

FISH STATISTICS IN THE LAKE CHAD BASIN DURING THE DROUGHT (1969-1976)

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RÉSUMÉ

Attaché à la Commission du Bassin du lac Tchad, l'auteur a eu l'occasion d'installer des postes de contrôle sur les plus importants axes routiers, l'autorisant ainsi à suivre l'évolution du trafic du poisson, originaire du lac Tchad et du Bas Chari. Il met en évidence la corrélation qui existe entre la sécheresse et la production et souligne la fragilité de l'équilibre biologique dans le bassin.

SUMMARY

While attached to the Lake Chad Basin Commission, the author had the opportunity to set up checkpoints on the main road axes and has thus been in a position to follow the evolution of the fish traffic originating from Lake Chad and the Lower Chari River. He shows the correlation that exists between the drought and the fish production, and stresses the instability of the biological balance in the basin.

1. INTRODUCTION

The exceptional drought experienced in 1972 and 1973 has transformed the hydrology of the Lake Chad basin and its effects on the fish stock has been catastrophic. The price of dried fish rose considerably and it is likely to remain so until such time when the fish stock is restored, a matter of several years.

This constitutes a serious problem since fish is an important source of animal protein for human consumption and, furthermore, represents a significant source of income for the riverine populations.

We are trying here to give an analysis of these problems.

2. HYDROLOGICAL EVOLUTION

Lake Chad is a shallow water body without any outlet, its volume depending solely on the inflow

of its tributary, the Chari River, whose hydrology in turn depends on the rainfall in its southern basin. (Fig. 1).

Since the flood has been more or less deficitary from 1962 and 1972-73 having been catastrophic years from a hydrological point of view, the surface of the Lake was reduced from about 22,000 km² to 7,000 km², thus drying up its northern part as the thrust of the flow was not strong enough to allow the inundation front to cross the Grand Barrier. (Fig. 2).

With the good 1974 rainfall in the southern basin, the incoming flow was sufficient to prevent another significant drying up and the northern part came partially under water again.

The flood of the Chari River in 1975 has been slightly less than the calculated average but the 1976 flood was once again a poor one which will lead to a further dryness of the northern part of Lake Chad.

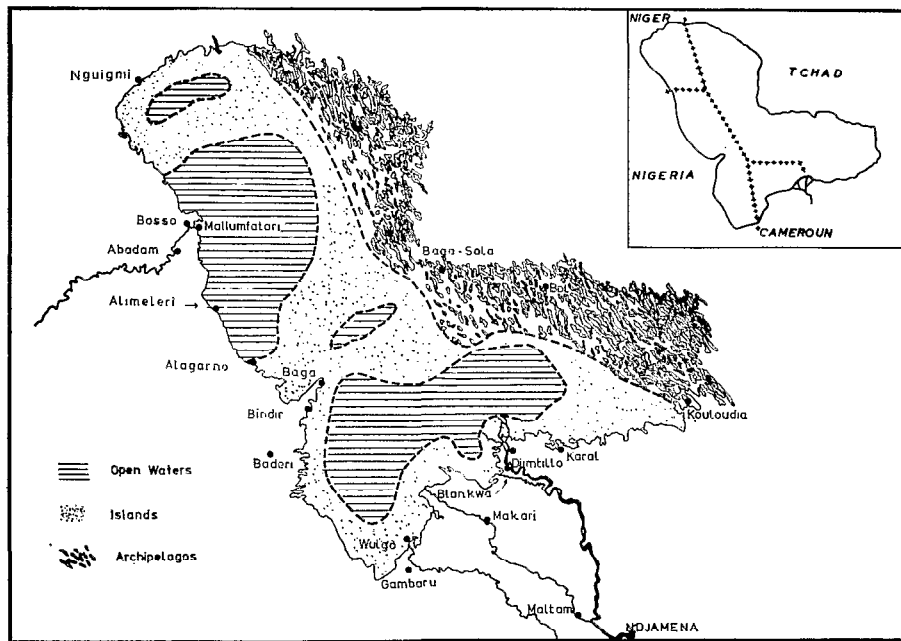


Fig. 1. — Natural areas of Lake Chad at water level 281.5 m (O.R.S.T.O.M., N'Djamena, 1974).
Régions naturelles du lac Tchad (niveau de l'eau : 281,5 m) (O.R.S.T.O.M., N'Djamena, 1974).

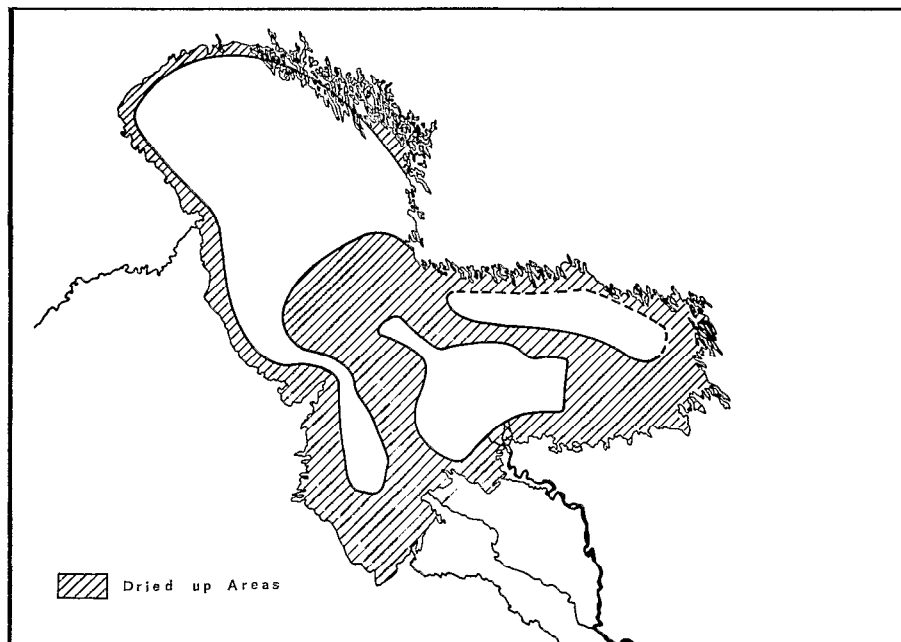


Fig. 2. — Lake Chad in May 1973 (water level 278.9 m) (O.R.S.T.O.M., N'Djamena, 1974).
Le lac Tchad en mai 1973 (niveau de l'eau : 278,9 m) (O.R.S.T.O.M., N'Djamena, 1974).

3. FISH STATISTICS

3.1. Considering the orographic nature of the basin, fishermen can settle anywhere they like and fish traders too can reach the temporary fishing places either by lorries or by the traditional camels, donkeys, etc.

3.2. The collection of landing statistics was quite impossible without strong logistical support because the fishermen never stay a long period of time at a same place. They carry their equipment from one place to another by boat, moving around the islands, the archipelagos and the shore. Therefore, it has been very difficult to follow their movements and study their catches. On the other hand, it has to be noted that Lake Chad is an international body, divided into four parts, and for the fishermen the political boundaries do not exist. They move according to the seasons, the fluctuation of the water levels and the breeding grounds.

3.3. In Nigeria a first statistical survey was carried out in 1960/61 (MANN, 1962) whereas in Chad and the Cameroons similar studies began in 1962 (COUTY, 1964; COUTY et DURAN, 1968).

While attached to the Lake Chad Basin Commission, we suggested the organization of a fish traffic census which would enable us have a better knowledge of fish catches and fish trade in the area and to see the economic importance of fishery activities in the countries concerned.

3.4. In general, the lorries carry traders, fishermen, gear, petrol for outboard engines, etc. to the shores. There, the traders who hire the lorries go to appointments with wholesale traders who came by boat from the fishing camps. Sometimes several traders hire a lorry together, at other times a lorry may belong to a single owner.

From the shores, the trucks loaded with the processed fish have to go through Maiduguri before proceeding to the south. For this reason we set up in this town, at the entrance of the roads to N'Djamena (formerly Fort Lamy) and Baga, two checkpoints for the purpose of gathering information from all the lorries or other means of transport carrying fish, and collecting data on the number of packages, the nature of the fish, the yield, etc. This work started on 1 July 1969 and has since been continuing on a daily basis up to the present time (table I to VIII, see appendix).

