THE FISHERIES OF WEST AFRICA

AND

PROSPECTS FOR DEVELOPMENT

by

J.G. Sutinen and R. B. Pollnac

International Center for Marine Resource Development

University of Rhode Island

and

H. P. Josserand

Center for Research on Economic Development

University of Michigan

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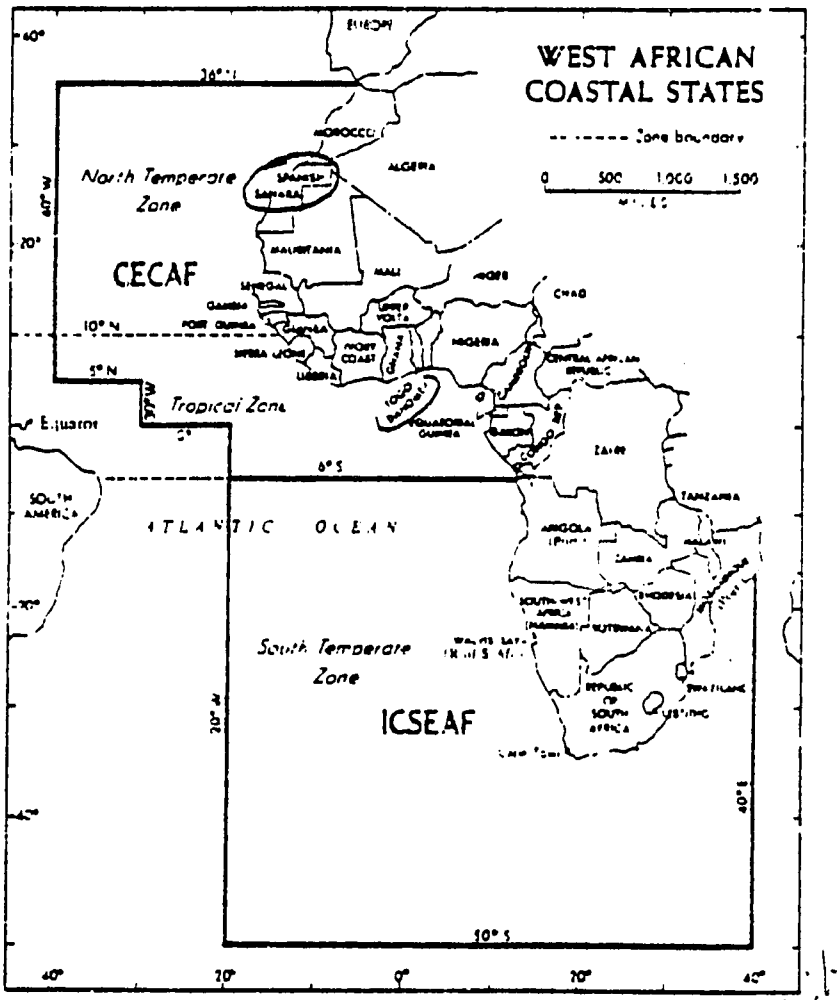

Source: Crutchfield and Lawson (1974)

EXECUTIVE SUMMARY

I. Introduction

West Africa has one of the world's largest and most abundant coastal fishing grounds. These resources also include several high-valued species, e.g., cephalopods, tuna, shrimp, sea bream and flatfish. Potential catch from the Eastern Central Atlantic (CECAF Region[1/]) was estimated at about 3.5 to 5.0 million tons in 1971, and more recently at about 4.2 million tons annually. The northern zone[2/] countries have the more abundant marine resources in the CECAF region, with about 75 percent of the estimated potential yield. Recently reported catches have been in the range of 3.0 to 3.8 million tons in the CECAF region (not accounting for discarded or unreported catches). However, unexploited resources are known to exist and as more knowledge of fish stocks is a acquired, the estimate of total potential may rise.

Fishery operations in West Africa marine waters can be divided into three groups: the African artisanal fisheries, the African industrial fisheries and the non-African industrial fisheries. With the arrival of the exclusive economic zones (EEZ) and high operating costs, non-African production (which represented over 70 percent of the total catch in 1977) fell in the late 1970s, and African production in the region grew by about 30 percent during the decade. Trade within the region is marked by local industrial exports of

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1/ CECAF is the Committee for Eastern Central Atlantic Fisheries. The CECAF region covers the area of West Africa from Morocco to Zaire and includes the following countries: Morocco, Mauritania, Cape Verde, Senegal, Gambia, Guinea, Guinea Bissau, Sierra Leone, Liberia, Ivory Coast, Togo, Benin, Nigeria, Ghana, Cameroon, Equatorial Guinea, Sao Tome-Principle, Gabon, and Zaire.

2/ The northern zone includes Coastal countries from Morocco to Guinea, i.e., Morocco, Mauritania, Cape Verde, Senegal, Gambia, Guinea Bissau and Guinea.

fish from the resource abundant northern zone to the southern zone where demand generally exceeds supply. While the bulk of production by non-African fleets is exported outside of the region, some is also exported to other African countries.

The results of this study are useful for deciding how A.I.D should proceed with developing a fishery strategy in West Africa. The study is based on secondary source material and there is need for further investigation. However, it is clear that marine fisheries hold great potential for promoting development in West Africa. This executive summary briefly decribes the economic importance of marine fisheries to coastal West African countries and makes recommendations on how A.I.D. should proceed in providing assistance to the sector. For greater details, the study, "The Fisheries of West Africa and Prospects for Development" should be consulted.

II. Significance of Marine Fisheries

Although certain marine fish species may be about fully exploited in some cases by foreign fleets, there exist substantial potential gains to West African countries by developing their capacity to harvest a larger portion of their resources and to effectively manage their marine fishery resources. Through the late 1970s the region's fishery resources were mostly exploited by non-African countries, mainly the USSR, Spain, South Korea, Poland, Romamia, and Bulgaria. With international acceptance of the EEZ in the mid-1970s, several states have the opportunity to more fully appropriate the substantial benefits from their fishery resources. Significant gains may be realized in terms of food supplies and nutrition, employment and income, and government revenues (from licence fees, etc.)

Food Supplies and Nutrition. Fish is a product of high protein content and is equivalent to meat as a source of animal protein. It is a traditional and significant source of protein in most of the West African states (with maybe the exceptions of Mauritania and Gambia). Total and per capita fish consumption increased during the 1970s for all states in the region. Also, per capita consumption of fish is about twice as much as that for meat. The southern zone[3/] with its large population, consumes about nine times as much fish as the more sparsely populated northern zone.

Generally, fish is less expensive than meat (averaging about two-thirds the cost of meat). This remained the case even during the 1970s when the price of fish increased at a faster rate than that of meat. Moreover, this price advantage of fish over meat prevails not only on the coast, but also in the interior of most countries. Fish is expected to retain some price advantage over meat in the foreseeable future.

Within countries of the CECAF region, fish is consumed by all social classes, so that an increase in supplies would have repercussions on the protein intake of all (according to the current distribution of income). The total demand for fish in the CECAF region increased at about 6 percent per annum in the 1970s. It is expected that demand in the region will continue this upward trend, at least as rapidly as population grows.

Greater exploitation by African fisherman of lower valued coastal pelagic (e.g., mackerel, horse mackerel and sardinella) fishery alone could add up to 50 percent more to regional fish supplies. Increased African production of other stocks are also likely to offer large benefits in terms of food

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3/ The southern zone within the CECAF region extends from Sierra Leone to Zaire and includes Sierra Leone, Liberia, Ivory Coast, Togo, Benin, Nigeria, Ghana, Cameroon, Equatorial Guinea, Sao Tome-Principal, Gabon, Congo, and Zaire

availability. Also significant additions to local supplies and nutritional intake can be realized if there is a reduction in the estimated 20 to 40 percent post-harvest losses, and more efficient processing techniques are adopted. These losses result from improper handling, inadequate facitities and multiple smoking of fish.

Employment and Income. Excluding Morocco, it is estimated that there are about 600,000 artisanal fisherman and 10,000 local industrial fishermen in the region. Potential employment gains in the sector may be significant. For example, if local fish harvests are increased by 50 percent (clearly a plausible prospect), then as many as 250,000 to 550,000 additional jobs may be created in the processing, distribution, and marketing subsectors alone. This is a conservative estimate and actual employment gains could be much greater.

Development of the artisanal fisheries would most likely have the greatest direct employment impact. This assumes the technology appropriate for artisanal fisheries production is less capital-intensive than that of industrial fisheries. Appropriate development will expand employment opportunities in both rural and urban coastal areas of the region. Since rural areas immediately adjacent to the coast are not generally productive agriculturally, expanded opportunities for employment in the fishery sector will reduce incentives to migrate to urban areas.

It should be noted that in some of the countries, fisheries are a major moving force for development. For example, reports indicate that in 1973 the gross product generated by fisheries as a whole for the Sahelian states represented 4.0 percent of that region's gross product, while the total manpower in the sector represented between 1.5 and 2 percent of the total labor force of the Sahel region.

Foreign Exchange Generation. The greater part of foreign exchange earnings produced by fisheries results from payments of fees and other remunerations by foreign fleets. Although West African states seriously lack the ability or resources to properly manage arrangements with the foreign fleets, earnings even under current conditions appear quite significant in a few cases. For example, the fees and fines which Mauritania collected in 1978 from foreign vessels amounted to 7 percent of the gross landed value of the total fish potential in its EEZ.

With a ceptance of the EEZ, coastal states have the opportunity to control and restrict foreign vessels, thus increasing revenues from these sources and conserving the resources. The greatest potential for increasing foreign exchange earnings by African states from their marine resources appear to rest with the fisheries for the cephalopods, crustacea and coastal pelagics. Establishing effective control over the cephalopod and crustacea fisheries could generate significant foreign exchange earnings. Cephalopods alone may yield from $160 to $214 million per year in net revenues for the CECAF region.

III. Recommendations

To the extent that secondary resource material permits, this study summarizes the current and potential signficance of marine fisheries. The study clearly indicates that marine fisheries development holds great potential for increasing food production and improving nutritional intake, employment creation and increasing incomes, and foreign exchange earnings. While some donors are providing assistance to this sector, a great deal remains to be accomplished.

Two major conclusions emerge from this study. First, a strategy for assistance to the fishing sector should be developed in order to properly launch interventions and to appropriate potential benefits in terms of food and nutrition, employment and foreign exchange. Secondly, assistance in management should be provided immediately.

Clearly, the next step towards developing an appropriate and definitive AID strategy is for a study team to make a preliminary visit to the region in order to assess likely development strategies and to recommend a specific set of strategies. The fishery sector should be viewed from the entire region and a set of appropriate strategies should be developed, taking into account the physical, cultural and ethnic diversity of the countries within the region (and within each country). This study team should consist of a fisheries biologist, a natural resources economist, a marine social anthropologist and an expert in fisheries administration and institutional design. Their work should also be coordinated with efforts by other organizations, e.g., FAO, ECOWAS, CILSS.

In addition to verifying the tentative economic, social and technical findings of this study, the field work should include the following:

1. Examination of the possible economic, social and technical advantages fishery development may hold over that of agriculture in certain areas. For example, in some of the coastal countries, there exist considerable surface areas of water which could be easily exploited for fishing as compared to the more limited surface areas actually under cultivation. It may also be possible to achieve higher rates of return in marine fisheries than in agriculture for some areas.

2. An analysis of implications for increasing local and regional food supplies through the fishing sector. Available data indicates that the landings of artisanal fishing operations comprise about 75 percent of total national landings and constitute the bulk of local fish supplies. African industrial fisheries exploit, for the most part, inshore fish and export much of their catch to countries within the region. It appears that increased exploitation by local industrial fisheries could yield significant benefits in terms of regional fish supplies, if suitable marketing arrangement are devised. Also, with proper regional agreements, it may be possible that the efficient non-African fleets could be used to a greater extent in supplying the fish-poor southern zone with more fish.
3. An analysis of the interrelation between fishing and agriculture. In some coastal countries there exists a close relationship between farming and fishing in the artisanal sector where fishermen prepare the soil and plant their crops during certain periods. It is important that this relationship by clearly defined in a fishery strategy.
4. An analysis of the employment generation potential in the fishing sector. The technology employed by artisanal fishing operations is generally less capital-intensive than that of industrial fisheries. This implies that artisinal fisheries would most likely yield the greatest direct employment impact. The present study also indicates significant potential for employment creation in anicillary industries (such as storage, marketing, processing, and boat repair) as a result of increased production by both artisinal and industrial fisheries. Such possibilities should be verified during the field trip.

5. An analysis of the implications for increasing foreign exchange generation through assistance to the fishery sector. Improved management of agreements with the non-African fleets by far appears to offer the greatest foreign exchange potential. The non-African operations have concentrated in the resource rich areas off Mauritania and Morocco, and to a lesser extent off the coast from Senegal to Sierra Leone. The coastal states in the northern zone have different objectives and different opportunities for exploiting their resources. Some coastal states may emphasis foreign fishing to collect fees while not developing domestic distant fishing capacity; and other states may opt to develop a domestic fleet capable of harvesting all resources in their EEZ. Such variations underline the importance of developing assistance strategies taylored to individual country conditions, needs and priorities.

6. An analysis of the potential contributions to development objectives by type of fishing operation. In developing assistance strategies, a socio-economic appraisal of artisanal and industrial fisheries should be carefully conducted. Indications are that artisanal fisheries have the advantage over industrial fisheries in terms of creating employment, using modest local investment, using simple technology, exploiting the more abundant resources, providing high quality fresh fish, providing products for local markets, consuming little energy, and lesser adverse impact on the physicial and human environments. On the other hand, it appears that industrial fisheries are more attractive in terms of possibilities for foreign private investment and as a foreign exchange earner. Also, in some cases (e.g., fishing great depths or rough waters or supplying large urban areas or processing facilities) the industrial fisheries seem clearly more efficient.

7. Implications for assistance to countries within the region based on factors such as level of development within the sector and resource endowment. Some countries within the region, e.g., Nigeria, Sierra Leone, Ivory Coast, Cameroon and Senegal have relatively large artisinal and/or local industrial fleets. As a result, the potential for expansion of fleets in these countries is more limited than in other countries. Also, strategies developed for the resource rich and more sparely populated northern zone and the modestly resource endowed and densely populated southern zone should reflect their respective endowment and demand for fish.

8. Identification of areas for and types of appropriate interventions. Assistance to fishermen should be provided through an integrated approach looking at the interactions in fishery communities among marine resources, agriculture, small-scale enterprises, community organizations, ethnic and social characteristics, and government policies. Specific needs of fishermen should be examined (e.g., technology, and equipment) and evaluated in terms of their impact on employment, income, and fish production. Needs in ancillary industries (processing, storage,marketing, and distribution) should be addressed.

Secondly, assistance in fishery management is needed and should be provided on a regional basis. The major challenge, especially in the northern zone is to effectively manage the migrating multinational fish stocks. Such assistance can be given either prior to or simultaneously with the development of an A.I.D. fishery strategy and should include the following:

-- Stock assessment. Assistance in stock assessment is required to determine the potential for artisanal, local industrial and foreign production. Thus, the benefits to be gained in terms of employment, food supplies and foreign exchange can materialize and over-exploitation of the resource could be avoided. A stock assessment is prerequisite to enabling the coastal states to develop appropriate management programs.

-- Surveillance. Assistance in surveillance (e.g., training, equipment) is needed to upgrade the governments' abilities to manage coastal fishery resources and enforce policies which maximize on returns from fishery contracts.

-- Training. Assistance is training is needed at all levels to effectively manage and to develop approprite policies and to strengthen institutions, if potential benefits from marine resources are to be realized.

In concluding, West Africa is one of the few areas of the world where fisheries development offers so much potential. We urge A.I.D. to proceed with the development of a definitive strategy and with assistance in management of the marine resources.

I. Introduction

The principal purpose of this paper is to assess prospects for the development of marine fisheries off the coast of West Africa. The Eastern Central Atlantic fishery (see map, Fig. 1) is one of the world's most productive, ranking sixth out of 17 major fishing areas in 1978 and comparable to the Northwestern Atlantic in terms of weight landed (FAO, 1979).[1] In 1978, reported landings in the Eastern Central Atlantic area totalled 3.05 million tons, with 44 percent caught by coastal African nations and 56 percent caught by non-African fleets. While most fish stocks are fully or over-exploited, some remain under-exploited (Everett, et al., 1980). These facts suggest that most of the potential benefits from the marine fisheries in the region are not currently being realized by the West African nations.

If certain problems are solved and programs implemented, West African nations should be able to substantially increase the benefits they realize from the marine fishery resources now under their jurisdiction. The potential benefits include improvements in food and nutrition, employment and foreign exchange earnings. These potential gains are particularly important in light of the severe food shortages, poverty and poor health

[1] Another means of comparison is with the U.S. domestic fishery. In 1977 the value of all U.S. commercial landings was about $1,515 million, weighing some 2.1 million tons (NMFS, 1978). In 1977, the value of all catches in the Eastern Central Atlantic is estimated at $1,157 million on 3.7 million tons (Everett, et al., 1980).

situations in most West African countries.

This paper has been prepared to assist AID formulate a set of development strategies for West African marine fisheries. To this end, we examine in the next section the present state and recent history of marine fisheries in West Africa. In Section III the problems and potential of fisheries development are assessed.

II. The State of West African Marine Fisheries

The marine fisheries of West Africa are complex at every level and in almost every dimension. In general, the fisheries are migratory, multispecies and multinational. Artisanal, semi-industrial and industrial fleets from African, European, and Asian countries compete to exploit these productive fisheries. The most abundant fish resources lie off the coasts of the less populated countries in the region; and while domestic markets for fish are well-developed in some coastal countries, they are rudimentary in others. Some observers believe the region will continue to have an unfavorable balance in the value of fish trade in the future.

To appreciate these and other complex features of the fisheries, we next summarize from the available literature what is known about the fishery resources, fishing operations, and the distribution, trade and consumption of fish in West Africa.

A. Fishery Resources of the East Central Atlantic Region

The physical and oceanographic characteristics largely determine the size and distribution of marine fishery resources in the region. These features have been described in some detail by a number of authors (e.g. Gulland, 1979, Crutchfield and Lawson, 1974, and Everett, 1976). The two characteristics of prime importance appear to be the size of the continental shelf and the extent of upwelling in the region.

In general, the continental shelf off West Africa is narrow,

normally less than 30 miles wide, except in the area between latitudes 24° to 20° North, and the area from Dakar (16° N) to Freetown, Sierra Leone, (8° N) where in places the shelf extends out 100 nautical miles. Table 1 presents Gulland's (1971) estimates of the extent of the continental shelf, down to 200 meters, for CECAF statistical divisions. (A more detailed breakdown of shelf size by country is presented in Apendix A.) There are also smaller areas of shallow water around the groups of oceanic islands (Madeira, Canary Islands, Cape Verde Islands, Annabon, Sao Tomé).

Upwellings enrich surface waters with phytoplankton, creating very favorable conditions for various pelagic species. The richest upwelling areas are off the coasts of Senegal, Mauritania and Morocco. While there is upwelling throughout the year, the specific location and extent varies seasonally, tending to move south in the northern winter and north to the Straits of Gibralter in the summer. Less rich and less regular upwellings occur in the Gulf of Guinea between Ivory Coast and Benin.

