

scale rice mill operators and then sold to retailers. Under the Third Five-Year Programme, it is planned to alleviate the producers' burden for export crops and to establish a Production and Marketing Corporation for food crops for domestic consumption to maintain their stabilized supply and adequate price level.

Government subsidies for agricultural production are offered for investment and services connected with the supply of seeds, seedlings, fertilizers, chemicals and tractors. Loans are provided by the Agricultural Bank through the State Agricultural Credit Committee for leasing of tractors to be used in the production of rice, maize, sorghum, yams, peanuts and cotton as well as for purchasing of seeds and fertilizers. However, the funds for these subsidiary measures are not sufficient. Most production equipment and materials are imported and their price is high. The government subsidiary measures have not yielded notable results partly for want of consolidation of the agricultural extension system.

1.2.3 Irrigation

The preliminary survey covered the aforementioned six states which are all located along the Niger river. As seen in Fig. 4-1 (Mean Annual Rainfall), rainfall in the six states equals or exceeds the average in Japan, and there are no topographical impediments to the construction of irrigation facilities because all the states are rich in low hills, rivers and plains.

Nevertheless, irrigated farming is not conducted by ordinary farmers except the model irrigation carried out in large farms. Rice is grown by rain-fed irrigation (upland rice) or in swamps or flood peripheries of rivers (swamp rice and floating rice), which is the typical natural culture seen in many developing countries.

Accordingly, cropping is carried out in time with the wet season (May ~ October) and the yield is affected largely by the amount of rainfall, flood level, and duration of the flood season. Farmers' income from paddy cultivation is not therefore stabilized. However, farmers in the southern region seemed to be enjoying a fairly stabilized income because of the high income from palm oil and the stabilized production of food crops such as cassava, yams and maize which are relatively free from the influence of climatic condition.

In the face of the growing demand for rice, the government incorporated a survey plan for improved rice cultivation and a region-wise rice production plan in the Third Five-Year Development Plan in order to stabilize and augment the rice production. Introduction of irrigated farming, which is an essential prerequisite to the fulfilment of this social demand, was noted to be observed in the following farms visited by the mission.

(1) Tiffany Farm in Bendel State

This farm has an acreage of 54,000 acres and is operated for production of rice and maize. Irrigated farming was started to cover 200 acre-land of this farm, with water driven through a canal from a small-tributary of the Niger (tributary of the Obe river) which was dammed up for the purpose. Surplus water is discharged into the natural river through a wasteway

connected with the said irrigation canal.

The problem entailed in this irrigated farming is that it was planned in the absolute absence of discharge data of the river from which water is taken. Therefore, the acreage of irrigated rice field which can be created by this plan depends on the future discharge observation.

(2) Uzo Uwani Pioneer Irrigation Project, Anambra State

The project area is a rice production farm surveyed, planned, constructed and operated by Nippon Koei, the spearhead of Japanese agricultural cooperation, and is under the nominal management of ADA. Its construction was started in 1975 after submission of a feasibility report to the Government of Ex-East Central State in 1974. The planned area to be irrigated 1,000 ha. in total which has an elevation less than 35 m in the total farm area of 4,000 ha. against the intake level of 37 m. The annual construction plan envisages the creation of 150 ha. irrigated area for 1975, 300 for 1976 and 500 ha. for 1977. Besides these, a 2 ha. irrigated experimental farm is available (See the General Plan).

Detailed data of the project are available from Nippon Koei. The mission therefore wishes to give some comments on the civil engineering aspect of the project.

Construction of this farm was facilitated, above all, by the availability of existing intake facilities from the Obina river. Specifically, an intake canal (main irrigation canal) with a substantially long distance had been completed, though not with lining, by USAID and FAO, from a diversion channel constructed by damming up a curved section of the Obina river with an earth dam. Since neither investment nor depreciation of these facilities had to be taken into account, the farm management was made extremely favourable. However, because these facilities were built quite some ago, there were no sufficient discharge data. Nippon Koei has been conducting the water level observation of the Obina for the last four years, but the lack of complete discharge data is likely to affect the future expansion of the dry season operational scale.

As for the soil nature, the mission was informed that soil specimens sampled at 100 points in the 4,000 ha. area, and 20 specimens of them had been put to laboratory test. Before the soil survey, the whole project area appeared to be covered with reddish soil called laterite, but the laboratory test disclosed that the pH value was generally neutral with the exception of few places where a pH value of about 4.5 was recorded and that the clay content was high (20 ~ 30%). After the construction was started, practically gravelly and highly permeable layers were found in some places.

These data will prove useful in planning the similar development in future.

(3) Perc Mabiri Rice Project, Rivers State

The project area was constructed by the Dutch for introduction of pump irrigation. At present, the irrigated area is 45 acres, which is planned to be expanded to 3,000 acres. The farm is situated in the extensive delta near the estuary of the Niger, and surrounded by tidal rivers with a tidal range of about 1 m not containing salinity in their normal flow. Discharge of

water resorts to gravity flow. When the water level of the rivers rises, however, intrusion of outside water is prevented by polders (1 ~ 2 m high) surrounding the farm, and pumps are run to drain inside water. Pumps are operated by diesel generators. There are no Dutch left in the farm so that its management is undertaken by the Nigerian staff of PABOD Food Co. The farm has a warehouse of large machinery such as threshers and dryers and is equipped with farm machinery, bulldozers, generators and a repair shop, but most of them are not used without taking any measures against rust development.

Operation of this farm involve a number of problems. In the first place, it is not conveniently located. To get to this farm, one has to make an hour's drive from Port Harcourt to Yenagoa port on the Nun river, and sail down a tributary of the Nun for a bout two hours to arrive at Pere Mabiri. Between Yenagoa port and Pere Mabiri, the river width is about 20 m in the narrowest section and about 1 km in the broadest section, and the water depth as estimated from the river width and flow velocity is not very large. Hence, there is no choice but to navigate upstream of the river estuary or navigate down the mainstream of the Nun river in order to transport heavy equipment and materials. This poor accessibility causes difficulty in transporting machinery, equipment, harvested products and personnel and also leads to unfavourable habitability. In the second place, the cost of pump irrigation and drainage cuts down the operational profit of the farm. In the third place, salt damage due to the rise of sea level is likely to inflict a severer damage upon the farm than the rise of water level in upper reaches during the flood season. In the fourth place, the annual rainfall is larger than 4,000 mm and the number of rainy days in the wet season is 25 days per month (cf. Mean Number of Rainy Days), and the relative humidity ranges from 80 to 90 % in certain hours of the day (cf. Mean Daily Relative Humidity), which is not at all favourable for the growth of rice.

(4) Shonga Todo Rice Project, Kwara State

The project area is a rice production farm put in operation in 1974 adjacent to the southern bank of the Niger. The whole project area of 8,000 acres is divided into three zones for development in three phases. The first phase development aims at clearance of 2,000 acres of rice field, the second phase development at 3,000 acres, and the third phase at 3,000 acres. At present, clearance of 600 acres out of the first phase development acreage of 2,000 acres is in progress, but no water source facilities are constructed yet. It is planned that irrigation water will be pumped up from the Niger river using 10 units of pumps each having a capacity of 230 cusec, for which an order has already placed with a U.S. manufacturer. The facilities so far completed are the staff's dormitory, connecting road, polder embankment, levelling of 600 acre land, and part of irrigation and drainage canals.

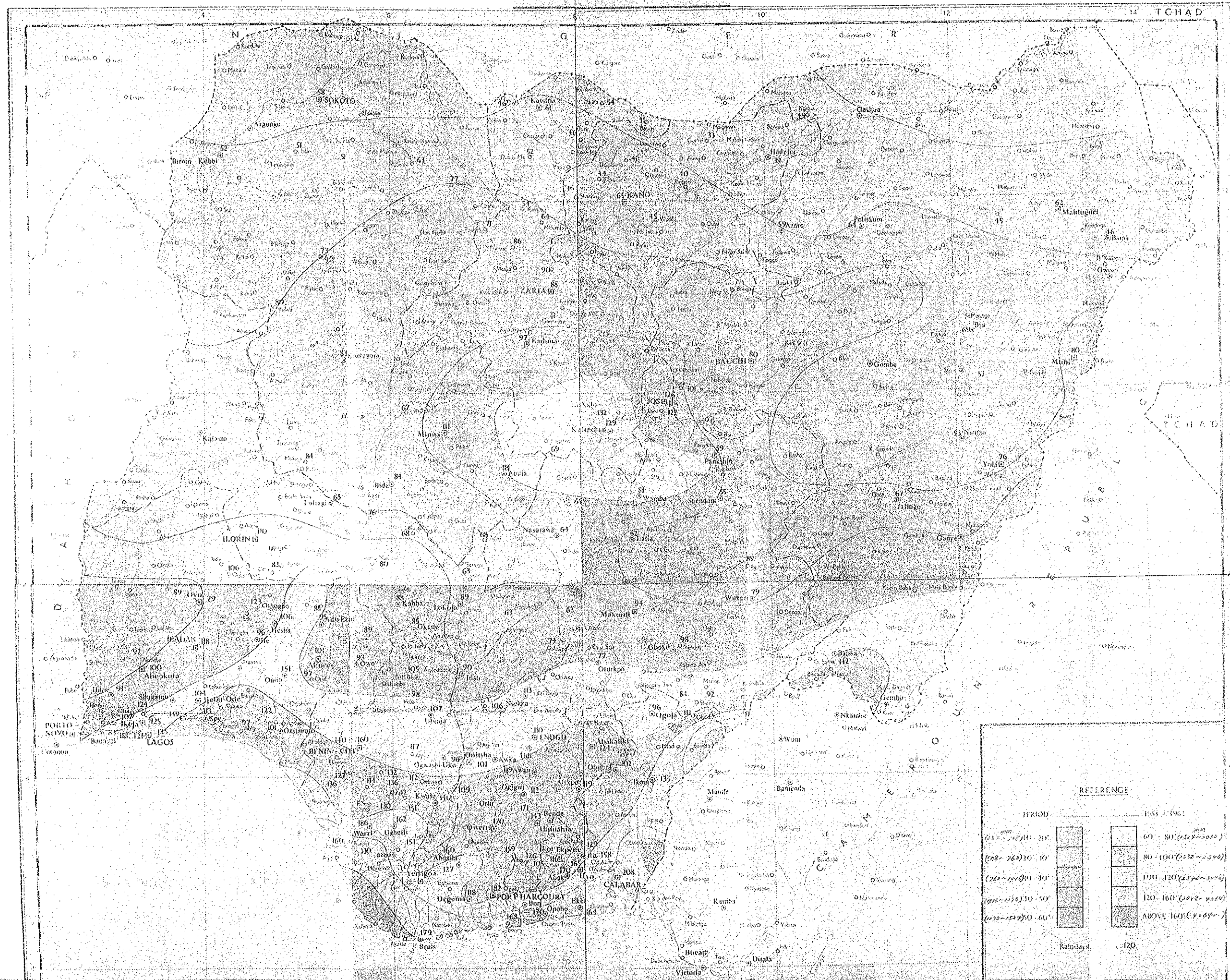
The polder, which embraces the whole project area, was built to a height of about 1.5 m which was determined on the basis of the flood water levels recorded in September 1974 and January 1975.