4. RELATIONSHIP BETWEEN CATCHES AND DECREASE IN THE WATER LEVEL

4.1. General

To study the figures in the attached tables and to explain the fluctuation of the yearly change in

the yield, we have to refer to the fluctuation of the water levels.

To analyse the catch of the southern part of Lake Chad coming through the N'Djamena Road checkpoint we are using the readings obtained on the gauge at N'Djamena (Chari River) because no other data are available. As far as the hydrology of the basin is concerned, it would appear that there exists a good relationship between the flow of the Chari and the rise in the water in the part of Lake Chad south of the Grand Barrier (if it is not overflooded).

For the Baga Road checkpoint, bearing in mind the obstacle formed by the Grand Barrier for an easy flow of the water to the northern part, and the fact that this part was isolated from the southern in 1972-74, we have used the readings on the gauge located near Malamfatori which are, however, perturbed during November/December by the contribution from the Komadugu-Yobe River.

4.2. Southern Part of the Lake

Fig. 3 which gives the total annual catch shows an yearly increase from 3,856 t in 1960/70 to 10,235 t in 1973/74 while the Chari contribution decreased from 1,056 m³/sec. to 575 m³/sec. Despite the increase in the catch as a consequence of the drought, the difference when compared with the yield of the northern part (Fig. 4) is not so significant. This is due to easier movement of the fish since the mouth of the Chari River is not cut off.

QUENSIÈRE (1976) shows the influence of the drought on the structure of the existing fish population and he explained that the most important species caught during 1966-71 were replaced by more unsteady fish populations having a higher diversity.

4.3. Northern Part of the Lake

Fig. 4 shows a decrease in the water level on the gauge at Malamfatori from level 281.4 to level 276.8 constituting a loss of 4.6 m over a period of five years. During this period of time the catch increased from 8,790 t to 26,862 t. This strong increase in the catch is due to the reduction of the water surface and the formation of small pools where the fish population became highly concentrated and easily trapped by the fishermen.

This natural phenomenon stimulated fishermen to move north and automatically brought about a greater fishing effort. In Tables X and XII which indicate the landing points of this part of the Lake, we can follow this progress from 1969/70 up to 1974/75.

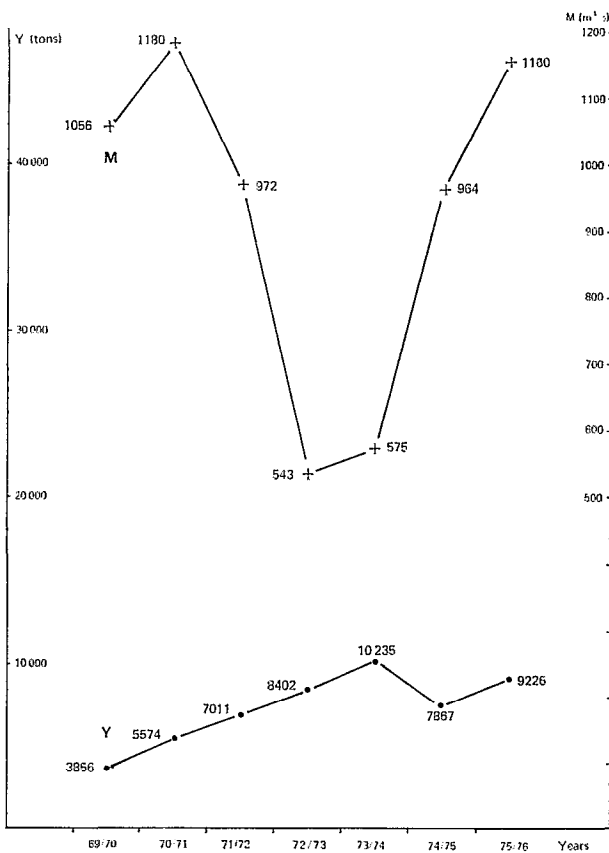


Fig. 3. — Southern part of Lake Chad. Yield in relation to the hydraulicity of the Chari River at N'Djamena (M, (+): hydraulicity, m³/s; Y, (●) yearly tonnage, metric tons dried fish). Région sud du lac Tchad. Rendement de la pêche en relation avec l'hydraulicité du Chari à N'Djamena. (M, (+): débit en m³/s; Y (●) tonnage annuel de poisson séché.

In this connection DURAND (1973) mentioned that the results with experimental fishing carried on from 1963 to 1971 (landings at Baga Kawa and Malamfatori) show that catch per unit effort had been decreasing very fast up till 1967 and became quite steady afterwards. And he explains this phenomenon by an increase of the total catching effort rather than by the decrease in the Lake level which was not very significant during this time. But later on, the fall in the Lake Chad level has certainly had an influence on the total production.

4.4. Discussion

In Fig. 5 we have indicated the curve of the Chari River, the reduction in the water level in the northern part, and the total yield obtained in the Lake as a whole. We can see the parallelism between

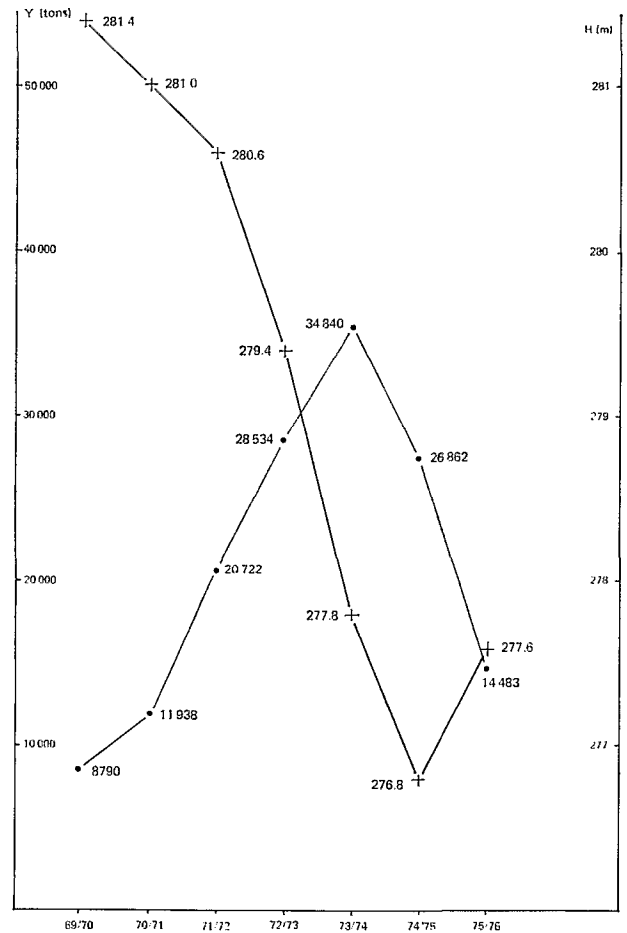


Fig. 4. — Northern part of Lake Chad. Yield in relation to the water level of lake (gauge at Malamfatori) (H, (+): gauge; Y, (●): yearly tonnage, metric tons dried fish). Région nord du lac Tchad. Rendement de la pêche en relation avec le niveau du lac (limnigraphe de Malamfatori) (H, (+): niveau du lac; Y, (●) tonnage annuel de poisson séché).

the two gauges during 1970 to 1972 but when the Grand Barrier cut off the inflow to the northern basin, the southern part was subject to the influence of the Chari river while the other part was isolated.

In Fig. 6 we have calculated, for the northern basin, a linear regression in order to demonstrate the existing correlation between the fall in the water level and the rise in the catch.

From 1969 until 1974 we can observe a very narrow correlation ($r = -0.96$) between the fall of the water level and the large increase in the catches. This is due to the concentration of the fish population and the ease with which they could be caught.

