13.5	27.4	21.8
Other services	182.2	187.1	227.6	281.5	408.0	2.7	21.6	23.7	44.9	22.3

Source: Annual Report 1992, CBN

TABLE 2-26 EVALUATION CRITERIA

<u>Factor</u>	<u>Weight (%)</u>	<u>Category</u>	<u>Points</u>
A. Data Availability	10	a. Existence	100
		b. Under Preparation	50
		c. Absence	0
B. Size of Total Project Cost (Unit: million naira)	10	a. 0 - 100	100
		b. 101 - 1,000	75
		c. 1,001 - 5,000	50
		d. 5,001 and over	25
C. Size of Unit Project Cost (Unit: naira/ha)	10	a. 0 - 20,000	100
		b. 20,001 - 50,000	75
		c. 50,000 - 100,000	50
		d. 100,001 and over	25
D. Cost Effectiveness	10	a. High	100
		b. Medium	60
		c. Low	30
E. Required Implementation Period (year)	5	a. 0 - 1	100
		b. 2 - 3	80
		c. 4 - 5	60
		d. 6 - 10	40
		e. 11 and over	20
F. Gestation Period for Benefit Accrual (year)	5	a. 0 - 1	100
		b. 2 - 3	75
		c. 4 - 5	50
		d. 6 and over	25
G. Urgency of Implementation	10	a. High	100
		b. Medium	60
		c. Low	30
H. Enthusiasm of Local People	5	a. High	100
		b. Medium	60
		c. Low	30
I. Water Resource Availability (Exist + Potentiality)	20	a. Big	100
		b. Medium	60
		c. Small	30
J. Agr. Land Absorption Capacity	10	a. Big	100
		b. Medium	60
		c. Small	30
K. Negative Impact on Environment	5	a. Big	-100
		b. Medium	-60
		c. Small	-30
		d. None	0

TABLE 2 - 27 INCREMENTAL NPV

(Unit: N/ha)

	Without	With	Increment
a. <u>Public Project</u>			
<u>North</u>			
- Paddy	67	879	812
- Maize	1,249	6,993	5,744
- Vegetables	-	3,584	3,584
- Total	1,316	11,456	10,140
<u>Central</u>			
- Paddy	134	4,834	4,700
- Maize	1,249	6,244	4,995
- Vegetables	-	3,200	3,200
- Total	1,383	14,278	12,895
<u>South</u>			
- Paddy	402	14,062	13,660
- Maize	892	999	107
- Vegetables	-	512	512
- Total	1,294	15,573	14,279
b. <u>Private Project</u>			
<u>North</u>			
- Paddy	67	550	483
- Maize	1,249	3,753	2,504
- Vegetables	-	2,016	2,016
- Total	1,316	6,319	5,003
<u>Central</u>			
- Paddy	134	4,402	4,268
- Maize	1,249	1,564	315
- Vegetables	-	840	840
- Total	1,383	6,806	5,423
<u>South</u>			
- Paddy	402	4,402	4,000
- Maize	892	1,564	672
- Vegetables	-	840	840
- Total	1,294	6,806	5,512

Table 2 - 28 BASES FOR BENEFIT ESTIMATION (IRRIGATION)

		Without	With				
			Public	Private			
1. Crop Yield & NPV Ratio							
Paddy							
- Yield (t/ha)		0.8	3.5	2.63			
- NPV Ratio (%)		40	60	50			
Maize							
- Yield (t/ha)		1.2	3.5	2.63			
- NPV Ratio (%)		50	60	50			
Vegetables							
- Yield (t/ha)		-	16.0	12.0			
- NPV Ratio (%)		-	40	35			
2. Crop Price							
- Paddy		N 4,185/ton (detailed in Table 2-29)					
- Maize		N 2,973/ton (detailed in Table 2-29)					
- Vegetables		N 2,000/ton (derived from average market price)					
	Unit	Without	With				
			Public	Private			
3. Crop Budget							
Paddy							
- Yield	ton/ha	0.8	3.5	2.63			
- Price	N/ton	4,185	4,185	4,185			
- GPV	N/ha	3,348	14,648	11,007			
- PC	N/ha	2,009	5,859	5,504			
- NPV	N/ha	1,339	8,789	5,503			
Maize							
- Yield	ton/ha	1.2	3.5	2.63			
- Price	N/ton	2,973	2,973	2,973			
- GPV	N/ha	3,568	10,406	7,819			
- PC	N/ha	1,784	4,162	3,910			
- NPV	N/ha	1,784	6,244	3,909			
Vegetables							
- Yield	ton/ha	-	16.0	12.0			
- Price	N/ton	-	2,000	2,000			
- GPV	N/ha	-	32,000	24,000			
- PC	N/ha	-	19,200	15,600			
- NPV	N/ha	-	12,800	8,400			
		Without Project			With Project		
		Paddy	Upland	Total	Paddy	Upland	Total
4. Crop Intensity (%)							
a. Public Project							
- North		5	70	75	10	140	150
- Central		10	70	80	55	125	180
- South		30	50	80	160	20	180
b. Private Project							
- North		5	70	75	10	120	130
- Central		10	70	80	80	50	130
- South		30	50	80	80	50	130

TABLE 2 - 29 PROJECT ECONOMIC PRICES AT 1993 PRICES

1. Paddy	
W.B. Project 2000 Price (f.o.b. Bangkok) (milled, 5 % broken)	US\$273
W.B. Project 2000 Price (c.i.f. Lagos)	US\$303
	N6,666
Handling, Transport & Margins	N1,000
Ex-mill Price (Rice)	N7,666
Ex-mill Price (Paddy)	N4,983
Quality Differential (90%)	N4,485
Transport (F/G to Mill)	N300
Farmgate Price of Paddy	<u>N4,185</u>
2. Maize	
W.B. Project 2000 Price (f.o.b. Gulf ports)	US\$113
W.B. Project 2000 Price (c.i.f. Lagos)	US\$133
	N2,926
Handling Transport & Margins	N600
Ave. Wholesale Price	N3,526
Quality Differential (90 %)	N3,173
Transport (F/G to Wholesale Market)	N200
Farmgate Price of Maize	<u>N2,973</u>

TABLE 2 - 30 RESULT OF ERR CALCULATION (IRRIGATION)

	IRR (%)	NPV* (N)
<u>Dam Project</u>		
North	9.4	- 3,567
Central	12.1	12,012
South	13.6	21,157
<u>Pump Project</u>		
North	8.5	- 6,594
Central	12.3	10,701
South	14.0	19,390
<u>Tubewell Project</u>		
North	11.7	2,460
Central	13.6	5,384
South	13.9	6,004

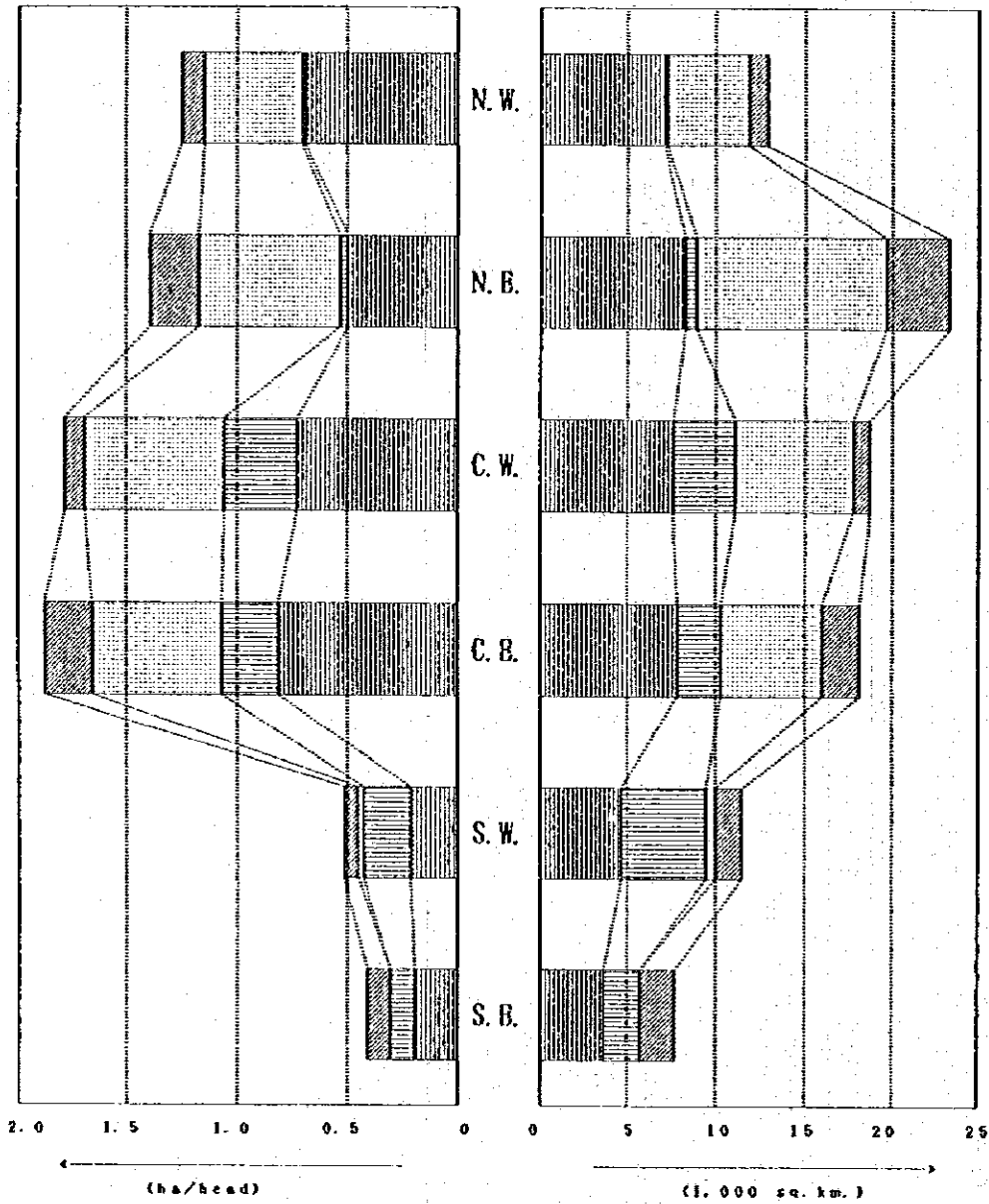
* Net Present Value at 10 % discount rate.