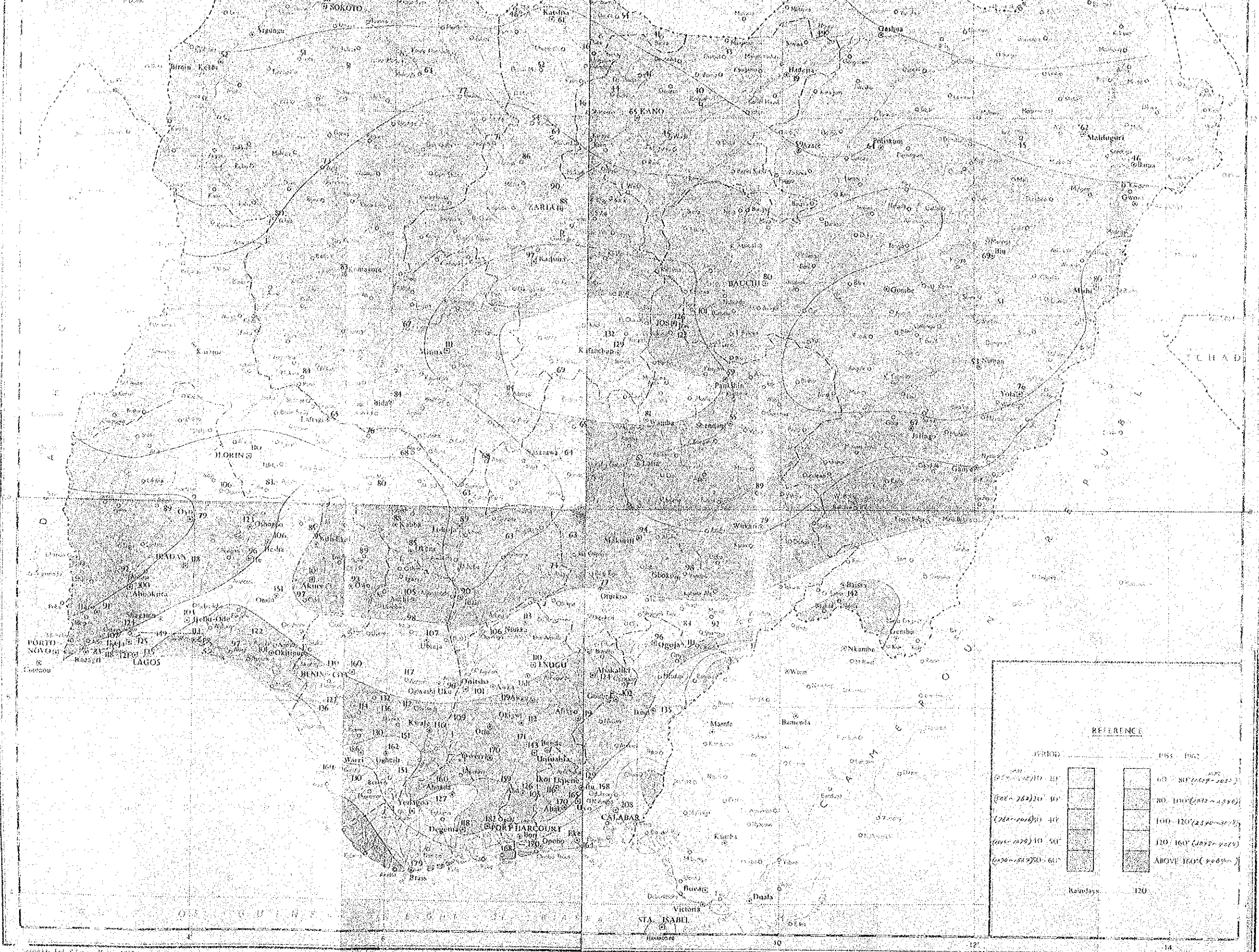
The problems entailed in the operation of this farm comes from the lack of discharge data of the Niger river which makes it justify the planned pump irrigation, and also from the topography which necessitates the construction of the polder. If water can be driven from

Kainji dam constructed on the Niger river about 150 km upstream of the farm. it may be possible to mitigate the economic disadvantage of pump irrigation and control the flood discharge to the Niger river to some extent.

NIGERIA MEAN ANNUAL RAINFALL

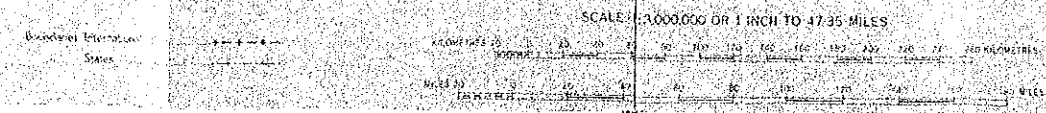
Fig. 4-1.





REFERENCE	
REGION	1951 - 1962
(000-200) 20'	60 - 80' (000-200)
(200-300) 30'	80 - 100' (200-300)
(300-400) 40'	100 - 120' (300-400)
(400-500) 50'	120 - 160' (400-500)
(500-600) 60'	ABOVE 160' (500-600)
Contours	120

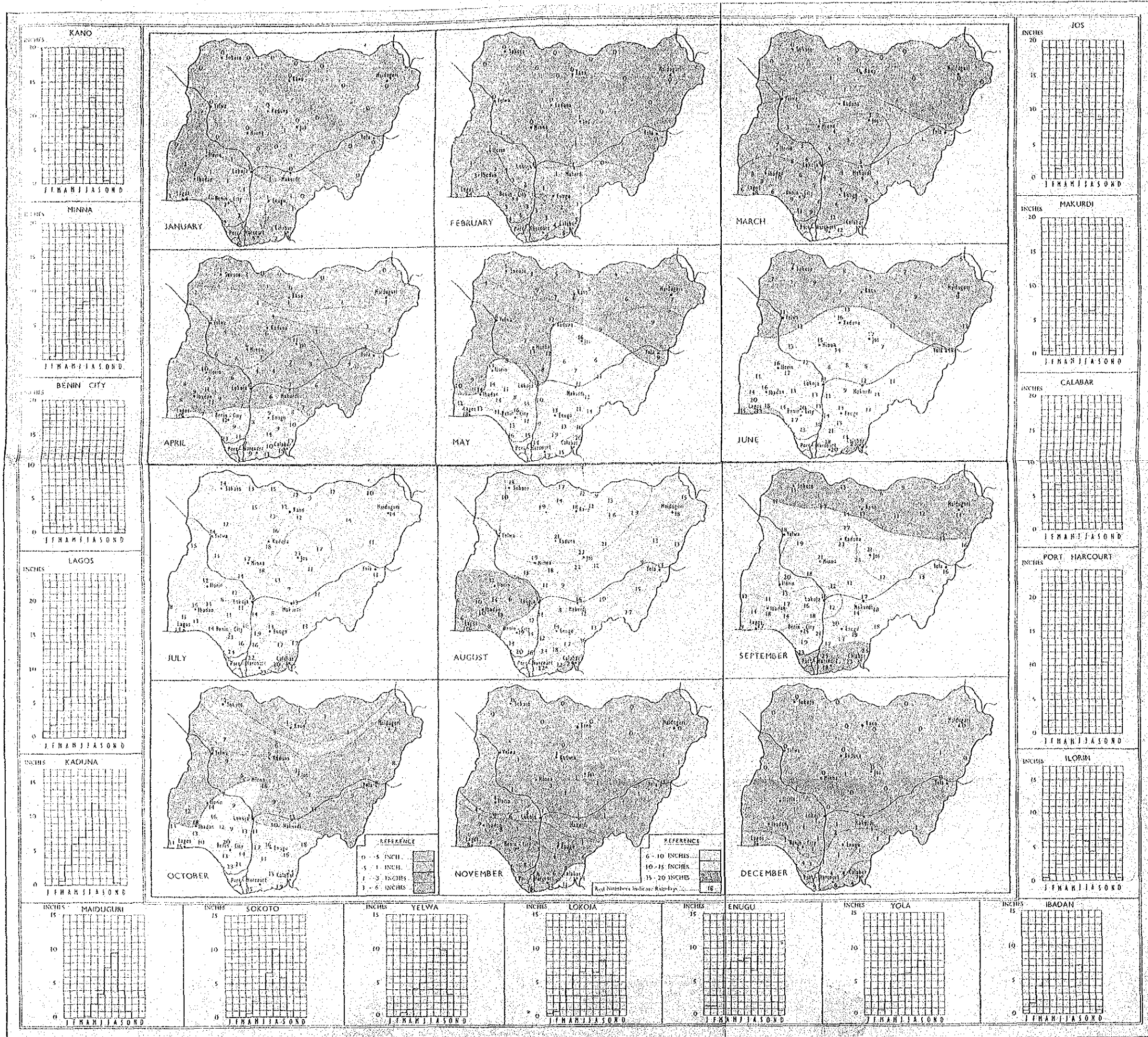
Copyright by Federal Survey, 1962.
 COMPILED BY THE FEDERAL BUREAU OF SURVEY