During the following years the yearly yield fell sharply notwithstanding the fact that the northern basin came under water again. The explanation to

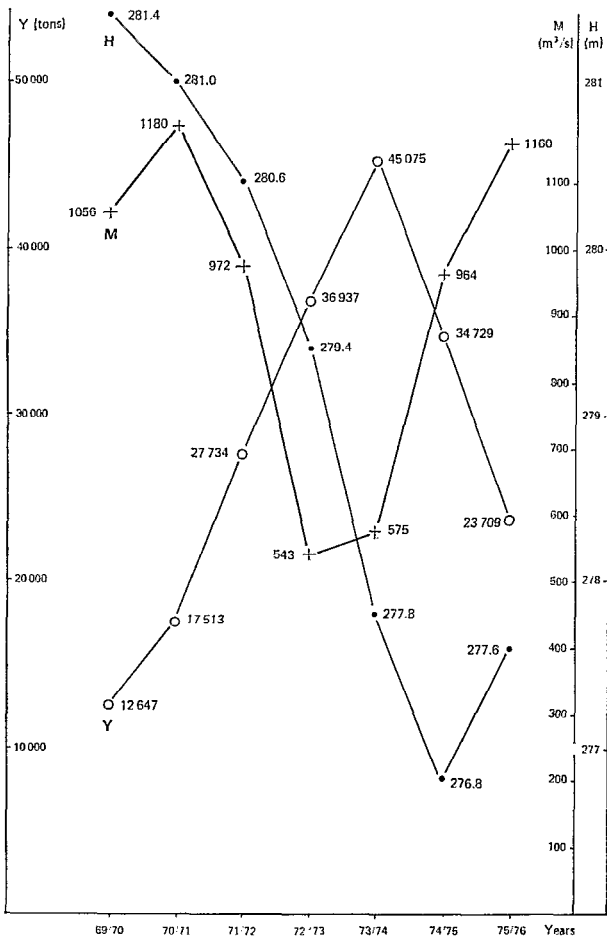


Fig. 5. — Total yield of the Lake in relation to its levels (H, (●): Lake level at Malamfatori; M (+): hydraulicity of the Chari River at N'Djamena; Y, (○): total yield in metric tons dried fish).

Rendement total de la pêche dans le lac Tchad en relation avec ses niveaux successifs. (H, (●) : niveau du lac à Malamfatori; M, (+) : hydraulité du Chari à N'Djamena; Y, (○) : production totale de poisson séché).

this lies in: the lack of genitors which had been caught during the drought and/or the bad living conditions for the young fish. This confirms that "Lake Chad is an ecosystem in perpetual change where the environment can be considered stable only for short periods" (DURAND, 1973).

5. SEASONAL INFLUENCE ON THE CATCHES

To explain the annual seasonal variation in the yields, in Figs. 7 and 8, we have used trimestrial data which are much more significative than the monthly or semestrial ones.

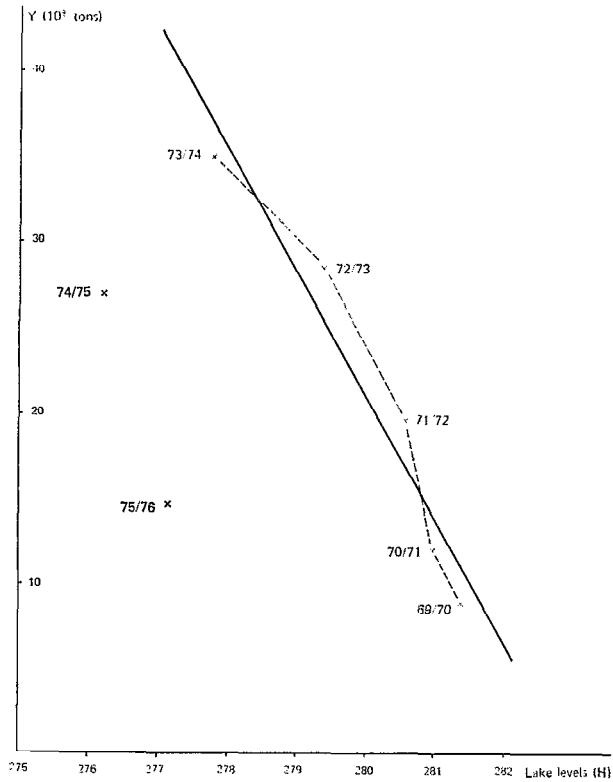


Fig. 6. — Linear regression between Yield (10³ metric tons dried fish) and lake level (H) at Malamfatori: $Y = -7,191 H + 2034,6$ (years 1969-1974).

Relation entre le rendement de la pêche (en 10³ tonnes de poisson séché) et le niveau du lac (H) à Malamfatori $Y = -7,191 H + 2034,6$ (années 1969-1974).

5.1. Banda

Fig. 7 shows us the characteristic impact of the drought on the catches in the northern part of the Lake. However, when comparing the two graphs we can see a certain homogeneity between the catches of the southern part and those of the northern part.

For example, the fall in the catch during the fourth trimester of 1971 observed in the southern part was noticed during the first trimester of 1972 in the northern part. But it is not possible to find out the reason for this sharp fall in the catch, as observed at the two checkpoints. Also, at the end of 1974 the fall is simultaneous but while the catch in the southern part increased again following a better inflow from the Chari River, the northern part did not receive enough water and reproduction was perturbed by the unfavourable hydrobiological conditions and catches continued to fall more and more.

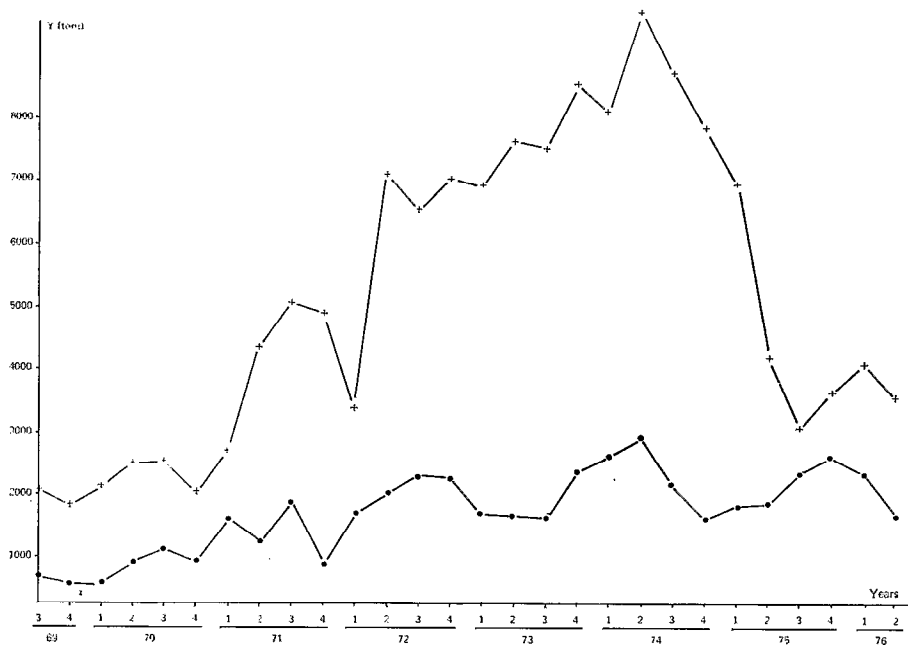


Fig. 7. — Average trimestrial yield (Banda) (+ Baga Road; ● N'Djamena Road).
 Production trimestrielle moyenne de Banda (+ : route de Baga; ● : route de N'Djamena).

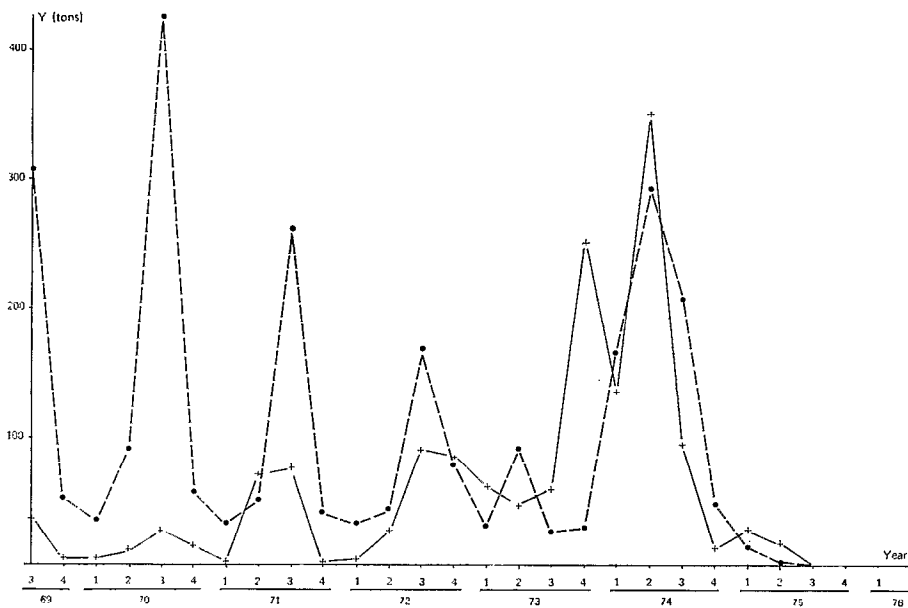


Fig. 8. — Average trimestrial yield (Salanga) (+ Baga Road; ● N'Djamena Road).
 Production trimestrielle moyenne de Salanga (+ : route de Baga; ● : route de N'Djamena).