TABLE 2 - 31 BASES FOR WATER RATE CALCULATION (NEW WATERWORKS, IN 2020)

Particular	Unit	Urban Water Supply		Rural Water Supply		
		Surface	Groundwater	Surface	G/W (M)	G/W (H)
1. Initial Cost	10 ³ N/MLD	10,000	9,370	6,000	12,500	19,050
2. Project Life	Year	30	20	30	20	20
3. Construction Period	Year	3	2	3	1	1
4. Replacement Cost						
- Cost	10 ³ N/MLD	5,000	4,685	3,000	6,250	9,525
- Recurring Period	Year	15	10	15	10	10
5. O&M Cost	10 ³ N/MLD	500	940	450	625	190
6. Load Factor	-	1.15	1.15	1.15	1.15	1.15
7. Effectiveness	%	80	80	80	80	90
8. Annual Supply Volume	10 ³ m ³	254	254	254	254	286

Land Availability per Capita

Present Land Use



Agricultural Land
 Forest
 Grass Land
 Other Land

Figure 2-1 PRESENT LAND USE AND LAND RESOURCES AVAILABILITY (Administrative Division)

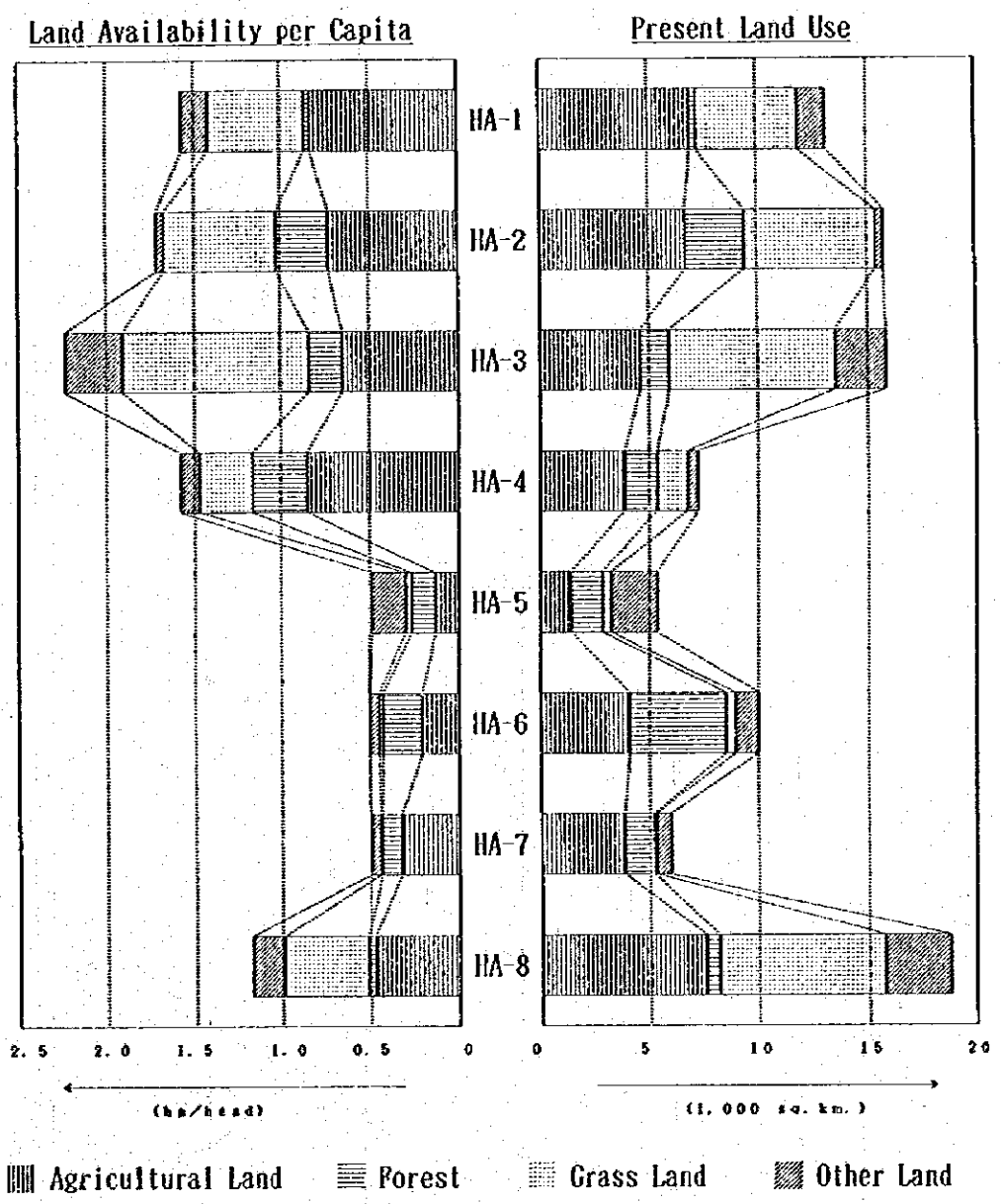
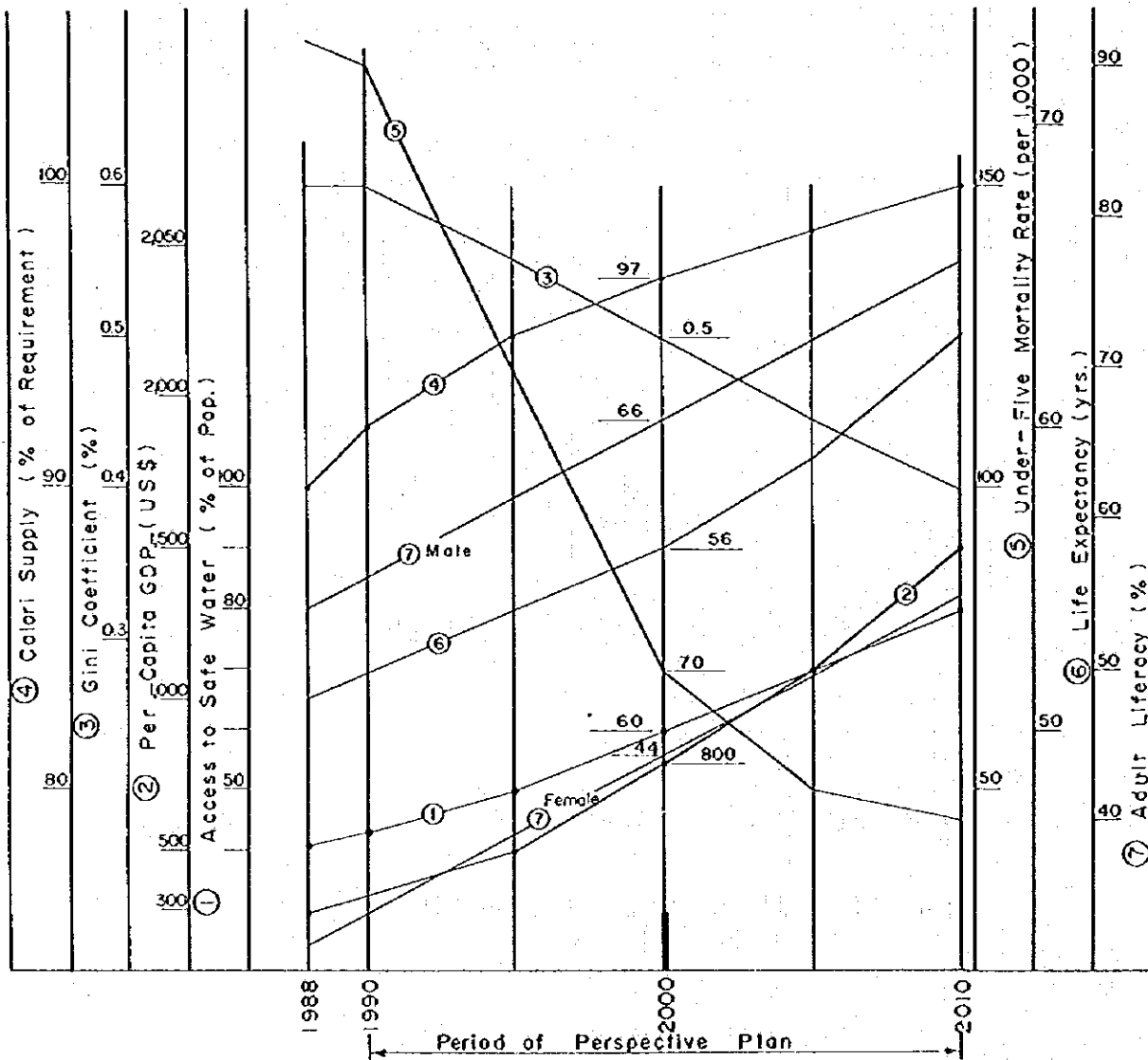


Figure 2-2 PRESENT LAND USE AND LAND RESOURCES AVAILABILITY (Hydrological Area)

**FIGURE 2 - 3 TARGETS OF SEVEN SELECTED INDICATORS
- NIGERIA -**



CHAPTER 3. WATER RESOURCES AND MANAGEMENT

CHAPTER 3: WATER RESOURCES AND MANAGEMENT

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PART 3A. METEOROLOGY

3A. 1 GENERAL CLIMATE AND SAHELIAN DROUGHT

3A. 1. 1 General Climate

(1) Air Mass Characteristics

The geographic location, size and shape of Nigeria allow it to experience most types of climate and weather in West Africa. The climate of West Africa exhibits a definite wet season and a marked dry season in response to the pressure pattern resulting in the seasonal shifts of pressure belt associated with the apparent movement of the overhead sun. Added to this are the monsoonal tendencies during the months of the northern summer.

Belts of distinctive weather have been observed to show a pronounced migration across the West Africa region, a migration strongly associated with the north-south movement of a zone of sharp discontinuity between the dry continental (Sahelian) air and the humid maritime (Atlantic) air. At the surface, it forms a boundary which has been given many names. This surface is referred to as the Inter-Tropical Discontinuity (ITD) which determine the zone of approximate penetration of the moist maritime air mass.

(2) Sunshine Hours

On an annual basis there is a general increase in the sunshine hours from the Atlantic coast to the interior. The amount of sunshine ranges from a minimum of 1,300 hours in the Niger delta to over 3,200 hours in the extreme northeast. The rate of increase is, however, not constant. There is a steeper gradient in the area south of latitude 9° N than to the north where there appears to be a more even distribution. This distinct break in gradient is closely related to the surface location of the ITD.

(3) Temperature

Because of its latitudinal location within the tropics, Nigeria experiences high temperatures all the year round. The mean for most stations

is about 27°C. Seasonal and latitudinal variations affect the extremes and the diurnal and seasonal ranges. The highest air temperatures are normally in April in the northern part of the country and a little earlier in the south. Minimum temperatures in the north are usually recorded around December. In the south, there is little difference between the December temperatures and the relatively low temperatures of the rainy season; the lowest temperatures of the year may be recorded during the rainy season.

Mean maximum temperatures increase from the coast northward; the highest monthly mean of 32.2°C for the coastal region to a mean of 40.6°C in the extreme north. Mean minimum temperatures on the other hand, decrease northward with the lowest of 21.1°C on the coast to less than 12.8 °C in the north. The monthly means of daily temperatures at selected stations are given below:

Monthly Means of Daily Temperatures at Selected Stations (°C)

Station	Max.	Min.	Range
Lagos (Ikeja)	30.7	21.8	8.9
Benin	30.6	21.9	8.7
Port-Harcourt	30.6	22.9	7.7
Ilorin	32.8	21.3	11.5
Kaduna	31.3	17.8	13.5
Kano	33.1	19.2	13.9
Sokoto	35.3	20.9	14.4
Maiduguri	34.4	19.3	15.1
Jos	27.8	16.6	11.2

Source: Divers

(4) Humidity

There are considerable spatial and seasonal variations in the relative humidity throughout the country. In the coastal region the months of June to October have monthly means over 90 percent while in the north, during January to April, mean values are close to 20 or 25 percent. Diurnal values may fall from 30 percent at dawn to 10 percent in the afternoon. This is characteristics of the Harmattan season when the dry and dust-laden North East Trade Winds are blowing from the Sahara under cloudless but dusty conditions.