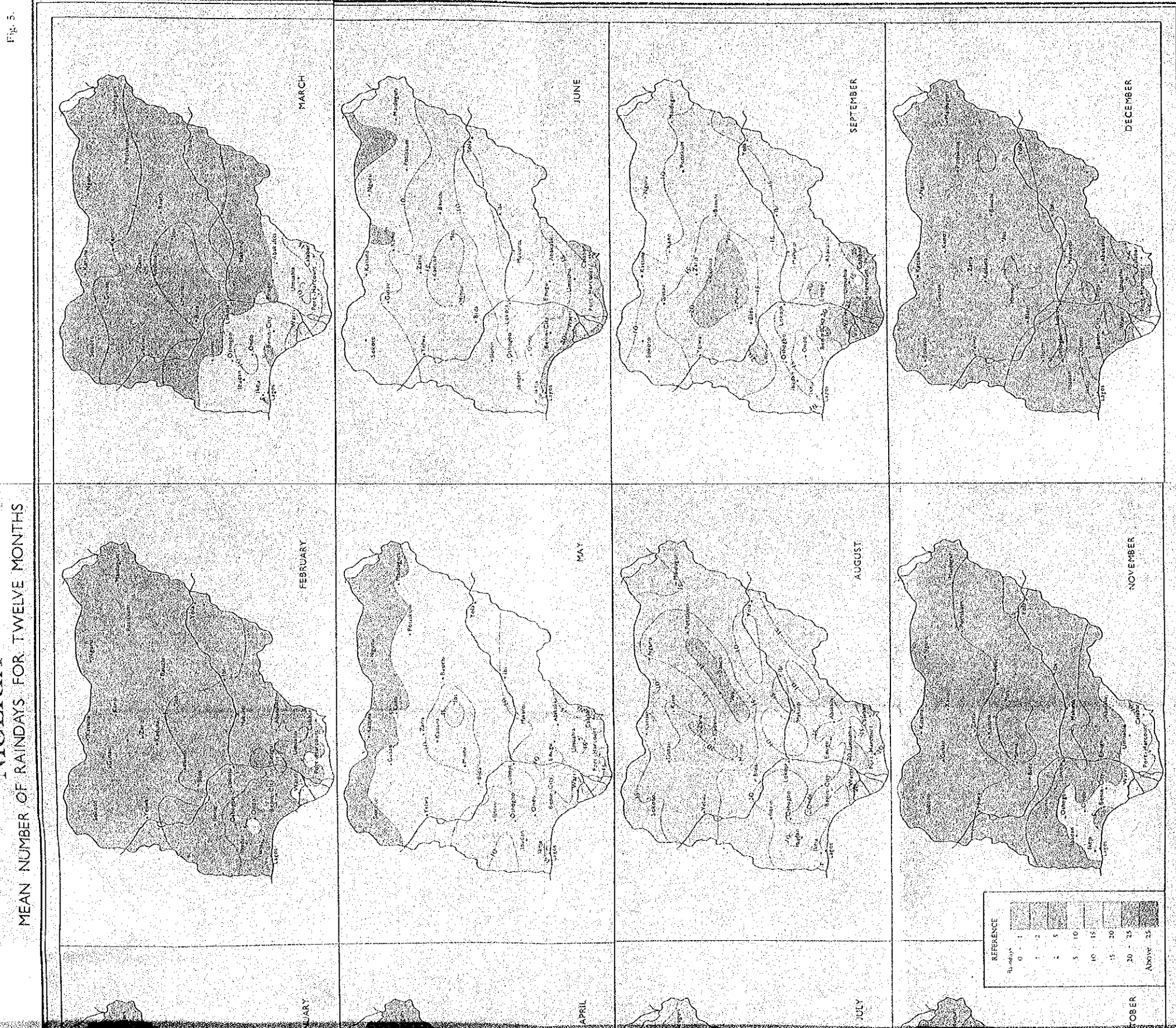
Drawn & printed by Federal Survey, 1962.

NIGERIA MEAN MONTHLY RAINFALL

Fig. 4-2.

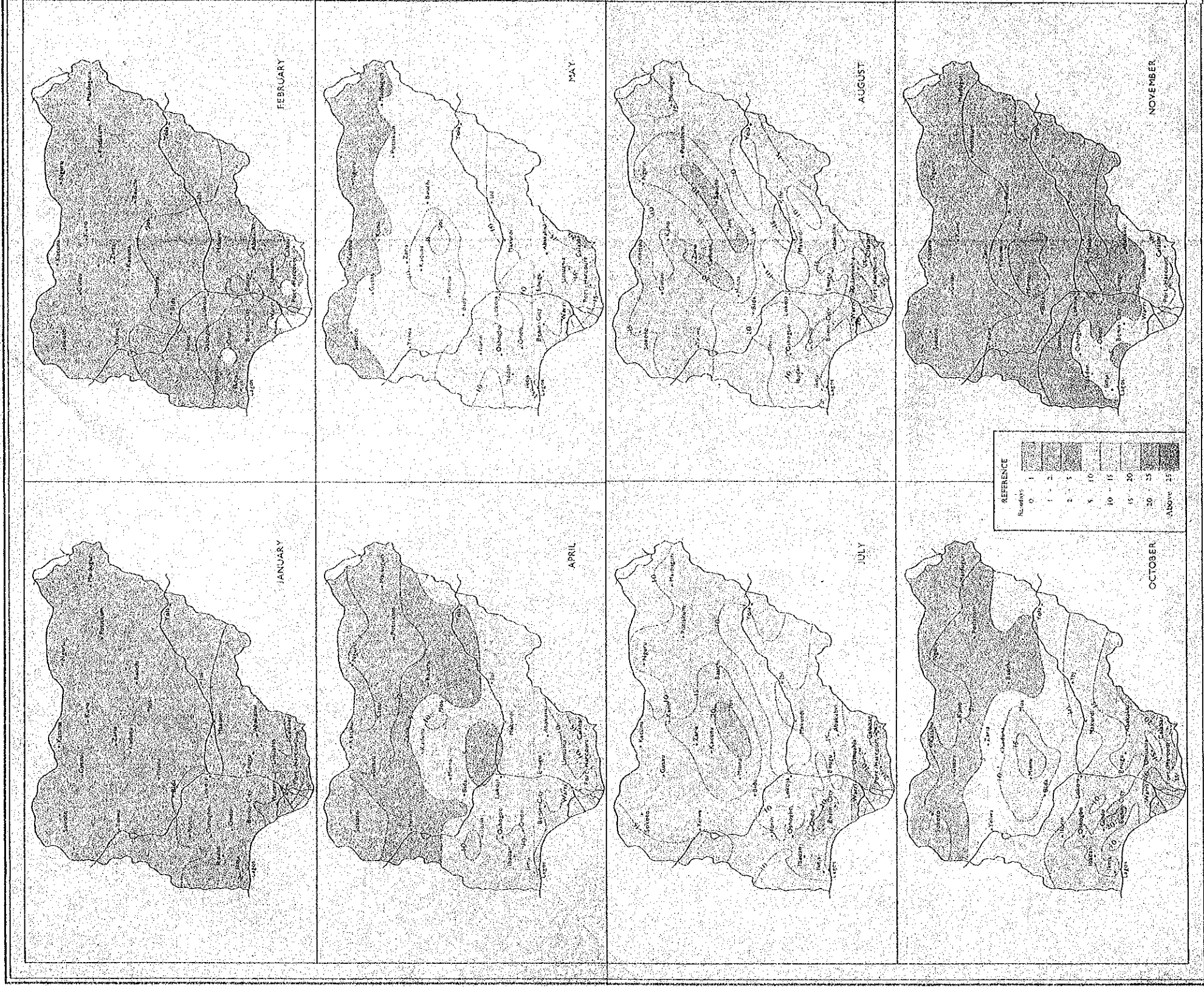


NIGERIA
 MEAN NUMBER OF RAINDAYS FOR TWELVE MONTHS



NIGERIA

MEAN NUMBER OF RAINDAYS FOR TWELVE MONTHS



NIGERIA

MEAN DAILY RELATIVE HUMIDITY : 16.00 HOURS

Fig. 6.