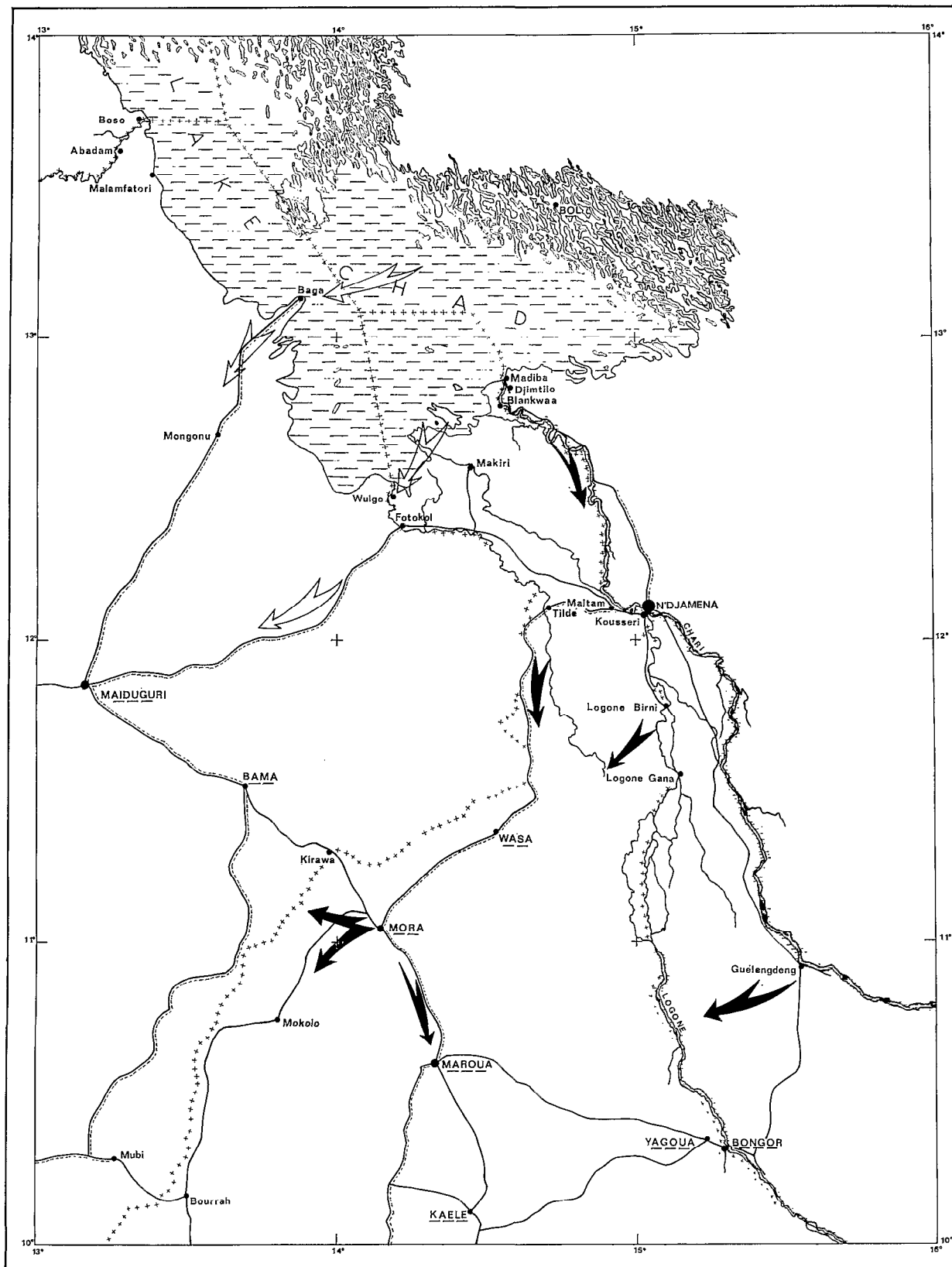


Fig. 9. — Map of Northern Cameroun. — Carte du nord Cameroun.

——— Tarred road → ● Principal outlets for Salanga trade → main traffic channels for Banda
 - - - - - routes bitumées ● principales voies de commercialisation du Salanga → principales voies de commercialisation du Banda

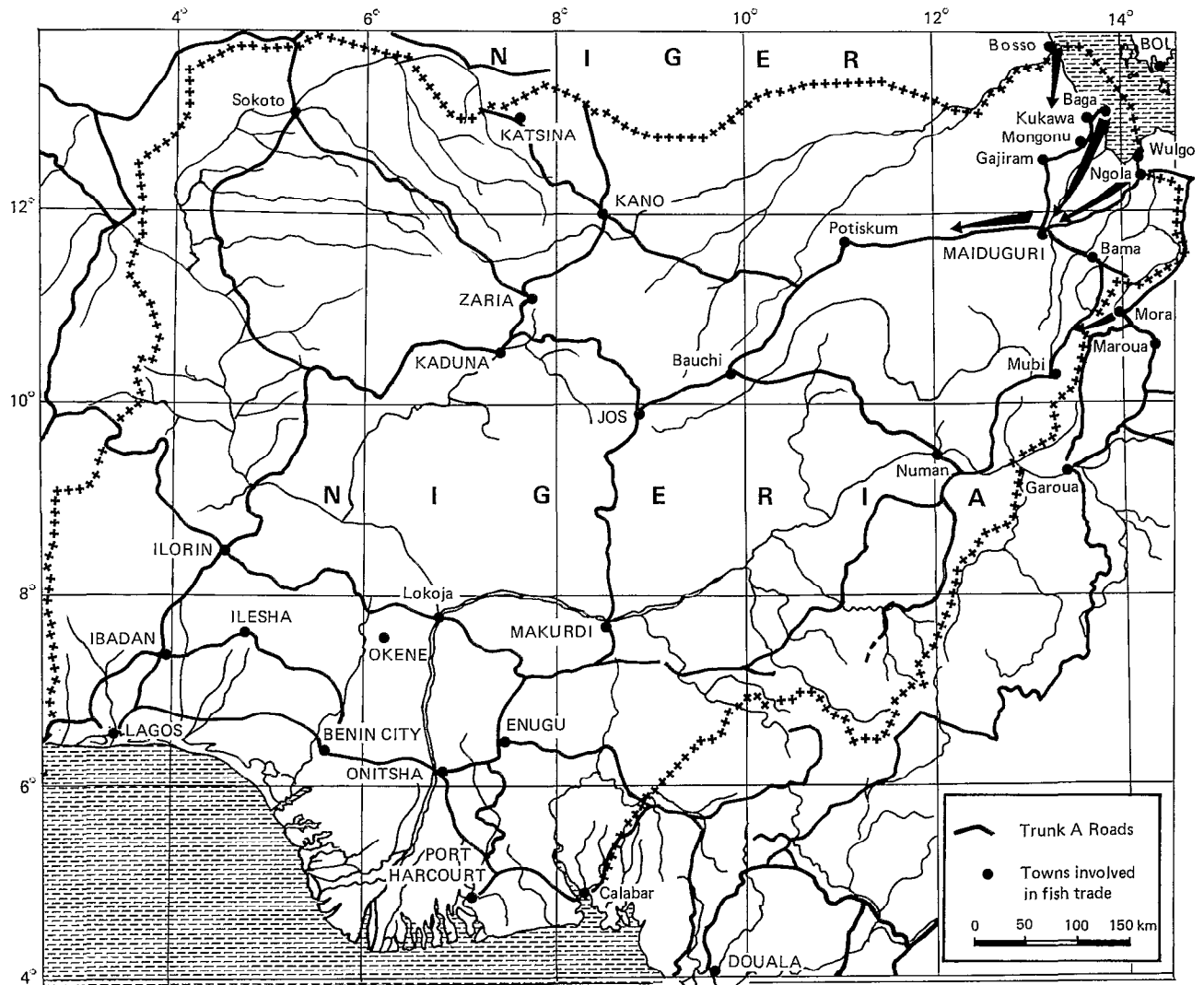


Fig. 10. — Map of Nigeria. See fig. 9 for explanations.
Carte du Nigeria. Voir fig. 9 pour les légendes.