(5) Rainfall

The rainfall pattern in Nigeria is a good reflection of the seasonal variations of the surface location of the ITC. The rainfall decreases both in duration and amount from the coast to the interior except where altitudinal effects create island of higher rainfall, for instance, the Jos Plateau. The coastal areas receive over 3,000 mm spreading over 8 - 10 months whilst the extreme north receives less than 400 mm spreading over 3 to 4 months.

The incidence of rainfall can be linked to one or more of four causes: coastal effects, monsoonal affects which are generally widespread, thunderstorms which are generally sporadic, and disturbance lines which are belts of intense thunderstorms moving east-west and giving heavy rains of short duration. Rainfall conditions in the 1980s by the HA are presented in 3A.3 based on the results of the JICA - NWRIS.

(6) Evaporation

Since the dry season is much longer in the north than in the south, the measured evaporation values are greater in the north than in the south as given in the following table (J. S. Oguntoyinbo):

Mean Annual Evaporation in mm

Station	Coordinate		Class A Pan
Kano	12°03'N	8°32'E	3,511
Maiduguri	11°51'N	13°05'E	4,047
Jos	9°52'N	8°54'E	3,058
Yola	9°14'N	12°28'E	2,971
Port-Harcourt	4°51'N	7°01'E	1,630

3A. 1. 2 Sahelian Drought

Drought in semi-arid regions has received more global attention within the last twenty years due to the prolonged occurrence of dry years and associated destruction of the vegetation and life. In the Sahelian zone, many studies have shown that these catastrophic events resulted from a combination

of the factors which helped to aggravate the consequence of severe drought especially in the spells of 1972 - 73 and 1982 - 84.

Figure 3A. 1 compiles the general variation of annual rainfalls in the Sahelian zone of West Africa in terms of standard deviation during the period of 1901 to 1987 that has been presented by Shinoda M. (1989) after Nicolson (1983) and Bennett et al (1985).

Another information is the regional variation of annual rainfall by major climatic zones in the Tropical Africa in terms of standard deviation with the base period of 1941 -84 (Ogio, 1985).

- The drought conditions as averaged for 60 stations were generally widespread during the fifteen years, 1969 - 84 with regional variation in intensity and spatial coverage. In the Rain Forest region, the persistence and severity are much less while the spatial and temporal variations are much greater than for other regions.
- It is important to note that apart from the regional differences, there are variations within a particular sector of a region. In 1973, Ibadan had an index of +0.49, while Lagos, Benin, Calabar and Port-Harcourt had indices of -0.55, -0.13, -2.39 and -1.34 respectively.
- The pattern for the Sahel region shows that the drought conditions were more persistent to the west than to the east or central regions being in contrast to the Guinea Savanna, and the drought was generally persistent since 1969 with near normal in 1969 and 1975 and the greatest persistence between 1981 - 84.

The major factors that influence the regional weather include the ITD, easterly waves, tropical storms, low level troughs, jetstorms and extra-tropical weather systems. Most rainfall in Tropical Africa is received during the rainy season which varies in length in different climatic regions. Within various efforts to explain climatic variations and their causes, the most common explanation is the control established by the seasonal migration of the ITD with its contrasting two air masses.

The significance of the Tropical Atlantic surface circulation patterns also is extensively discussed as a major control of the climatic system in general and the weather anomalies in particular, with an emphasis upon the possible role of the anomalies in a large-scale atmospheric circulation.

It is well known that three types of droughts usually associated with the environmental degradation are meteorological, agricultural and hydrological ones:

- In terms of irreversible effects, the hydrological droughts are the severe in relation to the water resources.
- Agricultural drought which relates to seasonal plant development is disastrous when total annual rainfall does not change.
- The least problematic is meteorological drought that is repetitive in nature.

Unfortunately, it has been blamed for the large-scale destruction of plant and animal life in the drought-prone areas in West Africa after the 1972 - 73 drought when the rainfall deficiency in 1973 was the worst in most part of Nigeria since instrumental records began. However, because the other two more serious types are least understood, various land-use activities have confused the Sahelian situation to the extent that all problems of rainfall ineffectiveness are blamed on the lack of adequate rainfall. It has been noted that the Sahelian zone is still suffering from a combination of natural drought processes and human interference due to population growth.

It has been clarified by many scientists that the low rainfall situation and attendant drought risk since 1969 with exceptional persistence, severity and broad expanse is seen to have the worst in 150 years.

3A.2 JICA - NWRIS

(1) Rainfall Station

The Federal Department of Meteorological Services (FDMS) is directly charged with the observation and data management of rainfall and other meteorological parameters. Usually, the Department makes use of suitable facilities within the government or public institutions. There are many organizations which collect rainfall data generally in connection with agricultural projects. These organizations include:

- River Basin Development Authorities (RBDAs)
- State Water Boards
- Some Zonal Offices of FMWRRD, the Water Resources Sector
- State Ministries of Agriculture and Natural Resources
- Public Institutions

484 rainfall stations have been listed so far through the NWRIS with information on maintaining organizations, types of stations and their functional status. The list of organizations maintaining rainfall stations is given below, in which "others" includes NEPA, hospitals, research institutes, private enterprises and so on.

Organizations Maintaining Rainfall Stations

Organizations	Nos. of Stations	%
State Water Boards	107	22
State Ministries	83	17
FDMS	79	16
RBDAs	62	13
Schools and Universities	39	8
Others	114	24
Total	484	100

Most of the stations consist mainly of purely rainfall stations with no gage for other data, like evaporation. The types of station are classified into five as shown in the following table:

Types of Rainfall Stations

Types	Nos. of Stations	%
Rainfall	279	57
Agric	95	20
Agromet	56	12
Synoptic	52	11
Climate	2	0
Total	484	100

According to the said inventory survey, 46 percent of the rainfall stations are generally in good condition. As far as the data collected for this study are concerned, about 50 percent of the stations have continuous records of five years or more. The synoptic stations maintained by the FDMS usually have very good unbroken records with accuracy and where broken, they were with a break of only a few years. Functional status of the rainfall stations is summarized as follows:

Functional Status of Rainfall Stations

Status	Nos. of Stations	%
Good	222	46
Intermittent	114	24
Poor	148	30
Total	484	100

Among 484 rainfall stations identified through the inventory survey, rainfall records on a monthly basis at 213 stations, as major stations, have been collected to cover a record length of 20 years from 1970 to 1989; however, record lengths at many stations were five to less than 20 years. For the study purpose of evaluating surface water potentiality, 89 rainfall stations have been selected after due consideration of their record length, data availability in the 1980s and proximity to major water resources development projects and river runoff stations with discharge data. Distribution of the selected 89 rainfall stations by the Hydrological Area (HA) is given as follows:

Distribution of Selected Rainfall Stations

<u>HA</u>	<u>Nos. of Stations</u>	<u>HA</u>	<u>Nos. of Stations</u>
I	8	VI	11
II	19	VII	6
III	27	VIII	9
IV	4		
V	5	Total	89

Locations, yearly rainfall records and mean monthly rainfall are tabulated in the Water Resources Inventory Survey of this report under separate volume.

(2) Evaporation Station

Evaporation data (Class-A Pan) are obtainable from the synoptic stations, and records on a monthly basis at 28 stations have been collected; however, observation was often intermittent at many stations. Mean monthly evaporation records in the 1980s are available only at 23 stations. Distribution of stations with effective data for the study is as follows:

Distribution of Evaporation Stations

<u>HA</u>	<u>Nos. of Stations</u>	<u>HA</u>	<u>Nos. of Stations</u>
I	2	VI	5
II	3	VII	3
III	5	VIII	2
IV	2		
V	1	Total	23

Locations, yearly evaporation and mean monthly evaporation are presented in the Water Resources Inventory Survey of this report under separate volume.

3A.3 Rainfall and Evaporation

3A.3.1 Rainfall

(1) Long Term Trend of Rainfall

In order to grasp the long term trends of rainfall over the country, 10 rainfall stations are selected (Figure 3A-2). The selection of stations is based on spatial distribution and the length of data available. The mean annual rainfall in the 1980s, which is obtained through the JICA-NWRIS, is compared with the long term averaged values before 1979.

Comparison of Mean Annual Rainfall (mm)

Station	Mean Values in the 1980s	Long Term Mean before 1979	Data Length
Maiduguri	455	672	75 yrs: 1915-24, 1926-90
Sokoto	535	706	74 yrs: 1915-23, 1925-48, 1950-90
Kano	684	839	85 yrs: 1905-63, 1965-90
Yola	927	943	55 yrs: 1931-65, 1969-87, 1989
Bauch	896	946	80 yrs: 1908-14, 1916, 1918-89
Kaduna	1,155	1,290	60 yrs: 1931-90
Jos	1,273	1,378	69 yrs: 1922-90
Ikeja	1,372	1,625	39 yrs: 1946-63, 1969-89
Enugu	1,593	1,795	70 yrs: 1916-21, 1923-65, 1969-89
Calabar	2,765	2,823	80 yrs: 1907-63, 1965-66, 1969-89

As can be seen from the above table, sharp decreases in the mean annual rainfall are observed in the north: Maiduguri, Sokoto and Kano. Long term trends of annual rainfall at four stations of Maiduguri, Kaduna, Kano and Ikeja are illustrated in Figure 3A. 3, 4, 5, 6, showing what appears to be a fluctuating pattern within this century. Using 39-85 years' rainfall record for the above four stations, the rainfall trends are observed as follows:

- At Maiduguri in the northeast region, downward trends of annual rainfall are sharply defined. The mean annual rainfall of the 1980s is 455 mm, 59 percent of the mean annual rainfall of the 1950s.
- At Kano in the north, lowest annual rainfalls of less than 500 mm are recorded in 1913, 1944 and 1973 at an interval of around 30 years. The same downward trends of annual rainfall at Maiduguri is also observed. The mean annual rainfall of 684 mm in the 1980s is equivalent to 75 percent of that in the 1950s.

- At Kaduna in the middle belt of the country, no clear downward trend is identifiable for the period of 1931-80. Since 1981 annual rainfalls tend to decline but far less than further north.
- At Ikeja in the south, lower annual rainfalls are recorded in 1946 and 1948. It is reported that the drought of the 1940s was perhaps most severe in the southern parts of the country. The period between 1955 and 1970 is marked by heavy rainfall, and followed by a period of low rainfall from about 1973 to 1983, and since 1983, the annual rainfalls are clearly increasing.
- As a whole, the significant and long term decline in rainfall pattern is restricted to the north, and no significant long term decline is observed in the south.

(2) Rainfall Speciality

(a) Seasonal Distribution

Except for a narrow, ultra humid strip along the coast where it rains all year round, rainfall patterns are marked by an alteration of wet and dry seasons of varying duration. The beginning and the end of the rainy season follow the migratory of the ITD. Seasonal distribution of rainfall by the HA in the year of 1980s is summarized as follows:

In the north of the country (HA-I, VIII), rainfall lasts for four to five months from May/June to September, with a peak in August. The HA-I receives the mean annual rainfall of 370 mm at Kalmalo to 970 mm at Kainji dam. About 90 percent of the annual rainfall concentrate in these four to five months. In the HA-VIII with the mean annual rainfall of 330 - 920 mm, about 90 percent of the annual rainfall concentrate in the four month period from June to September.