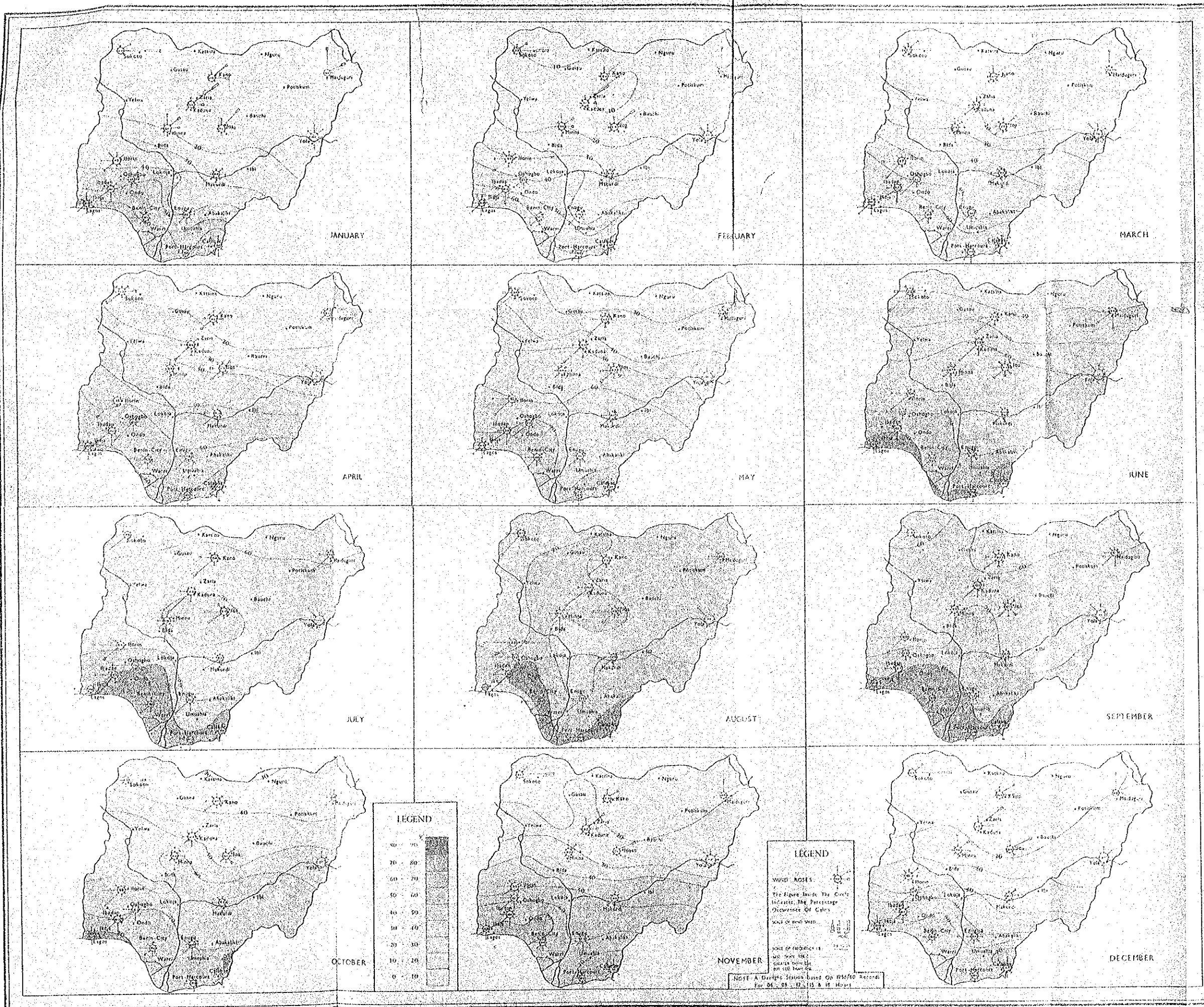


Fig. 7 General Plan
 Uzo Uwani Pioneer Irrigation Project
 Anambra State

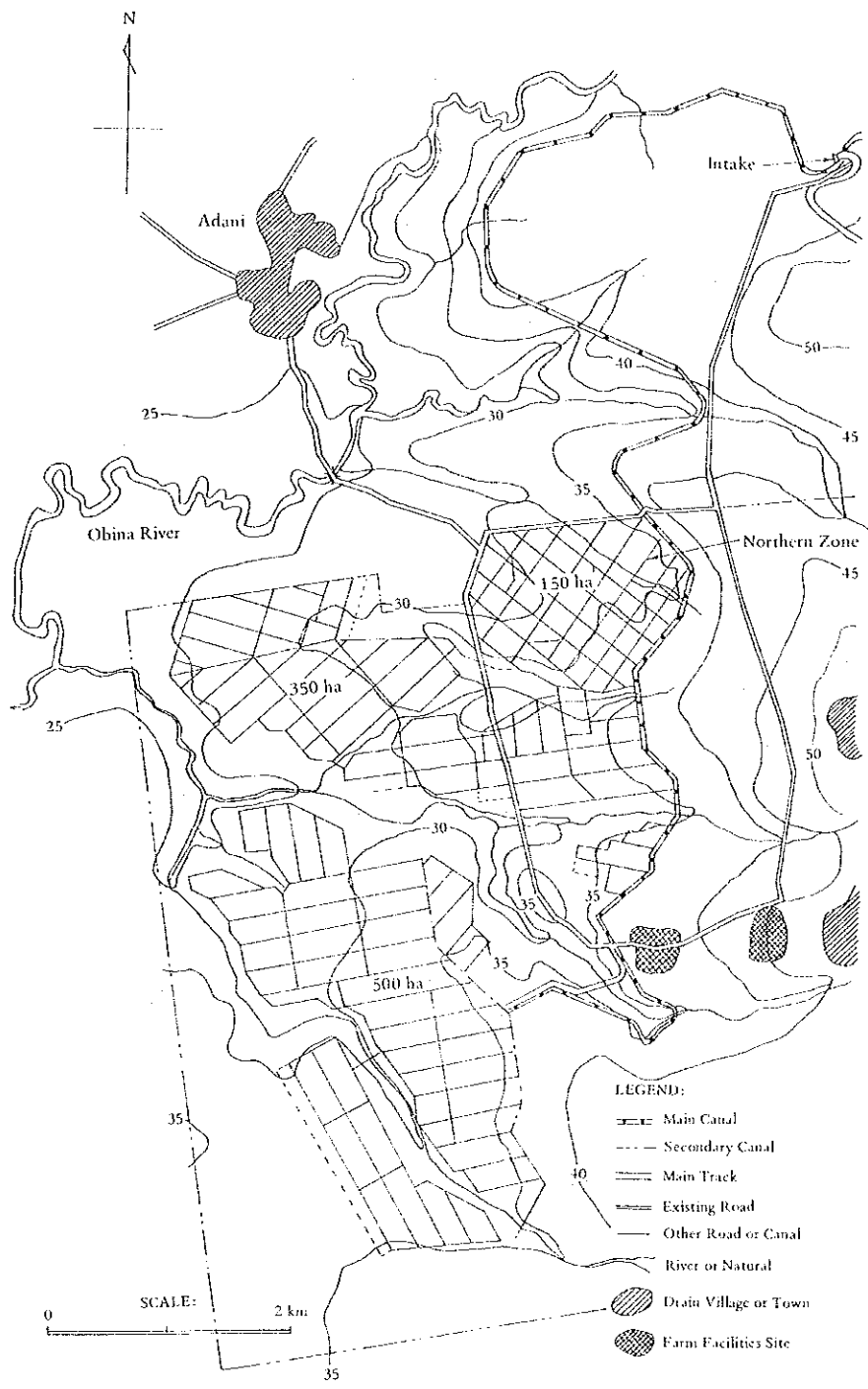
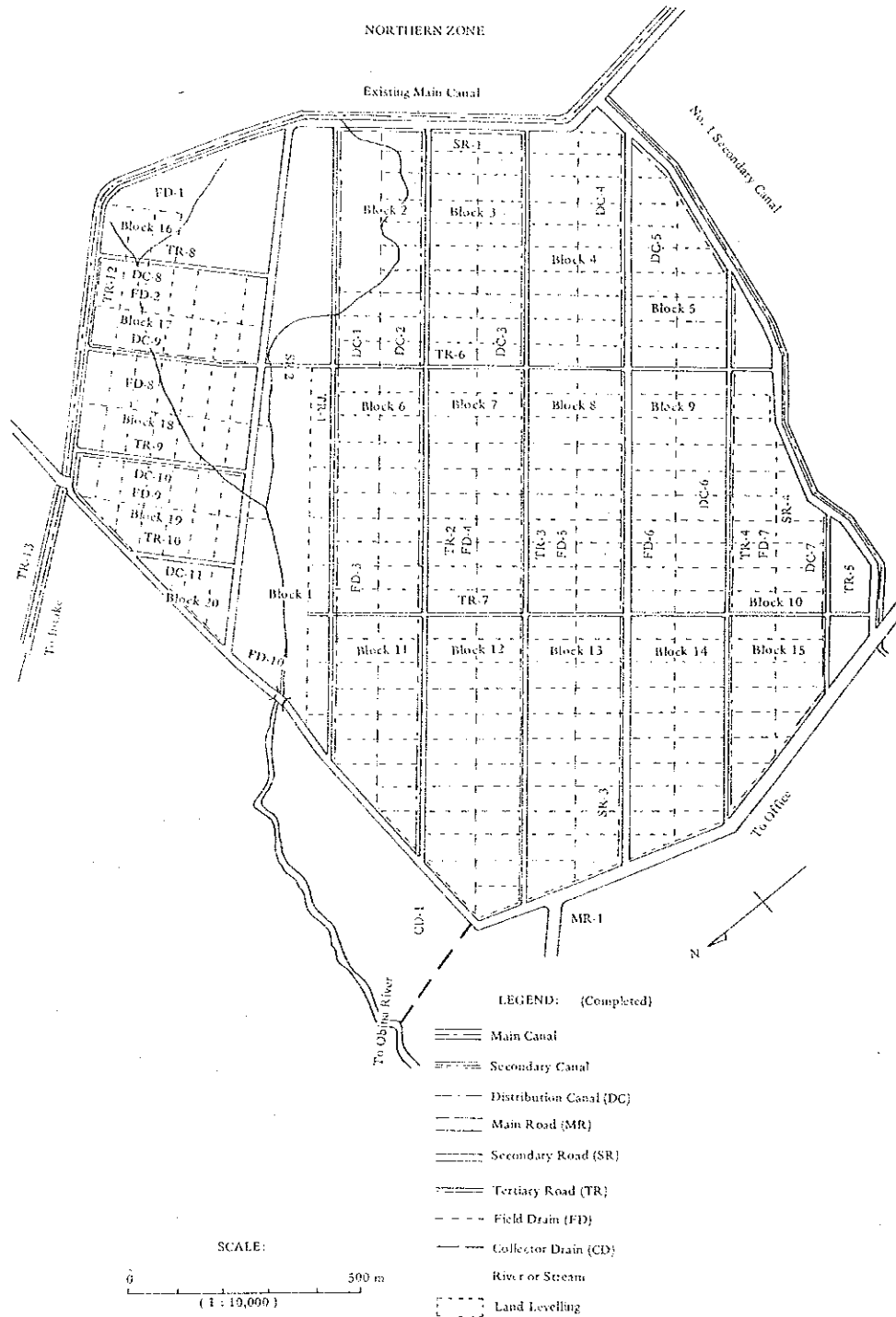


Fig. 8 Progress of Construction Work



1.2.4 Technical Cooperation

This section deals with the technical cooperation offered by different countries in the development of Nigerian agriculture, especially in the augmented rice production. Due to the limited time allowed for the preliminary survey, the following description centres on the six states actually visited by the mission.