5.2. Salanga

Fig. 8 gives us the data for salanga. I would again bring to mind here that *Alestes baremoze* and *Alestes dentex* undertake anadromous migration, moving from the Lake through the Chari and Logone Rivers, to breed on the fringe of the "yaérés". The young fish are washed away when the river overflows the embankment and carried through the natural drain and the El Beid river to Lake Chad. When two years of age and mature, they likewise follow this same reproduction migration. This phenomenon is typically characterized by the data collected at the N'Djamena Road checkpoint where

we can observe a considerable increase in the yield each second and third trimester followed by a sharp decrease during the next two trimesters until 1972.

After 1975 these species disappeared completely from the catches, this following the drought of 1972/73 when the flow of the Logone River was very poor and insufficient to inundate the yaérés which consequently brought about an interruption in the fish stocks.

However, we have been able to observe the sale of salanga, caught in the southern basin and in the delta of the Chari River, in some markets in Northern Camerouns.

I think that these data could also be useful in helping to explain the biology of these species.

From the data collected for the northern part of Lake Chad we can observe a certain cycle but it is not as clearly marked as for those fish which make anadromous migrations. Anyway, we have to mention here that salanga fisheries started only very recently in the Lake (the first observation was made in 1969/70). Before this date the salanga sent through Baga to Maiduguri were caught mainly in the Komadugu-Yobe River.

Going through Table No. IV we observe an anomaly in February 1974. In effect, the 4th and 1st trimesters are those where the yield is, in general, the lowest and to find such a high tonnage at this time of the year is beyond explanation.

6. EVOLUTION OF THE TRADE

6.1. From the figures in Table IX it would appear that the Lagos market dealing in the Lake Chad fish trade has lost much of its importance while Benin City, Onitsha, Enugu and Okene have been progressively increasing their demand for these fish. By contrast, Maiduguri is, and will always be, a distribution centre for bulk sale. In the other cities mentioned in the table the tonnage carried to them is more or less stable.

6.2. On the annexed map (Fig. 10) we have indicated the different towns involved in fish trade originating from the Lake Chad basin and the main inlets for this produce.

6.3. In Table XI we have calculated an index which shows us whether or not the demand for fish is increasing in the area concerned. This could be useful in future for other economic analyses.

6.4. The Lake and the delta of the Chari River are regional bodies where fishermen and traders of the four countries, components of the Lake Chad Basin Commission, carry on their activities.

As the currencies in the countries concerned are different and, bearing in mind the world economic crisis which has brought about a general inflation, the prices practised at the shores and on the islands fluctuate according to the supply and demand law; the exchange rate too follows this rule and the CFA francs and Naira are exchanged at an unofficial rate. For this reason it is not possible to give an accurate up-to-date estimation of the economic importance of the fish trade of the area in question.

6.5 It has to be mentioned that for about a year now the road network in the Cameroons (Fig. 9) has been improved with the completion of the north-south axis which permits lorries a direct link with

the southern Lake shore and the Chari delta throughout the year. This has an effect on the traditional trade routes and some of the yield which previously was transported by way of Maiduguri through Gambaru or Wulgo is now carried directly to the south using the new road. It would, therefore, be advisable to have a checkpoint set up on the Cameroonian side in order to check the fish traffic along this new axis.

7. DISCUSSION

7.1. Lake Chad is a very shallow water body without any outlet and with only one main tributary. Situated under a latitude with arid and subarid climate the evaporation rate annually is very high. And it depends on the rainfall in its southern basin which can be very irregular. We have been observing this phenomenon since 1964.

The general richness of the Basin and particularly of the Lake may be explained by the large area flooded for part of the year, the shallowness of the water, the vast areas of submerged or floating vegetation, high intensity and long duration sunshine permitting photosynthesis at all levels, and the atmospheric conditions which cause continuous mixing thus keeping all the nutritive elements in suspension.

7.2. We can expect that Lake Chad, whatever its surface, will continue to be exploited to the maximum, as the need for protein-rich food is bound to remain high. Even so, despite this very rich nutritional potential of the Lake, it can never be stressed sufficiently that there is a correlation between the surface area of the Lake and the fish stock. The fall in its level and the risk of drying out in the northern part are indeed factors that will affect the fishery which could eventually disappear completely for a certain period of time.

7.3. If the Chari River is the main tributary to the Lake, it has to be mentioned that the flood of the Logone River is essential for the inundation of the "yaérés" in Northern Cameroons and in a part of Nigeria. For the fish population the drying up of these plains would be a disaster. Also, given the very special topographical character of the basin, it is not a question of depth of the inundated area but more so a question of the large extent of the flooded area during several months of the year.

8. CONCLUSION

Notwithstanding that this Basin has an undeniable fish potential, nevertheless its equilibrium is fragile. This is not only due to climatic reasons as demons-

trated earlier. There is another point which is never sufficiently stressed. The four countries bordering the Basin have wide development programmes to develop the area. Surveys are carried out and projects such as irrigation schemes and other agriculture activities are already under way. To develop and extend projects for crop farming on an industrial scale, the use of herbicides, insecticides and other pesticides is increasing from year to year and the struggle against parasites will be

intensified. Industrial development can also affect aquatic life especially through chemical pollution.

Therefore, to develop the fishery industry in the Basin it is necessary that all surveys and activities be concerted and that a coordination exist between the different agencies, departments and other bodies working on the development and improvement of the economy of the Basin.

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APPENDIX

TABLE NO. I : MONTHLY ANALYSIS OF BANDA COMING THROUGH THE BAGA ROAD CHECKPOINT.
Yield in metric tons (dried fish).

	69/70	70/71	71/72	72/73	73/74	74/75	75/76	TOTAL
JUL	778.9	790.8	1,689.8	2,083.2	2,399.0	2,963.1	1,127.9	11,832.7
AUG	539.1	908.8	1,918.6	2,053.0	2,222.5	2,783.5	882.2	11,307.7
SEP	815.3	875.2	1,500.0	2,433.0	2,912.8	2,987.9	1,063.9	12,588.1
OCT	650.0	869.1	2,041.5	2,380.9	2,604.7	2,721.2	948.9	12,216.3
NOV	700.1	582.2	1,481.6	2,346.3	2,682.8	2,769.3	1,572.0	12,134.3
DEC	527.0	599.1	1,414.4	2,323.6	3,282.9	2,342.2	1,163.9	11,653.1
JAN	843.6	832.0	1,004.1	2,209.8	2,445.3	2,130.9	1,565.0	11,030.7
FEB	576.6	937.9	1,250.0	1,974.5	2,377.9	1,791.5	1,174.9	10,083.3
MAR	771.0	973.8	1,150.1	2,766.9	3,349.2	2,016.1	1,393.5	12,420.6
APR	882.3	1,671.7	2,642.9	2,711.5	3,202.6	1,791.2	1,280.6	14,182.8
MAY	781.5	1,220.3	1,744.6	2,709.5	3,647.8	1,388.9	1,414.1	12,906.7
JUN	864.8	1,554.9	2,770.0	2,250.5	2,908.4	1,023.3	896.5	12,268.4
	8,730.2	11,815.8	20,607.6	28,242.7	34,035.9	26,709.1	14,483.4	144,624.7

TABLE NO. II : MONTHLY ANALYSIS OF SALANGA COMING THROUGH THE BAGA ROAD CHECKPOINT.
Yield in metric tons (dried fish).