In weight terms, coastal pelagic species dominate the reported catches in the region. In the northern coastal zone,[1] the principal pelagic species include the sardine off Morocco and Mauritania, and the sardinella, mackerel and horse mackerel, distributed from Mauritania to Sierra Leone. Everett, et al., (1980) report the estimated potential annual yield for the sardine is about 1 million metric tons, for the sardinella from 350,000 to 600,000 tons, for mackerel about 200,000 tons, and for

[1]The northern zone includes Morocco to Guinea, and the southern zone Sierra Leone to Zaire.

Table 1. Shelf Areas of the Eastern Central Atlantic, Within the 200 M Contour

Division	Length (n.mi)	Breadth	Area $n.mi^2$	Area km^2
Morocco Coastal $36^{o}N$-$26^{o}N$	760	15-50	19,000	65,000
Sahara Coastal $26^{o}N$-$20^{o}N$	380	30-80	19,000	65,000
C. Verde Coastal $20^{o}N$-$10^{o}N$	650	20-100	33,000	110,000
C. Sherbro Coastal $10^{o}N$-$8^{o}W$	530	15-100	20,000	70,000
W. Gulf of Guinea $8^{o}W$-$3^{o}E$	690	10-40	15,000	50,000
C. Gulf of Guinea $3^{o}E$-Equator	670	15-50	19,000	65,000
S. Gulf of Guinea Equator-$6^{o}S$	450	30-45.	16,000	55,000
TOTAL				480,000

Source: Gulland, 1971

horse mackerel about 450,000 tons. The southern coastal zone is resource poor in comparison to the northern zone, resulting from poor primary productivity and the narrow continental shelf. The potential catch of sardinella and bonga (ethmalosa) off Sierra Leone and Liberia may be more than 50,000 tons. Off the coasts of Ivory Coast, Ghana and Togo, the potential catch of sardinella is estimated at 60,000 tons; however, the potential of bonga and anchovy are not known. Mackerel potential from Ivory Coast to Benin is thought to be less than 50,000 tons. The size and potential of the sardinella stocks in the Gabon-Congo area are also not known.

While demersal species account for only a fourth or less of coastal catches, they play an important role in local fisheries. In the northern coastal zone, the principal demersal species include sea breams, hakes and croakers. According to Everett, et al., (1980) the estimated potential yield of sea breams in the area from southern Mauritania to Guinea is about 66,000 tons. The estimated potential yield of hake stocks is below 100,000 tons. The potential catch of coastal demersal species from 0 - 50 m in depth is about 200,000 tons (excluding the bigreye grunter, Brachydeuterns auritus) in the southern Mauritania to Guinea area. The potential catch of bigeye grunter in the Senegal/Gambia area is estimated at 50,000 tons. Hence, the total demersal potential in the northern zone is over 400,000 tons. In the southern zone, demersal species are relatively more important, accounting for one-third or more of total catches, although the potential yield

of mixed demersal fish in the southern zone is only about 150,000 tons (see Table 2 for a more detailed breakdown).

In 1970, one fish species, the Balistes capriscus or trigger fish, began to dominate catches in some areas of both northern and southern zones. Balistes accounted for about 60 percent of the 1970 total catch of small trawlers operating in Ghana; and between 1972 and 1974, 70 percent of the total catch of trawlers operating out of Lomé, Togo, was Balistes. Its occurrence has been reported off most countries from Senegal to Nigeria. (CECAF, 1979d). The fish grows to about 40 cm. in length, but has a tough, sand-paper-like skin which inhibits processing and preservation. Because of its low value, fishermen in some countries tend to discard the fish at sea (Pease, 1980). The cause of the increased abundance of Balistes capriscus is not known, nor whether the cause is a local or global phenomenon, nor whether the species is pelagic or demersal (CECAF, 1979d). The explosion of Balistes apparently caused the drop in abundance of the bigeye grunter and shad and other species that share the same bathymetric distribution (CECAF, 1979e).

In value terms, the cephalopod fishery in the northern zone represents one of the most important fisheries in the region, if not the world. Everett (1978) estimates the value of the 1976 catch of cephalopods to have been U.S. $200 million. Octapus comprises most of the cephalopod catch (60 - 70 percent), followed by cuttlefish (20 - 25 percent) and squid (10 - 20 percent) (CECAF, 1979b). The potential biological yield of all

Table 2. Estimates of Catch Potential and State of Exploitation for Major Fish Resources in the CECAF Region.

Coastal Pelagic Stocks	Estimated Biological Potential (MT)	State of Exploitation
Northern Zone		
Sardines (off Morocco and Mauritania)	1,000,000	full
Sardinella (off Mauritania to Sierre Leone)	350,000-600,000	probably moderate
Mackerel (off Mauritania to Sierre Leone)	200,000	over
Horse Mackerel (off Mauritania to Sierre Leone)	450,000	full
Southern Zone		
Sardinella & bonga (off Sierre Leone & Liberia)	50,000	
Sardinella (off Ivory Coast to Togo)	60,000	full
Bonga & anchovy (off Ivory Coast to Togo)	?	
Mackerel (off Ivory Coast to Benin)	150,000	
Sardinella (off Gubon to Congo)	?	moderate
Demersel Stocks		
Northern Zone		
Sea Breams (off Mauritania to Guinea)	66,000	over
Hake (off Morocco to Sierra Leone)	100,000	over
In-shore mixed (off Mauritania to Guinea)	200,000	over
Bigeye Grunter (off Senegal & Gambia)	50,000	
Southern Zone		
Mixed (off Sierra Leone & Liberia)	45,000	Inshore stocks are fished
Mixed (off Ivory Coast)	8,900	close to maximum
Mixed (off Ghana to Benin)	17,000	potential, whereas
Mixed (off Nigeria & Cameroon)	33,000	offshore stocks are
Mixed (off Equatorial Guinea to Zaire)	47,600	lightly fished.
Cephalopods		
Octopus (off Morocco to Senegal)	110,000	over
Cuttlefish (off Morocco to Senegal)	40,000	over
Squid (off Morocco to Senegal)	40,000	over
Shrimp (pink)		
Northern Zone	8,000	full
Southern Zone	7,000	full
Tuna		
Yellowfin (Central Atiantic)	100,000	heavy
Skipjack	?	
Bigeye (Whole Atlantic)	55,000	full
All fishery resources in CECAF region	4,200,000	

Source: Everett, et al (1980)

cephalopod stocks is about 200,000 tons, and are considered to be over-exploited at present (Everett, et al., 1980). Cephalopods are found at all latitudes of the northern zone, but the principal fishing activity occurs off the coast of Morocco. Smaller, but still important concentrations of cephalopod stocks exist off the coasts of Mauritania and Senegal. The identity and distribution of the various stocks are not well known, however (CECAF, 1979b).

The Skipjack, Yellowfin and Bigeye tuna are the principal ocean pelagic species caught in the CECAF region. According to Everett, et al., (1980), the estimated potential in the Central Atlantic of yellowfin is 100,000 tons. The potential of Bigeye in the whole Atlantic is about 55,000 tons. The potential of Skipjack is not known, but could be substantial. Yellowfin stocks are heavily fished, Bigeye are fully exploited and Skipjack catch could be increased.

The most important crustascean fishery is for pink shrimp. The stocks of pink shrimp (Penaeus duorarum) are found near river mouths and lagoon entrances to the sea, e.g. off the Senegal River, Gambia River, Southern Senegal and Guinea Bissau, Sierra Leone and Nigeria (Everett, 1976). The biological potential of pink shrimp from Ivory Coast to the Congo is estimated at 7,000 tons, and an additional 8,000 tons can likely be realized from the northern zone. These stocks appear to be fully exploited at present (Everett, et al., 1980). Other coastal and river esturial shrimp (e.g. Parapenaeopsis atlantica) are widely

distributed throughout the Gulf of Guinea, though their potential is not known. Deep water shrimp (e.g. Parapanaeus longirostris) occur in commercial quantities, but their potential has not yet been assessed (CECAF, 1979c).

Gulland (1971) originally estimated the total biological potential of the region to be between 3.5 and 5.0 million tons. More recently, Everett, et al., (1980) claim a "possible maximum catch of about 4.2 million tons from the region's resources" (p. 1). Recent reported catches have been in the range of 3.0 - 3.8 million tons. When one allows for discarded and other unreported catches, it appears the regions' fish resources are about fully exploited on the whole. However, under-exploited resources are known to exist and as more knowledge of the fish stocks is acquired the estimate of total potential may rise.

II.B. Trends in Catches in the Eastern Central Atlantic

Total reported catches in the Eastern Central Atlantic more than tripled over the period 1964 to 1978. The greater part of the increase occurred in the northern coastal zone from Morocco to Guinea (see Figure 2), and was largely the result of increased catches of coastal pelagic fish, especially sardines and sardinella (see Figure 3.).

1. Principal Species

In the mid- to late-1970's, coastal pelagic fish accounted for about 60 percent of the weight of total reported catches in the region. The sardine and sardinella species are the most significant coastal pelagics, accounting for 30 to 40 percent of total catches (in weight terms) in the region. Horse mackerel and mackerel are other important species, together accounting for about 20 percent of the total weight of catches in the region.

In value terms, other species are more important to the region than the coastal pelagics. Everett, et al. (1980) estimated Cephalopods (octopus, cuttlefish and squid) to be worth U.S. $265 million in 1977, about 23 percent of the total estimated value of catch in the region.[1] The next most valuable species are tuna and crustacea (mainly shrimp and prawns) with value shares of 17 and 16 percent, respectively.

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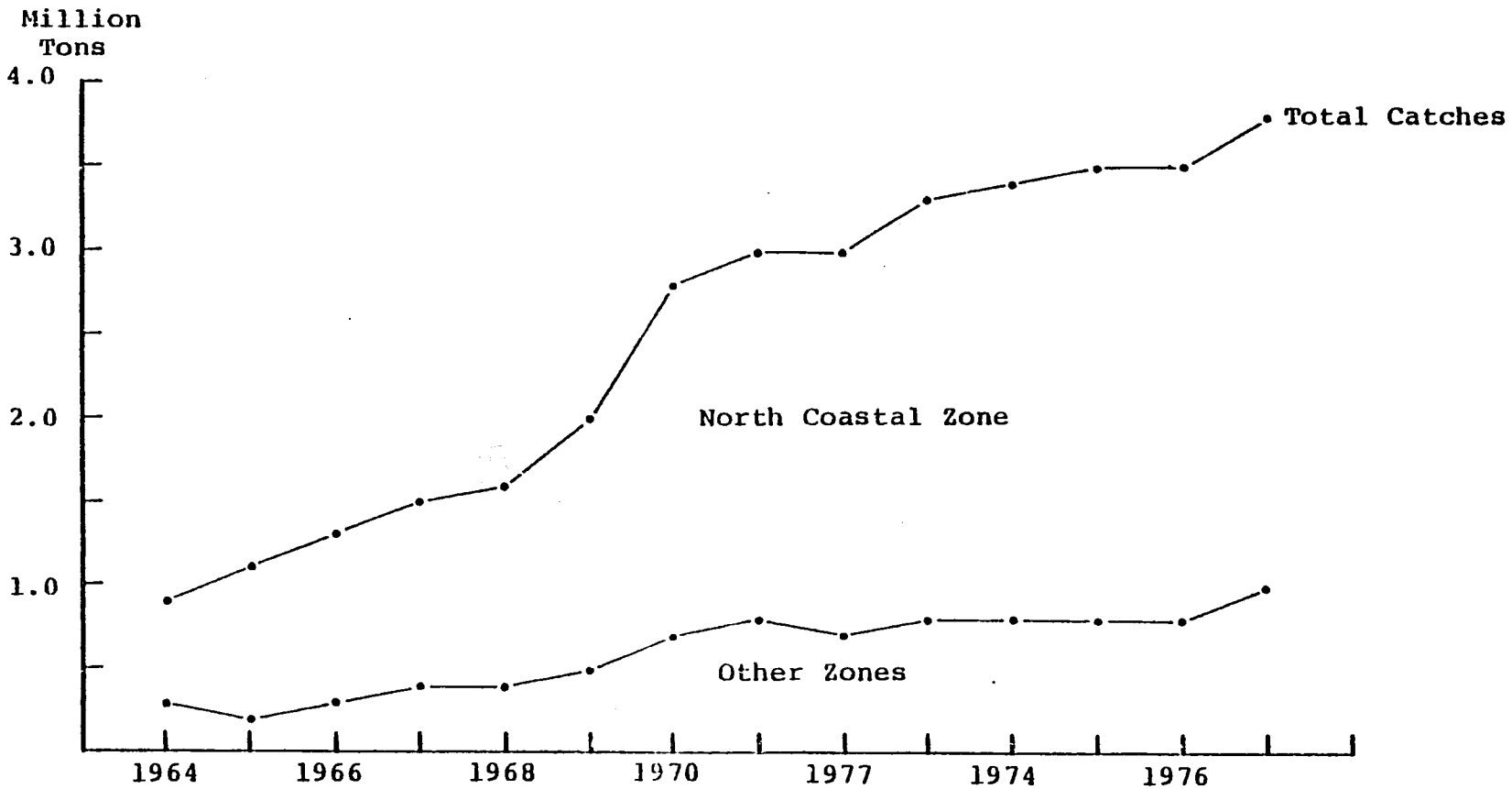
[1] As Everett explains, these estimates should be taken only as rough indicators of value.

Figure 2. Reported Catch Distribution
by Area,
Eastern Central Atlantic



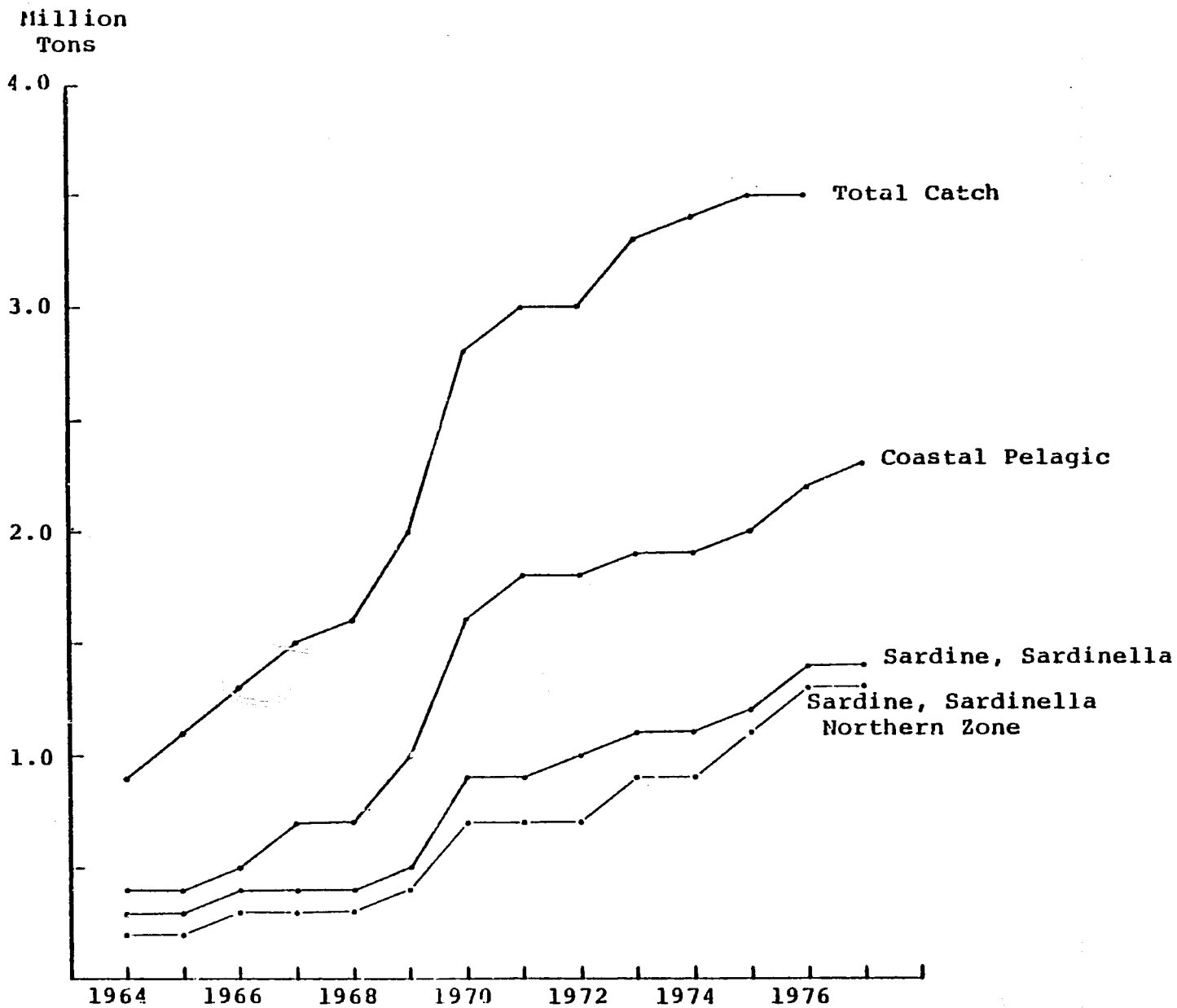


Figure 3. Reported Catch Distribution
by Major Species Groups

Table 3, constructed from the data of Everett, et al. (1980), summarizes the shares of the various fisheries in the whole Eastern Central Atlantic Regional for 1977.

Table 3. Shares of catches by Species Groups, in Weight and Value, 1977.

IN WEIGHT				IN VALUE		
Ranking		(000 m.t)		Ranking		(U.S. $ million)
1.	Small Pelagic	(1520.0)	41%	1.	Cephalopods	(265.0) 23%
2.	Mackerel	(869.4)	23%	2.	Tuna	(193.2) 17%
3.	Mixed	(486.5)	13%	3.	Crustacea	(184.5) 16%
4.	Demersal	(412.5)	11%	4.	Mackerel	(175.3) 15%
5.	Tuna	(276.1)	7%	5.	Demersal	(165.1) 14%
6.	Cephalopods	(147.5)	4%	6.	Mixed	(98.7) 9%
7.	Crustacea	(36.9)	1%	7.	Small Pelagic	(75.6) 7%

As can be seen from Figure 2, the greater portion of the region's catches are taken in the North Coastal Zone (Morocco to Guinea). The North Coastal Zone also is where almost all of the cephalopods (the most valuable fish) are caught. Clearly, the North Coastal Zone waters are the richest in the region, in both weight and value terms.

Table 4 summarizes the approximate relative shares of the major species groups for the region and the North and South Coastal Zones, from 1972 to 1977.

Table 4. Approximate Shares of Major Species Groups by Zone, 1972 - 77.

	---Percent Shares of Catches---		
	Whole Region	North	South
Coastal Pelagic (e.g., sardinella, sardines, mackerel)	~60	~70	~55
Demersal (e.g., hakes, seabream)	<15	~10	>30
Ocean Pelagic (e.g., tuna)	<10	NI	NI
Shellfish (e.g., shrimp, octopus)	>5	<10	<5
Others	~10	>10	~10

2. Non-African Production

Until recent years, non-African fleets have dominated the region's fisheries. From 1964 to 1977, the share of non-African fleets increased from about half to two-thirds of the annual catches. In 1977, over 70 percent of the value of all catches is attributed to non-African nations (Everett, et al., 1980).