(1) People's Republic of China

China is experienced in rice cultivation just as Japan. There are two Chinese experts dispatched to Itokin area (Lagos State) who are taking part in the rice production increase plan.

In February 1975, a nine-member Chinese mission made a 1-week survey in Kwara State and proposed to select the project area in Gakpan area. The mission was informed, however, that the report of the survey had not yet been forwarded to the Nigerian government, so far.

According to the Newspaper, "Nigerian Herald" on June, 29, 1976, she decided to cooperated with Nigeria in the following rice projects

- a 133 ha. small scale rice project in Itokin, Lagos State,
- a 400 ha. small scale rice project in Odoekpe, Anambra State,
- a 630 ha. small scale rice project in Gapan Duro area, Kwara State.

(2) FAO

A preliminary survey mission conducted a survey in Bendel State and Kwara State in 1975, and a feasibility survey mission is expected to visit Kwara State again towards the end of 1976. The mission learned that pioneer agricultural development projects were implemented in the former Eastern State and South Eastern State, and two FAO experts were stationed currently (June 1976) in Niger State for agricultural survey of the whole state.

(3) IDA

A large-scale oil-palm production project was started by IDA in Imo State.

(4) The Netherlands

The Niger River Delta Area Development Project was formulated in Rivers State around 1967, with the relevant survey report submitted to the Nigerian government (NEDECO and others). However, no follow-up activities were made since that time.

(5) West Germany

Rau Imex, a private farm machinery maker, is participating in the Mechanized

Upland Paddy and Maize Production Project managed by Bendel State under which 4,000 acres of farmland was created out of the total planned acreage of 10,000 acres. (2,500 acres for upland paddy and 1,500 acres for maize).

(6) United States

The United States sided with Biafra during Biafra Civil War, so that the construction of irrigation facilities under Uzo Uwani Pioneer Irrigation Project, Adani, Anambra State, was undertaken by USAID with partial cooperation offered by FAO.

Tiffany Farm in Bendel State, covering an acreage of 54,000 acres, is operated with technical cooperation offered on the private basis. The mission was informed that rice cultivation recently started in a 200-acre land of this farm for direct sowing of IR-22 encountered a number of difficulties. Small gravity irrigation facilities are already completed in this farm.

Under Shonga Todo Rice Project in Kwara State, an order for pumps has been placed with a U.S. manufacturer which is expected to undertake their design and site installation works.

(7) Japan

Under contract with the Government of Anambra State, Nippon Koei is cooperating in the implementation of Uzo Uwani Pioneer Irrigation Project at Adani which aims at double cropping from September 1975 in a total of 1,000 ha. of land to be newly cleared according to the following annual construction plan:

1975	150 ha.	} 1,000 ha. in total
1976	350 ha.	
1977	500 ha.	

Nippon Koei is also planning to cooperate in similar projects under contract with other state governments.

2. Existing Problems

2.1 Agriculture

(1) Research and Experimental Institutes

In the past years, researching and experimental efforts have been made chiefly for specific crops such as cocoa, oil palm and rubber. Researches in the field of main food crops have been made only by National Cereals Research Institute and Federal Rice Research Station, Badeggi, and their branches, with basic studies and experiments left to the faculty of agriculture in universities and International Institute fo Tropical Agriculture. (IITA)

In general, research facilities are deficient and staffed by limited numbers of research workers, and delay is observed in the extension of research findings among general farmers.

(2) Extension Service

Each state government has an extension system established under it, but improvement is required in the terminal service network.

Budget appropriated for extension service accounts for 29 ~ 67 % of the total agricultural development budget in the northern states, but it ranges from 2 to 14 % in the southern states. Each extension worker is required to serve an average of 15,589 farm households which is far larger than the average of about 500 households covered by each Japanese extension worker. This is a clear evidence to show the shortage of extension workers in Nigeria. (The minimum and maximum numbers of households covered by each extension worker were 2,621 in Ex-Benue Plateau State and 129,117 in Rivers State, respectively).

It was noted that demonstration and extension farms were small in number, and extension workers were often engaged in administrative work rather than field service.

(3) Mechanized Farming

For the purpose of emergency food production increase, large-scale mechanized farms were established, and various farm machinery including operation machinery e.g. tractors, pre-processing preparation facilities, and processing and storage facilities were introduced with subsidy offered by the government. However, ordinary farmers who are mostly small holders are virtually irrelevant to and little benefited by this mechanization effort. Although introduction of small and medium type farm machinery and livestock farming equipment is planned, supply of these machinery and equipment is not sufficient.

(4) Expansion of Farmland Area

In order to shorten the fallowing period of savannah fallows, studies are being made on the method of soil conservation and maintenance of soil fertility. Utilization of flood peripheries of large rivers is also planned, but this will call for a voluminous civil engineering works to be continued over many years.

(5) Large-scale Mechanized Farm

To accelerate the farmland area expansion, integrated mechanized farms under direct management of the Federal and State Governments are established. These farms are now operated chiefly for the production of maize and upland paddy. Maintenance of soil productivity and establishment of suitable rotation systems are the preconditions for their successful management. Another problem is to be unable to dispense with the services of foreign experts which are now essential for the construction and management. (The 2,000 ~ 4,000 mechanized rice farm called for such services in its construction and management)

(6) Agricultural Production Materials

Fertilizers and chemicals required for production increase cannot be obtained

easily. For example, single element fertilizers such as ammonium sulphate and urea cannot be obtained except by the farms under direct government management as evidenced by Nippon Koci. In addition, suitable herbicides are not available.

(7) Plant Protection

Insect pests peculiar to Africa have been identified, but their control method has not yet been established. Rice is subject to frequent outbreak of blast, but sprayers and other control equipment are not available in sufficient numbers. Further, crops are often afflicted with rodent and bird injuries.

2.2 Agricultural Economy

The main problems confronting Nigerian agriculture and countermeasures are enumerated below.

Item	Problem and Countermeasure
Promotion of Export Crops	The agricultural policy enforced in the pre-independence days during which emphasis had been placed on export crops was continued even after independence, and the Marketing Board held low the purchasing price from farmers with the resultant profit invested in non-agricultural sectors. As a consequence, the farmers' volition for production increase was retarded and the production has been stagnated. Since export crops are an important source of foreign exchange earnings next only to oil, their production should be promoted, with measures to be taken to return the profit from their export to the agricultural sector.
Establishment Self-sufficiency in Food Supply	Due to the population increase, urbanization and improvement of the people's income level, there has arisen quantitative change in demand for greater supply of foods and qualitative change in demand from tuber-root crops to rice and wheat. Agricultural development policies including the farmland expansion and consolidation should be promoted to cope with the growing and changing demand for foods.
Modernization of Agricultural Management	Nigeria was once an agricultural country where self-sufficient agriculture resorting to extensive farming and manual labour using simple farming implements sufficed to support the people's livelihood. However, it is now required to elevate the living standard fo rural inhabitants to that of urban dwellers. It is therefore necessary to promote the modernization of agricultural management and thereby raise the financial footing of rural inhabitants.

Item	Problem and Countermeasure
Improvement of Rural Environment	Social overhead capital in rural areas is lower than in urban areas. Effort should therefore be exerted to promote the income level of rural inhabitants and improve their living environment so that their outflow to urban areas can be prevented.
Consolidation of Storage and Processing Facilities	Storage and processing facilities of food crops for domestic consumption are limited in both scale and number. These facilities should be consolidated in parallel with the improvement of the distribution system in order to assure consumers of smooth and stabilized supply of foods at reasonable price.
Subsidy	Judging from their present scale of management, farmers have no own fund to promote the consolidation of land infrastructure, fundamental management facilities and machinery, nor can they afford production materials such as fertilizers and chemicals. Subsidiary measures should therefore be taken by the Federal and State governments.
Recruiting of Leaders and Experts	Nigeria is in want of personnel capable of planning and implementing development programmes. Aid from advanced countries should therefore be secured, with particular emphasis placed on the repletion of the extension services for farmers.

2.3 Irrigation

As stated earlier, irrigated farming is carried out either by the government or by private corporations. The planned extension of rice cultivation is expected to promise ordinary farmers a greater income from rice. To maintain stabilized rice production in future, it is necessary to introduce irrigated farming in place of the currently practised rainfed culture. This can be attained in two ways, i.e., promotion of irrigated farming in large plantations operated by the government or private corporations, and extension of minor irrigation among ordinary farmers. The existing large farms are operated, regardless of their being irrigated or not, by farmers in surrounding areas who are employed on a part-time basis, and many of these employed farmers are also engaged in the operation of their own land. If irrigated farming is introduced in such large farms, it is certain to produce a spill effect upon neighbouring farmers and to lead to the future promotion of irrigated farming. Needless to say, this must be accompanied by systematic endeavours to enlighten and induce ordinary farmers to take to irrigated farming.

3. Future Course of Development

3.1 Agriculture

Under the Second Five-Year National Development Programme (1970 ~ 1974), agricultural development was given high priority with plans formulated for the stable supply of

food crops, production increase of export and industrial crops, provision of greater employment opportunities for rural inhabitants, reorganization of the relevant administrative setup. Although partial revision was effected to the programme, ₦N. 125,632.8 thousand or about 10.0% of the total programme fund was appropriated for the development of agriculture and forestry (incl. livestock farming and fisheries). (Source): Second National Development Plan: 1970 ~ 1974 the First progress Report. (₦N.1 = 2.80 U.S.)

The fund appropriated to the agricultural sector (including forestry, live stock and fisheries) under the Third Five-Year Development Programme (1975 ~ 1980) amounts to about ₦ 1,400 million or 7% of the total programme fund, and this is approximately four times as much as the amount allotted under the Second Five-Year Programme (₦ 305 million). (Source): News Release No. 1042 "14th Independence Anniversary Broadcast by H.E. General Yakubu Gowon" 1974 Central Planning Office, Second Progress Report, 1974 (₦ 1. = \$1.60 U.S.) Further, the Federal Government takes part in the agricultural development which has so far been undertaken by state governments. To attain the objective of emergency food production increase which is given top priority among a number of plans incorporated in the programme, the planted area of cereals is planned to be expanded to 1,440 thousand ha. and that of tuber-root crops to 600 thousand ha., and the irrigated farmland area is also planned to be increased to 560 thousand ha. Further, it is planned that the extension system will be consolidated for diffusion of improved farming techniques among farmers and positive introduction of high-yielding improved varieties, fertilizers and chemicals.