In the middle belt of the country (HA-II, III, IV), rainfall lasts for five to six months from May to September/October. The mean annual rainfall in the HA-II ranges from 890 mm at Ikara Town to 1,940 mm at Egudu. The rainy season starts in May and ends in September in the northern part of the area and October in the southern part of the area. The duration of rainy season in the HA-III ranges between four and seven months: four months from June to September in the northern part of the area close to the Chad basin, and seven months from April to October in the southern part of the area close to the

international border. Being located in the south of the Jos Plateau, the HA-IV receives relatively high annual rainfall of 1,000 - 1,600 mm. About 90 percent of annual rainfall concentrate in five months from May to September.

In the south of the country (HA-V, VI, VII) with the mean annual rainfall of 1,000 - 3,400 mm, rainfall increases steadily from January and generally reaches its peak in September. About 90 percent of annual rain fall in six to seven months of April/May to October in the HA-V, and seven to eight months of March/April to October in the HA-VI and VII.

(b) Spatial Distribution

The mean annual rainfall over the HA areas has been estimated by the isohyetal method. The isohyetal map showing the mean annual rainfall in the 1980s is presented in the Water Resources Database Maps. Observed rain gage data at the selected 89 locations were used to interpolate between gages. The average depth over the area is computed by determining the incremental volume between each pair of isohyets. The incremental volumes were added and then divided by the total area. The mean annual spot rainfall at the selected 89 stations falls within 330 mm to 3,420 mm. The mean areal rainfall over the country with the area of 923,000 km² is estimated at 1,080 mm as shown below:

Areal Mean Annual Rainfall in the 1980s

HA	Area (km ²)	Areal Rainfall (mm)	Range (mm)
I	131,600	710	400 - 900
II	158,100	1,130	920 - 1,250
III	158,900	990	570 - 1,850
IV	73,000	1,300	1,300 - 1,650
V	53,900	1,990	1,300 - 2,800
VI	100,500	1,480	1,100 - 2,600
VII	59,800	1,810	1,500 - 2,200
VIII	188,000	560	400 - 1,300
Total	923,800	1,080	400 - 2,800

3A.3.2 Evaporation

As mentioned earlier, data on pan evaporation in the 1980s are available at 23 stations, though observation was intermittent at many stations,

which is not enough to draw lines of equal amount over the country. Observed mean annual pan evaporation in the 1980s is estimated as given below:

Mean Annual Pan Evaporation in the 1980s

HA	Nos. of Stations	Pan Evaporation (mm)	
I	2	1,990	- 3,630
II	3	2,210	- 4,491
III	5	1,580	- 2,620
IV	2	1,520	- 1,900
V	1		2,450
VI	5	1,200	- 2,100
VII	3	1,660	- 2,210
VIII	2	4,470	- 5,220
Total	23	1,200	- 5,220

3A. 3. 3 Current Problems and Needs

By 1965, 1,058 rain gages were in operation in the country. In 1971 some 300 rainfall stations reported reliable information on data covering only 10 continuous years (P. K. Acheampong). As many of the rainfall stations which were reported in 1984 as 1,074 in number have not been functioning, the number of rainfall stations with a data length of more than five years in the 1980s is only 484. Moreover these rainfall stations are not always evenly distributed.

At the moment there are around 50 evaporation pans maintained by the Meteorological Service Department of Nigeria. Some of the stations even stopped collecting data during the dry season due to lack of water.

Rainfall is a major limiting factor to agricultural production in the most regions of the country, and is the starting point of surface water hydrology. The network density of operational rainfall and evaporation stations with continuous observation should be increased to the minimum requirements as recommended by the United Nations, Educational, Scientific, and Cultural Organization / World Meteorological Organization (UNESCO / WMO) in 1988.

With the nature of such data, non predictable and non repeatable, data and information should be disseminated and stocked. Continuous data and information with accuracy should be published for the benefit of users.

FIGURE 3A-1 TRENDS OF ANNUAL RAINFALL IN THE SAHELIAN ZONE

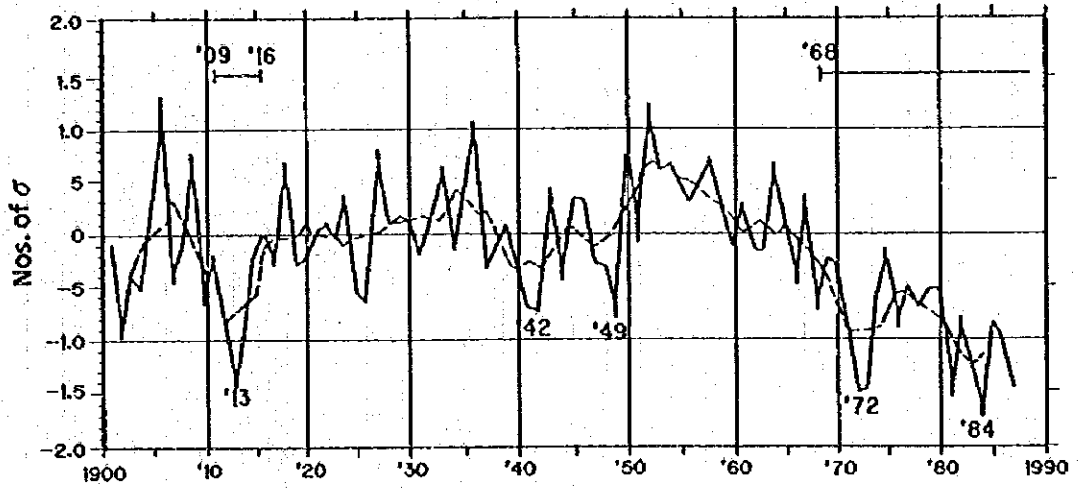
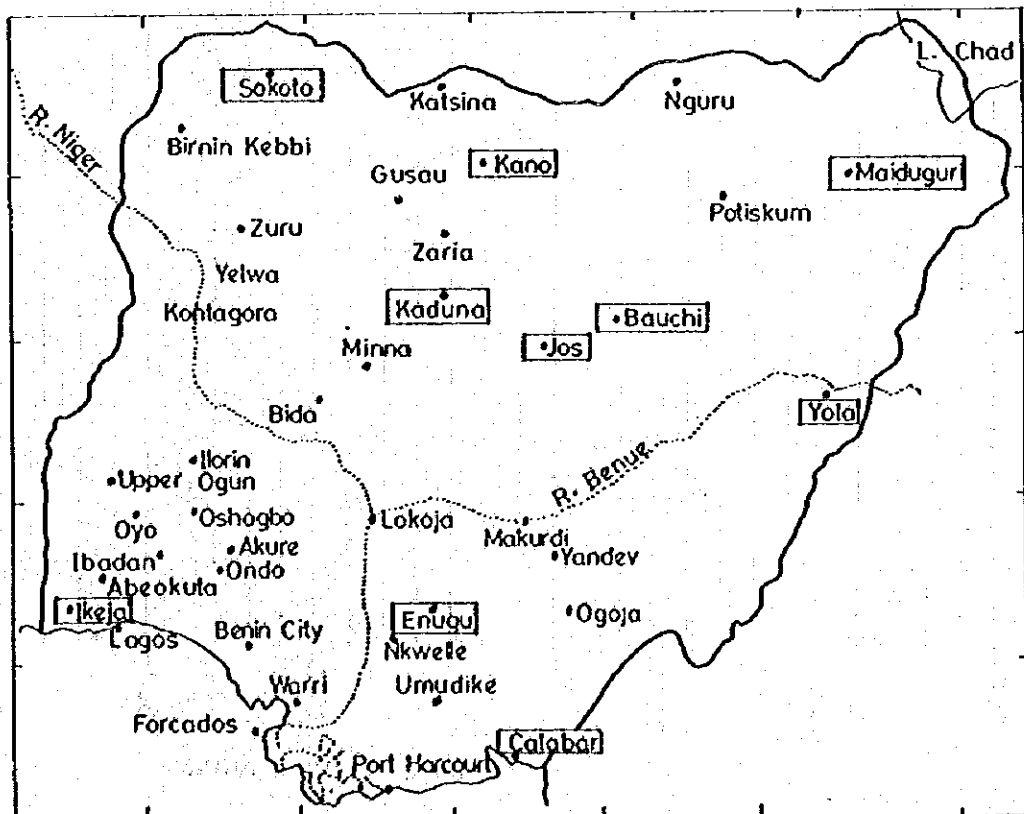