	69/70	70/71	71/72	72/73	73/74	74/75	75/76	TOTAL
JUL	4.7	4.4	19.5	13.6	16.5	39.7	-	98.4
AUG	10.4	10.4	12.1	21.4	19.4	45.3	-	119.0
SEP	21.7	13.0	46.1	56.4	25.5	10.2	-	172.9
OCT	0.9	2.8	1.6	38.6	77.6	13.4	-	134.9
NOV	3.7	0.6	1.4	8.4	65.7	0.4	-	80.2
DEC	-	12.6	0.7	37.5	109.2	0.3	-	160.3
JAN	4.3	1.0	3.2	23.6	26.1	5.9	-	64.1
FEB	-	1.5	-	29.7	87.6	21.1	-	139.9
MAR	1.7	2.9	3.1	13.3	25.1	-	-	46.1
APR	2.5	19.9	10.7	12.5	100.2	13.1	-	158.9
MAY	2.6	22.2	6.9	7.1	48.4	3.6	-	90.8
JUN	7.6	31.7	9.4	30.1	203.3	-	-	282.1
	60.1	123.0	114.7	292.2	804.6	153.0	-	1,547.6

TABLE NO. III : MONTHLY ANALYSIS OF BANDA COMING THROUGH THE N'DJAMENA ROAD CHECKPOINT.
Yield in metric tons (dried fish).

	69/70	70/71	71/72	72/73	73/74	74/75	75/76	TOTAL
JUL	377.2	442.6	1,014.7	832.5	346.4	865.1	706.1	4,584.6
AUG	266.8	371.8	535.8	1,044.2	924.7	680.1	819.2	4,642.6
SEP	405.6	351.9	355.1	433.3	420.7	712.5	936.8	3,615.9
OCT	261.0	358.9	213.8	793.9	1,079.1	447.4	920.3	4,074.4
NOV	218.5	235.4	521.0	606.1	415.9	572.9	838.3	3,408.1
DEC	218.1	363.2	221.9	866.6	926.9	605.3	950.8	4,152.8
JAN	194.3	536.5	604.0	483.9	869.6	675.1	884.5	4,247.9
FEB	151.1	265.1	451.0	863.1	777.7	468.9	820.7	3,797.6
MAR	301.9	811.6	651.0	402.2	1,028.1	655.9	626.1	4,476.8
APR	294.9	244.7	613.1	805.9	915.4	530.4	592.5	3,996.9
MAY	355.3	561.3	919.4	264.4	1,039.2	643.6	547.2	4,330.4
JUN	317.1	454.4	520.2	634.7	970.4	730.2	583.6	4,210.6
	3,361.8	4,997.4	6,621.0	8,030.8	9,714.1	7,587.4	9,226.1	49,538.6

TABLE NO. IV : MONTHLY ANALYSIS OF SALANGA COMING THROUGH THE N'DJAMENA ROAD CHECKPOINT.
Yield in metric tons (dried fish).

	69/70	70/71	71/72	72/73	73/74	74/75	75/76	TOTAL
JUL	160.0	103.6	138.9	30.3	7.2	86.3	-	526.3
AUG	83.4	139.3	38.1	68.2	18.3	63.7	0.3	411.3
SEP	65.8	181.8	86.3	72.0	1.1	62.6	-	469.6
OCT	16.6	41.2	18.7	47.7	13.5	32.5	-	170.2
NOV	21.5	7.4	24.2	22.0	4.1	16.5	-	95.7
DEC	16.9	10.6	3.2	12.4	15.4	-	-	58.5
JAN	3.4	0.2	11.2	14.3	9.0	3.6	-	41.7
FEB	7.8	0.4	-	11.3	152.3	1.4	-	173.2
MAR	29.5	38.7	24.1	8.6	6.5	9.6	-	117.0
APR	7.7	8.0	22.7	30.4	81.1	-	-	149.9
MAY	29.2	3.6	13.5	10.3	15.6	3.9	-	76.1
JUN	53.3	42.3	9.7	44.2	197.0	-	-	346.5
	495.1	577.1	390.6	371.7	521.1	280.1	0.3	2,636.0

TABLE NO. V : BAGA ROAD : DESTINATION OF PRODUCTS PER TOWN (in metric tons dried fish).

DESTINATION	BANDA								SALANGA							
	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	TOTAL	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	TOTAL
MAIDUGURI	1851.0	791.7	1442.5	2410.8	1627.9	1043.5	1190.1	10357.5	28.6	72.7	46.1	58.1	167.4	30.7	-	403.6
LAGOS	4882.7	5949.7	7684.1	8621.8	9089.7	6412.7	3119.9	45760.6	3.2	14.3	18.4	47.2	59.5	15.7	-	158.3
ENUGU	582.0	2173.6	3942.0	5440.2	6301.6	4714.3	2620.5	25774.2	7.5	15.8	11.0	54.5	81.8	24.0	-	194.6
BENIN	54.8	334.2	1366.8	2800.7	3531.1	3236.1	1825.8	13149.5	-	-	5.4	25.8	53.4	29.5	-	114.1
ONITSHA	+	43.7	637.0	1934.0	5729.0	4370.2	2216.4	14930.3	-	-	-	2.6	129.9	19.6	-	152.1
KANO	665.2	1491.1	2140.8	2568.6	2208.5	1803.1	1224.0	12101.3	10.1	18.2	10.6	26.7	37.1	1.8	-	104.5
PORT HARCOURT	-	329.7	1315.9	1430.8	1440.1	578.8	139.3	5234.6	-	-	9.2	19.4	30.4	0.7	-	59.7
IRADAN	108.4	55.4	347.7	899.6	1452.0	1713.9	481.8	5058.8	-	-	0.8	3.0	23.1	-	-	26.9
KADUNA	146.5	50.1	224.1	124.4	159.8	151.6	62.1	918.6	-	-	-	-	0.7	-	-	2.0
MAKURDI	8.4	146.6	31.7	134.0	8.9	24.5	8.6	362.7	-	-	0.3	1.3	0.1	-	-	1.7
MUEI	86.9	88.2	29.1	30.7	163.2	21.1	7.3	426.5	5.5	2.0	-	13.7	143.9	13.4	-	178.5
BAMA	15.0	5.8	-	0.5	19.9	4.8	3.3	49.3	0.8	-	-	-	-	6.2	-	7.0
I LORIN	101.2	43.1	179.0	-	8.5	52.6	7.0	391.4	-	-	-	0.4	-	-	-	0.4
BAUCHI	43.3	1.7	8.1	-	-	-	-	53.1	0.3	-	-	-	-	-	-	0.3
ZARIA	8.0	8.7	61.4	-	-	-	-	78.1	-	-	0.1	-	-	-	-	0.1
POTTSKUM	5.0	2.2	-	2.1	-	-	-	9.3	-	-	-	-	-	-	-	-
JOS	38.0	225.5	672.0	1474.8	1049.2	706.2	255.8	4421.5	0.7	-	0.7	33.4	26.3	7.6	-	68.7
KATSINA	15.8	4.5	-	-	-	-	-	20.3	-	-	-	-	-	-	-	-
IREJA	-	20.5	-	-	-	-	9.1	29.6	-	-	-	-	-	-	-	-
LOKOJA	3.0	20.0	72.6	-	-	-	-	95.6	-	-	0.9	-	-	-	-	0.9
SOKOTO	27.2	-	27.8	-	0.2	-	-	55.2	-	-	0.3	-	-	-	-	0.3
NUHAR	2.4	-	12.9	-	-	-	-	15.3	0.2	-	-	-	-	-	-	0.5
CALABAR	-	-	0.5	-	-	-	-	0.5	-	-	10.2	-	-	-	-	10.2
OKENE	-	17.2	120.5	286.2	1244.9	1857.5	1312.3	4838.6	-	-	-	6.0	36.0	3.8	-	45.8
OTHERS	85.4	12.6	291.1	83.5	1.0	18.2	0.1	491.9	1.9	-	-	0.5	-	-	-	2.4
MAROUA	-	-	-	-	0.4	-	-	0.4	-	-	-	-	15.0	-	-	15.0
	8730.2	11815.8	20607.6	28242.7	34035.9	26709.1	14483.4	144624.7	60.1	123.0	114.7	292.2	804.6	153.0	-	1547.6

TABLE NO. VI : BAGA ROAD : DISTRIBUTION OF CATCH PER LANDING AREA (in metric tons dried fish).