In 1978, the trend towards increasing non-African production stopped. Due in large part to the rising costs of distant water fleet operations and to extended jurisdiction over the fisheries by the coastal nations, the share of non-African production dropped below 60 percent. This was principally caused by the reduction in catches by the USSR, historically the largest single fishing nation in the region. Production by the USSR

peaked in 1976 with reported catches of 1.3 million metric tons, about 37 percent of total production in the region. In 1978, USSR catches dropped to 800,000 mt, its lowest since 1972.[1] (See Figure 4.)

In value terms, the largest non-African fishing nation in the region is Spain (including the Canary Isles). In 1977, Spain alone accounted for 26 percent of the total value, even though it accounted for only 12 percent of total production. This reflects Spain's harvests of the higher valued species (tuna, crustacea and cephalopods).

Other major fishing nations include South Korea, France, Japan, Poland, Romania and Bulgaria. Figure 5 exhibits the trends of production by groups of non-African countries. It appears that all of the major non-African producers reduced their catches in 1978 to levels comparable to 1972 and 1973. Of course, it is too soon to conclude whether the non-African nations will continue to reduce their activity in the region.

Most of the non-West African production occurred in the North Coastal Zone. From 1970 through 1976, 90-95 percent of non-West African production came from the North Coastal Zone; and in 1977 this share dropped to about 85 percent. (No similar data are available for later years.) Within the North Coastal Zone, non-

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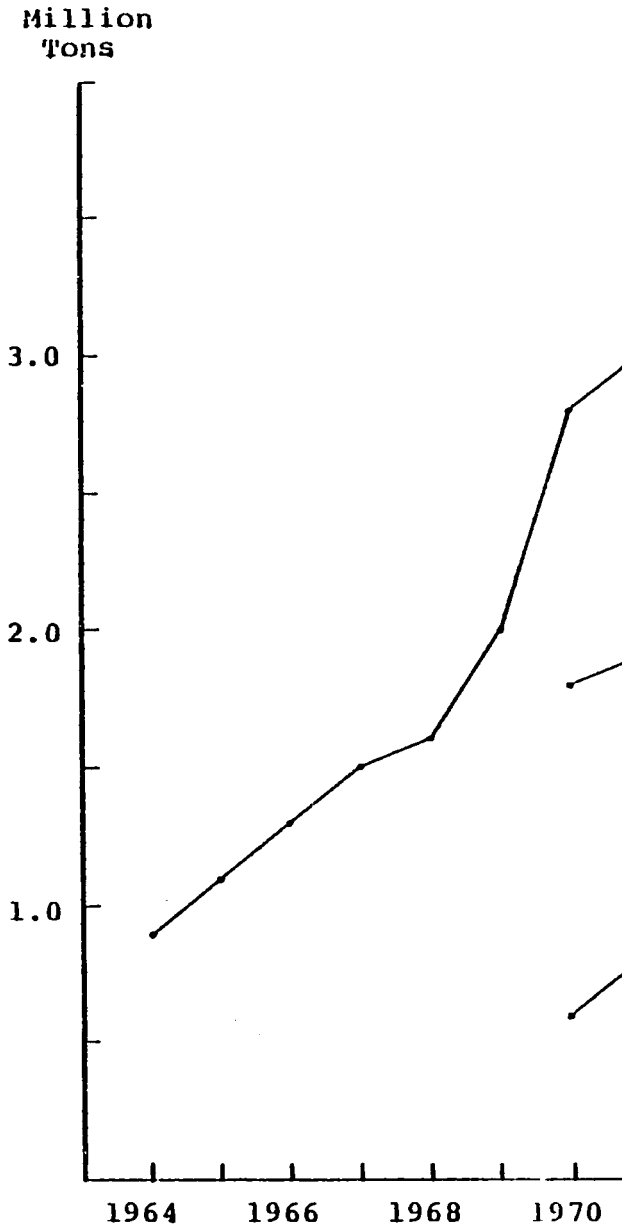
[1] The reported catch statistics for the USSR are particularly suspect. There are at least two good reasons to believe the reported catches do not reflect the full extent of Soviet fishing in the region. One reason is that some of the Soviet's catches are reported as African national catches. A second reason is that often the Soviet's catches go unreported.



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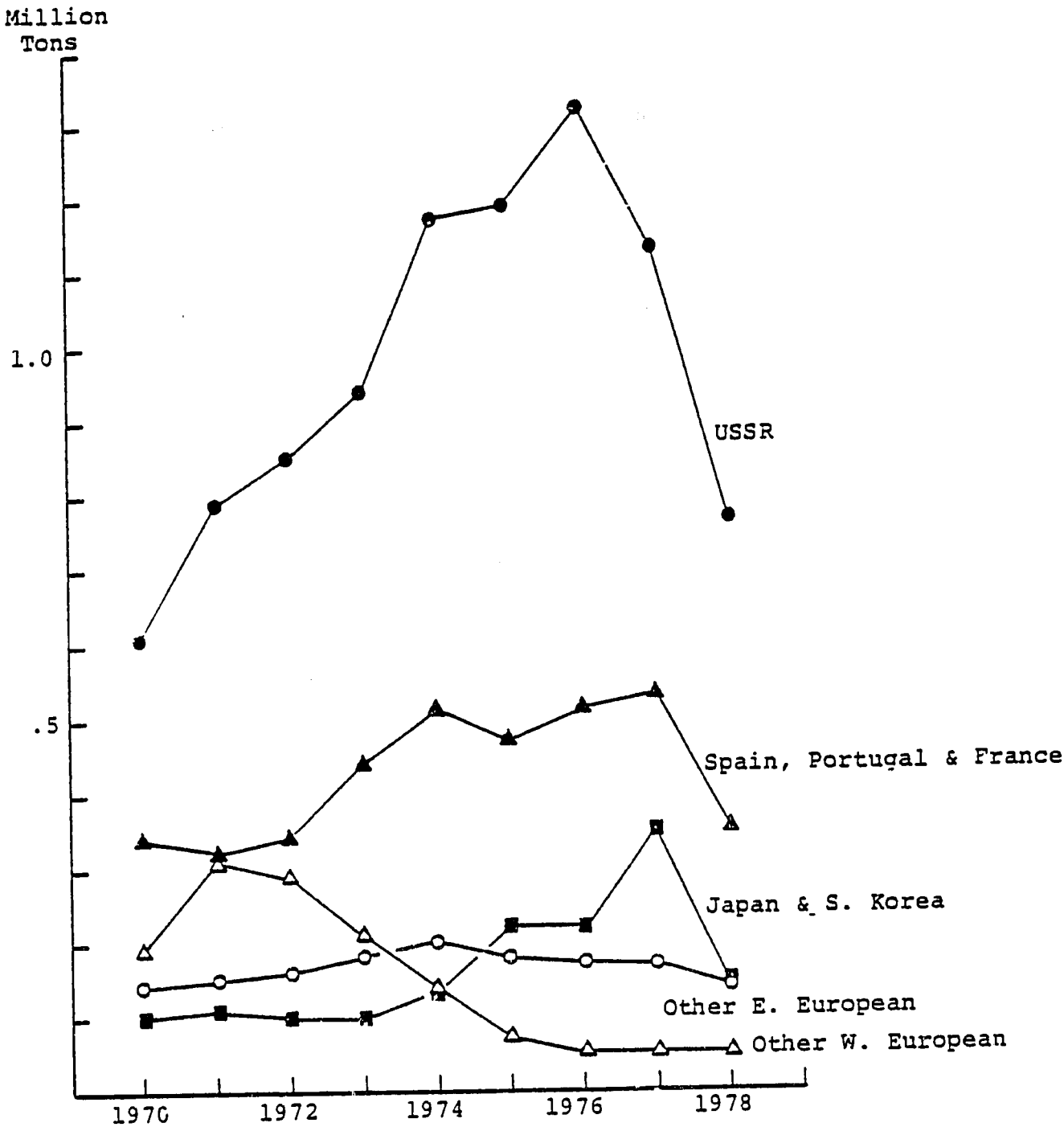


Figure 5. Trends in Non-African Production, 1970 - 1978

West African activity has concentrated mostly in the Sahara Coastal Division, a CECAF statistical division off the coasts of southern Morocco and Mauritania. The principal producers in the Division have been the USSR, Spain, South Korea, Poland, Romania and Bulgaria.

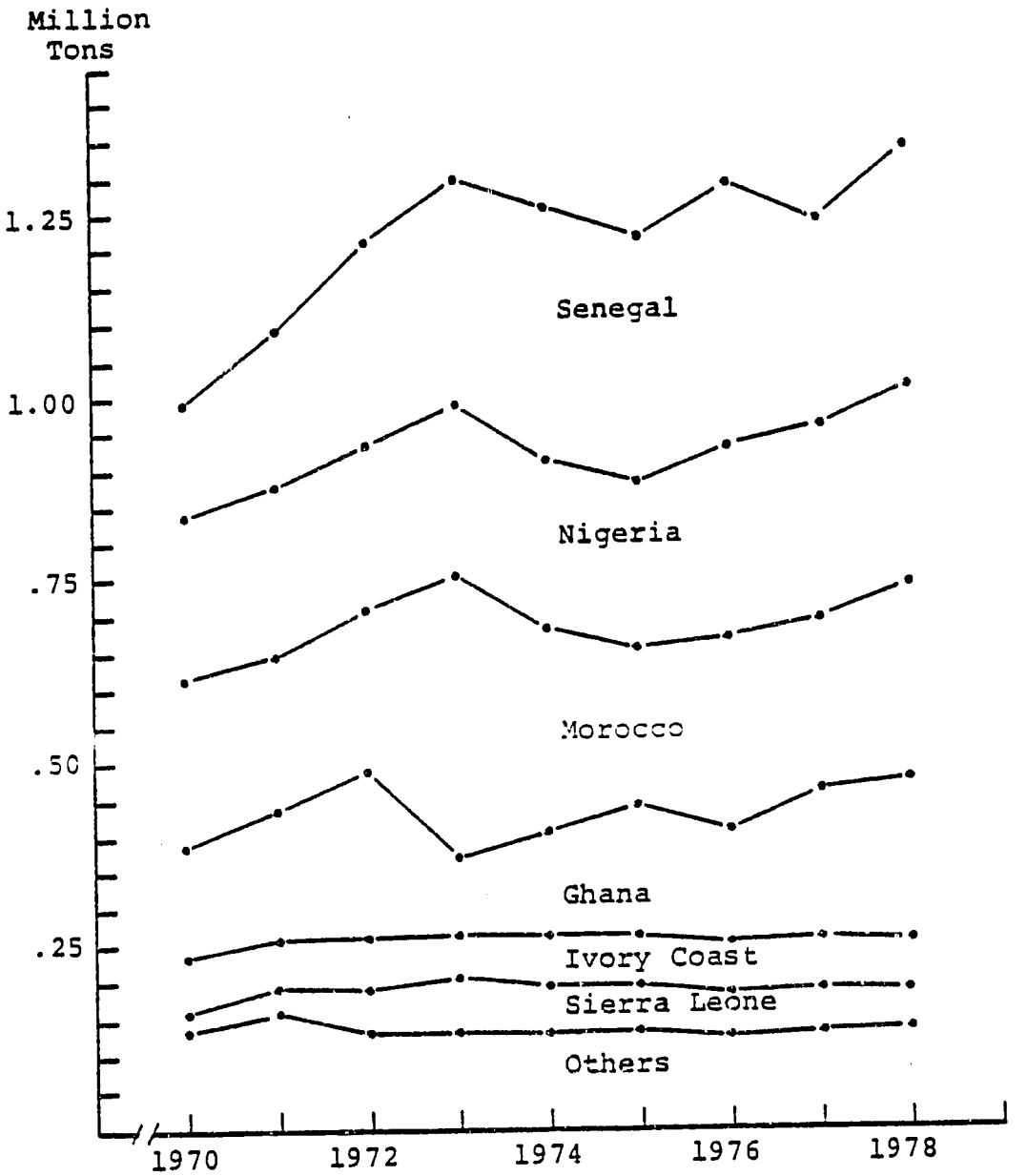
3. West African Production

The trends in weight of production for the principal West African nations can be seen in Figure 6. Total West African production increased by about 30 percent from 1970 to 1978. Most of the reported increase occurred in the early 1970's, and achieved largely by Senegal and Morocco.

For the West African producers as a whole in 1977, the most important fisheries are demersal and crustacea in value terms (about 50 percent of total value), and small pelagic in weight terms (45 percent of production)(based on estimates by Everett, et al., 1980).

In contrast to non-West African production, few differences appear between northern and southern coastal production for West African nations. Figure 7 shows the production trends of countries in the North Coastal Zone (Morocco to Guinea), and countries in three southern divisions (Sierra Leone to Cameroon). By the late 1970's, there was little difference in production for the two zones. Again using estimates of Everett, et al., (1980), there was little difference also in value of 1977 production between the two groups of countries ($155 million for the northern

Figure 6. Trends in West African Production, 1970 - 78



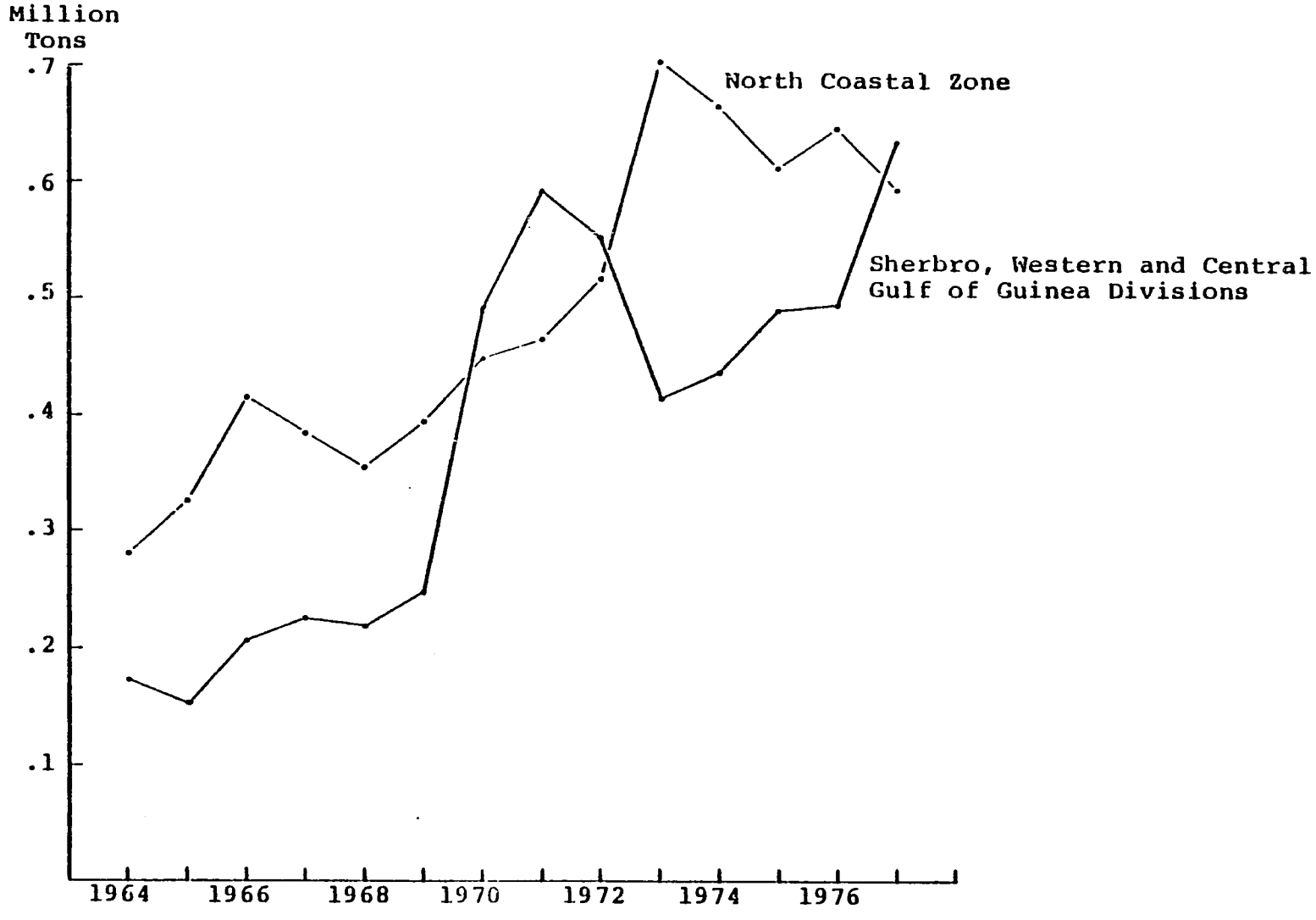


Figure 7. West African Production by Zone

countries and $165 million for the southern countries).

In the late 1970's, the largest West African producing nations were Senegal and Nigeria, followed by Ghana and Morocco. Table 5 (based on Everett, et al., 1980) ranks the major West African nations by weight and value of their marine fish production in 1977.

Table 5. Country Rankings, in Weight and Value, 1977.

In Weight (>50,000 mt)	In Value (>$15.0 million)
1. Senegal	1. Senegal
2. Nigeria	2. Nigeria
3. Morocco	3. Ghana
4. Ghana	4. Morocco
5. Ivory Coast	5. Ivory Coast
6. Sierra Leone	6. Cameroon
	7. Mauritania

The percent contribution of various species to each West African country's total production is given in Table 6. For Senegal, the principal fisheries are demersal and crustacea by value, plus small pelagic by weight. Nigeria's principal fisheries are mixed and crustacea by value, plus small pelagic by weight. Ghana's principal fisheries are tuna and demersal by value, plus small pelagics by weight. Morocco's only dominant fishery is small pelagics (sardines). Ivory Coast's principal fisheries are tuna and demersal by value, plus small pelagic by weight. For Cameroon, it is crustacea and demersal; Mauritania, cephalopods and small pelagics; Sierra Leone, demersal and mixed. The catch composition for the other countries is given in Table 6.