FIGURE 3A-2 LOCATION OF SELECTED 10 RAINFALL STATIONS



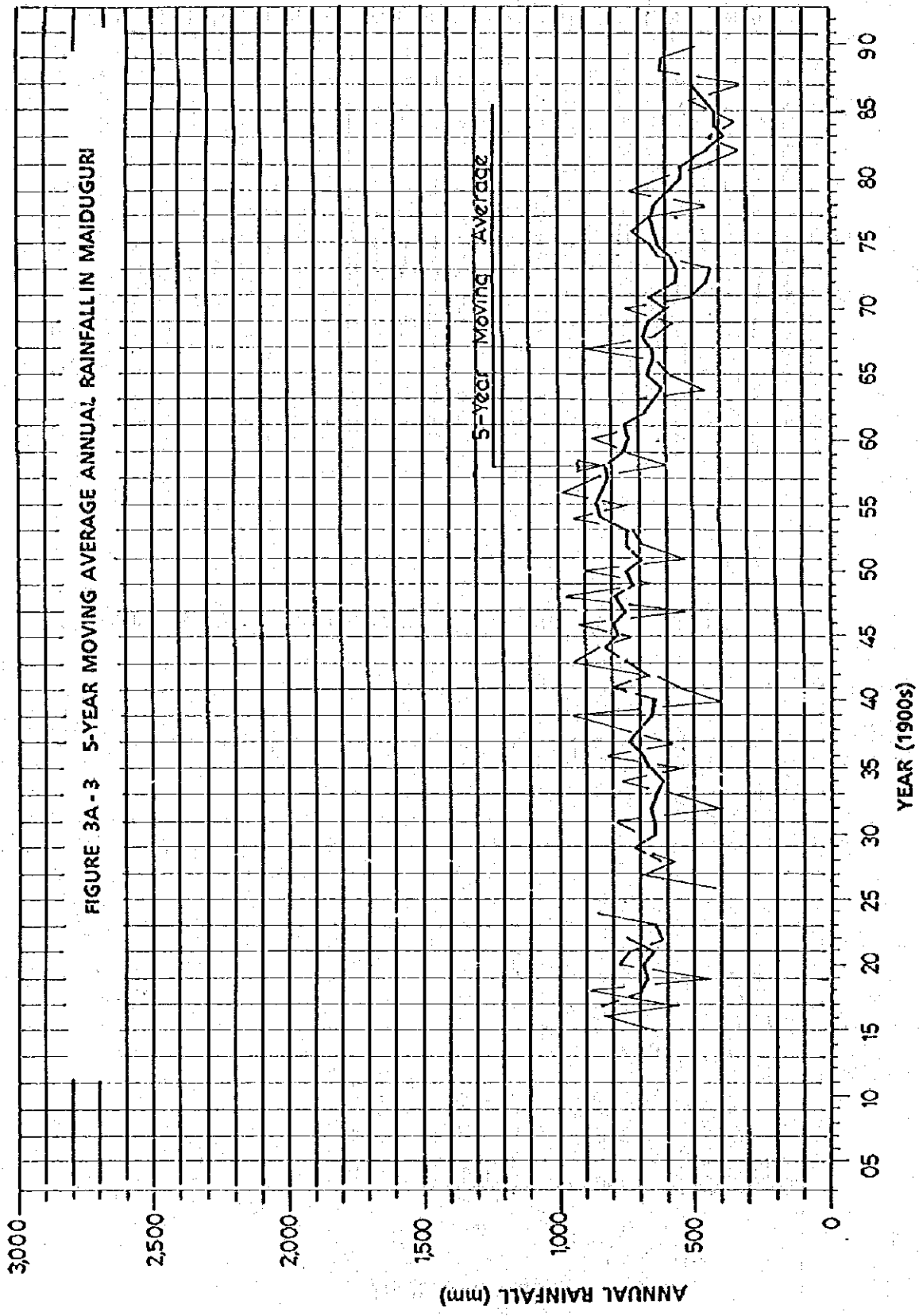


FIGURE 3A-3 5-YEAR MOVING AVERAGE ANNUAL RAINFALL IN MAIDUGURI

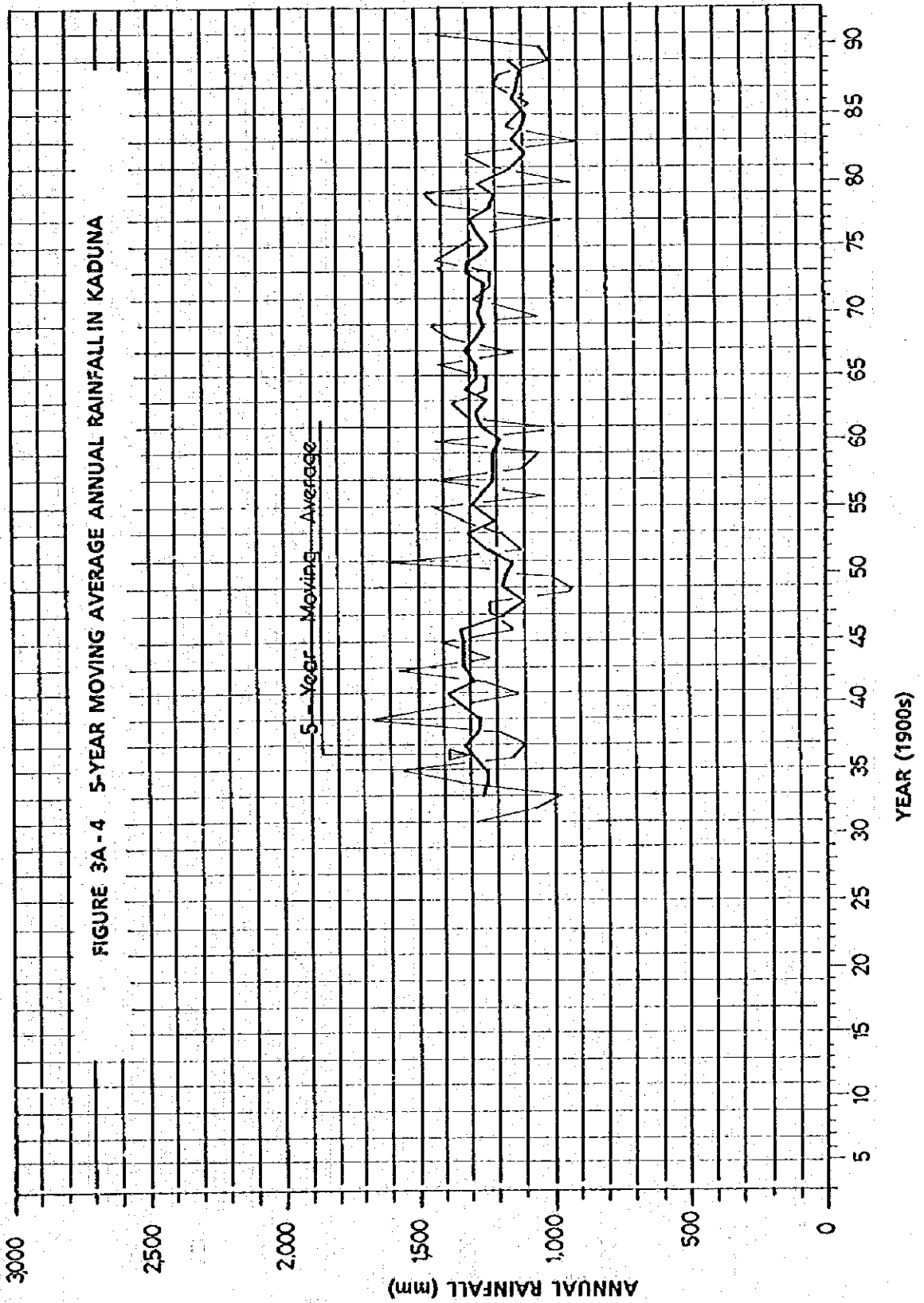
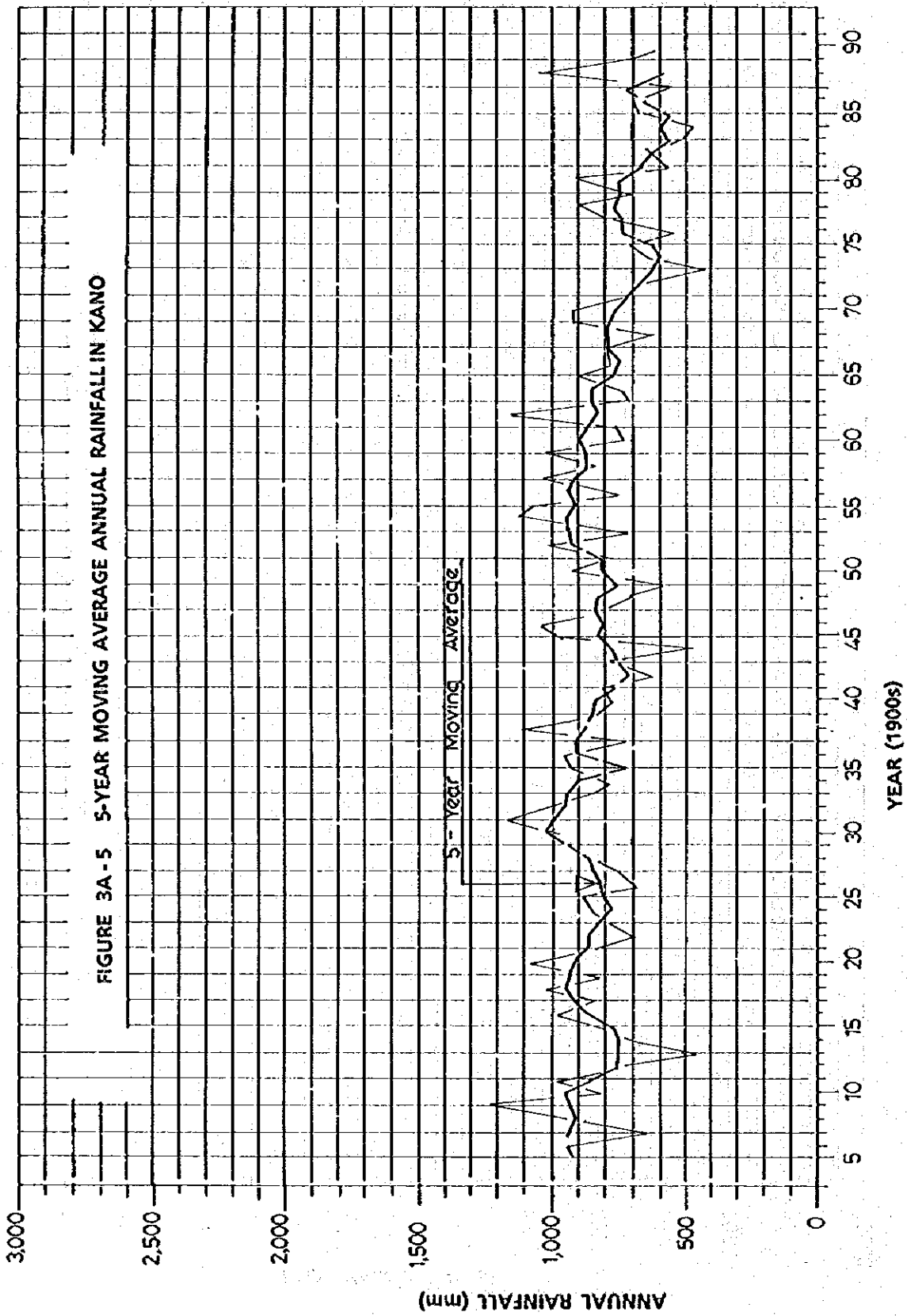