ORIGIN	BANDA								SALANGA							
	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	TOTAL	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	TOTAL
BAGA	5047.8	6308.2	9129.4	10112.5	12013.7	5851.0	10129.3	58591.9	23.4	54.2	33.6	58.9	510.7	18.5	-	699.3
MALAMFATCRI	484.6	683.9	2162.3	5510.8	14285.4	18862.2	2857.3	44846.5	2.5	0.5	2.5	95.2	185.1	113.3	-	399.1
ABADAM	2071.1	3541.7	6590.4	9149.7	5341.3	1335.8	840.5	28870.5	15.7	28.3	39.4	97.3	69.9	7.0	-	257.6
ALAGARNO	585.8	1034.0	1966.0	2800.8	2097.8	386.6	391.0	9262.0	13.0	24.6	11.4	22.1	33.9	4.2	-	109.2
MONGONU	323.2	221.3	550.5	279.7	41.8	40.6	35.3	1492.4	3.5	13.4	25.2	10.0	0.6	0.1	-	52.8
BINDIR	29.8	-	32.2	43.3	19.2	27.8	13.1	165.4	0.1	-	0.2	-	-	-	-	0.3
BADERI	80.8	1.7	82.8	190.6	73.8	41.8	72.2	543.7	-	-	-	3.2	-	-	-	3.2
ALLIMELERI	43.5	5.6	57.0	13.6	8.0	11.6	-	139.3	0.1	-	1.5	-	-	-	-	1.6
NIGER REP.	-	-	-	17.2	30.9	51.0	31.8	130.9	-	-	-	-	-	-	-	-
OTHERS	28.7	2.1	32.7	107.2	87.1	90.4	112.9	461.1	1.8	2.0	0.9	5.5	4.4	9.9	-	24.5
MARTE	34.9	17.3	4.3	17.3	36.9	10.3	-	121.0	-	-	-	-	-	-	-	-
	8730.2	11815.8	20607.6	28242.7	34035.9	26709.1	14483.4	144624.7	60.1	123.0	114.7	292.2	804.6	153.0	-	1547.6

TABLE NO. VII : N'DJAMENA ROAD : DESTINATION OF PRODUCTS PER TOWN (in metric tons dried fish).

DESTINATION	BANDA								SALANGA							
	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	TOTAL	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	TOTAL
MAIDUGURI	1077.7	355.4	686.5	613.8	1363.8	983.4	988.5	6069.1	157.4	117.4	140.7	48.0	9.9	10.0	-	483.4
LAGOS	1465.4	2066.0	2182.2	2437.6	2097.4	1509.0	2055.8	13813.4	64.1	93.8	75.7	34.0	0.5	0.2	-	268.3
ENUGU	114.0	94.3	1076.2	1539.7	1664.1	1227.4	1467.7	8032.5	6.4	13.6	36.5	24.1	2.7	5.4	-	88.7
BENIN	14.9	177.8	405.2	1041.9	1029.3	706.4	988.4	4363.9	0.4	-	18.6	37.9	2.5	4.8	-	64.2
ONITSHA	-	3.9	189.4	374.5	1498.0	1181.8	1462.8	4710.4	-	5.1	4.0	10.2	10.1	-	0.3	29.7
KANO	279.4	635.9	807.6	853.9	728.9	437.7	525.4	4268.8	34.4	26.5	26.3	39.8	4.9	9.8	-	141.7
FORT HARCOURT	-	159.0	395.4	359.3	455.1	255.1	165.8	1789.7	-	11.9	11.9	0.6	-	-	-	24.4
IBADAN	19.6	37.6	230.7	201.0	255.8	198.7	383.6	1327.0	7.6	-	12.8	0.5	-	-	-	20.9
KADUNA	26.7	46.0	44.0	30.1	8.6	23.9	11.1	190.4	0.3	-	-	1.2	-	-	-	1.5
MAKURDI	-	40.8	21.5	23.8	2.8	8.0	2.3	99.2	0.3	-	-	-	-	-	-	0.3
MUJI	22.6	43.5	16.7	92.4	98.7	34.2	6.3	314.4	36.4	4.1	-	123.4	69.2	7.6	-	240.7
BAMA	57.4	2.8	11.7	26.9	43.1	51.4	5.5	198.8	71.1	16.7	25.9	7.2	49.7	11.9	-	182.5
ILORIN	64.7	16.2	53.0	8.3	-	4.5	-	146.7	0.1	-	1.2	-	-	-	-	1.3
BAUCHI	9.9	-	-	-	-	-	-	9.9	1.0	-	-	-	-	-	-	1.0
ZARIA	17.1	3.9	16.6	-	-	-	-	37.6	0.1	-	1.5	-	-	-	-	1.6
POTISKUM	1.7	2.2	-	-	-	-	-	3.9	-	-	-	-	-	-	-	-
JOS	22.2	135.8	213.8	268.9	193.0	268.4	89.0	1191.1	5.0	-	19.8	21.6	-	0.5	-	46.9
KATSINA	-	3.5	-	100.9	-	-	-	104.4	-	-	-	-	-	-	-	-
IKEJA	-	8.5	-	-	-	-	-	8.5	-	-	-	-	-	-	-	-
LOKOJA	-	11.7	10.9	-	-	-	-	22.6	-	-	-	-	-	-	-	-
SOKOTO	2.0	-	17.7	-	-	-	-	19.7	-	-	1.1	-	-	-	-	1.1
NUMAN	1.3	-	-	-	-	-	-	1.3	1.6	-	-	-	-	-	-	1.6
GALABAR	-	-	0.2	-	-	-	-	0.2	-	-	0.9	-	-	-	-	0.9
OKENE	-	-	61.6	35.5	255.2	630.0	1073.9	2056.2	-	-	-	3.2	3.9	-	-	7.1
OTHERS	16.5	48.3	169.3	19.8	-	34.8	-	288.7	2.5	-	3.7	-	-	4.1	-	10.3
MAROUA	133.6	255.2	10.8	2.5	20.3	32.7	-	455.1	74.7	299.9	10.0	8.7	367.1	223.1	-	983.5
GAROUA	15.1	-	-	-	-	-	-	15.1	21.7	-	-	-	-	2.7	-	24.4
MOUNDOU	-	-	-	-	-	-	-	-	10.0	-	-	-	-	-	-	10.0
	3361.8	4997.4	6621.0	8030.8	9714.1	7587.4	9226.1	49538.6	495.1	577.1	390.6	371.7	521.1	280.1	0.3	2636.0

TABLE NO. VIII : N'DJAMENA ROAD : DISTRIBUTION OF CATCH PER LANDING AREA (in metric tons dried fish).

ORIGIN	BANDA								SALANGA							
	69/70	70/71	71/72	72/73	73/74	74/75	75/76	TOTAL	69/70	70/71	71/72	72/73	73/74	74/75	75/76	TOTAL
WULGO	1977.2	2873.1	2896.7	3328.9	3148.2	2009.8	2654.7	18 888.6	126.4	176.9	216.5	153.8	210.8	9.4	0.3	894.1
GAMBARU	1010.1	1816.4	3494.7	4345.7	6161.0	4218.5	5265.0	26 311.4	181.7	90.2	170.3	193.9	303.9	19.1	-	959.1
N'DJAMENA	94.6	20.9	-	6.3	-	-	-	121.8	47.1	14.1	-	-	-	-	-	61.2
CAMEROUN	255.6	258.9	35.7	122.6	98.1	813.3	1103.5	2 687.7	130.4	284.8	-	17.4	6.4	245.7	-	684.7
OTHERS	24.3	28.1	193.9	227.3	306.8	545.8	202.9	1 529.1	9.5	11.1	3.3	6.6	-	5.9	-	36.9
	3361.8	4997.4	6621.0	8030.8	9714.1	7587.4	9226.1	49 538.6	495.1	577.1	390.6	371.7	521.1	280.1	0.3	2636.0

TABLE NO. XI : PROGRESS OR REGRESS INDICES OF PRODUCTS PER DESTINATION.