TABLE 6

PERCENT OF WEIGHT AND VALUE OF REPORTED NATIONAL LANDINGS
BY COMPOSITION OF CATCH (1977)

COUNTRY	CATCH	PERCENT BY WEIGHT	PERCENT BY VALUE
Senegal			
	Tuna	5	12
	Crustacea	1	23
	Demersal	28	38
	Cephalopod	1	2
	Mackerel	14	9
	Small Pelagic	36	6
	Mixed	15	10
Nigeria			
	Crustacea	1	30
	Demersal	11	21
	Small Pelagic	44	10
	Mixed	44	39
Ghana			
	Tuna	9	32
	Crustacea	1	6
	Demersal	15	27
	Mackerel	11	10
	Small Pelagic	49	11
	Mixed	15	14
Morocco			
	Tuna	1	2
	Crustacea	1	14
	Demersal	4	11
	Cephalopod	2	21
	Mackerel	17	21
	Small Pelagic	66	20
	Mixed	9	11
Ivory Coast			
	Tuna	19	46
	Crustacea	1	11
	Demersal	19	26
	Small Pelagic	50	9
	Mixed	11	8
Cameroon			
	Crustacea	9	61
	Demersal	46	25
	Mackerel	19	12
	Small Pelagic	26	2
Mauritania			
	Tuna	2	2
	Demersal	21	12
	Cephalopod	28	80
	Mackerel	10	3
	Small Pelagic	34	2
	Mixed	5	1
Sierra Leone			
	Demersal	29	55
	Small Pelagic	29	6
	Mixed	42	39

TABLE 6 (con't)

PERCENT OF WEIGHT AND VALUE OF REPORTED NATIONAL LANDINGS
BY COMPOSITION OF CATCH (1977)

COUNTRY	CATCH	PERCENT BY WEIGHT	PERCENT BY VALUE
Liberia			
	Crustacea	12	81
	Small Pelagic	20	1
	Mixed	68	18
Cape Verde			
	Tuna	18	12
	Crustacea	18	87
	Small Pelagic	12	0
	Mixed	52	1
Gabon			
	Crustacea	9	56
	Mixed	91	44
Gambia			
	Crustacea	5	71
	Small Pelagic	60	9
	Mixed	35	20
Guinea			
	Demersal	49	67
	Mixed	51	33
Guinea Bissau			
	Crustacea	21	87
	Mixed	79	13
Togo			
	Demersal	66	95
	Small Pelagic	34	5
Congo			
	Demersal	18	52
	Small Pelagic	65	24
	Mixed	17	24
Equatorial Guinea	Mixed	100	100
Benin			
	Demersal	50	90
	Small Pelagic	50	10
Zaire			
	Demersal	50	71
	Mixed	50	29
Sao Tome & Principle	Mixed	100	100

SOURCE: Calculated from Everett (1980), Tables 5.5 and 5.6

II.C. Fishing Operations

Fishing operations in West African marine waters can be divided into three groups: the African artisanal fisheries, the African industrial fisheries and the Non-African industrial fisheries.[1] We begin this discussion first describing the non-African operations, since they have long dominated fishing activity in the region.

1. Non-African Industrial Fishing[2]

Europeans began fishing intensively in the region off Morocco in the 1920's, exploiting the sardine. Spain, Portugal and Italy began, at about the same time, to trawl for hake and sea bream. In the 1950's, there was some seasonal fishing for tuna which later extended to year round. Non-African distant water fleet operations began on a large scale in the early 1960's. Medium to large size trawlers were principally from the USSR, Poland, and other East European nations. Around 1970, fleets from Norway, Bermuda and South Africa entered the region using purse seiners to supply fish meal factory ships. These non-

[1] Artisanal and industrial operations are distinguised from each other roughly on the basis of vessel type. Artisanal fishing operations use dugout canoes, and industrial fishing operations use planked wooden or other types of modern hulls.

[2] The current status of the non-African distant water fleets is uncertain. As indicated above, latest available statistics show a considerable drop in 1978 catches by the non-African vessels. Everett et al., (1980) indicate this trend continued through 1979, and best guesses are that foreign activity continued to wane in 1980. The following description of non-African fishing activity applies more to the period 1975-1977. The reader is cautioned that the present (1980-1) status of this fleet may be significantly different than what is portrayed herein.

African operations have concentrated in the resource rich areas off Mauritania and Morocco, and to a lesser extent, off the coast from Senegal to Sierra Leone (Everett, 1976).

In the mid-1970's the principal non-African nations operating in the region were the USSR, Japan, South Korea, Spain and other Eurpoean fleets. These non-African fleets have dominated the cephalopod and sardine fisheries in the northern zone and have harvested significant amounts of other demersal and pelagic species. Very little reported fishing by these fleets has occurred in the southern zone (Gulf of Guinea).

The vessels used are large (over 200 GRT), often having freezing facilities on board, and capable of operating for extended periods out at sea. Some of the fleets are accompanied by large (over 10,000 GRT) mother-ships which process, store and transport the fleet's catch.

Spain has been the principal harvester of cephalopods. Operating primarily out of the Canary Islands, over 200 Spanish trawlers landed nearly 60 percent of the total cephalopod catch in 1977 (Everett, et al., 1980). Large Japanese, Soviet and South Korean freezer-trawlers also harvest significant quantities of cephalopods.

Hakes and seabreams, the other valuable demersal species in the northern zone, are principally harvested by Spanish, Portuguese and Soviet trawlers. These are often taken in conjunction with cephalopod catches.

The principal pelagic fisheries in the northern zone are for

the sardine, sardinella, horse mackerel and mackerel. Spain is a dominant participant in the sardine fishery, employing about 40 purse seiners (based both in the Canary Islands and the Spanish mainland). This fleet fishes mainly from June to February off the coast of central-southern Morocco. Poland, USSR, Bulgaria and Romania exploit sardines off Mauritania using large freezer trawlers of over 1000 GRT.

Soviet and East European freezer trawlers are the major exploiters of the other, cheaper pelagic fish (sardinella, horse mackerel and mackerel). Everett (1978) estimated between 40 to 100 large (2500 GRT) Soviet trawlers consistently fishing these stocks.

In addition to the large freezer trawlers, there are fleets of smaller purse seiners working with fish meal factory vessels in the zone. "Interpeche", a company registered in Bermuda, operated a fish meal factory vessel during the mid-1970s that was 18,000 GRT, capable of processing 2,000 tons of fish per day. The seiners supplying the fish for processing were between 100 to 250 GRT (Everett, 1978). Such fish meal fleet operations apparently are concentrated offshore of Senegal and Mauritania. The number and production of these operations are not known.

Some of the non-African distant-water vessels operate from coastal ports such as Nouadhibou, Dakar and Freetown, though most are based in Las Palmas, Canary Islands. The Spanish and Portuguese vessels are reported taking trips of from one week to over a month duration. Little is known about the operations and

strategies in this region of the other distant-water fleets such as the Soviets, Japanese and South Koreans.

There is also little known about crew size and composition of these large vessels. Foreign vessels operating in Mauritania waters are required to employ some Mauritanians as crew members (Christy, 1979).

The near future trend for non-African distant water fleets is difficult to predict. As extended economic zones (EEZ) are more rigorously enforced, the activity of these fleets should diminish (from mid 1970s levels) but not disappear altogether. The coastal states in the northern zone have different objectives and different opportunities for exploiting their fishery resources. Christy's (1979) evaluation of some arrangements coastal states have made with other nations seems to imply a diversity of foreign involvement in these fisheries will emerge. Some coastal states may emphasize foreign fishing to collect fees while not developing domestic fishing capacity, and other states may opt to develop a domestic fleet capable of harvesting all resources in their EEZ.

The future of foreign activity also depends upon the cooperative arrangements among the coastal states in the region. In recent years, some fish importing states in the southern zone have contracted with non-African vessels to harvest and deliver fish to their ports for domestic consumption. With the proper regional agreements, the efficient non-African fleets may be used to a

greater extent in supplying the fish-poor southern zone states with more fish.

2. African Industrial Fishing

Most industrial fishing operations in the coastal African states are of small to medium scale (many reports characterize them as semi-industrial). These fleets exploit, for the most part, inshore fish stocks using trawlers and purse seiners. Only two countries in the region have established marine fishing traditions: Ghana and Senegal. In addition to large inshore industrial fleets, both countries have several tuna boats, and Ghana for several years has operated a fleet of distant water trawlers. In the late 1970s Morocco had the largest industrial fleet, followed by Ghana, Senegal, Nigeria and Ivory Coast.

The African inshore industrial fleet (ie. trawlers and purse seiners) grew from about 900 in 1965, to 1200 in 1974, and to over 1500 in 1979 (Everett, 1976 and 1980). The northern zone coastal states (Guinea to Morocco) have had more industrial vessels over this interval of time, dominated by the purse seiners of Morocco. If Morocco is excluded, the southern zone coastal states (Sierra Leone to Zaire) possess the largest number of vessels, and the trawler is the most common type of vessel (see Table 7). These facts suggest relatively greater potential for trawler fleet expansion in the northern zone. If distant water fleets continue to reduce their activity, they may best be supplanted by locally based trawler fleets.

Table 7. Approximate Number of Locally Based Vessels in West Africa (1979)

Country	Tuna Vessel	Distant Water Trawler	Trawler	Purse Seiner	Gillnetter/ handliner	Canoes
Mauritania			10	10	10	145**
Senegal	35		84	12	15	6,442
Gambia, The			4	12		350
Cape Verde	20			3	40	800
Guinea Bissau			10			
Guinea			16			3,000*
Sierra Leone			20			6,087
Liberia			24			700**
Ivory Coast	6		30	21	20	2,800
Ghana	33	18	360[1]			8,238
Togo			12	11		603
Benin			12			500
Nigeria		6	85			69,627
Cameroon			33			5,950
TOTAL	94	24	700	69	85	105,229

[1] Includes purse seiners.

Sources: Everett, et al, (1980).
*FAO, Fishery Country Profile, 1978.
**FAO, Fishery Country Profile, 1979.

The inshore industrial fisheries in the southern zone may not have good prospects for development. The resources in the Gulf of Guinea are nearly fully exploited by local fleets. Whereas the southern zone coastal states have less than one-fourth of the fish resources, they have over three-fourths of the population (Talarczak, 1977). This situation of excess demand in the southern zone has led some countries to attempt to develop distant water fleets. Apparently, however, only Ghana has succeeded. The distant water trawlers based in Cameroon no longer operate. Nigeria has a small fleet of distant water freezer trawlers, but rely mainly on chartered foreign vessels to catch and deliver frozen fish (Everett, et al., 1980). It is by no means clear that distant water fishing operations is a viable course for fisheries development in the southern zone coastal states.

Shrimp is one of the more important fisheries for local industrial fleets, especially in Senegal, Nigeria and Cameroon. Because of shrimp's high value on the international market, private sector investment in shrimp fleets has been largely responsible for the industry's development. Everett, et al., (1980) report the shrimp stocks in the region generally are fully, but not over exploited. One of the more difficult problems of resource management involves the interaction between the industrial and artisanal shrimp fisheries. Shrimp migrate during their single year life span from lagoons to the open sea. During this migration they grow and become more valuable.

Artisanal fishermen harvest young shrimp leaving lagoons, thus reducing the biomas and value of the industrial shrimp harvest at sea. The difficult problem is how and how much to restrict the harvest of young shrimp by artisanal fishermen, often a target population in fisheries development programs.

Tuna is becoming more of an important African industrial fishery. In 1974 there were 91 tuna vessels based in coastal ports, and by 1979 there were 120 (Everett, 1976 and 1980). The two principal fleets are located in Senegal and Ghana, each with over 30 tuna boats. Like shrimp, tuna is produced mainly for export.

Demersal fish are harvested by African industrial fleets throughout the region, though with varying intensity and scale of operations. Much of the demersal fish landings are the by-catch of shrimp trawlers, but some fleets fish exclusively for demersal species. Vessels in these fleets vary in size from the small wooden trawlers of 9 - 12 meters to the large freezer-trawlers of about 2,000 GRT (Talarczak, 1977). From the sketchy evidence available it is not clear whether the trend has been towards the smaller trawlers or towards the larger distant water vessels. It appears that neither sector of the fleet has expanded substantially in recent years.

Purse Seining for coastal pelagic species (eg. sardines, sardinella, mackerel, bonga) also is an important industrial fishery for many African states. In addition to Morocco's large purse seine sardine fleet, there are purse seine fleets operating

out of Mauritania, Senegal, Gambia, Ivory Coast and Togo, fishing mainly for sardinella. These fleets consist of small to medium sized vessels (10-35 meters) which take trips up to a week in length. In addition to sardinella, these vessels catch significant quantities of mackerels and bonga.

3. African Artisanal Fishing

Production by artisanal fishing operations comprise a large portion of total landings for several coastal countries in the region. For the coastal countries of Mauritania to Cameroon, artisanal landings account for about 75 percent of total national landings. This ranges from a low of 22 percent for Mauritania and 29 percent for Guinea to 93 and 97 percent in Nigeria and Sierra Leone, respectively (see Table 8).

Artisanal fishing operations in the coastal states involve roughly 100,000 canoes and approximately 600,000 fishermen. Most of these operations are in the southern zone, which is more densely populated and without sufficiently rich fishing resources to attract the large scale industrial fleets. By most accounts, Nigeria has by far the largest artisanal fishery, involving nearly 70,000 canoes and over 400,000 fishermen. Other countries with moderately large artisanal operations are Sierra Leone, Ivory Coast, Ghana and Cameroon in the southern zone, and Senegal in the northern zone (see Tables 7 and 9).

The vessels used by artisanal fishermen vary in both size and type. Most are dugout canoes from 7 to 10 meters in length

Table 8 . Approximate percentage of landings contributed by small-scale fishery.

COUNTRY	Percent Small-Scale
Mauritania	22.0
Senegal	66.9
The Gambia	66.0
Cape Verde	75.3
Guinea Bissau	71.4
Guinea	28.6
Sierra Leone	92.5
Liberia	83.3
Ivory Coast	33.3
Ghana	72.7
Togo	82.5
Benin	42.9
Nigeria	26.3
Cameroon	77.3

SOURCE: G. V. Everett "Some Observations on Small-Scale Fisheries in the CECAF Region.: 1979.

Table 9. Distribution of Marine Fishermen in West Africa

Country	Artisanal Fishermen	Industrial Fishermen
Mauritania	650	200*
Senegal	46,600	3,000
Gambia	3,000	160*
Cape Verde	2,789	337
Guinea Bissau	No data	100*
Guinea	4,000	160*
Sierra Leone	12-20,000	200*
Liberia	2,889	240*
Ivory Coast	17-22,000	510*
Ghana	60-100,000	3,600*
Togo	4,000	230*
Benin	3,500	120*
Nigeria	415,000	910*
Cameroon	12,000	330*
TOTAL	583,428-636,428	10,097

*Number of industrial fishermen estimated by multiplying number of locally based industrial vessels by ten.

Sources: Recent FAO Fishery Country Profiles;
Country Fishery Plans.

Table 10. Approximate Percentage of Artisanal Fleet Motorized

Country	%Motorized
Mauritania	---
Senegal	63
Gambia	65
Cape Verde	---
Guinea Bissau	---
Guinea	23
Sierra Leone	22
Liberia	---
Ivory Coast	---
Ghana	87
Togo	79*
Benin	20
Nigeria	---
Cameroon	15

*"La peche au togo et la planification de son developpement", in CECAF/TECH/79/14, (1979).

Source: Everett, 1979, 'Some Observations on Small-Scale Fisheries in The CECAF Region'.

constructed from a single log. Larger canoes (11-13 meters) are also constructed of a single log but with sides extended upward by the addition of planks. Available data suggests that while many of these artisanal vessels are powered by oar and sail, an increasing number are being motorized (see Table 10). For example, in Togo, the fraction motorized rose from 16 percent in 1967 to 79 percent in 1977. Not all countries, however, have proceeded so spectacularly with motorization.

The gear used practically spans the entire spectrum of gear found in artisanal fisheries around the world. Perhaps the most common gear are hand lines, long lines and gillnets. Other gear reportedly used include beach seines, cast nets and various types of traps. One report (Jarrold and Everett, 1978) even has canoes in Senegal employing purse seines.

The coastal pelagic Bonga (Ethmalosa), comprising a large part of the artisanal catch in most countries, is caught mainly with gillnets. Gillnets are also used to catch sardinella and other pelagic species. Various demersal species (e.g., croakers and groupers) are caught principally with handlines and long-lines.

Number of crew in each vessel varies according to vessel size and fishing gear. For example, small nonmotorized vessels fishing with lines operate with an average of three fishermen. The traditional, unmotorized Ghanian canoe, which is operated all along the West African coast, carries a crew of from five to seven when net fishing. The larger, motorized canoes carry crews as

large as 14 (12 is the average) for net fishing. Some fishermen (e.g., the Anglo (Ewe) of Ghana and Togo) fish principally with beach seines.

Available data suggest that in many West African countries fishing is a seasonal occupation for about one-third of the fishermen. Depending on the region and traditional practices, they either prepare the land and/or plant during the planting season and fish when the agricultural work is completed. This seasonality of fishing has made it difficult to arrive at accurate estimates of numbers of fishermen. The most recent unpublished FAO statistics, where available, allow one to estimate that approximately 33 percent of the fishermen are part-time, ranging from only eight percent in the Gambia (1977) to a full 45 percent in Sierre Leone (1979). The migratory nature of many of the fishermen adds to the variability in local numbers resulting from seasonality. Most notable of the migratory fishermen are the Fanti boat fishermen (Ghana) and the Anglo (Ewe) beach seine fishermen from Ghana and Togo. Until recently they were found in large numbers all along the West African coastline. They are still highly migratory, but some local governments have excluded them from their fishery in favor of local fishermen. Migratory fishermen, although not as wide-ranging as the Fanti and Anglo, are also reported for other West African countries (e.g., Sierra Leone and Ivory Coast).

Throughout West Africa the small-scale fishing fleet is characterized by owner-operators. These owner-operated vessels

are often crewed by a group of kinsmen. Cost of small-scale vessels, motors, and gear is such that individual fishermen can realistically expect that with proper planning they will be able to own a vessel of their own some day. As the boats, motors, and gear become more sophisticated, however, moneylenders play an increasingly important role in financing the fishermen. In many cases, successful female primary buyers assume the additional role of moneylender; thus, increasing their control over the fishermen and insuring themselves with a steady supply of fish. It is reported that in some areas, especially close to major towns, the incidence of non-fishermen owners is increasing. This is to be expected as profits as well as costs of equipment increase. This phenomena can be clearly seen in the Ghanaian semi-industrial, small-trawler fleet (10 meters and under) where it is reported that the majority of vessels are not owned by fishermen.

Distribution of catch among the fishermen varies somewhat from society to society, but the primary determinant of the remuneration system appears to be the scale of the technology. With respect to the simpler, unmotorized canoes, the shares are divided equally with one share going to the boat, one to the net (if used), and one each to the crew of fishermen. As the technology becomes more costly, larger shares are allocated for equipment replacement and repair. For example, the Fanti using the large motorized canoes first deduct expenses (petrol, etc.),

give one share to each of the 9 to 14 crew members, one-half to one share to non-fishermen owners, one to two shares to the boat, two to three to the net, and three to four to the motor. The larger numbers concerning shares for equipment are from the most recent report (Christensen 1978), suggesting that equipment shares are increasing. In most areas, regardless of equipment type, a small share of the catch (several fish for home consumption) is given to women or children who help unload the vessel and carry the fish up to the beach for distribution.

The small-scale fishermen in the fourteen countries focused on in West Africa come from a wide range of ethnic groups. In each country two, three, or more ethnic groups are involved in the coastal marine fishery (see Appendix C). This means that in the various areas, differences in lifestyles, local power structures, and family structures, must be taken into account when designing development programs to insure that they are adapted to the local society (CF. Pollnac 1976, 1978, 1980). Further, although in some areas, lingua francas reduce the linguistic diversity of the region, it should be kept in mind that differing attitudes towards the alternative languages can influence the success of local level communications associated with the development programs (see Pollnac and Sutinen 1980).

II.D. Marketing and Distribution

As a whole, the region's marketing and distribution of fish is marked by dominance of industrial exports in the northern

zone, and of industrial imports supplementing sizable artisanal supplies in the southern zone. This pattern is due fundamentally to the distribution of fish resources and consuming population in the region. The northern zone is richest in fish resources (about 75% of the total), while the southern zone has the largest share of the population (over 90% by some accounts).