FIGURE 3A-5 5-YEAR MOVING AVERAGE ANNUAL RAINFALL IN KANO



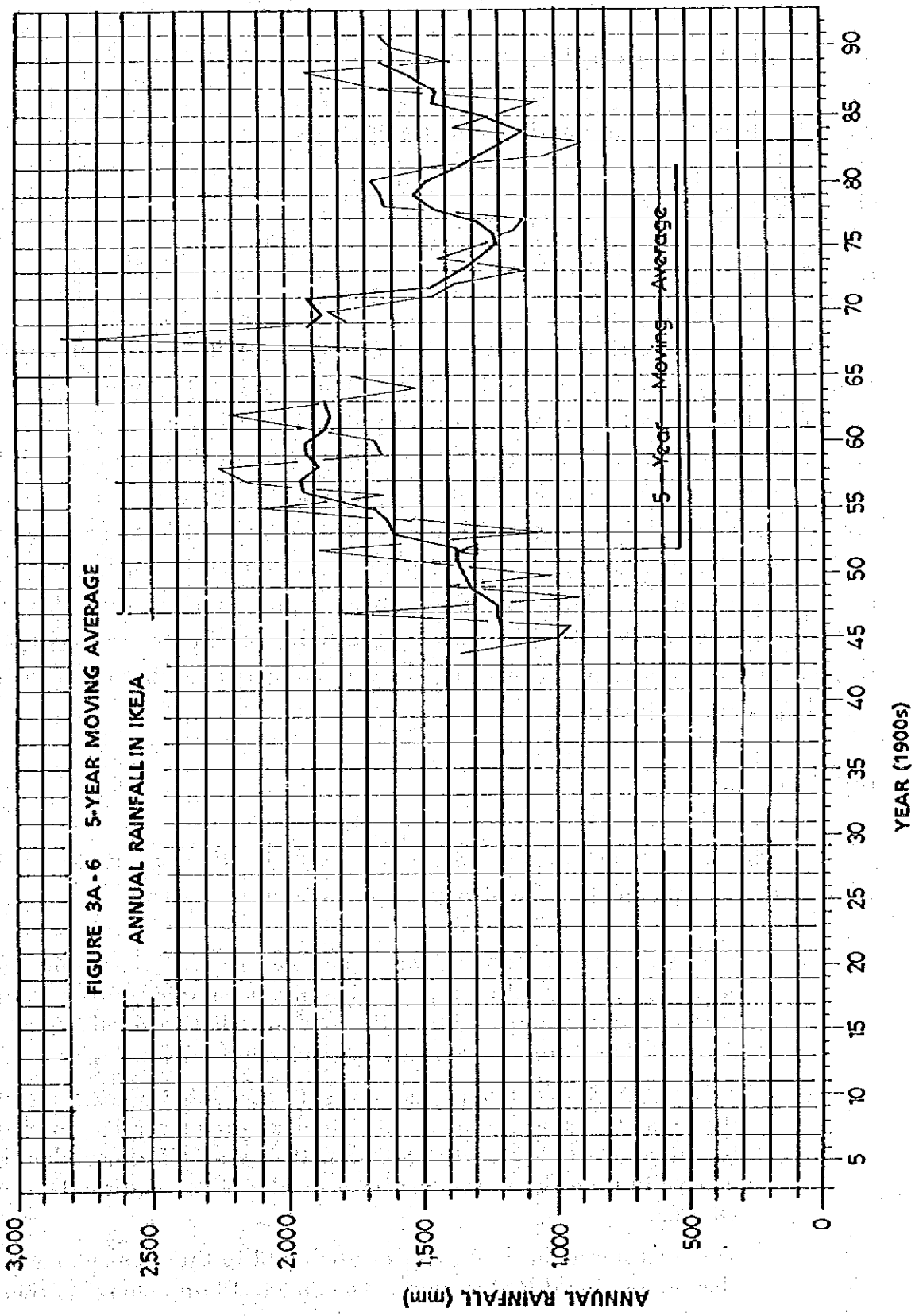


FIGURE 3A-6 5-YEAR MOVING AVERAGE

ANNUAL RAINFALL IN IKEJA

5 Year Moving Average

PART 3B. RIVER SYSTEM

3B.1 DRAINAGE PATTERNS

3B.1.1 Relief Structures and General Geology

(1) Relief Structures

(a) General Relief

Nigeria is a country with a great variety of landforms. Much of the country is dominated by the so-called Hausa Plains generally lower than EL 600 m, while the eastern border with Cameroon is marked by a continuous extent of mountains, the Eastern Highlands that rise to the Chappal Waddi (EL 2,419 m), the highest point in Nigeria. In the north, the Jos Plateau rises abruptly from the plains reaching EL 1,781 m of the Shere Hill. The area west of the Niger River is dominated by the plain where the inselbergs rise abruptly above the surrounding plains. The Idanre Hill, the highest of these inselberges rises to EL 981m in Ondo State. In general, the land surface of the country may be divided into three major relief patterns, viz, the plains, the highlands, and the troughs and river valleys.

(b) The Plains

The plains which are the dominant feature in Nigeria have resulted from alternating denudational and aggradation activity:

- The African denudational land surface of early Cainozoic age composed of crystalline rocks of basement complex is the main landform in the high plains of Hausaland. They form wide plains dissected by mature valleys such as the Kaduna River Valley.
- The Post-African denudational land surface of late Cainozoic age in the area of Cambrian Basement Complex is the main landform in the area referred to as the Western Plains and Ranges sloping generally from the watershed between the Niger and the Gulf of Guinea.
- The aggradational land surfaces are found in the areas bordering the denudational land surface. The Sokoto Plain belongs to these

surfaces of late Cainozoic age composed of sedimentary rocks of Cretaceous to Tertiary age.

- East of the Jos Plateau lie the hills and plains of Kerri-Kerri and Gombe composed of sedimentary rocks of Cretaceous to Tertiary age. To the north, the plains merge with the Chad Basin of Quaternary age and are dissected by a centripetal pattern of river valleys. The wide featureless plains in the north-eastern part are interrupted by immobile sand dunes.
- Modern aggradational land surfaces extend over the areas bordering the southern margins of the Western Plains and Ranges, which are composed of sedimentary rocks of Cretaceous to Tertiary age.
- The most recent aggradational land surfaces lie further south along the coast of the Gulf of Guinea comprising the coastal plains, islands and sandbars together with many lagoons and creeks. These plains extend into the Niger Delta which is a swampy area of 4,000 sq. km, composed of the coastal plain sands and lignite series of Cainozoic age in its northern part and of alluvial mud in its southern part. The plain extends further eastwards across the Niger from the Anambra Plains to the Cross River Plains at the foot of the Eastern Highlands, but is interrupted in the centre by the Awka-Orlu Uplands and the Nsukka-Okigwi Cuesta composed of resistant Cretaceous sedimentary rocks and marked by two distinct escarpments. These escarpments are composed of false-bedded sandstone and coal measures. Of much interest is the occurrence of the most spectacular example of gully erosion and bare land topography which have resulted from combined human and natural forces.

(c) The Highlands

The areas classified under highlands include the mountains, plateaux, hill ranges, ridges and isolated hills (inselbergs, volcanic cones, rocks and plugs). The Gondwana and Post-Gondwana surfaces, the oldest and highest in the African continent, are represented in the Eastern Highlands and on the Jos Plateau. Remnants of the Gondwana and Post-Gondwana surfaces can be found in the central part of the Eastern Highlands especially on the Mambilla Plateau and in the Bamenda Mountains. This area has been uplifted along a line of tectonic weakness or a fault line which extends from the area of the Cameroon volcanoes and volcanoes of the Bight of Bonny.

(d) The Troughs and River Valleys

The Niger was subsided in the Cretaceous period and filled with sandstones of the Upper Cretaceous age. Between Jebba and Yelwa, the river cuts through a strip of crystalline rocks. East of Jebba the valley has a wide flood plain with sand bars. South of Lokoja, the valley is comparatively narrow especially where the river dissects more resistant Basement Complex rocks from Kuroko to Ajaokuta and south of Onitsha where it dissects the clayey sandstone.

The Benue Trough is characterized by a wide flood plain from the Cameroon border. Outcrops of the Basement Complex rocks are not common, and the river is free from rapids permitting navigation from Ghana to Cameroon during the wet season. The middle section of the valley is dotted by flat topped hills composed of Cretaceous sandstone and scattered volcanic cones of Tertiary to Recent. The trough is thought to be the result of faulting.

(2) General Geology

Nigeria is underlain by two broad geological units-the crystalline rocks of the Basement Complex and younger sedimentary formations. Approximately, 50 percent of the country is underlain by Basement Complex rocks and the remaining 50 percent by the sedimentary formations.

The Basement Complex of Nigeria comprises granite, gneiss and migmatite formed during the periods of Pre Cambrian-Upper Cambrian intruded by basalt or pegmatite dykes of Jurassic. In the area along Niger and Benue Rivers, Mesozoic formations cover the Basement Complex. The formations consist of sandstone, shale and other sedimentary rocks mostly of Cretaceous and partly of Jurassic.

The Niger River Delta is composed of sand, gravels and clay of Quaternary which overlie the Mesozoic and Tertiary formation.

In the Northern Region of Nigeria, Hadejia and Komadugu Gana River Basins, Quaternary sand and gravels formed by wind erosion cover the Basement Complex heavily. Granite of Basement Complex is distributed extensively in the central part of the country, the Western Region of the Niger

River and the mountainous district near the border of Cameroon. The granitic rocks are very coarse, very hard and resistant to weathering. Gneiss and migmatite of the Basement Complex are also compact, very hard and resistant to weathering as well. Many isolated hills and peaks are formed by differential erosion due to this nature of the Basement Complex in contrast to that of Mesozoic or younger sedimentary formations. This area is widely covered by red soil called laterite or tropical iron red soil. It originates from weathering of rocks and is very rich in iron.

Sandstone and other sedimentary rocks of the Mesozoic formations which are distributed along the Niger and Benue River are variable in their petrographic characteristics and are classified into more than twenty formations. They are loosely consolidated in general or are even unconsolidated in some cases. They are very susceptible to weathering because grains are poorly cemented.

Younger formations comprising sandstone and mudstone in the States of Anambra, Imo, Ondo and Abia in the Southern Region are more poorly consolidated than the Mesozoic formations as above mentioned and are classified as unconsolidated sediments.

3B.1.2 River Basins and Hydrological Areas

(1) General

The rivers in Nigeria are arranged into five drainage systems: the Niger, the Benue, the Chad inland drainage, the Cross and the littoral. Most of the littoral rivers are short, and follow more or less regular courses in the north-south direction. Except Chad system, almost all the rest of Nigeria's river systems drain into the Gulf of Guinea. Those of the Niger and Benue system have built up the huge Niger Delta as a result of the combined action of sea waves and depositional action of the rivers discharging into the sea.

(2) Watersheds

A watershed divides two drainage basins generally corresponding with a line along the highest points of the topography. Since the magnitude of sub-surface flow is practically unknown, this flow is not taken into consideration.

In the west, the Western Plains and Ranges constitute the major watersheds which stretch from neighboring Benin in a fairly simple line towards the Niger Valley, and separate the rivers running southerly and discharging into the sea from the right tributaries of the Niger. The north-south direction of the former group of rivers is largely controlled by trends of foliation and joints of relatively resistant rocks. Most of the rivers such as the Ogun, Oshun, Oluwa are generally parallel to each other their tributaries to display a dendritic drainage pattern. In the area of the coastal plains, the rivers form braided channels.

In the south-east, the irregular scarp of the Nsukka-Okigwe cuesta forms the major watershed separating the rivers that drain into the Niger and the Imo from those that drain into the Cross. Major rivers in this area, the Imo and Cross are oriented towards the Bight of Bonny, while the Anambra joins the Niger near Onitsha. The highlands of the eastern border form another important watershed separating some tributaries of the Benue and Cross Rivers from those that flow into Cameroon. The watershed between the Benue and the Cross River is not well defined.

In the north, the central Highland (Zaria to Funtua) and the Jos Plateau form a major hydrogeographical centre from which a radial pattern of drainage develops with rivers draining to the Zamfara and Sokoto river and the Lake Chad; all these rivers join the Niger either directly or indirectly except those which run into Lake Chad. Between the Jos Plateau and the Mandara Hills, the watershed between the Chad and the Benue is difficult to determine because of a lack of relief.

Major rivers which drain into the Lake Chad, namely the Komadugu Yobe, the Ngadda, the Yedseram and the Goma form a centripetal pattern. Gradients of these rivers are low and very little water ultimately reaches the Lake. The Lake Chad, of which only a part lies in Nigeria, varies considerably

in area due to fluctuation of its water level according to annual and seasonal precipitation.

(3) Hydrological Areas

Eight Hydrological Areas (HAs) have been demarcated by major watersheds on the FSN maps, following previous procedures so far taken by FDWR. Each HA has been divided into major tributaries drainage areas (Sub-Hydrological Areas (SHAs)) which have been further subdivided into smaller drainage areas taking account of the strategic small river basins defined by hydrological observations and major hydraulic structures. Initial delineation of the above mentioned hydrological areas was done by five domestic consultant firms for the JICA-NWRIS (Technical) under the direction of the JICA Team, and has subsequently been upgraded based upon detailed analysis of Landsat TM Images in the "JICA-Statellite Image Analysis" conducted by PASCO International Inc., Japan together with the area calculation of each SSHA by the Computer Software Package for Geographical Information System developed by the Environmental Systems Research Institute, USA (ARC/INFO). The delineation of HAs, SHAs and SSHAs is shown in the Water Resources Database Maps "Hydrological Area Subdivision", and the drainage areas of each HA, SHA and SSHA are annexed with the following summary.