DESTINATION	BAGA ROAD														NDJAMENA ROAD																	
	BANDA							SALANGA							BANDA							SALANGA										
	69/70	70/71	71/72	72/73	73/74	74/75	75/76	69/70	70/71	71/72	72/73	73/74	74/75	75/76	69/70	70/71	71/72	72/73	73/74	74/75	75/76	69/70	70/71	71/72	72/73	73/74	74/75	75/76				
MAIDUGURI	17.87	7.64	13.92	23.27	15.71	10.07	11.49	7.09	18.01	11.42	14.39	41.48	7.61	-	17.76	5.86	11.31	10.11	22.47	16.20	16.29	32.56	24.29	29.10	9.93	2.05	2.07	-				
IAGOS	10.67	13.00	16.79	18.84	19.86	14.01	6.81	2.02	9.03	11.62	29.82	37.59	9.92	-	10.60	14.95	15.79	17.64	15.18	10.92	14.88	23.89	34.96	28.22	12.67	0.19	0.07	-				
ENUGU	2.25	8.43	15.29	21.10	24.44	18.29	10.16	3.66	8.12	5.65	28.01	42.03	12.33	-	1.42	11.74	13.40	19.17	20.72	15.28	18.27	7.22	15.33	41.15	27.17	3.04	6.09	-				
BENIN CITY	0.41	2.54	10.39	21.29	26.85	24.61	13.88	-	-	4.73	22.61	46.80	25.86	-	0.34	4.07	9.29	33.87	23.59	16.19	22.65	0.62	-	28.97	59.04	3.89	7.48	-				
ORISHA	-	0.29	4.21	12.95	38.37	29.27	14.85	-	-	-	1.71	85.40	12.89	-	-	0.03	4.02	7.95	31.80	25.09	31.06	-	17.17	13.47	34.34	34.01	-	1.01	-			
KANO	5.49	12.32	17.69	21.22	18.25	14.90	10.11	9.67	17.42	10.14	25.55	35.50	1.72	-	6.55	14.90	18.92	20.00	17.07	10.25	12.31	24.28	18.70	13.47	28.09	3.46	6.91	-				
PORT HARCOURT	-	6.29	25.13	27.33	27.51	11.05	2.66	-	-	15.41	32.50	50.92	1.17	-	-	8.89	22.09	20.06	25.43	14.25	9.26	-	-	48.77	48.77	2.46	-	-				
LEKADAN	2.14	1.10	6.87	17.78	20.70	33.88	9.53	-	-	2.97	11.15	89.88	-	-	1.48	2.83	17.38	15.15	19.26	14.97	28.91	36.36	-	61.25	2.39	-	-	-	-			
KADUNA	15.95	5.45	24.40	13.54	17.40	16.50	6.76	65.00	-	-	-	35.00	-	-	14.02	24.16	23.11	15.81	4.52	12.55	5.83	20.00	-	-	-	-	-	-	-			
MAKURDI	2.32	40.42	8.74	36.95	2.45	6.75	2.37	-	-	17.65	76.47	5.88	-	-	-	41.13	21.67	23.99	2.82	8.07	2.32	100.00	-	-	-	-	-	-	-			
MURT	20.38	20.63	6.82	7.20	38.26	4.95	1.71	3.08	1.12	-	7.67	80.62	-	-	7.19	13.84	5.31	29.39	31.39	10.88	2.00	15.12	1.70	-	51.27	28.75	3.16	-	-			
BAMA	30.43	11.76	-	1.01	40.37	9.74	6.69	11.43	-	-	-	-	-	-	28.87	1.41	5.89	13.53	21.68	25.85	2.77	38.96	9.15	14.19	3.95	27.23	6.52	-	-			
ILORIN	25.86	11.01	45.73	-	2.17	-	-	-	-	100.00	-	-	-	-	44.10	11.04	36.13	5.66	-	-	-	7.69	-	-	-	-	-	-	-	-		
BAUCHI	81.54	3.20	15.28	-	-	-	-	100.00	-	100.00	-	-	-	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-	-	-	-	-		
ZARIA	10.24	11.14	78.62	-	-	-	-	-	-	-	-	-	-	-	45.48	10.37	44.15	-	-	-	-	6.25	-	-	93.75	-	-	-	-	-		
POTISKUM	53.76	23.66	-	22.58	-	-	-	-	-	-	-	-	-	-	43.59	56.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
JOS	0.86	5.10	15.20	33.36	23.73	15.97	5.78	1.02	-	1.02	48.62	38.28	11.06	-	1.86	11.40	17.95	22.58	16.21	22.53	7.47	10.66	-	-	42.22	46.05	-	1.07	-			
KATSINA	17.83	22.17	-	-	-	-	-	-	-	-	-	-	-	-	3.35	-	96.65	-	-	-	-	-	-	-	-	-	-	-	-	-		
IKEDA	69.26	11.14	-	-	-	30.74	-	-	-	-	-	-	-	-	100.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LOKOTA	3.14	20.92	75.94	-	-	-	-	-	-	100.00	-	-	-	-	51.77	48.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SOKOTO	49.28	11.14	50.38	-	0.36	-	-	-	-	100.00	-	-	-	-	10.15	89.85	-	-	-	-	-	-	-	-	-	100.00	-	-	-	-	-	
NUMAN	15.69	-	84.31	-	-	-	-	40.00	-	100.00	-	-	-	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-	-	-	-	-	-	
CALABAR	-	-	100.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
OKENE	-	0.36	2.49	5.91	25.73	38.39	27.12	-	-	-	13.10	78.60	8.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
OTHERS	17.26	2.56	59.18	16.98	0.20	3.70	0.02	79.17	-	-	20.83	-	-	-	5.72	16.73	58.64	6.86	-	-	-	24.27	-	35.92	45.07	54.93	39.81	22.68	-	-	-	
MAROUA	-	-	-	-	100.00	-	-	-	-	-	-	100.00	-	-	29.36	56.08	2.37	0.55	4.46	7.18	-	7.60	30.49	1.02	0.88	37.33	11.07	-	-	-	-	
MAROUA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-	-	-	-	-	-	-
MOUNDOU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE NO. XII : PROGRESS OR REGRESS INDICES PER LANDING AREA.

ORIGIN	BAGA ROAD														N'DJAMENA ROAD																		
	BANDA							SALANGA							BANDA							SALANGA											
	69/70	70/71	71/72	72/73	73/74	74/75	75/76	69/70	70/71	71/72	72/73	73/74	74/75	75/76	69/70	70/71	71/72	72/73	73/74	74/75	75/76	69/70	70/71	71/72	72/73	73/74	74/75	75/76					
BAGA	8.60	10.76	15.58	17.25	20.50	9.98	17.28	3.35	7.75	4.80	8.42	73.03	2.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MALAMFACORI	1.08	1.53	4.82	12.29	31.85	42.06	6.37	0.63	0.12	0.63	23.85	46.38	28.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ABADAN	7.17	12.27	22.83	31.69	18.50	4.63	2.91	6.09	10.99	15.29	37.77	27.14	2.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ALAGARNO	6.32	11.16	21.23	30.24	22.65	4.18	4.22	11.90	22.53	10.44	20.24	31.04	3.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MONGONU	21.66	14.83	36.89	18.74	2.80	2.72	2.36	6.63	25.38	47.73	18.94	1.13	0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BINDIR	18.01	-	19.47	26.18	11.61	16.81	7.92	33.33	-	60.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BADERI	14.86	0.31	15.23	35.06	13.57	7.69	13.28	-	-	-	100.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ALLIMBELERI	31.23	4.02	40.92	9.76	5.74	8.33	-	6.25	-	93.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NIGER REP.	-	-	-	13.14	23.61	38.96	24.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MARTE	28.84	14.30	3.55	14.30	30.50	8.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
OTHERS	6.22	0.46	7.09	23.35	18.89	19.61	24.48	7.35	8.16	3.67	22.45	17.96	40.41	-	1.59	1.84	12.68	14.86	20.07	35.69	13.27	25.75	30.08	10.30	17.88	-	15.99	-	-	-	-		
WULGO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.47	15.21	15.34	17.62	16.67	10.64	14.05	14.14	19.79	24.21	17.20	23.58	1.05	0.03	-	-	-	-	
GANBARU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.83	6.90	13.28	16.51	23.41	16.03	20.01	18.94	9.40	17.76	20.22	31.69	1.99	-	-	-	-	-	
CHAD REP.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	77.67	17.16	-	5.17	-	-	-	76.96	23.04	-	-	-	-	-	-	-	-	-	-
CAMEROON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.51	9.63	1.33	4.56	3.65	30.26	41.06	19.05	41.59	-	2.54	0.94	35.88	-	-	-	-	-	