There are three principal sources of fish supplies for countries in the region:

1. landings by the national artisanal fleet,
2. landings by the national industrial fleet, and
3. imports and landings by foreign fleets.

The landings by the artisanal fleets are fresh, by industrial fleets mostly fresh with some frozen, by foreign fleets almost exclusively frozen (if not chilled); and imports take the form of frozen, canned and dried fish.

The landings by artisanal fleets generally are consumed locally within the country. In the northern zone (especially Mauritania, Senegal and The Gambia), most of the artisanal production goes directly to fresh consumption. From Guinea south to Cameroon, significant proportions of national artisanal landings are smoked or undergo some other form of traditional processing (salting, sun-drying, fermenting). With few exceptions, artisanal landings are not extensively distributed to the interior, generally being consumed along the coast.

The landings of the national industrial fleets are both

consumed locally (in fresh and processed forms) and exported (after processing). In the northern zone, the landings by foreign fleets undergo onshore processing and then are exported. In the southern zone, foreign landings typically are in frozen form, pass through a cold store network (highly developed in a few countries such as Ghana), then thawed and smoked before final consumption. Imports other than landings of foreign fleets do not make up a large part of domestic fish supplies.

Each coastal state in the southern zone paid out more for fish imports than received for fish exports in 1978. In contrast, each northern zone state realized a positive trade balance in fish products (see Table 11). Much of this trade is not, of course, confined to the region. Most of the shellfish and tuna are shipped to Europe, Asia and North America.

Imports in the southern zone consist largely of frozen fish provided by both African and non-African distant water fleets fishing in northern zone waters (though some are caught off Angola). Imports of frozen fish have replaced earlier imports of dried fish of Mauritanian and Scandinavian origins (Talarczak, 1977). The expansion of frozen imports in the southern zone occurred in conjunction with the development of cold storage facilities in these countries. The major importing countries of Nigeria, Ivory Coast and Ghana currently have substantial cold storage capacities (see Table 12).

Table 11. Fish Trade, 1978 (Value in thousand dollars)

Country	Imports	Exports	Trade Balance
Mauritania	123	22,938	22,815
Senegal	6,829	69,201	62,372
Gambia	255	2,247	1,992
Cape Verde	99	702	603
Guinea Bissau	140	1,543	1,403
Sierra Leone	1,358	0	-1,358
Liberia	7,463	2,433	-5,030
Ivory Coast	31,731	22,100	-9,631
Ghana	25,668	637	-25,031
Togo	3,267	0	-3,267
Benin	2,978	859	-2,119
Nigeria	75,052	1,891	-73,161
Cameroon	5,575	4,420	-1,155

Source: Everett, et al (1980).

Table 12. Location and Approximate Capacity of Cold Storage Plants.

Country	Cold Storage Capacity (tons)
Morocco	10,000
Madeira (Portugal)	---
Canary Isles (Spain)	60,000
Senegal	12,000
Gambia, The	1,500
Cape Verde	3,500
Guinea Bissau	1,000
Guinea	3,400
Sierra Leone	3,000
Liberia	2,000
Ivory Coast	20,000
Ghana	15,000
Togo	2,000
Benin	1,000
Nigeria	50,000
Cameroon	4,000
Equatorial Guinea	---
Gabon	300
Sao Tome and Principe	100
Congo	1,500
Zaire	3,000

Source: Everett, et al (1980).

Though not entirely clear from the published documents, sardinella appear to comprise a large portion of the frozen imported fish. In the past at least, the USSR and East European fleets have been major suppliers of frozen fish imports to Ivory Coast, Togo, Benin and Nigeria. The Ghanaian distant water fleet provides the country's frozen fish, and most of Ghana's imports are of canned and dried fish products (mainly from Japan) (Everett, 1977).

1. The Traditional Marketing and Distribution System

CECAF Project estimates indicate that the small-scale fishermen land about 75 percent of the total weight of the fish landed by locally based vessels in West Africa. One of the great problems, however, is the lack of adequate fish handling facilities at small-scale fish landing places. In most areas fish are handled, processed, and marketed at beach locations lacking even basic facilities such as hygenic areas for cleaning, washing, and sorting of fish, not to mention running water or ice supplies (Talarczak and Haling, 1978). It has been estimated that problems in handling due to lack of facilities cause losses as high as 20 to 40 percent of landing prior to reaching the consumer.

Due to this shortage of adequate landing and processing facilities, most fish landed by the artisanal fleet has been traditionally processed by smoking. Some drying and salting also occurs as well as other infrequently used preservation techniques. In some countries such as Sierra Leone, a raised platform is used

which is less effective than the smoking ovens used in Nigeria and Ghana (Linsenmeyer 1967). In Ghana the method uses smoke from a wood fire burning inside an open earthen oven with fish laid on racks directly over the fire. This process typically results in excessive dehydration, which increases the life of the product but also results in low nutritional quality. In particular, the protein content of the fish is destroyed by excessive dehydration. Thus, smoking as traditionally practiced, destroys valuable protein so badly needed in this part of the world (Caurie, 1975).

A relatively large number of fish smokers, often family firms composed of fishermen's kin, handle the catches of the isolated small producers. Other middlemen (usually females) collect these small-scale catches and distribute them to inland markets where they are purchased by either retailers for local sale or other wholesalers who will distribute the product to more remote areas. In most areas smoked fish are preferred for their taste and role in traditional recipes.

The general method for marketing the artisanal catch in almost all West African countries is that upon landing, the fish are sold to middlemen, usually a woman who is either the fisherman's wife, kin, or an unrelated entrepreneur. The unrelated female entreprneurs are beginning to dominate the wholesale and retail trade as a result of their role in financing the more expensive motorized technology that is beginning to dominate the small-scale fishery. In one country, Sierra Leone, it is reported that the proportion of male middlemen is beginning to

increase. In Senegal, and to a limited extent in Ghana, some of the buyers are organized into marketing cooperatives. The primary buyer is often the person who further processes the fish (e.g., by smoking) for distribution.

Little information is available concerning prices paid to fishermen. It is reported that in Ghana each village or town along the coast has a head fish buyer who is elected by the others. She meets the first vessel to reach the beach and bargains with the captain concerning the price to be paid. The price decided upon becomes the base price for the day. The decision is based upon factors such as size of catch, species of fish, and size of catch on previous days (Christensen 1978; Quinn 1978). Price per pan (selling units are tin pans) decreases late in the day due to restricted time for selling and processing. Additionally, if subsequent landings are much larger or smaller than the initial landing, prices can vary as much as 50 percent in either direction. Nevertheless, the base price is usually honored. This pattern of basing prices for the day on initial landings is also practiced in Sierra Leone where drops in prices near the end of the day were also recorded. Other levels of middlemen (e.g., in the wholesale and retail markets) also set prices based on an evaluation of the state of the market in the various towns where they sell their fish (see Quinn 1978).

In Senegal the recently organized marketing cooperatives set the prices. Fishermen selling outside the cooperatives are subject to market forces. It is reported that the Offices des

Pêches Maritimes holds a monopoly over wholesale fish marketing in Guinea where the national government sets prices and profit margins (Guinean Country Profile, 1978). One informant, however, reported that traditional middle-women can still be found buying and selling fish in Guinea. In Benin, the Societe Nationale d'Armement et de Pêche attempts to enforce fish prices set by the Minister of Commerce.

The best available information concerning the distribution and marketing of marine fish at inland locations is from Ghana. There, coastal buyers travel to inland towns where they sell to retailers. In some cases the inland retailers are coastal people who have been set up in the business by the coastal buyer (Schwimmer, 1979) and thus form distinct ethnic groups in the inland locations. The introduction of frozen fish technology has not completely eliminated this traditional system. In one town close to an inland terminal for frozen fish distributed by the Ghana Fishing Corporation, the fish wholesalers smoke the thawed frozen fish and sell it through the traditional retailers. Further, the traditional coastal supply system still accounts for a good proportion of the fish distributed to inland locations (Schwimmer, 1979). In other West African countries (e.g., Sierra Leone, Togo, and Ivory Coast) frozen fish from the industrial fleet are also bought and smoked by middlemen for further distribution suggesting that the traditional processing industry can readily adapt to the new technology while at the same time provide a product preferred by the consumer.

2. Marketing and Distribution of Industrial Landings

The utilization of industrial landings varies considerably from the utilization of artisanal landings. The high-value fish such as tuna, shrimp and some demersal species are processed and destined almost exclusively for export. The balance of the local industrial landings generally is sold locally in fresh or frozen form.

There is an increasing tendency towards use of frozen fish in the southern zone, and the cold store networks will play an ever important role in the marketing and distribution of fish in those countries.

Modern processing facilities for fish meal and oil exist in Mauritania, Senegal, Cape Verde Islands, Ivory Coast and Ghana. Tuna canneries exist in Senegal, Cape Verde Islands, Ivory Coast and Ghana. And shrimp processing is important in Senegal, Gambia, Ivory Coast, Nigeria and Cameroon. All of these modern processed fish products are exported to Europe, Asia and North America.

The growth of frozen fish imports in the southern zone involved rapid development of refrigeration facilities, particularly in Ghana, Ivory Coast and Nigeria. Cold store capacity by country is given in Table 12. Except for shrimp processing, there exists little onshore freezing capacity in the region. In the recent past, more freezing was conducted on board freezer trawlers and motherships. It is not clear from published reports

whether local ice supplies are adequate. No evidence is available on ice production capacity and distribution, however, Talarczak (1977, p. 64) argues that "development of ice making facilities is required throughout the southern CECAF countries".

In the southern zone much of the marketing and distribution of fish landed by the local industrial fleet is conducted by fish companies using modern distribution networks - including insulated vans and storage facilities. These operations distribute fish to the inland cities and large villages, in the form of 20 kg cases of iced fish.

Some shipowners do sell directly to local market wholesalers or brokers, and the product enters the traditional marketing system described above. Semi-wholesalers also buy iced fish directly from vessel owners and transport it to local or interior markets.

Frozen fish landed in the southern zone by the large distant water vessels is unloaded at commercial or fishing harbors and transported to the buyer's coldstore. The buyer later ships the frozen fish (in 30 kg cartons) to smaller coldstores located in the towns where it is sold to semi-wholesalers and fish brokers. Local retailers sell the fish in local markets by the piece or 10 kg block. Some of the frozen fish is smoked by traditional methods before reaching the semi-wholesalers and retailers. Smoking is particularly prevalent in Ghana.

3. Seasonality of Sales

Imported frozen fish can be landed in West African ports at almost any time of the year, though at different prices. Well smoked or dried fish may be kept up to two months before sale, but fresh fish is usually least abundant, and most expensive, on the coast during the 'rainy months'. Depending on the latitude along the bulge of Africa, this varies, but it generally covers the time from June through September. It turns out that this time roughly corresponds to the seasonal trough in the number of live animals brought for slaughter to coastal markets; fish and meat scarcities, therefore, occur somewhat simultaneously, and the effects on their respective prices tend to reinforce each other.

4. Dockside Fish prices

This information is presented here for several types of fishing activity, and two countries. The prices quoted here for fish caught by modern vessels and African artisanal fishermen were those received in major ports, in this case, Abidjan and Lomé. Prices received by freshwater fishermen are those which prevailed at the same time on the markets of large towns near the coast.

	Ivory Coast CFA/Kg Average		Togo CFA/Kg Average
	1975	1976	1976
Industrial			
Seiners	49	49	-
Trawlers	65	86	50
Artisanal			
Maritime	150	152	141
Inland (lagoon)	185	187	-
River/Lake	125	130	125

SOURCES: Ivory Coast: Koffi, 1977; Togo: Josserand, 1979.

Note that in Abidjan, frozen fish was imported at a cost of 73 CFA/Kg in 1975, and 94 CRA/Kg in 1976, (Koffi, 1977). The question becomes then, to know why frozen fish did not displace other types of fish any more than it did. The explanation lies in a combination of factors. Some of these, such as the limited absorptive capacity of both transportation and storage networks, were mentioned previously; others, such as the extent of protection obtained by the domestic industrial fishery, are discussed further in this report.

5. Price Competitiveness of Fish Versus Meat

As a general rule, fish is less expensive than meat in coastal West Africa. This is true even though during the late seventies, the price of fish has been rising at a faster rate than the price of meat. Moreover, this price advantage of fish over meat prevails not only on the coast, as one would certainly expect, but in the interior of most countries as well.

For example, Staatz, (1980) surveyed the respective changes in fish and meat prices at the retail level on a north-south axis in Ivory Coast. He found that the ratio of fish price to meat price in Abidjan was .38. Almost exactly at the geographical center of the country, in Bouaké, the ratio had risen to .48, and rose further yet in Korhogo, in the very north of the country: .69. Even there, almost as far from the coast as can be, and in a traditionally livestock surplus area, the unit price of fish was still below that of meat. In the case of Ivory Coast, the fish referred to by Staatz was mostly frozen fish, but the price competitiveness of fish with respect to meat does not always require that the former be frozen. In Senegal, the retail price of fish and meat products on the Bakel market were as follows:

	CFA/Kg. (March 1980)
Bone-in beef	250
Boneless beef	400
Fish	300

(Josserand, joint assessment, 1980)

Note that Bakel is located in Eastern Senegal, near the boarders with Mauritania and Mali, perhaps farther from the Atlantic coast than any other community of this size in Senegal, and right along the Senegal river. The Bakel area is also a major supplier of livestock to the capital. Yet, the fish sold in the Bakel market had been brought chilled, from M'Bour, Cayar, Joal and Saint-Louis (all well established artisanal fishing communities

along the coast) by private traders; transport being done by road.

6. Marketing Structure, Efficiency and Viability

a. Industrial Sector

In each coastal state, industrial-type catches are landed by a few modern fishing companies. In general, these are owned and operated by foreigners, under sole ownership or jointly owned with local private or public interests. This is the case in Mauritania, Senegal, and Ivory Coast. Sometimes, West African equity dominates, as in Sierra Leone, Nigeria and Togo. In Liberia, a single private company (Mesurado Fishing Co.) dominated the market until the fall of the Tolbert regime. In Benin, under the threat of state control, the few privately operated trawlers registered in Cotonou left for more hospitable waters. Benin is now in the process of buying a few trawlers to put the state company, Sonapeche, in business.

Some of the industrial fishing companies have attempted to achieve vertical integration by handling storage, processing and distribution under chilled or frozen form as well, but in many cases these operations are handled by other private companies. The firms which process and distribute fish caught by modern vessels, all based in the countries' capitals, often also handle frozen fish imports.

Although one can observe much diversity in the level and structure of private investment in coastal states, such investment

clearly appears to be a function of the local fish stocks and size of market, of the government policy toward foreign and domestic private investment, and of specific national goals with respect to food and employment. Even under very favorable private investment conditions, however, there is often a high degree of concentration in industrial fishing, importing, processing or distribution. This in itself should not elicit surprise; the introduction of a new and costly - though efficient - technology, almost always implies economic concentration in the short-run. Depending on the size of market and the vitality of the private sector, the degree of economic concentration decreases over the medium-run. The modern fishing and processing industry of Senegal has evolved in the general direction of increased competitiveness over the last few years, but not without difficulty (recall the failure of many Senegalese-foreign joint ventures).

The Ivorian experience is also interesting in this respect. In the early 1970s, 70 percent of total investment in industrial fishing came from private-foreign and Ivorian-sources. The penetration of the domestic inland market by frozen fish was executed by a single Lebanese owned company. Within a few years, the few established or newly created frozen fish import companies also took up storage and distribution in the interior. The government of Ivory Coast strongly encouraged this action on their part for at least two reasons: (i) to increase competitiveness in the storage and wholesaling of frozen fish in the

interior, and (ii) to protect domestic industrial fishing companies and artisanal fishermen. This protection took the form of a 32.5 percent duty on forzen fish imports, and the physical protection of the coastal market by limiting the amount of frozen fish sold within 200 kilometers of the Abidjan area. Eventually (1976), the government established a public society, AGRIPAC, responsible for the import and distribution of most frozen fish, thus emulating decisions taken in several countries (Ghana, Togo, Benin).

This increasing public sector involvement raises a number of basic economic questions, among which two seem most relevant:
(i) To what extent is it wise to protect the domestic industrial fishery against inexpensive frozen fish imports?
(ii) If the import, storage and distribution of frozen fish is handled in a monopolistic-oligopolistic fashion (as may well have been the case in Ivory Coast during the early seventies), why not encourage private competition rather than creating a public company for the same purpose?

Senegalese waters are rich enough, and local demand sufficiently high to justify a well developed domestic fishing industry. Adidjan's location, port installation and active industrial sector suggest the profitability of strengthening its present advantage in the processing of tuna and other expensive species. In Ivory Coast, fish stocks in domestic waters are so limited that as early as 1970, 60 percent of the domestic industrial catch came from non-Ivorian waters (Senegalese, Liberian, Congolese, Ghanaian and even Mauritanian;

Siges, 1973). The Ivorian modern fleet may also be justified in the sense that it supplies a large share (57 percent) of total domestic catch, and that the fish it brings in is valued a lot more than that caught by artisanal fishermen (Koffi, 1977). Similarly, Liberia before 1980 maintained the viability of its small modern domestic fleet through specialization in valuable species (mostly shrimp, exported frozen to the United States); the general Liberian market was then mostly supplied by inexpensive frozen fish imports.

For other nations, with limited domestic markets and fish stocks, the viability of a modern national fleet is seriously open to question. Togo and Benin are unlikely to profit much from the modern fishing vessels they are now acquiring. The same kind of investment in Guinea probably ought not to come before internal transportation has improved; the Gambia and Guinea-Bissau are rightly looking closely at the possibility of further cooperation with Senegal.

b. Traditional Sector

The private fish marketing system in coastal West Africa has a long tradition of ubiquitous efficiency. Without getting into too much detail, we show that the above conclusion rests upon evidence of extensive penetration of inland markets by many competing sellers of varied fish products. Indeed, an observer of African markets would be hard put to find one market, even in the most remote areas, where fish is not present in one form or another.

Frozen fish may well have been introduced in the interior of Ivory Coast by a modern company, but frozen fish had been preceded by chilled fish from the coast, and dried/smoked fish from both the coast and the Niger River. In fact, the towns of Sokodi and Dapango, in northern Togo, were supplied with frozen fish from Lomé in the early sixties (Rep. of Togo, 1966). This trade was then handled by women buying frozen, chilled and smoked fish in Lomé, transporting it half-way up the length of Togo by train, (up to Blitta), and from there to the north by road. The very same thing took place in Benin. As noted above, many private traders are found offering varied fish products on inland markets. For instance, the 1970 SEDES survey of fish trade in Ivory Coast showed which types of fish were available on interior Ivorian markets. They found that in the city of Bouaki, half-way between the coast and the border with Upper Volta, the following types of fish were for sale:

- frozen fish bought in Bouaki, (from Abidjan)
- chilled fish on ice, also from Abidjan
- fish bought and smoked in Abidjan
- smoked fish from Mali.