Drainage Area by HA

HA	Division	NWRMP	Drainage Area (km ²)	No. of SHA	No. of SSHA	Drainage Area Outside (km ²)	Total (km ²)
I	Niger North	North-West	131,600	14	34	461,600	593,200
II	Niger Central	North-West	158,100	16	34	-	158,100
III	Upper Benue	Central East	158,900	14	25	98,000	256,900
IV	Lower Benue	Central East	73,000	9	29	8,300	81,300
V	Niger South	South-East	53,900	5	10	-	53,900
VI	West Littoral	South-West	100,500	10	18	-	100,500
VII	East Littoral	South-East	59,800	7	19	13,400	73,200
VIII	Lake Chad	North-East	188,000	15	33	-	188,000
	Total		923,800	90	202	581,300	1,505,100

3B. 1.3 River System Diagram

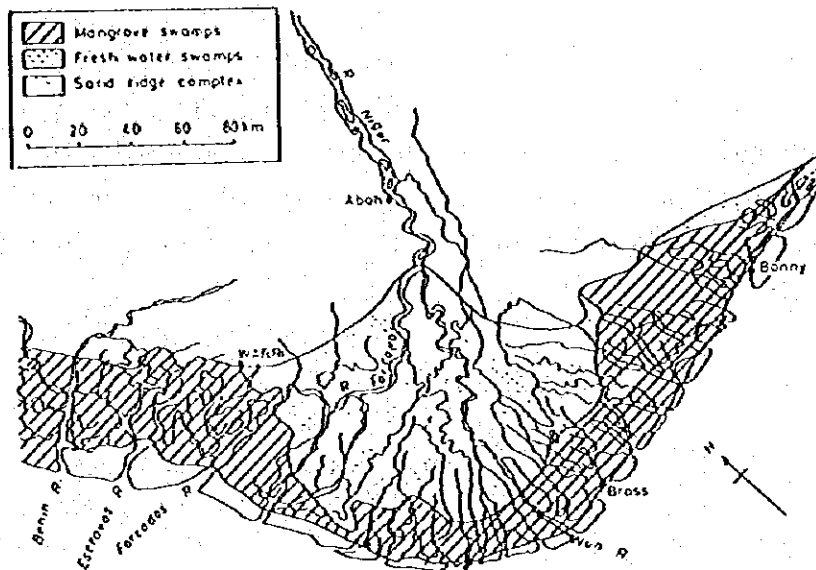
A river system diagram, as explained in the Database Maps (Drawing 11), has been constructed on the basis of the Database "Hydrological Area Subdivision " and " Land Use by Hydrological Area". The former database illustrates boundaries of the 202 SSHAs. This block diagram for major rivers includes the information on river name, and catchment area as well as the annual amount of potential surface water resources in terms of annual runoff (MCM) and annual runoff yield (mm), of which the later is fully discussed in Part 3C "Surface Water Resources".

3B. 1.4 Wetland Regime

(1) General

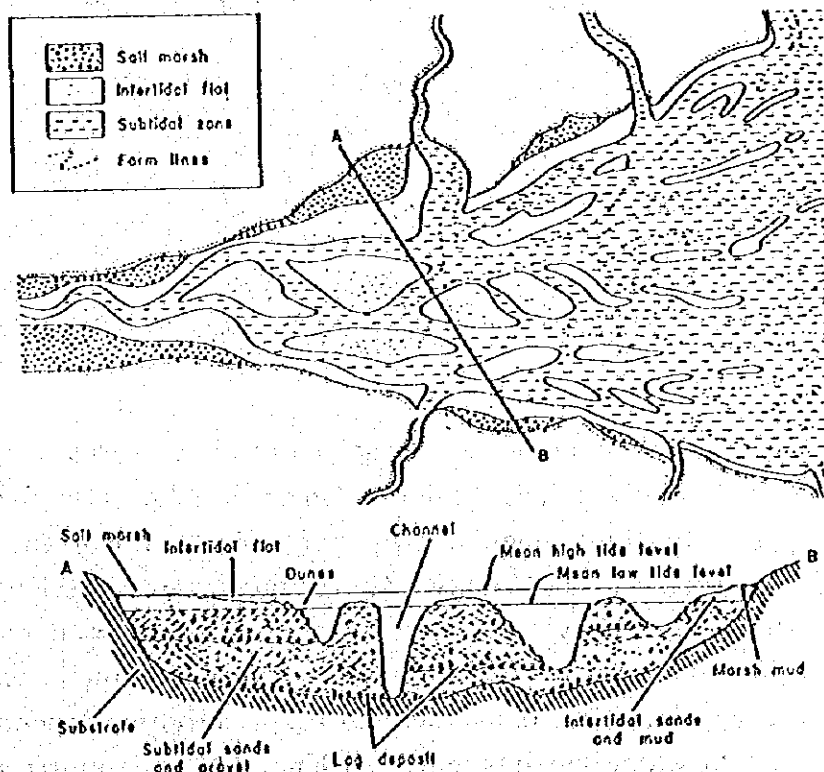
The wetlands which are defined as land subject to excessive wetness to the extent that the wet conditions influence the possible land uses, can be generally categorized into (1) coastal plains (deltas, estuaries and tidal flats), (2) inland basins (extensive drainage depression), (3) river floodplains (recent alluvial deposits bordering rivers) and (4) inland valleys (flat-floored, relative shallow valleys that are widespread in the undulating landscape). The first three categories refer to distinct physiographic units that can be easily identified from a large-scale soil map. The inland valleys are too small to be shown a map of such a scale.

A typical delta is formed by the Niger in Nigeria. The characteristic delta sequences are (1) freshwater swamps in the upper parts which are subject to annual flooding with exception of the river levees, (2) saline mangrove swamps in the lower stretches which are subject to tidal flooding, and (3) a complex of sandy ridges along the coastal fringe.



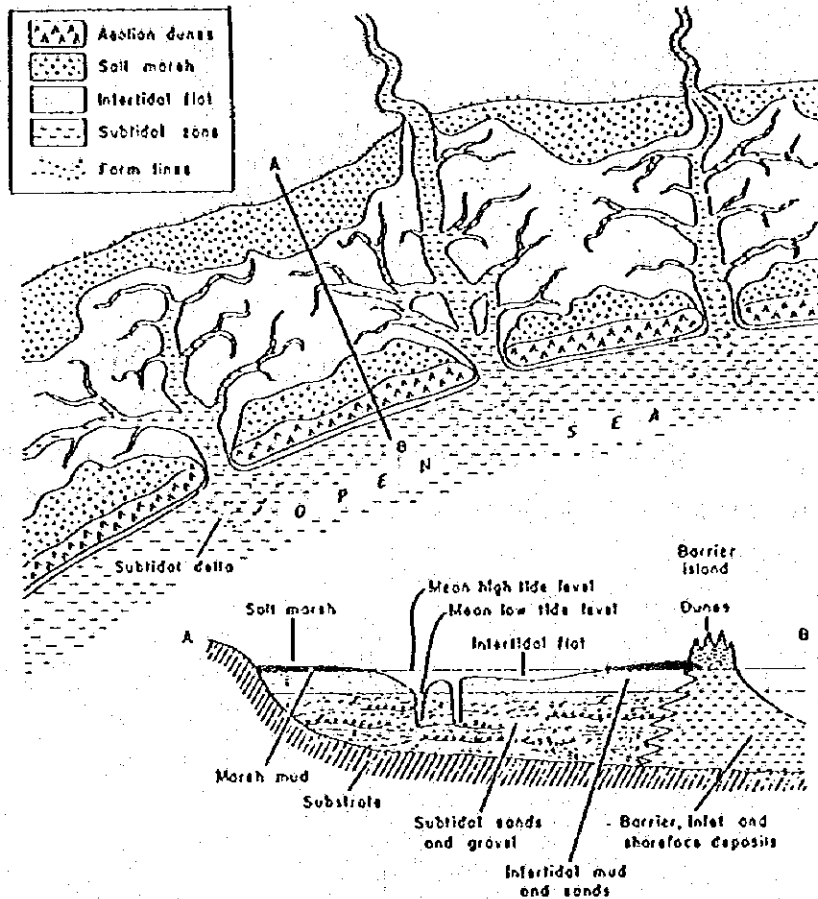
Morphologic characteristics of the Niger delta (Faniran and Jeje 1983).

Estuaries are funnel-shaped river mouths which are characterized by tidal sedimentation since sediment supply is low, relative to river discharge. Salt marshes occur along the sides and intertidal sandbanks and islands in the center. The proportion of these banks and islands increases headwards estuarine mouth.



Sedimentation in an idealized estuary (Allen 1970).

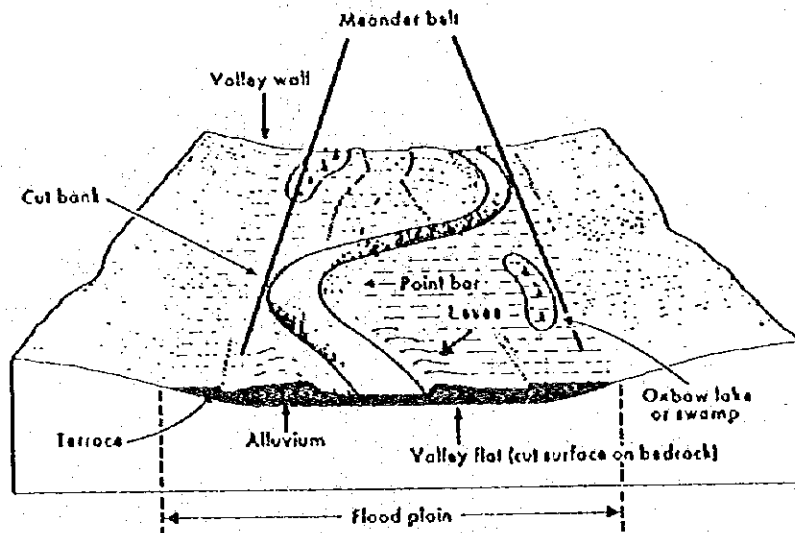
Tidal flats are longshore tidal sedimentation areas that are usually sheltered from wave action by protective sand barriers at their outer fringes. Inlet channels cut through these barriers locally, to allow for tidal flooding. Typical tidal flats occur along the Southwest coast where huge sandbars have formed between the ocean and the tidal flats (lagoons) under the influence of west-east longshore currents.



Sedimentation in an idealized tidal flat protected by a sand barrier (Allen 1970).

Inland basins comprise the extensive drainage depressions, in which Lake Chad is the largest ancient shallow basin on the edge of the Sahara. This has been tectonically stable [Beadle, 1974], but subject to important changes in climate from the Pleistocene upto recent times. The severe recession of the lake water has altered not only the area, but the ecological and hydrological structure of the Lake. The Lake Chad Basin is a very prominent livestock and agricultural area, and most investment to these activities depend upon the availability of lake water which is shared with neighboring countries.

A river floodplain is a wide, flat plain of alluvium bordering a stream channel, with the periodical flooding by point bars and oxbow lakes.