The growth rate of demand and the required growth rate of crop supply, as estimated for the 1975 ~ 1980 period by Federal Department of Agriculture with 1968/69 taken as basic year, are shown below in Table 9.

Table 9. Crop-wise Growth Rate of Agricultural Production (1975 ~ 1980)

	Growth Rate of Demand	Required Growth Rate of Supply	Growth Rate of Agricultural Production
Maize	3.8	6.5	8.0
Millet	3.8	6.5	8.0
Sorghum	3.8	6.5	8.0
Rice	5.7	10.4	11.5
Wheat	10.4	10.4	11.5
Cassava	1.9	3.5	5.5
Yams	1.9	4.5	6.0
Cocoyams	1.9	3.5	5.5
Peanuts	2.8	5.7	7.5
Cowpeas	2.8	5.7	7.5
Soybeans	2.8	5.7	7.5
Melon seeds	2.8	5.7	7.5

The annual per capita consumption of food crops in 1968/69 was 96.4 kg for cereals, 262 kg for tuber-root crops, and about 12 kg for other crops.

The food supply and demand situation forecast by the said department for 1975 and 1980 is shown in Table 10 below.

According to the projected food supply and demand situation shown in the Table 10, it is expected that the production of rice, cassava, cocoyams, banana and cowpeas will surpass demand in 1975, whereas the supply of other cereals will fall short of demand. However, this forecast is based on mere calculation and does not guarantee production increase for any crop. Production of rice, for example, is estimated to exceed demand, but both the planted area and the production have been on a low level with negative surpluses of 4,800 tons and 8,000 tons which had to be imported in 1974 and 1975, respectively.

There is no assurance that the projected growth rates of other crops can be attained. The military administration of Nigeria has therefore given great importance to the emergency food production increase as one of its top priority policies, and is expecting to receive technical cooperation of advanced countries in its attainment. For the purpose of this emergency food production increase, the Federal Government is planning to take the following measures.

- (1) To establish a main cereals production and marketing public corporation equipped with storage facilities in each state to stabilize the price, and determine the floor price for each crop.
- (2) To cooperative with each state government in the establishment and operation of food processing centres.
- (3) To enforce the main cereals seed production plan.
- (4) To provide financial aid for planting or replanting of tree crops.
- (5) To promote the development of farming implements, small tillers and animal power cultivation for agricultural modernization.
- (6) To establish an agricultural credit bank and nurture agricultural cooperative associations.
- (7) To strengthen the cooperation and link between extension services and research institutes, and increase the number of extension workers.
- (8) To enhance the smooth distribution of fertilizers, seeds and seedlings by taking advantage of farmers' organizations such as agricultural associations and cooperatives besides solidifying the existing distribution system of the state government.
- (9) To promote the activities of agricultural cooperatives and consolidate roads and

Table 10. Projected Food Supply and Demand Compared
(1,000 metric tons)

Commodity	1968/69 Base Year Supplies	Compound Annual Trend Rate of Growth Supply	1975			1982		
			Projected Demand	Projected Supply	Surplus	Projected Demand	Projected Supply	Surplus
Maize	831	2.4	1,034	982	-51	1,200	1,105	-94
Millet	1,909	0.5	2,273	1,977	-296	2,754	2,026	-728
Sorghum	2,985	-0.3	3,710	2,922	-787	4,307	2,879	-1,428
Rice	333	10.4	455	667	+211	555	1,094	+539
Wheat	27	6.5	46	24	-21	61	34	-27
Cassava	7,521	2.5	8,439	8,940	+501	9,183	10,115	+931
Yams	7,239	-0.2	8,122	7,138	-983	8,838	7,067	-1,771
Cocoyams	802	2.5	900	953	+53	979	1,078	+99
Plantain (Banana)	1,250	2.5	1,403	1,486	+83	1,526	1,680	+153
Groundnut	263	-0.5	311	254	-57	350	247	-102
Beans (Cowpea)	430	5.7	509	634	+125	573	837	+263
Soya Beans	38	5.7	46	57	+11	51	57	+23
Melon Seeds	52	2.5	62	62	+0.2	69	70	+0.6
Benni Seeds	38	2.5	45	45	+0.2	50	51	+0.4
Vegetables	1,164	3.5	1,588	1,481	-107	1,937	1,758	-178
Fruits	133	3.5	191	170	-20	237	202	-35
Palm Oil	535	-0.2	698	528	-107	832	523	-309
Groundnut Oil	29	-0.2	33	29	-9	46	29	-17
Melon Seed Oil	8	2.5	11	10	-1	13	12	-1
Butter	20	2.5	33	24	-8	43	28	-15

+ = Positive surpluses that could enter African Market

- = Negative surpluses that have to be imported unless there is increased production

Population: 1968, 69; 62,986,000 1975; 75,135,000 1980; 87,526,000

storage facilities in rural communities for smoother marketing of agricultural products.

- (10) To train technicians specialized in irrigation engineering, water management, and farm management.
- (11) To promote the creation of agricultural estates.
- (12) To promote the production of rice, wheat, cotton, kenaf and dairy products by *direct implementation of their production increase plan which has so far been enforced by respective state governments.*
- (13) To conduct soil surveys and effect capital input for consolidation of irrigation facilities and prevention of soil erosion so as to ensure expended and efficient land use.

As can be readily seen from the above measures, the agricultural policy of the Federal Government is focussed upon the self-sufficiency in food, although financial aid is planned to be offered for planting and replanting of industrial crops for export.

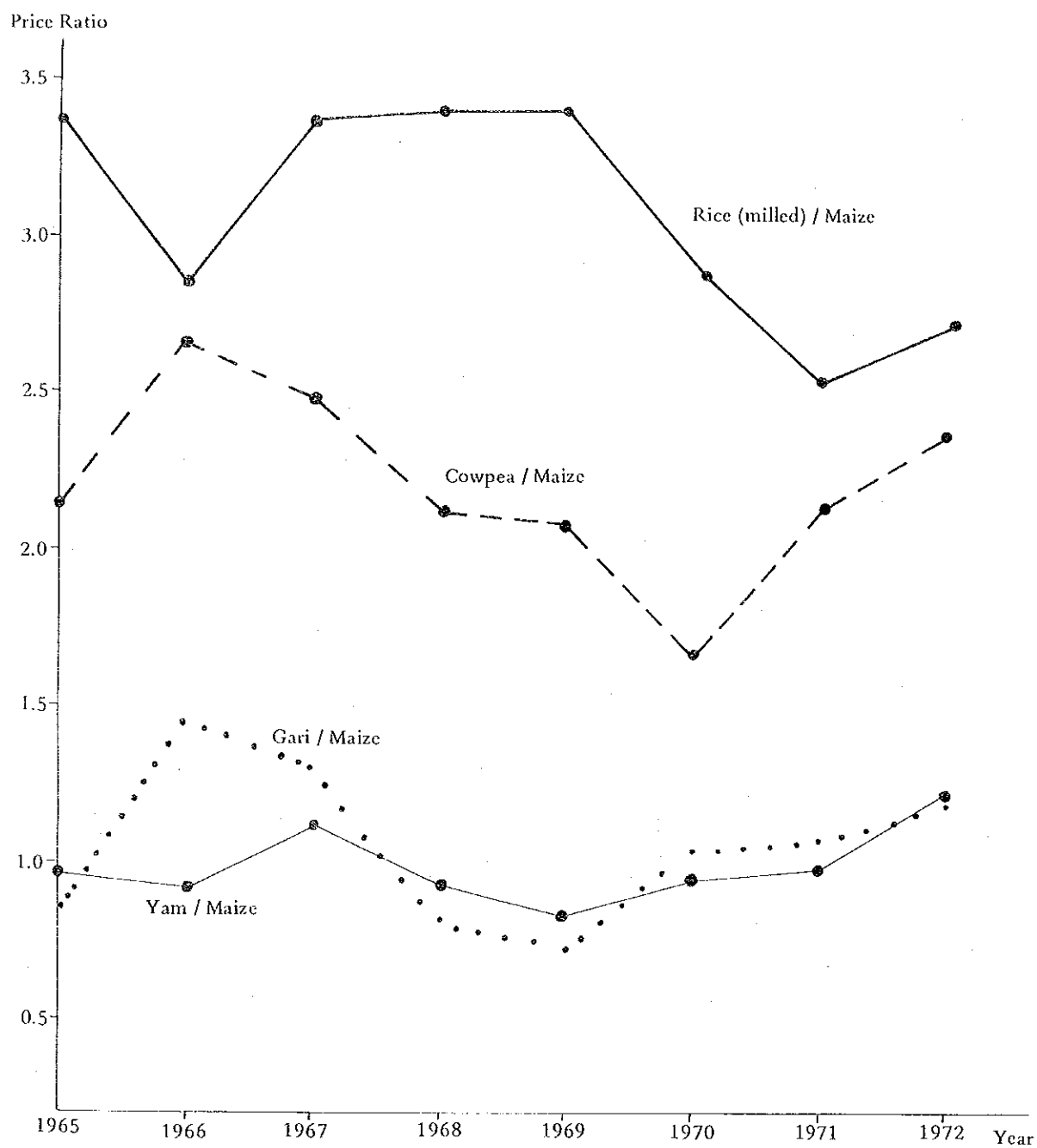
3.2 Agricultural Economy

Examination of the rice production increase plan which constitutes part of the emergency food production increase plan incorporated in the Third Five-Year Development Programme disclosed the following facts.