They calculated the various marketing costs associated with the sale of each product, (purchase, packaging, processing, storage, taxes, losses, etc.). Profit margins were around 30 percent for chilled and smoked fish, and an average 18 percent for frozen fish; these are considered to be reasonable for this type of trade. The SEDES study also looked into the matter of transport costs. Their basic finding was that, in spite of the

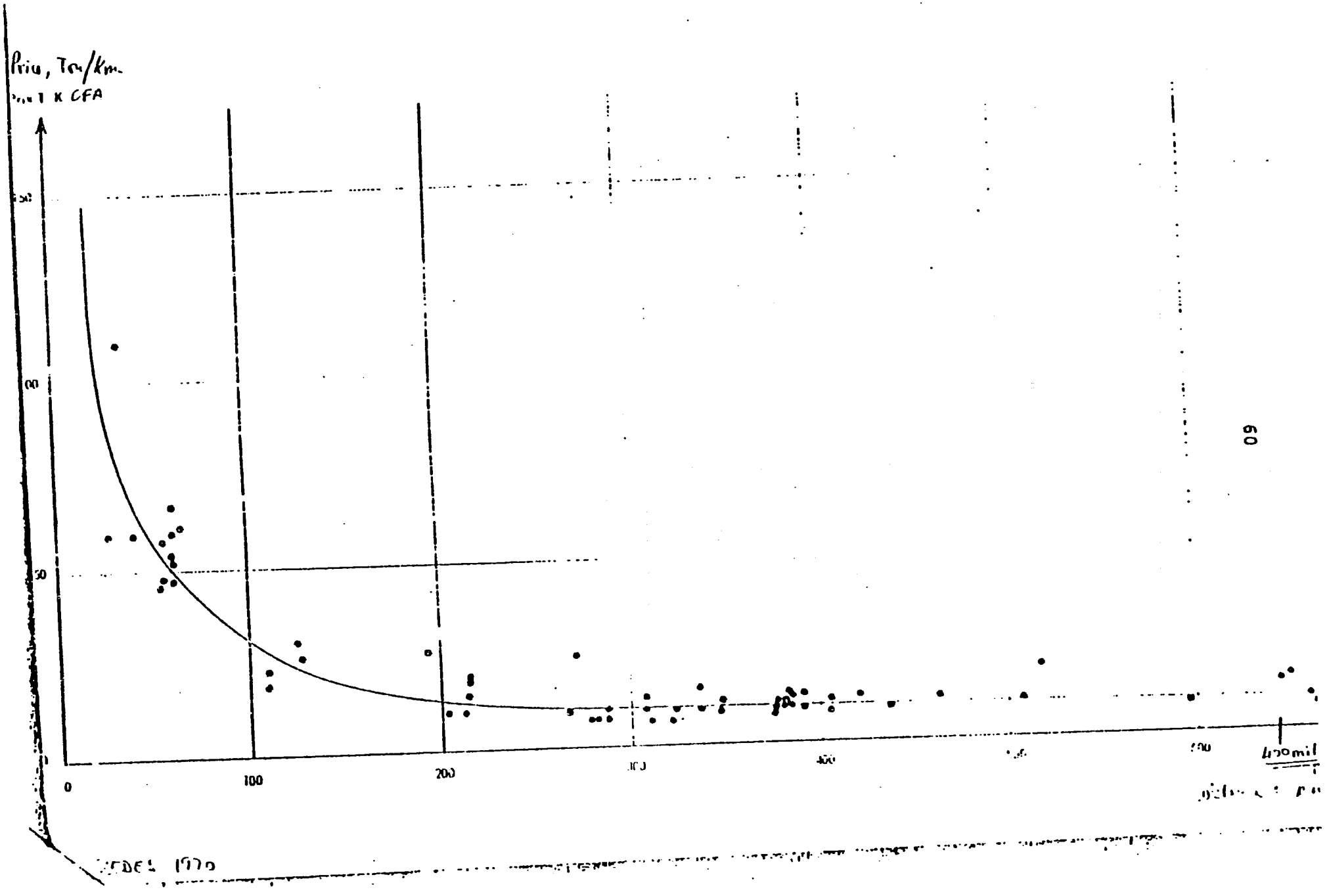
poor quality of the transportation network, the costs associated with small accompanied fish shipments were low (2,500 CFA for one ton of fish over the first hundred kilometers), and displayed significant economics of distance (see figure). The marginal cost of shipping fish 500 rather than 300 kilometers appears negligible. True, transport is not entirely reliable, and in the case of frozen or chilled fish, this may lead to sizeable losses, but such low-priced transport explains in part the ever-presence of fish on African markets.

As explained elsewhere in this report, fish marketing is handled almost exclusively by women. Their role consists not only of buying, processing, transporting and retailing fish; they are increasingly involved in the underwriting of fishing ventures. As such, they may have most or all of the equity in a fishing craft or its equipment. Their access to credit is confined to the informal sector (i.e. outside of banks and public agencies) and largely undocumented. It must be extensive, however, because their purchases of frozen fish are done in cash and often involve very large amounts.

The West African "fish wives" are probably the most colorful and noticeable marketing agents, but their trade also involves large numbers of people less often recognized but just as important. We refer here to the people in charge of processing - mostly smoking and drying - fish. The West African coast is lined with small communities where people's exclusive occupation consists of such processing. They appear in or near all major fishing

VARIATION DU PRIX DE LA T. K EN FONCTION DE LA DISTANCE

(Transports du poisson)



villages, and around the capitals. The city of Abidjan is flanked by veritable industrial suburbs where all economic activity is closely linked to the smoking and transport of fish to the capital; a whole specialized firewood industry - brought in from other areas by the truckload - has developed. The extent of fish processing in Ivory Coast is such that for every fisherman there is one person entirely occupied in processing, and the Ivorian case is not to be seen as markedly different from what happens in other countries.

What preliminary conclusions can we draw from the preceding overview of fish marketing and distribution in coastal West Africa?

First, fish is price-competitive with meat in almost all cases, despite the relative rise of fish prices with respect to meat which has been taking place in the whole region during the late seventies. Fish is expected to retain some price advantage over meat in the foreseeable future.

Secondly, the modern industrial sector handling fish production and trade has, at the onset, shown signs of economic concentration; this caused a certain concern among the governments of several coastal states. The opinion expressed here is that unless strong protection is extended to the pioneering firms, concentration in the industry will not be maintained in the medium term. Most coastal governments would, therefore, find it to their advantage to promote domestic competition in this subsector rather than to attempt a public takeover of the modern fish distribution and trade network. The viability of modern

domestic fleets, (government owned and managed) for countries such as Benin and Togo, is questionable.

Third, the traditional, private fish marketing subsector is characterized by a large number of efficient and omnipresent agents; these, and the many people involved in closely related activities (e.g., processing) have shown their ability to make the best of the transport and distribution infrastructure available, and to handle newly introduced products. The vitality of this private sector, and the extent to which it can be used as an instrument in fisheries development should not be neglected.

II.E. Fish Consumption

Any discussion of past, present and future patterns of fish consumption in coastal West Africa must revolve around two essential facts; the importance of fish in the diet and proteidic intake of individuals, and the powerful influence that meat and fish exert upon each other in the market place and consumers' food budgets. All the evidence available on animal protein consumption patterns in CECAF-covered nations (with the notable exception of Mauritania) show that fish and meat are very close substitutes. Over time, changes in the quantity available of one have influenced the quantity consumed of the other, and their respective prices have clearly been related.

The long-standing historical pattern of meat/fish consumption interaction in coastal West Africa reflects the fact that for ecological reasons, the Sahelian states, as well as the savanna-like part of coastal states, have had a natural advantage over coastal areas in livestock production. On the

other hand, coastal areas are obviously better placed from a fish supply point of view. There have been some movements of dried and smoked fish from the Niger river and lake Tchad toward the south, but the mainstream of trade has consisted of trekking livestock from the Sahel and the savanna toward the coast, most often across national boundaries, while chilled and dried/smoked fish made its way northward from the coast to the hinterland.

Up to the end of the 1960's, this trade, organized by separate, well-organized private groups, was extensive and far-reaching, given the state of the transportation network and the lack of storage facilities. The prices of these two major products naturally reflected --and still do-- respective locational advantage; the unit price of fish rising farther from the coast, and the unit price of livestock and meat rising farther from the Sahel and closer to the coast.

This orderly pattern was disrupted in several ways; which are worthwhile exploring briefly. The first change was gradual, and quite beneficial; the transportation network (overall) improved. This meant that both livestock from the north and fish from the south became cheaper to convey to their old respective markets, and that in some cases, these products penetrated areas previously not reached. This did not change in any major way the price competitiveness of fish along the coast or that of meat in the Sahel, but the spread between fish and meat prices in many intermediate areas narrowed.

The second major change of the times consisted of the introduction, in the late sixties, and early seventies, of frozen fish on local markets in significant amounts. The case of Ivory Coast is quite interesting in this respect. Frozen fish was first introduced on a large scale by a private importer during the summer of 1969. By the end of the same year, frozen fish was sold not only in Abidjan, but in Man and Danané, near the Liberian border; in Bondoukou, in far-eastern Ivory Coast; and in Korhogo, in the extreme north of the country, (SEDES, 1970). This first major penetration of frozen fish into Ivory Coast involved 3,600 tons in 1969. In the following year, the amount rose to 10,000; then 15,300 in 1971, and 23,700 in 1972, (SIGES, 1973).

The penetration of frozen fish into Ivory Coast, (and other countries, although in a less spectacular way), merits attention, both because of the facts that make it possible, and because of its effects on other aspects of trade. Part of the reason behind the success of frozen fish in the Ivorian hinterland was its low price. Ex-vessel price for frozen fish in Abidjan was then, and still is, much lower than the dockside price of fish landed by artisanal onshore, inland lagoon, and freshwater fishermen. A second factor was that there was almost no consumer resistance to the introduction of this new product on the basis of appearance, taste, etc. since frozen fish could be thawed and smoked prior to sale. Various sources have set the proportion of fish sold in smoked form at about 75% for Ivory Coast, (e.g.

Barry, 1978). In this respect, frozen fish has had an enormous advantage over frozen meat, and to this day, frozen beef is not accepted in the interior of Ivory Coast as readily as frozen fish is. Another reason one may want to invoke to explain the success of frozen fish in Ivory Coast is the contribution to this new trade by established traditional private fish traders. In the Ivorian case, the transportation and storage of frozen fish from the coast to the interior has been handled in a modern industrial fashion by the few large importers and, more recently, by AGRIPAC, the state-controlled fish import enterprise. From storage centers, now located in many inland communities of Ivory Coast, frozen fish is bought wholesale (or at least semi-wholesale) by a large number of intermediaries, mostly women, who either sell it to processors (smokers) located in other communities, or process and retail themselves this fish in various locales. The adaptation of the traditional marketing system to new products and processes, or the superimposition of new channels upon old ones has been observed in very much the same way in Senegal, Togo, Benin; and is discussed further in the section on marketing proper.

An important side-effect of the frozen fish penetration into Ivory Coast has been the displacement of virtually all previous imports of dried/smoked fish from the Niger river. Traditionally, central and northern Ivory Coast imported a few thousand tons per year of "Mopti fish", mostly from Mali. After 1970, these exports all but disappeared. Admittedly, other factors, such as the Sahel drought, decreased yield from the Niger river and increased urban Malian demand for Niger river

fish may have been a factor too, but the closure of the Ivorian market to Malian and Nigerien fish can be traced mostly to shipments of frozen fish from Abidjan.

The third, and unquestionably most momentous change in the regional pattern of animal protein consumption, has been the 1968-1973 Sahel drought.

The various factors leading to the drought are still a source of controversy, and its ultimate effects are open to question as well; nevertheless, several facts relevant to the question of animal protein consumption in the region may be put forward. Let us first say that the effect of the drought upon the supply of livestock from the Sahel went through several stages. At first, herders kept culleable animals, and tried to lead their herds through and out of the hard times by adopting longer or more complex transhumance patterns. A large number of the 'losses' suffered by certain Sahelian states were therefore more a question of cattle migrating south (into northern Ivory Coast, Togo, Benin), than a matter of actually dying on the hoof in Mauritania, Mali or Niger. The impact was felt through sharply higher prices for livestock and meat in those states.

The second main stage involved the realization among many herders that this was going to be an unusually harsh drought, and that they could not help some of their animals live through it. A short period of destocking ensued, during which Sahelian cattle were sold for next to nothing; this came to be known as the period of "la vache à mille francs", (the $5-cow days). This

upsurge of Sahelian livestock on markets was, however, extremely brief. There were, after all, few animals to be sold and Sahelain governments, worried by this exodus, prohibited all further exports. As of 1973, the Sahel herds went into a period of reconstitution, during which very few animals were sold for slaughter. By then, the traditional supply of Sahelian meat to the coastal states had all but disappeared, and coastal states were frantically searching for alternative sources of animal protein.

Nations like Senegal and Ghana, with access to large fish resources, made up some of the meat deficit by increasing their consumption of fish. Ivory Coast, on the other hand, sharply increased its imports of non-west African meat and fish; countries like Togo and Benin also absorbed the shock by relying increasingly on imports of inexpensive frozen fish.

In Ivory Coast, per capita fish consumpiton rose from 17 Kg in 1964 to 28.1 Kg in 1976, while per capita consumption of all meats grew very slowly up to nearly 10 Kg. by 1976 (Staata, 1980). In Togo, per capita fish consumption grew from 6 Kg in the mid-sixties to 11.8 Kg in 1975, while meat intake per capita rose from 5.8 Kg to 6.6 Kg over the same period (Josserand, 1979). Little information is available on the evolution of per capita fish consumption in Benin, although one estimates it to have been 9.8 Kg per year in 1976, as opposed to 8.4 Kg for meat, (Josserand, 1979); in Ghana, however, Sullivan (1979) reports that fish imports have followed a path clearly reciprocal to that of meat availability through domestic supply and imports. In Ghanaian case, one

should note, meat imports are much more a function of current policy than of supply conditions in neighboring Sahelian countries.

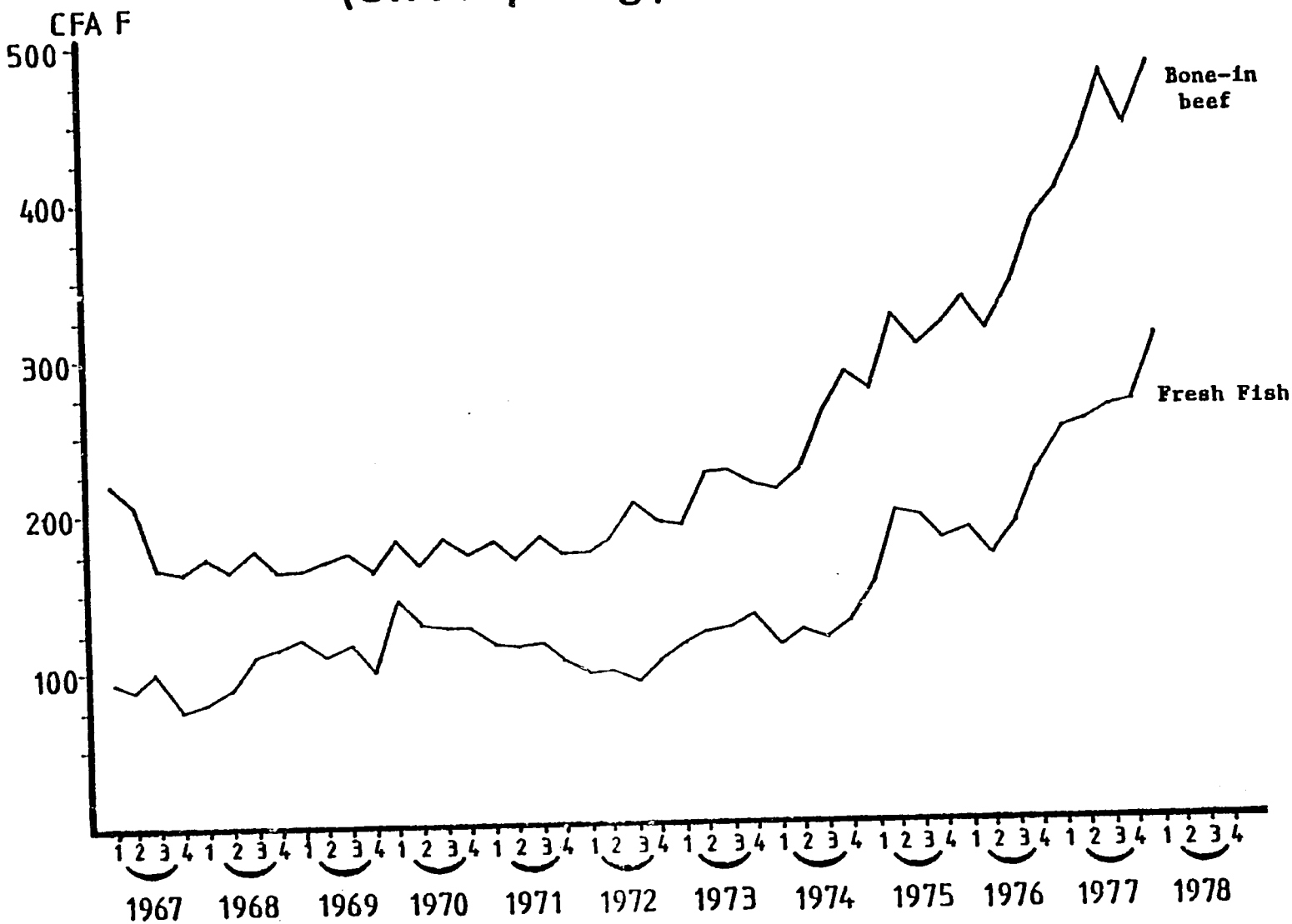
The notion that fish and meat are close substitutes in the CECAF region is supported not only by the relationships between quantities consumed of one and of the other, but by the movement of their respective prices as well. In Liberia, meat and fish prices remained stable between 1967 and 1972; from 1972 through 1976 the prices of both products rose at about 15-20% per year, then stabilized again in the following years, (MPEA, 1978).

Figures 8 and 9 show the respective trends of fish and meat prices in Ivory Coast and Togo. The fact that the prices of two such commodities move in unison is naturally not to be taken in itself as proof that they are substitutes, but in the present context, it reinforces our assumption that they are.

That West African consumers are able to substitute to a large extent one source of animal protein for the other without loss of satisfaction or well-being is fortunate. From a policy point of view, however, its significance is that one shcuild not undertake interventions likely to directly influence the supply of one of these two products without due consideration of the possible indirect effects on the price of the other.