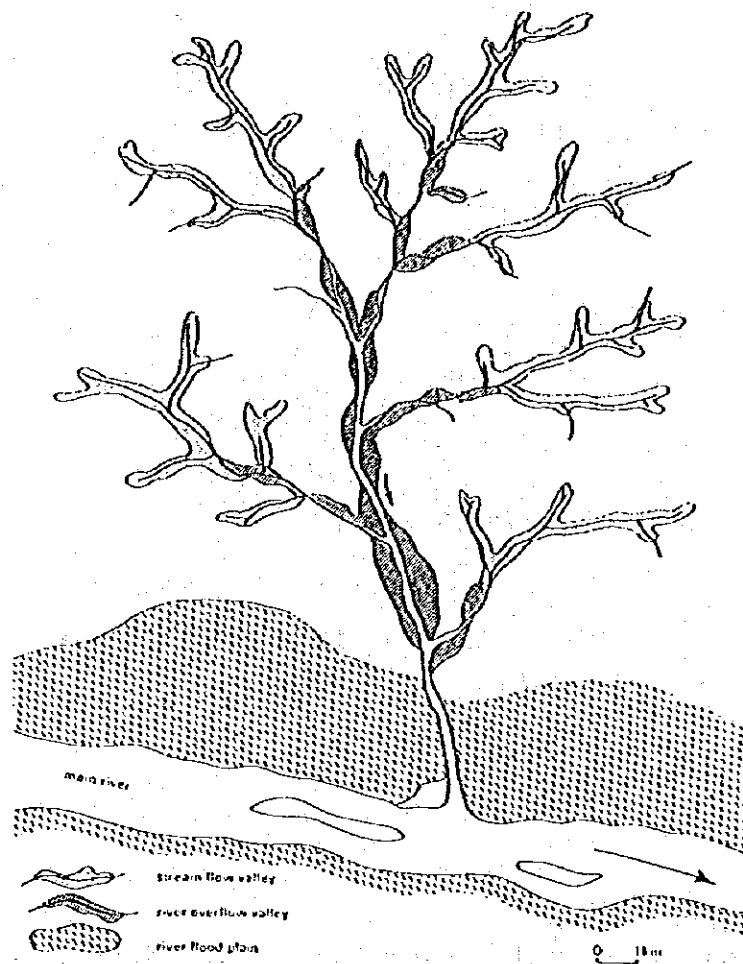


An idealized floodplain (Bloom 1969).

A river with a well-developed floodplain generally flows in broad regular curves, called meanders. As a result of extreme curving, a meander may cut off its own channel with the remaining channel segment called an oxbow lake. River terraces are formed upon lowering of the base level which causes the river to start eroding its own sediment. When the load in the river bed is excessive, a braided river system forms interconnecting channels between unstable sandbanks that are generally submerged during floods.

Most rivers have well-developed floodplains at least in their middle and lower stretches. Depending upon local topographic and geological conditions, the width varies from tens of meters to tens of km while the length extended up to several hundred km.

The term "Inland Valley" refers to the numerous flat-floored and relatively shallow valleys that make up most of the African landscape. They are known as "fadamas" in Nigeria and "yaeres" in Cameroon. Their catchments range in size from 100 to 2,000 ha depending upon local topography, and the inland valleys vary strongly in their morphologic, hydrologic and pedologic characteristics.



Schematic location of the two categories of inland valleys and a river floodplain (Savvides 1981).

Longitudinally, the valleys can be continuous and smooth or interrupted and stepped. Continuous valleys occur in lithologic formations with little structural variation, such as sedimentary rocks. Stepped valleys occur in the Basement Complex where hard rocks alternate with soft formations. In cross section, three types can be distinguished:

- Narrow valleys with relatively steep and straight to convex sideslopes, occurring in relatively hard rocks.
- Intermediate valleys with moderately steep, concave sideslopes, occurring in moderately hard rocks.
- Wide valleys with gentle, concave sideslopes, in relatively soft formations such as sedimentary rocks.

With respect to hydrologic characteristics, two main types can be recognized as shown in the figure above:

- Stream-flow valleys in the uppermost parts of the river catchments. Apart from rainfall, runoff and seepage from the adjacent uplands are the main water sources. These valleys have a poorly defined, more or less centrally located, shallow stream channels. The flat bottoms of valleys vary in width from 10 m in the upper portions to 100 m in the lower stretches, while catchment sizes vary from 2-5 sq.km on granitic formations to 20-50 sq.km in sedimentary rocks.
- River-flow valleys downstream of the former stream-flow valleys. These have a distinct stream channel that is in general located at one side of a small floodplain upto 200 m wide in the valley bottom. The main water source is overflow from the river rather than runoff or seepage.

The soils of valley bottoms vary widely in their characteristics both within and between valleys, because of morphogenesis, location, hydrological regime, lithologic origin and climatology. They can be rich to poor chemically, from sand to clay in texture and moderate to poor in drainage, and floods differ widely in depth, duration and velocity; however, the coarse infertile soils prevail in valley bottoms of poor and acid rocks (sandstones, granites, quartzites, rhyolites); coarse to medium-grained soils of low to moderate fertility occur in intermediate rocks (hornblend granites, quartz-feldspar gneisses, diorites, andesites); and medium to fine, relatively fertile soils are found in the valley bottoms of areas with rich parent rocks (amphibolites, dolerites, basalts, hornblende gneisses, shales, siltstones).

(2) Special Features in the Northern Fadama

(a) Introduction

The Hausa word 'Fadama' has a very broad meaning implying seasonally damp or flooded land, and it could reasonably be used to refer to large parts of the flood-plain, including swamps and lakes. At the same time, Fadama has come to be used to mean land which can be cultivated, and in this way, it contrasts with the upland. It is also correct to talk of grazing fadama, and many of the extensive areas of montmorillonitic clays exposed by December in the central flood plain are true fadama land.

Agriculture in fadama involves both dry land and upland farming, swamp or fadama farming, residual soil moisture farming and irrigated cropping.

In general, the pattern of fadama farming is more complex. Both rice and sorghum (guinea corn) can be grown on seasonally flooded land, but it is rice for which the floodplain is famous. West African rice Oryza glaberrima was domesticated in West Africa over 2,000 years ago, and it is possible that cultivars are still being grown in the floodplain. While recent observations suggests that Asian rice Oryza sativa is dominant, it is necessary to crop a number of different species in order to maintain an ecological balanced environment.

(b) Physical Characteristics

In the northern and central part of Nigeria, low-lying seasonally flooded areas, known as fadama along the flood plains of the Sokoto-Rima, Hadejia-Jama'are-Yobe, Niger and Benue river systems are composed of fluvial deposits and contain extensive exploitable aquifers. They vary in width from a few hundred meters to as much as 20 km and encompass the land and water resources which could be utilized for irrigated agriculture. Fadama formation is a geomorphological phenomenon that has resulted from the combination of slow river bed accretion and periods of high rainfall that caused extensive flooding and deposition of sorted materials over the flood plains. Most of the coarse sands which constitute the matrix of productive aquifers were deposited during the Pleistocene pluvials. Subsequent flooding has overlain these with a mixture of generally finer sands, silts and clays varying in thickness from one meter to seven or eight meters.

Deposition of sediments was accompanied by raising the base level of the rivers. The shallow aquifers constituted by the sands generally lie below the flood levels and are hydraulically connected to river systems being subject to recharge during the wet season floods.

(c) Ecological Context

The fadama which are low-lying, flood-prone, slow-draining areas (poorly drained) and generally possess finer grained and less acid soils, are remarkable different from adjacent uplands in terms of their ecology and microclimate. Under natural hydrological conditions in the past, the rivers also deposited rich sediments in the fadama during floods which aided in maintaining soil fertility. Grazing animals, domestic and wild sought the rich fadama vegetation for forage and, in this process, added organic and mineral components to the soil in the form of manure. Fadama was not only important to terrestrial plants and animals, but also was used by many riverine fish species for spawning via lateral migrations from the river channel into the temporarily-flooded fadama depressions. Fish that were trapped in the fadama as the flood water receded were easily harvested by fishermen and become an important food and income source for communities within or adjacent to fadama areas.

Due to a markedly different moisture regime from upland soils, the natural vegetation cover has been characterized by a composite of thick acacia scrubland, open grassland, and open seasonally or permanently ponded areas supporting dense emergent vegetation including rushes, sedoes and reeds. Traditional use of fadama areas by pastoral livestock herds moving into or through the areas from regions to the north, as well as by settled agriculturists and fishermen has had a dramatic effect on the ecology. The original scrub has been replaced in many places by grasslands, and the land adjacent to numerous villages that occupy the margins of fadama has been entirely cleared for arable farming and is available to pastoralists only after crop harvest. Farmers have traditionally worked in river margins of the fadama where they could raise water with shadoofs to irrigate small parcels of vegetables and rice. In addition to fadama with natural vegetation supported large and diversified resident or transient wildlife populations including large herbivores and their associated predators. Even today, the fadama is known to provide important wintering areas for a vast number of migratory paleoartic birds. The Hadejia-Nguru wetland is one of the few remaining wetlands of appreciable size in the northern Nigeria which has not been converted to cultivation.

The fadama was a very important hydrological element in the floodplain ecosystems and retains this function today to a lesser extent. By

trapping flood water, the fadama mitigated the downstream effect of flooding and helped to maintain dry season flow as some of the trapped water eventually percolated into the groundwater and then moved laterally to river channels. It is clear that the annual river flooding and fadama are vital for recharge of the shallow aquifer. Owing to extensive fadama clearing for agriculture and construction of large dams on the river upstream system, the natural conditions that prevailed in the past no longer exist. Various riverine ecosystems have been altered so extensively that wildlife habitat has basically disappeared, fisheries have already been severely reduced, social conflicts have becoming more intense and the hydrological regime bears little resemblance to the natural conditions.

(d) Position of Fadamas in the Water Resources Management

The natural resources in these areas are the subject of three separate and often conflicting evaluations:

- By indigenous producers who use the areas for agriculture, fishing, grazing or hunting/gathering;
- By national-level planners and foreign aid/development experts who wish to intensify production through irrigation or river control, and
- By conservationists concerned about the role of such wetlands in local, regional and inter-continental systems, most obviously in Palaearctic bird migration systems.

Each of the three appraisals of the fadama land resources obviously represents markedly the different ideologies of nature and of development:

- Large-scale development such as dam construction would have significant adverse impacts on ecological systems and also serious implications for indigenous people and existing small-scale and informal economic activity.
- The indigenous activity itself can also have adverse impacts on conservation if fishing effort rises and in some circumstances can prejudice large-scale development through soil erosion in upstream catchments.
- The designation of protected areas for conservation can constrain development programmes and have socio-economic impacts when existing rights are extinguished.

3B.2 THE NIGER AND THE BENUE

3B.2.1 General

There are three principal river basins from climatic, topographic and geological points of view. One is the Niger river basin including the Benue basin covering a large part of the Central and North-West Region of the country, the second is the Chad basin expanding along the border of the Niger in the North-East Region, and the third is the South-Littoral basin facing the Gulf of Guinea in the south. The profiles of main rivers are shown in the Data-Base Maps.

The main rivers and tributaries of the Niger basin originate mostly in Jos Plateau with elevations of 1,500 to 1,700m and flow down in all directions toward each sub-basin. Some tributaries flow down from the right bank plateau of the Niger and the left bank mountain of the Benue river basin which are formed mostly with undulating hilly topography and are placed under the western Sahel climate condition.

The rivers in the Chad basin also originate in Jos Plateau and flow down from west to east to Lake Chad. The river of Yedseram only flows down along the border with Cameroon at the eastern corner of Nigeria and onto Lake Chad. The basin is mostly formed with vast alluvial plains except the high plateau area in the upper river basin and belongs to the semi-arid climate zone.

The rivers in the south littoral region have their sources in the northern plateau and in the mountains along the Cameroon border, and flow to the south and discharge into the Gulf of Guinea. The river basin consists of many small, undulating, steep hilly areas and is placed under the tropical climate with heavy rainfalls.

The river system diagram of the main rivers is shown in the Data-Base Maps. In this section, the Niger and the Benue river basins are described below.