Judging from the rice production in 1971/72 which was 207 thousand tons and the import volume of rice which registered 5 thousand tons in 1974 and 8 thousand tons in 1975, the annual per capita consumption of rice is no larger than about 3 kg, which indicates that rice has not established itself as a main staple food of Nigerian people. Under the guideline established for implementing the Third Five-Year Programme, the required growth rates of rice and wheat supply are estimated at a maximum of 10.4% per annum. Considering the existing small amount of the production, the future population increase and the probable improvement of the people's income level, it is likely that the demand for rice will increase to a considerable extent. The market price of rice is on a high level relative to other staple foods (See Table 11 and Fig. 9), so that it can be said that farmers are willing to increase rice production. However, in order to create larger demand for rice and establish it as a staple food, it is necessary to cut down the production cost. Further, in extending rice cultivation among ordinary farmers, measures should be taken to exempt them from excessive financial burden prone to ensue from the consolidation of land infrastructure and from the introduction of various production facilities and machines.

Construction of the projected pilot farms in Imo and Bendel States should be planned with consideration given to the labour force and technical level of neighbouring farmers, and its operational scale and income target should be set so as to permit modern and model management which can be extended in the surrounding areas in future.

Fig. 9. Changes in Producer Market Price Ratios of Milled Rice, Yams, Gari and Cowpeas to Maize in Ex-Western State



Source: International Institute of Tropical Agriculture, Ibadan.

Table 11. Retail Price of Staple Foods

	Ibadan		Lagos	
Milled Rice	1 kg	₦1.30 ~ 1.46	0.2 ℓ	₦0.40
Yams	1 kg	₦0.80	1 kg	₦0.82
Gari	1 kg	₦0.80		
Soy Beans	1 kg	₦0.53	1 kg	₦0.60
Soy Beans (Flour)		₦1.24	1 kg	₦1.30
Wheat Flour			1 kg	₦0.30 ~ 0.43
Maize	0.9 kg	₦0.45	0.2 ℓ	₦0.10
Bread				

3.3 Irrigation

The following points should be taken into account in selecting suitable sites for implementing the large-scale rice field development plan.

(1) Rainfall

Although rainfall data are available for the period after 1953, river discharge data are virtually absent, so that calculation of the run-off volume will have to be worked out by using estimated values. Accordingly, it is desirable to select the sites in areas extending south of Lat. 7° N. where rainfall is copious.

(2) Infrastructure

Management of any large farm presupposes the availability of a substantially large number of farmers, regardless of whether it is to be operated by a single private corporation or divided into blocks for operation by individual farmers. If the operation of a farm calls for the input of 1,000 farmers each having an average of four family members, then houses to accommodate a total of 5,000 persons and other related facilities such as stores and schools should be provided. This is a great task comparable to the creation of a new town. To save the cost required for such infrastructural consolidation, the selected site should be located as close to the existing town or village as possible.

(3) Site Location in Flatland Area

Although Nigeria has the largest population of all African countries, it still abounds in suitable farmland area. The site of rice field development should therefore be selected in a flatland area where levelling work can be minimized. To meet the request of the Nigerian government, the 2,000 ~ 4,000 ha flatland site should be selected from a limited number of areas in the six states concerned.

(4) Soil

Since no detailed soil map could be obtained during the present preliminary survey, the proposed sites should be studied from the viewpoint of soil condition in the forthcoming survey. It can be said that the alluvial area in river basins is generally fertile and embraces many farms already under cultivation (See Fig. 10. Provisional Soil Map).

(5) Flood

The areas along rivers are fertile but subject to flooding and inundation in the wet season. Such low-lying areas can be used for cultivating current varieties of swamp rice and floating rice, but should be excluded for irrigated rice culture.

(6) River Discharge

From the lack of the past observation data, there is no choice but to grasp the discharge pattern on the basis of the future observation. The river from which the water is taken should therefore be selected with an ample allowance considered for its discharge.

(7) Irrigation Method

Mechanical irrigation should be avoided.

Neither the existing state nor the future prospect of cultural practices presents any likelihood of double or rotation cropping becoming a reality in the near future, so that introduction of mechanical irrigation for rice field development cannot be justified. The site selection should therefore be made in a area where gravity irrigation is feasible.

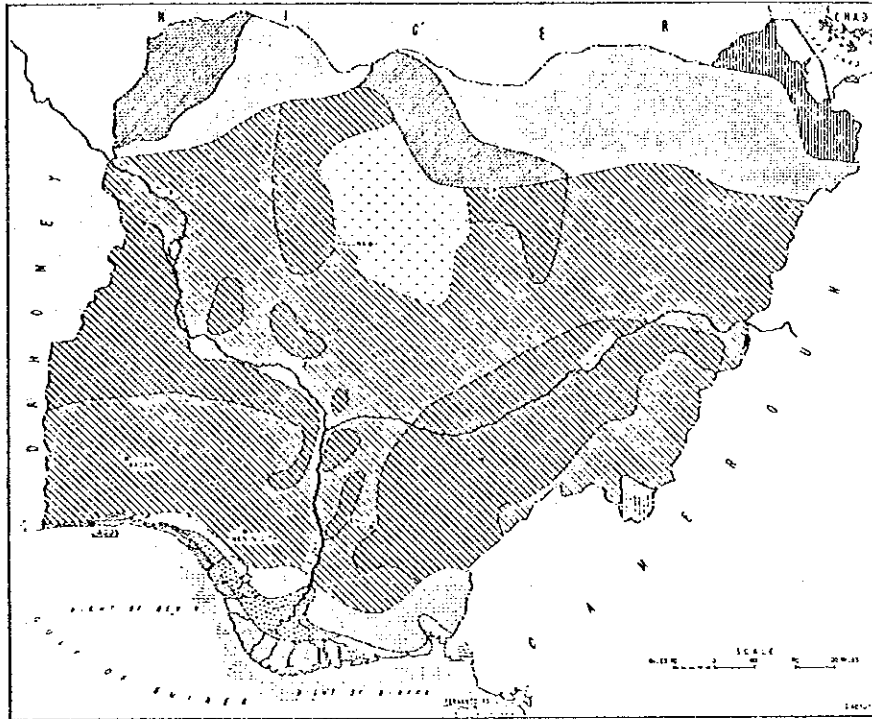
(8) Obtaining Local Consent

Local consent is meant the agreement of local inhabitants and the State government. The agreement of local inhabitants is required chiefly for acquiring land because farmland is the communized village property in Nigeria. Compensation for land does not involve any difficulty because it can be given in terms of employment opportunities for local inhabitants and their houses in the farm.

The agreement of the state government is of particular importance because Nigeria is a federal republic and political consideration bears closely upon any state-level development programme.

After careful consideration of the above points and on the basis of the findings of the present survey, the following two areas were given priority for selection of suitable paddy rice cultivation areas.

Fig. 10. Provisional Soil Map of Nigeria
(Agriculture in Nigeria by F.A.O.)



R E F E R E N C E

- A. (1) Well-drained and fairly well-drained soils, moderately to strongly leached of low to medium humus content, with small areas of poorly-drained soils.
- (I) Orange-brown to red loose sands
 - (II) Brown to red-brown compact silty fine sands
 - (III) Predominantly reddish friable porous sands to sandy clays
- A. (2) Well-drained strongly leached soils, of high humus content (above 5000 ft. contour)
- (IV) Reddish friable porous clays and sandy clays
- B. Well-drained excessively leached soils with small areas of poorly-drained soils
- (V) Yellowish-brown friable porous sands to sandy clays.
- C. Swamp soils, with small areas of low-lying dry-land soils.
- (VI) Freshwater-swamp soils, grey to white sands and grey clays and sandy clays, with humic topsoils
 - (VII) Brownish-black saline mangrove-soils, with mat of rootlets
- D. Sands and clays of North-East Borno.
- (VIII) Grey to black plastic clays, poorly-drained or seasonally-flooded and loose pale grey-brown sands.
- The darker cross-hatched patches represent areas where concretionary ironstone or masses of concretions are commonly found in the profile.

(1) Orle-Edion River Basin in Bendel State

This is a flatland area (approx. 80,000 ha) situated in the north-eastern part of Bendel state and stretching along the lower reaches of the Orle-Edion river which joins the Niger river on its right bank. The swamp area along the Niger embraces rice fields which have been already under cultivation. The project area inclines from west to east at a gradient of $1/2,000 \sim 1/3,000$, with the Orle-Edion river flowing down through its central part. The area also has a paved arterial road running through its central part from south to north, and is close to Auchi.

If an area of 4,000 ha extending in the east of the said arterial road near the Niger river is developed, discharge balance can be maintained because the Orle-Edion has a catchment area of about $1,200 \text{ km}^2$ and the average monthly rainfall in Benin city in the dry season (November \sim March), is 2 inches.

(2) Oramiriukwa River Basin in Imo State

This area is situated in Owerri division in the southeastern part of Imo state, and the paved arterial road runs through its central part linking Owerri and Aba. The Oramiriukwa river from which irrigation water is to be taken is crossed by the said arterial road at a point only 7 miles from Owerri. Water-gauges were installed in three places of the Oramiriukwa (in 1972), and it was planned that two additional gauges were installed in the downstream section.

If the area extending north of the arterial road is selected as the catchment area and the downstream flatland area lying between the Otamori and the Ogochia as the area to be benefited, the former will have an acreage of about 700 km^2 and the latter about 250 km^2 . The monthly average rainfall in Enugu is 1.9 inches in the dry season, which suffices for creation of $2,000 \sim 4,000$ ha of new rice field.

In the neighbourhood of this area are found Nippon Koei's Uzo Uwani Project Area (about 150 km to the north) and World Bank's Umuahia Oil Palm Project Area (about 100 km to northeast). Since feasibility survey has already completed for these two projects, discharge and soil data required for site selection in the Oramiriukwa basin will be obtained conveniently.

Besides the above, as the next alternative, the following area is recommended.

(3) Oyi River Basin in Kwara State

This is a farmland area extending along the left bank of the Oyi river with Dumaji village as centre. It is situated about 10 miles to the south of Shonga Todo Project Area, and adjoins existing rice fields on the side of the Niger river. Swamp rice is grown in this area using the flood water from the Niger river.