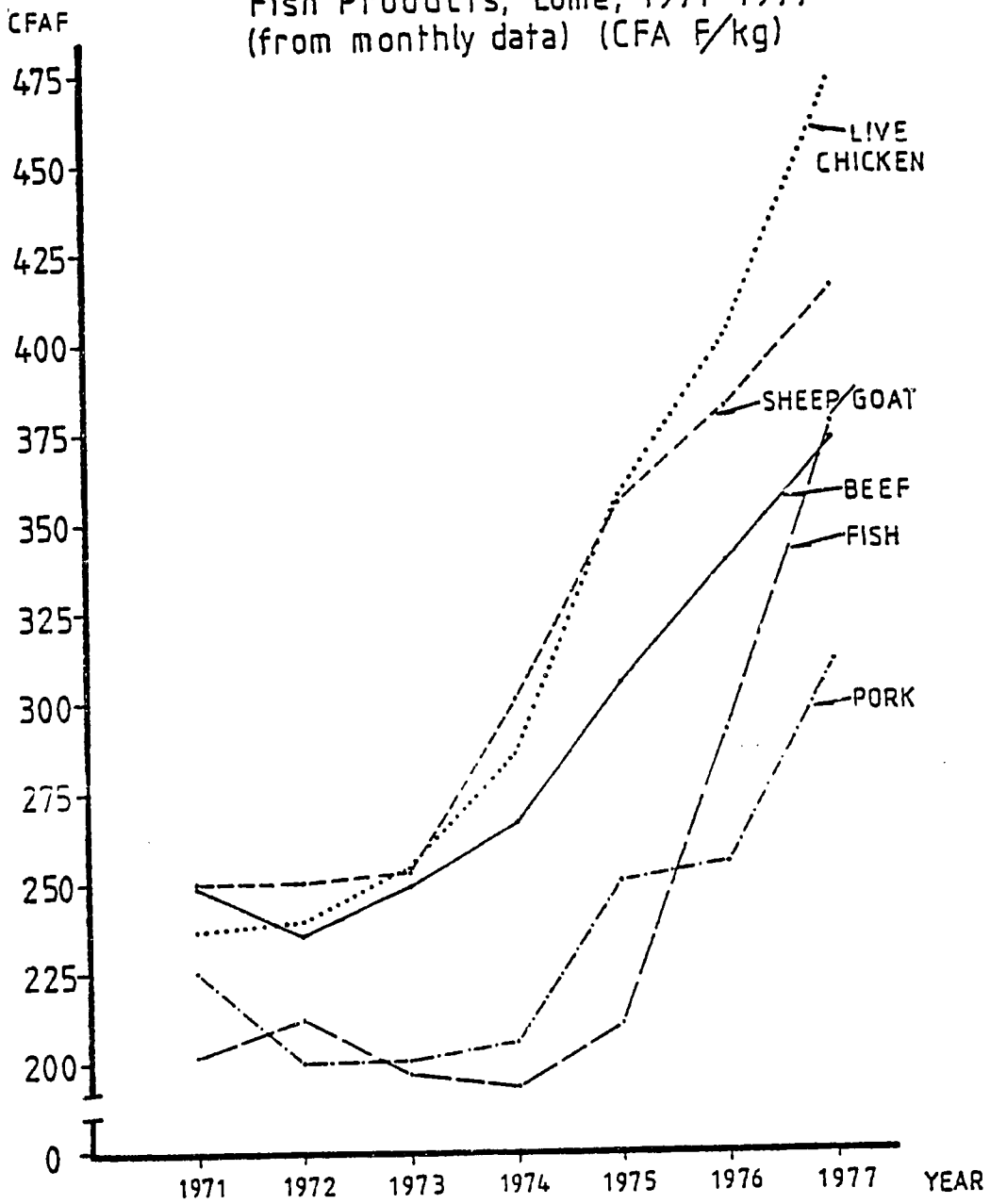
Although we lack time series data on several West African coastal countries, the bulk of the evidence shows that total consumpiton of fish increased in the region during the 1970s; virtually every country increased total consumption, but the extent of this increase and its causes and effects varied from one

FIGURE 8. Quarterly Retail Prices – Abidjan 1967–1978
(CFA F per kg.)



Source: Data collected by the Ministère de l'Economie, des Finances, et du Plan, Direction de la Statistique. (Staatz, 1980).

FIGURE 9. Retail Prices of Selected Meat and Fish Products, Lome, 1971-1977 (from monthly data) (CFA F/kg)



Source: Service Statistique, Informatique, 1978 (Josserand, 1979)

state to the next. In Ivory Coast, total fish consumption increased from 64,000 tons in 1960 to 79,000 tons in 1965, 100,00 tons in 1970 and over 195,000 tons in 1976. Following this 1976 peak, and due to a 30-35% increase in fish prices over the next two years, consumption dropped back to 147,000 tons by 1978; (Staatz, 1980; SIGES, 1973). The Gambia and Liberia showed a rather stable level of total fish consumption through the seventies, (Josserand, 1979), while consumption in Sierra Leone rose in the early 1970's and stabilized in the following few years. Nigeria on the other hand, is West Africa's largest fish consumer, and a net importer. Domestic production was over 600,000 tons in 1971 and 1972, but fell in subsequent years and stabilized around the 500,000 tone/year mark. Total consumption reached a high point in 1972, declined the following three years, and went back to 580,000 tons by 1976, (Josserand 1979). Calculated Nigerian fish imports increased steadily as follows:

1971:	5,000 tons	1972:	10,000 tons	1973:	13,000 tons
1974:	14,700 tons	1975:	41,000 tons	1976:	85,000 tons

It is our opinoin that the low per capita level of fish comsuption calculated for 1976, (8.5 Kg/yr) was largely due to the congestion of the port of Lagos and the lack of storage and distribution facilities for imported frozen fish in southern Nigeria. These constraints slackened in the late 1970s and, given present low fish consumption, deficit in livestock and meat supply for the 70 million odd Nigerians, the rapid rise in national income, and the vitality of the private sector, one should look for Nigerian fish imports well over the 100,000 tons/year level in the near-term.

What general conclusions on fish consumption in coastal West Africa can we draw from the information available? First, let us note that total and per capita fish consumption increased during the 1970s for all states included in the CECAF region. Second, in all nations for which data is now available, the per capita consumption of fish is greather than that of meat; the ratio of fish/meat consumption being about 2 in Senegal and Sierra Leone, 1.6 in Liberia, 2.4 in Ivory Coast, 1.8 in Togo, 1.3 in Benin, and 1.7 in Nigeria, (Josserand, 1979). The same ratio, although not estimated, is believed to be greater than one in both Ghana and Cameroon. Third, the pattern of total fish consumption at any point in time in the region is uneven. The southern zone (Sierra Leone through Cameroon), with its large population, consumes about nine times as much fish as the northern zone, (Mauritania through Guinea). Fish consumption is about proportional to the distribution of population among the two zones (see Table 13).

The major consuming countries are Nigeria, (43% of total quantity with 61% of the population); Ghana (21% and 8%, respectively); Senegal, (11% and 4% respectively) and Ivory Coast (10% and 6% respectively). Sierra Leone and Cameroon each account for about 5% of total consumption. Finally, we note that levels of per capita fish consumption are very uneven within countries. Consumption is much higher near the coast than in the interior. For example, 1975 per capita consumption of fish in Abidjan was of 56 Kg, and that of other Ivorian coastal areas 38 Kg, but fish consumption in the north of the

Table 13. Estimated Supply and Consumption of Fish, 1975

Country	Derived Supply (in 1,000 tons)	Per Capita Consumption (kg)
Mauritania	14.9	14.9
Senegal	185.0	37.1
Gambia	9.5	5.0
Cape Verde	3.8	12.8
Guinea Bissau	--	--
Sierra Leone	76.7	25.7
Liberia	15.9	9.3
Ivory Coast	160.3	32.8
Ghana	351.2	35.6
Togo	25.5	11.3
Benin	36.0	11.7
Nigeria	706.4	11.2
Cameroon	73.3	9.7
total	1658.7	

Source: Everett, et al (1980).

country was less than 8 Kg/year (Staatz, 1980). A 1960 survey conducted in Ghana, when per capita consumption was only 15 Kg, showed per capita consumption to be over 35 Kg in the Accra-Tema region, as opposed to less than 4 Kg in the northern region (Everett, 1977). This pattern is obviously influenced by such factors as distance from the coast and transportation/storage costs, the fact that the national capital, where a lot of effective demand takes place, is located on the coast, and to the greater availability of alternative sources of animal protein (livestock and game) in the hinterland than along the coast. We feel, however, that in recent years the disparity in per capita fish consumption between the coast and the interior has diminished. This has been due mainly to the improvement of transportation systems in the region, and the deeper penetration of coastal fish --frozen as well as chilled-- into previously badly supplied areas.

II.F. Demand

Demand studies usually focus on either of two areas of interest. The first concerns movements along a known, short-term, demand curve in response to price changes; the responsiveness of demand, in terms of quantity demanded is then expressed by calculating the price elasticity of demand for a particular good.

The second type of study concerns itself with shifts of the whole price/quantity demand relationship over time. As such, it is more useful for the forecasting of aggregate demand over several years, the kind which interests us here.

Whereas the determinants of quantity demanded in the short-run are mostly the price of the good examined and the current price of its substitutes, the determinants, or shifters of the entire demand schedule are primarily changes in population and per capita income. These two and other "trend factors" contribute to the rightward shift of the price/quantity demanded function, which we can compare, in simplified terms, to an increase of aggregate demand over time.

The relationship between income and fish consumption usually is not linear. The additional quantity of fish consumed as income rises is influenced by where the consumer starts from, both in terms of income and fish consumption. In the West African case, several countries have reached a level of income and fish consumption such that specific additonal income gains would lead to an increase in fish consumption, but by a smaller proportion. In Senegal for example, a 10% increase in income would lead to a 5% rise in fish consumption (the income elasticity of demand being about .5).

Most other coastal nations do not seem to be as well off as Senegal in this respect; the income elasticities of demand in Ghana, Ivory Coast and the Gambia (.8), Sierra Leone and Liberia (.9) imply a rise in fish consumption nearly proportional to any increase in per capita income. Nigeria and Guinea have estimated income elasticities of demand equal to 1. Benin and Togo, on the other hand still seem to regard fish as something

of a luxury good; a 10% increase in per capita income in these nations would lead to a 14% increase in fish consumption.

The rate of increase over time of aggregate demand may then be expressed, in its simplest form as:

$$d = ppl + n(y)+tr.,$$

where d is the rate of growth of demand (dQ/dt/Q), ppl the rate of population growth, n the income elasticity of demand, y the rate of growth of per capita income, and tr is a "trend" factor including the compounded effects of increased urbanization, the prices of substitutes, and even infrastructural changes such as marketing or transport improvements.

The demand projections calculated by the FAO during the early seventies (FAO 1971), saw an increase in demand for fish of about 6 percent per annum for the CECAF coastal states. The demand for fish in the region has indeed increased at this approximate rate, but not entirely for the reasons anticipated. Demand forecasts derived in the early seventies were based on what we consider today as having been proper population growth and income elasticity assumptions, although the expected rate of increase in per capita real income was on the high side. Several of the West African coastal states showed remarkable rates of growth in gross domestic product during the 1970's. Recent figures from the BCEAO (Central Bank of West African States) outline the progression of aggregate national income indicators for several of the nations which interest us.

GDP at Factor Prices, (Billions CFA Francs)

	Benin	Ivory Coast	Togo	Senegal*
1969	...	365.6	...	...
1970	61.2	415.3	73.4	216.6
1971	63.4	440.1	79.9	240.1
1972	73.4	472.5	86.7	273.6
1973	79.8	565.3	91.8	278.3
1974	98.3	738.7	127.9	338.8
1975	103.2	834.5	123.6	406.4
1976	119.0	1,120.4	133.8	459.3
1977	132.7	1,590.4	...	...
1978	...	1,740.6	...	...

*GDP at market prices

SOURCE: BCEAO, Monthly bulletins, 1980.

Except for Ghana, other West African coastal nations seem to have proceeded at nearly equally high rates of aggregate growth, but this positive effect on total demand for fish was mitigated by high rates of inflation throughout the region (Table 14)..

Although such high rates of price inflation must have limited the effect of income changes on aggregate demand, other positive factors were at work as well. Population continued to grow remarkably fast in the region (see Table 14). Average annual growth rates for the 1970-1978 period ranged from a low of 2.2% in Cameroon to a high of 5.6% in Ivory Coast (due to large net immigration). It is also quite possible that the increase in total demand for fish was favored by a simultaneous rightward shift (increase) in supply. This was a period of expansion and modernization for West African fisheries, and such a shift in supply did

take place, but it cannot entirely account for the increase in consumption; if that had been the case, the market price would have had to fall markedly, and this did not occur. A good deal of the increase in total demand for fish must, therefore, be attributed to various effects hidden in the 'trend factor'. It is thought this compound factor is influenced mainly by the increasing rate of urbanization, and the relative prices of substitutes.

We can confidently state that these indeed had a very positive effect on the quantity demanded; urbanization - along the coast - did increase substantially, the transport and marketing networks were improved, as shown previously, the price of fish has remained below that of meat where demand is strongest (coastal towns), and has risen over time at about the same rate. The only known exception to the latter point is the case of Togo (of Josserand 1979).

The problem is that our information about "trend" factors is - although correct over all, we believe - more general than specific, especially since the region in question constitutes such a vast and varied market. We can predict that the rates of population growth and urbanization will remain high. We are rather optimistic about the region's ability to further improve transport and marketing networks. Livestock production in the Sahel is not likely to progress by leaps and bounds, neither is livestock production on the coast and on the world meat market; the glut of the mid-seventies is gone. This means that one should not look for a softening of meat prices relative to fish. Moreover, even

if fish prices were to increase relatively to that of meat, the shift from fish to meat consumption would probably be quite limited. The cross-price elasticity of demand for beef with respect to fish in Abidjan was estimated to .38 by Shapiro (1979). Thus, a 100 percent increase in the price of fish would only induce a 38 percent increase in beef consumption.

For these reasons, and although we cannot make a more specific pronouncement, we expect demand for fish in the West African region to continue on its upward trend, at least as rapidly as population grows.

Table 14. Population and Income Trends

	POPULATION			INCOME			
Country	Population Mid-1978 (Millions)	Average Annual Growth Rate (%) Urban	Total	GNP Per Capita	Average Annual Growth Rate (%) PerCap GNP[1]	Total GDP[2]	Inflation
Mauritania	1.5	8.6	2.7	270	3.6	2.3	10.4
Senegal	5.4	3.3	2.6	340	-.4	2.2	8.0
Guinea	5.1	6.1	2.9	210	.6	5.4	6.4
Sierra Leone	3.3	5.6	2.5	210	.5	1.3	10.8
Liberia	1.7	5.6	3.3	460	2.0	1.5	9.7
Ivory Coast	7.8	8.2	5.6	840	2.5	6.8	13.9
Ghana	11.0	5.2	3.0	390	-.5	.4	35.9
Togo	2.4	5.6	2.7	320	5.0	4.2	7.4
Benin	3.3	3.9	2.8	230	.4	3.8	7.4
Nigeria	80.6	4.9	2.5	560	3.6	6.2	18.2
Cameroon	8.1	7.5	2.2	460	2.9	5.1	9.8

[1]1960-1978.

[2]1970-1976.

[3]1970-1960.

Source: World Bank (1980)

II.G. Institutions

Institutions play a major role in shaping the trends in the fisheries sector. Government institutions at both the national and regional levels are particularly important. Private sector institutions such as for finance and communications also are important, but little information is readily available.

At the national level, the entity responsible for governmental fisheries policies is usually a Department, Division, Bureau or Service within the Ministry of Agriculture (Everett, 1976). The entity also is located in Ministries of Water and Forests, of Rural Development, or of Industry and Commerce. The Fisheries department is the principal organ for policy formulation, planning, research, and for implementing and supervising programs and regulations related to fisheries management and development. In practice, a department's work involves collecting and analyzing basic biological and economic data, registering and licensing fishing vessels, identifying, planning and implementing investment projects (such as constructing landing facilities), and operating extension program for fishermen.

Fisheries departments often are also charged with controlling fishing activities within the country's extended economic zone (EEZ). The establishment of EEZs has been a major component of fisheries policy in most coastal states. By 1980 most countries had EEZs out to 200 miles (Everett, et al, 1980) so that all of the important fisheries resources are now under the jurisdiction of coastal African states. The establishment of EEZs has significantly

expanded the role of government institutions - particularly the fisheries departments - in the management and development of these fisheries. No information is available on how effectively the government insititions are dealing with this added responsibility.

While fisheries departments are designated as the principal entity for fisheries policy, this role is often usurped in practice by another governmental entity such as the Ministry of Finance or Ministry of Trade and Industry (Everett, 1976). And, in some countries, the private fishing industry plays a more dominant role in establishing national fisheries policy. Which entities are most important for fisheries policy in each country is not clear from available published reports.

A few countries have established other governmental organizations to engage in various forms of fisheries production activity. For example, Ghana established the State Fishing Corporation which owns distant water freezer trawlers, purse seiners, and an extensive coldstore network (Talarczak, 1977). In Guinea, the Office des Pêches Maritimes is charged with the purchase, production and marketing of all industrial fish consumed in Guinea (Everett, 1976). In Benin, the Societe Nationale d'Armement et de Pêche operates the publicly-owned deep sea fishing fleet, operates retail outlets, and has a monopoly on both imports and exports (Josserand, 1980). In Togo, the Office des Pêches is charged with the technical aspects of production and imports of frozen fish (Josserand, 1980). The

Government of Senegal is part owner of companies to both catch and export fish (Everett, 1976). The success of these public, production oriented organizations is not known.

In areas where abundant fish stocks are shared by several adjacent coastal states, the conservation and proper management of stocks by the same states as well as by foreigners require a minimum of cooperation. The sharing of marine resources included in the recently redefined Extended Economic Zones implies more than mere changes in the fishery policy on the part of individual governments. The exploitation of sub-regional stocks by a nation's domestic fleet, and by foreigners under its control, will not fail to have repercussions on the stocks available to its neighbors. It would indeed be of little usefulness to Senegal to promote a policy of stock conservation in its own waters if Mauritania simultaneously chose the maximum exploitation approach. Under the same conditions, a large investment in water control and surveillance on the part of Senegal would hardly be worthwhile; foreign fishing vessels would merely exploit neighboring waters, with an eventual detrimental effect on domestic catches in Senegal. On the other hand, when there is a concurring willingness on the part of sub-regional coastal states to control and manage national waters with some regard to the interests of their neighbors, close cooperation is required. There are, for example, enormous economies of scale in sub-regional stock assessment, surveillance of waters, and professional training.

The advantages of such sub-regional groupings specifically

oriented toward the sharing and management of fish stocks have been perceived for some time by several West African nations. Mauritania, Senegal, the Cape Verde Islands, the Gambia and Guinea Bissau have instituted high-level collaboration on the conservation and management of fish stocks in their sub-region. The most recent reunion of these countries' representatives took place in Nouakchott, in June of 1980; CECAF technical advice has been obtained from the inception of the grouping. The five member states are aiming their cooperation efforts at biological research and standing stock assessment, control of sub-regional waters, training, and the further development of the artisanal fishery. Other areas of concern, and where collaboration is also sought, include: the application of common regulations for foreign vessels, better statistical control of foreign catches and a harmonization of license fees charged distant-water fleets.

Many political and economic difficulties need to be overcome before the sub-regional fishery grouping has clearly tangible effects; this effort, however, merits encouragement. At any rate, fishery development programs aimed at the sub-region, or one of its member states, should be partly assessed on the basis of how they contribute to or fit into this collaboration effort.

At the regional level at least two organizations exist which are relevant to fisheries matters: the Fishery Committee for the Eastern Central Atlantic (CECAF) and the Economic Commission of West African States (ECOWAS). The following are excerpts from and "Aide-Memoire on CECAF":

> The Statutes of the Fishery Committee for the Eastern Central Antlantic (CECAF) were promulgated by the Director-

General of FAO on 19 September 1967.