Development of the areas along the Niger river should be pushed forward as part of the comprehensive plan which premises the completion of Kainji dam. The area can therefore be given second development priority after the aforementioned two areas. The Oyi river has a catch-

Fig. 11. Orle-Edion River Basin
 (Two Alternative Proposed Sites)
 1 : 250,000

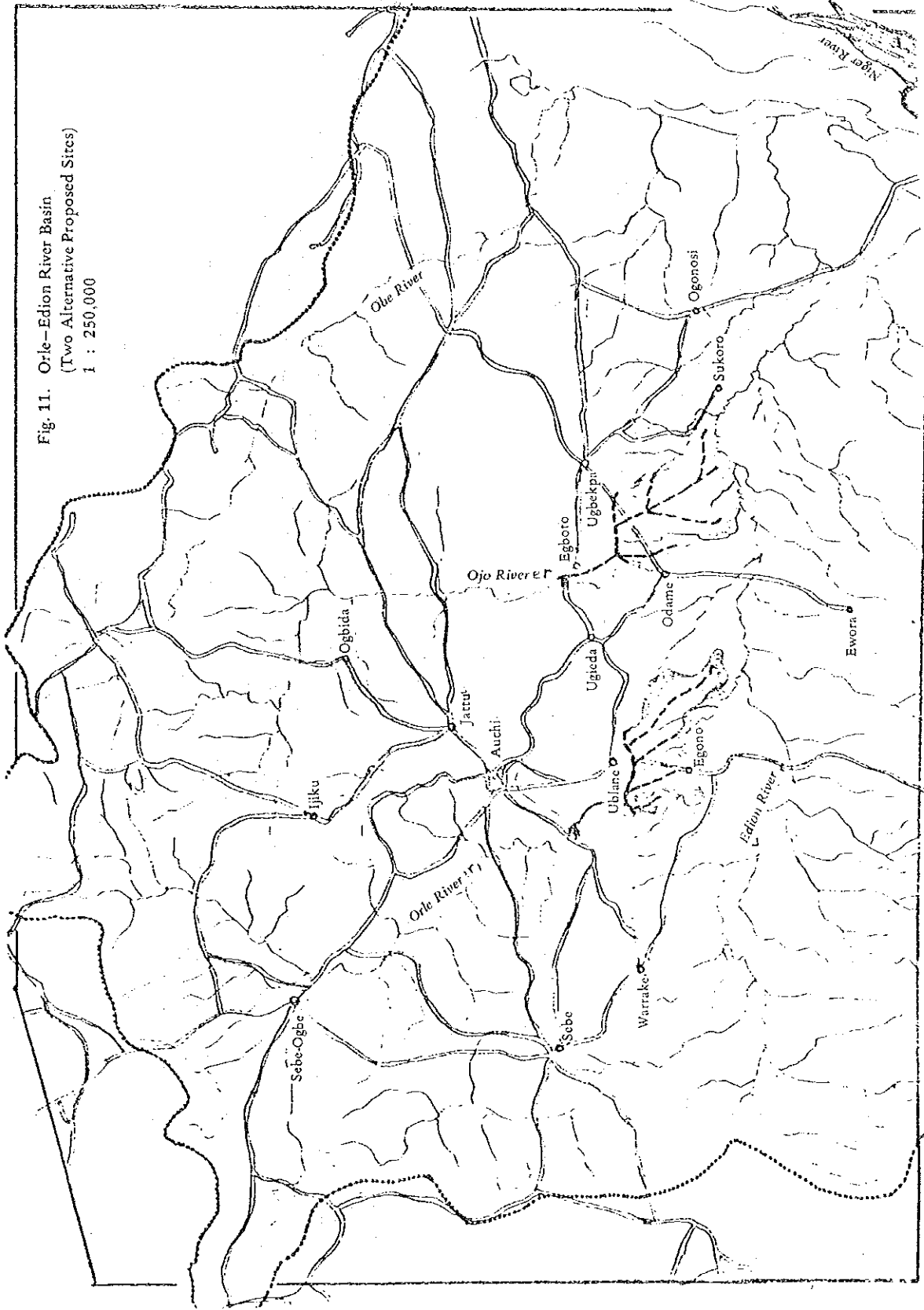
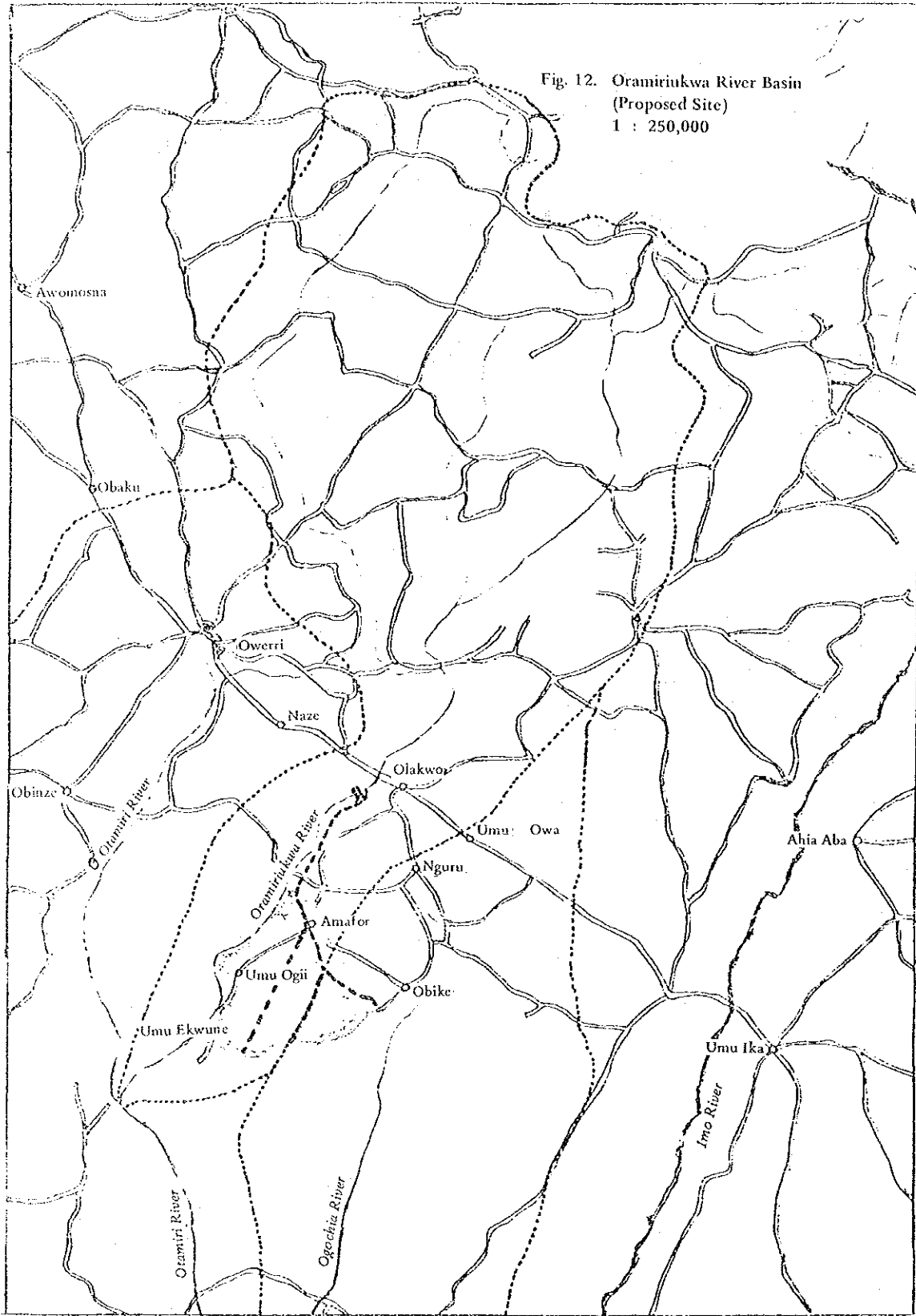


Fig. 12. Oramiriukwa River Basin
(Proposed Site)
1 : 250,000



ment area of as large as 1,200 km² including the central hilly area, and is therefore a promising water source in the northern central zone where rainfall is rather scanty.

3.4 Technical Cooperation

3.4.1 Preconditions

(1) Being an oil producing country, Nigeria is financially favoured and can disburse sufficient development funds. The Nigerian government is therefore hoping to be provided only with technical cooperation.

(2) Under the Third Five-Year National Development Programme, the Nigerian government aims to accomplish its emergency food increase plan in a two-year period starting from April 1975. Attainment of this plan may not be possible, but the importance attached to the plan is thus very great.

(3) It is considered both unavoidable and acceptable that Japan's technical cooperation is requested only in rice cultivation. The Nigerian government is hoping for Japan's technical cooperation in establishing at least one 5,000 ~ 10,000 acre (2,000 ~ 4,000 ha) farm in each state where paddy cultivation is practicable. All these large farms are planned to be placed under direct management of the Nigerian government.

(4) For the purpose of this project, pilot farms whose size is about 1/10 ~ 1/20 of large farms need to be established.

(5) The Nigerian government bears the entire project cost including the land acquisition cost and other necessary expenses.

(6) Japan's technical cooperation requested is the cultivation, storage and processing of rice. The Nigerian government expects that Japan will dispatch experts and provide necessary machinery and materials (cost of which is to be borne by the Nigerian government) and further offer guidance in the operation and management of the farms.

(7) For early implementation of the project, Japan is requested to send a suitable number of experts to Nigeria to conduct a feasibility study for selection of suitable project areas, formulation of a rice production increase plan, and estimation of the project cost.

(8) Japan's technical cooperation is expected to be offered with precedence given to paddy rice cropping for some time to come.

3.4.2 Japan's Compliance with Nigerian Request

(1) The five-member preliminary survey mission, which stayed in Nigeria for four weeks in May 1976, discussed with the competent officials of the Nigerian government to study the details of the requested cooperation and explained to them about Japan's technical cooperation