The present composition of the Committee is the following:

- 20 coastal states, namely: Benin, Cameroon, Cape Verde, Congo, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mauritania, Morocco, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Spain, Togo, Zaire.

- 10 non-coastal states which are: Cuba, France, Greece, Italy, Japan, Korea (Republic of), Norway, Poland, Romania, United States of America.

The essential mission of the Committee is to promote, coordinate and assist national and regional programmes of research and development, leading to the rational utilization of the marine fishery resources of the area, and assist in their implementation through sources of international aid. It enables member countries to analyze and monitor the state of their shared stocks and the fisheries fed by these stocks to exchange their experiences and points of view on fishery development problems and study programmes for co-management of the resources.

CECAF is assisted in its task by specialized working parties on fishery statistics and resource evaluation and by two sub-committees; the first deals with resource management within the limits of national jurisdiction; it is open only to coastal Member Nations which are thus provided with a framework within which they can discuss problems specific to their exclusive economic zones, such as, for example, the management of shared stocks. The second sub-committee deals with fishery development; it ensures liasion between CECAF and the project referred to hereunder.

In order to assist developing Member Nations to implement the programme of work defined by CECAF and, in particular, to enable them to acquire the necessary technical knowledge to manage and develop their fisheries rationally on a national and regional scale, a mechanism entitled "Project for the Development of Fisheries in the Eastern Central Atlantic" was set up at the end of 1974. It is financed by the United Nations Development Programme and donor countries and is executed by FAO. Since its establishment, it has contributed towards strengthening substantially the capacities of the member countries in fields such as statistics, resource appraisal and management and staff training.

ECOWAS is viewed by some observers as "the most concrete

manifistation to date of the desire of all states in West Africa to form an all-embracing subregional economic grouping" (Renniger, 1979). The objective of ECOWAS is

> to promote co-operation and development in all fields of economic activity particularly in all fields of industry, transport, telecommunications, energy, agriculture, natural sciences, commerece, monetary and financial questions ... (ECOWAS Treaty, Article 2, from Renniger, 1979).

Sixteen states ratified the ECOWAS treaty in 1975. Members of the community include Benin, Cape Verde, The Gambia, Ghana, Guinea, Guinea Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo, and Upper Volta. Of the countries focused on in this report, only Cameroon is not a member.

To establish a common market in West Africa the treaty provides for, inter alia: (i) the elimination of customs duties, and of administrative and quantitative trade restrictions among member states, and (ii) the harmonization of the agricultural policies and the promotion of common projects in member states, notably in the fields of marketing, research and agro-industrial enterprises. The treaty also would create specialized commissions, including the Industry, Agricultural and Natural Resources Commission.

ECOWAS clearly has the potential for dealing successfully with a number of regional fisheries issues (eg., management of transboundary fishery resources, trade in fish products, migratory fishermen). But, because of its youth, ECOWAS has yet to produce concrete achievements in any area. If ECOWAS succeeds, it ultimately would make redundant other regional and sub-regional organizations (such as the West African Economic Community - a smaller,

but successful subregional grouping). Therefore, states may be reluctant to switch their support from other existing, vital organizations to ECOWAS, which has an uncertain future.

There is currently no established institution specifically designed to deal with regional and subregional fisheries matters. However, the CECAF project is taking significant steps in this direction. FAO has established a program, to be carried out by CECAF, to assist LDCs in managing and developing fisheries in their EEZs. Included in the program is investigation of the consequences of the new EEZ regime and developing cooperation and collaboration with other regional bodies, "particularly the West African Economic Community (CEAO), the Economic Commission of West African States (ECOWAS) and the Permanent Inter-State Committee for Drought Control in the Sahel Zone (CILSS)" (CEDAF, Dec. 1979). Clearly, it is too early to tell how regional fisheries matters will be dealt with.

III. Current State of Fishery Development Plans and Projects

According to Everett (1976 and 1980), official fishery plans of CECAF coastal states typically have three basic objectives: (i) fish resource management, (ii) to provide adequate fish supplies to meet demand, and (iii) acheive balanced socio-economic development of the fishery sector. Common strategies used to achieve the planning objectives include (a) increasing artisanal production, (b) promoting the processing industry and exports, (c) gradually replacing foreign fishing vessels with local vessels in their EEZs, (d) supporting research to aid fish resource management, (e) promoting appropriate fisheries technology and extension services, and (f) establishing training facilities.

put in the exec. summary

Everett, et al. (1980) summarize the current national development plans as they pertain to fisheries in the region. They note planning styles vary considerably due to the wide range of national political philosophies, and caution that actual expenditure often is markedly different from planned expenditure. The following plan summaries are excerpted from their report.

The government of Mauritania is determined to improve the intensity of small scale fishing and hopes to introduce traditional agriculturists, livestock herders and other affected by the drought, to this activity. With regard to exploitation of the rich fish resources within the 200 mile EEZ, the government is encouraging the establishment of joint ventures rather than the continuing licensing of foreign-based vessels. It is hoped that joint ventures can ensure the development of Mauritanian based companies and increase the amount of investment accessible to Mauritanian ownership. It is too early to be sure if the emphasis of such a foreign policy will lead to increased government and national revenue either in the short or long term. The government is committed to assisting a well equipped fishery laboratory at Nouadhibou, so that statistics adequate for resource evaluation can be collected and analysed. These statistics would be collected from both foreign and local vessels that operate in waters off Mauritania. On the basis of these statistics and the analyses undertaken at the laboratory, the government intends to fix the annual quantity of fish that each fleet would be permitted to fish.

The objectives of the fifth Senegal Development Plan (1977-81) with regard to the fishery sector are to improve management of the fish resources primarily through cooperation with neighbouring countries, improve the well being of the traditional fishermen, and to promote exports of fish and fish products. It is intended that the traditional fishermen be assisted through an improvement of fish distribution by the establishment of markets

and cold stores. Cooperatives are to be given every assistance in the form of loans and grants of equipment to aid fish marketing, and the canoe motorization programme is to continue. It is planned that improved fish unloading facilities be built at Dakar, and that small fishing ports be built at St. Louis, Djifer (near Joal) and Elinkine (Casamance). By means of a credit programme, the fishing vessels in the Dakar fleet are to be improved, and fleets of small vessels are to be formed at these small ports. Fish processing facilities will receive assistance for improvement. Implementation of the plan targets has been undertaken with vigour and many new vessels have been acquired and port construction completed. However, there is a continuing need to intensify training programmes for fishermen to crew the semi-industrial vessels. Relative to other countries in the CECAF region, the priority given to fishery research is high, and efforts are being made to develop sub-regional cooperation for management of migrating fish stocks. The country earns substantial amounts of foreign exchange through the issue of licenses to foreign vessels to fish in Senegal waters.

Objectives for the fishery sector in the Economic and Social Development Plan (1975-1980) of the Gambia are summarized as:

i. to use local fish as a means of improving the nutritional standard of the population;

ii. to effect a rational long term utilization of coastal and inland fisheries resources;

iii. to the extent that it will be consistent with the above, increase employment and net foreign exchange earnings in the sector.

iv. to achieve a ten percent annual rate of growth in production.

A fifth objective has been the promotion of interregional cooperation in fisheries. With the assistance of a grant from the EEC, increased attention has been given to assisting artisanal fishermen, through a revolving credit fund. Government is attempting to develop industrial fishing through the formation of a joint venture with a Ghanaian company already fishing Gambian waters, and through establishment of the Fish Marketing Corporation.

The Government of the Republic of Cape Verde is attempting to boost foreign exchange earnings through increasing exports of lobster and tuna. With the help of an UNDP/FAO fishery project, the artisanal sector is being assisted to increase catches. It is intended that the tuna fleet be increased when management problems are overcome, and investment in cold storage through the foreign aid programme will allow development of a entrepôt trade in frozen fish and other foods.

Guinea Bissau has substantial fish resources and it is believed that foreign based vessels, fishing national waters in the EEZ, may catch 100,000 tons per year. As the result of the two joint ventures, some fish caught by industrial vessels is being landed and it is hoped that as fleet size increases, there will be significant exports of frozen marine products

and ample supplies for local consumption. A Swedish assisted project is aiding artisanal fishery development.

The Republic of Guinea licenses foreign flag vessels to fish its waters and land a percentage of the catch at Conakry. While this contribution eases supplies, there is still believed to be a substantial unmet demand for fish in the country. The imposition of a controlled fish price may have hindered development of artisanal fisheries. Also a Canada/FAO project has attempted increasing the degree of motorization of canoes. The collection of statistics is difficult and hinders elaboration of a satisfactory resource management policy.

The Development Plan of Sierra Leone from 1974/75 to 1978/79 projects GDP growth at 6.2 percent per annum, and population growth at 2.6 percent per annum. The annual increase in demand for fish is expected to be 5.1 percent and it is planned that the country become self-sufficient in fish before the end of the plan period. More recent fishery objectives, for the Annual Plan 1976/77, were: a) to increase production in both industrial and artisanal fisheries from 40,500 tons in 1975/76 to 44,700 tons in 1976/77; b) the expansion of the boatbuilding yard so as to be able to construct at least two 34 foot fishing boats; c) intensification of the training programme; d) setting up of outstations to facilitate extension activities; e) the acquisition of one trawler by the Division for training, research and exploratory activities, and f) to increase foreign exchange earnings through export of about 4,000 tons of frozen fish and shellfish. Government has taken equity in an industrial fishing

and distribution company, and it is intended that the activities be expanded so as to provide the country with a soundly based industrial fishing and processing operation. While some export of shrimp has begun, the country still consumes fish caught by foreign vessels fishing Sierra Leone waters. There has been no substantial increase in the number of Sierra Leone flag vessels. There are indications that the artisanal fish catches have increased in recent years.

Little government involvement in the fisheries of Liberia has been evident, but private companies associated with the former Tolbert regime have been active in the valuable shrimp fishing and processing activities. The artisanal sector is dominated by Ghanaian fishermen although Liberians are showing signs of interest in the sector, and FAO is formulating a plan for small scale fishery development. It is possible that Liberia will continue to require to import frozen fish because the fish resources on the adjacent continental shelf are not substantial and consumption continues to rise.

The objectives for the five year Plan for Economic, Social and Cultural Development for the Ivory Coast in the period 1976 to 1980 include an annual growth rate of 8 percent, an annual increase in incomes of 7.3 percent on average, and a target of 28 percent of GDP to be devoted to investment. The objectives are of particular concern to the Ivory Coast fishery sector. The first objective concerns covering the needs of the nation by national fishery operations. It is intended that this be undertaken by expanding the local fleet so as to be

better equipped to catch fish in distant waters by modernizing the artisanal fishing operations, establishing fishing industries at San Pedro, by negotiating rights to fish in distant waters and by intensifying fish culture and exploitation of inland waters. Foreign based companies have already made commitment to invest in fish farming. The second main objective is to improve the fishing port at Abidjan, and its associated industrial activities, such as freezing, cold storage and marine repairs, so that the port can continue to play an important service role for fleets, mainly fishing tuna, in the Atlantic. It is envisaged that about U.S. $70 million be spent on the fishery sector, of which about 80 percent will be financed by government and public sector entities. Substantial investment has already, in fact, occured in tuna boats, canneries and port facilities, and export of tuna products (in addition to shrimp) earns foreign exchange to help offset the cost of importing cheaper frozen fish. The longterm aim is to provide on average 30 grams per day of animal protein per caput by 1985 (divided equally between fish and meat). Given the few local marine resources and the rapidly expanding population, it is unlikely that the aim can be achieved without substantially increasing the already high imports (of over 70,000 tons).

The Development Plan of Ghana (1975-1980) foresees that fish landings will increase by 10 percent annually to satisfy the needs of a population increasing by 2.7 percent and a GDP increasing by 5.5 percent per annum. Emphasis for the fishery sector is given to increasing productivity of the existing

fishing fleet and plants so as to satisfy domestic demand, earn foreign exchange through the export of tuna and shrimp, and increase employment opportunities. The government also plans to intensify fish farming. The fishing sector in Ghana is presently facing shortages of fuel and spare parts, and the larger vessels have difficulty in finding fishing grounds.

Due to poor abundance of marine resources, the Republic of Togo imports nearly 20,000 tons of fish per year. It is unlikely that substantial investment in industrial vessels will be made due to the shortage of fishing grounds where such vessels can operate. The lagoon fishery is quite productive, and the good fishing port facilities at Lomé have encouraged vessels fishing off neighbouring countries to use the port as a base.

In Benin the government has introduced a three year development plan which is scheduled to run from October 1977 to September 1980. The plan postulates an annual rate of increase for GDP of 18 percent over the period, with an inflation rate of 8 percent a year. About U.S. $1,000 million is to be invested, with priority going first to infrastructure projects such as irrigation works, feeder roads, storage and marketing facilities to support a major restructuring of the agricultural sector. The principal fish importing company is state controlled, and it is unlikely that the government will invest in modern fishing vessels. Nevertheless, the lagoon fishery is expected to remain highly productive and supply a substantial amount of the country's fish needs. The Republic of Benin intends to

increase landings of fish and shrimp by 14 percent each year. Infrastructural facilities are to be improved, and the fishing port at Cotonou is to be extended. In order to assist artisanal fisheries, a number of breakwaters are to be built, and canoe motorization is to be assisted.

The projected GDP growth rate during the Development Plan (1975-80) of Nigeria averages 9.5 percent per annum, and per caput income is projected to rise 6.5 percent annually. The objectives for the fishery sector are:

i. to increase domestic fish production so as to meet local fish demand;

ii. to earn foreign exchange by exporting products like shrimp;

iii. to encourage local manufacturing of fish products such as fishmeal and dehydrated fish;

iv. to provide employment of Nigerians, especially young school leavers in the coastal areas, and

v. to increase the per caput income of indigenous fishermen with the proposed package type of development (which would result in increased catch and better prices due to improved processing and storage facilities).

About 4.6 percent of total investment in the agricultural sector is to be devoted to fisheries. Some progress has been made in earning foreign exchange from the export of frozen shrimp and facilities for receiving and distributing imported frozen fish have been improved. However, the planned target of local landings to exceed one million tons will be difficult to achieve, and imports are expected to continue to exceed 200,000 tons.

The fourth five year Economic, Social and Cultural Development plan for Cameroon (1976-1981) includes a commitment to completion of the fishery harbour at Douala and the creation of a development fund to provide equipment to small craft fishermen. New Trawlers for both fishing and shrimping are to be purchased. The GDP is expected to increase by 7.1 percent p.a. and the annual population growth rate is expected to be 2.1 percent. In spite of the small continental shelf available to the country; the national planners expect that local fish catches will increase. Nevertheless, annual imports of frozen fish will probably exceed 10,000 tons.

FAO through CECAF has played an important catalytic and pre-investment role in the development of the fisheries of the West Coast of Africa. The numerous technical reports produced by CECAF (see Appendix D) attest to this role. As can be seen in Table 15, Canada is the largest contributor to small scale fisheries development in the region. FAO through CECAF has assisted other donor agencies from Sweden, France, Italy, EDF, etc. in terms of project identification and design. Table B lists other recent developments in West African fisheries. Costs and dates of these project were not available.

Besides CECAF, ORSTOM, a Paris based overseas scientific and technical research center, has been conducting research of considerable value to the development of West Africa's fisheries. They have been carrying out physical and biological oceanographic studies in the tropical Atlantic. Detailed biological studies have been conducted off the Ivory Coast.

In addition, research concerning the usefulness of echosounding as well as airborn and sattelite teledetection methods for the quantitative and qualitative assessments of marine resources have been conducted off the coasts of Senegal, Mauritania, Ivory Coast, Guinea, and Ghana. Other technical studies were carried out which were aimed at developing data systems for optimal resource management. This included projects such as the development of a sampling and data collection methcd for line fishing in Senegal.

Table 15 Recent Foreign Assisted Fishery Projects in West Africa

Country	Dates	Donor	Type of Project	Cost Millions SUS
Mauritania	1977	Japan[a]	Gear, Training, Cold Stores	2.2
Senegal	1972/76			
	1979	Canada[a]	Motorization of canoes, Storage & Distribution of canoe catch	3.0 12.0
	1979/	Canada[3]	Fish landing stations, Marketing cooperatives	NA
	1975/	UNDP/FAO[a]	Testing semi-industrial vessel improving statistics	0.4
	1976/	NORAD/FAO[a]	Testing semi-industrial vessel	0.8
	1977/	France[a]	Handliner construction	3.0
	1977/	Italy[a]	Testing semi-industrial vessel	0.5
	1976/	Japan[a]	Motorization, small vessels	1.0
	*	EDF[b]	Trials of fishing boats "dories"	0.04[1]
The Gambia	1973/76	UNDP/FAO[a]	Testing semi-industrial vessel Improving statistics, Drafting fishery laws	0.4
	1977/	EDF[a]	Construction of feeder roads, promotion of ice plants	1.2[1]
	*	EDF[b]	Artisanal fisheries	1.4[1]
Guinea Bissau	1977	Sweden[a]	Motorization of canoes, Experts, Marketing assistance	2.3
	*	EDF[b]	Study of development of traditional fishing	0.03[1]
Guinea	1976/	UNDP/FAO[a]	Testing semi-industrial vessel Support to CIDA/FAO Project	1.6
	1977/	Canada/ FAO[a]	Motorization of canoes	1.2
	*	EDF[b]	Equipment and technical assistance for Secondary Polytechnic Maritime Institute	2.0[1]
Sierra Leone	1976/	Canada[a]	Oyster culture	0.1
Ivory Coast	1976/	France[c]	Development of Sur Boats	0.3
Ghana	1972/	Canada[a]	Gear and processing development, Socioeconomic evaluation	0.4
	1972/76	UNDP/FAO[a]	Testing semi-industrial vessels	0.6
	1977	UK-ODM[a]	Catamaran vessel	0.1
	1979[2]	UK-ODA	Demonstration & Evaluation of surf landing fishing boats	NA
Benin	1977/	EDF[a]	Aquaculture activities	0.1[1]
	1977/	Cuba[a]	Ferrocement vessels	0.1
	*	EDF[b]	Cotonou fishing port studies and structures	1.3[1]
Nigeria	1973/	UNDP/FAO[a]	Assistance to fishery cooperatives	0.5
Cameroon	1978/	Canada[a]	Canoe motorization, Marketing	12.0[3]
Gulf of Guinea	*	EDF[b]	Regional study of sea fishing	0.2[1]

[a] C. Everett in CECAF/TECH/79/14 (1979)

[b] H.H. Bergschmidt "Community help for fishing and fish farming" in The Courier No. 64 (1980).

[c] J. Stoneman & J. Disney "The role of the ODA and TPI in fisheries development" in The Courier no. 64 (1980).

* EEC aid from 1958 to end of June 1980.

[1] Amount in EUA.

[2] Operational at end of 1979 and early 1980.

[3] Based on telephone interview, November 1980.

Table 16. Summary of Recent Selected Developments in West African Fisheries

Mauritania	Extension of Nouadhibou port Investment in semi-industrial gill-netters Planning study Construction of laboratory at Nouadhibou
Senegal	Investment in semi-industrial vessels Agreements with Spain, Ivory Coast EEC, Poland Construction of St. Louis port Fishmeal/freezing plant at Djifer Cooperative cold stores World Bank fishery planning study Sub-regional cooperation with Mauritania, The Gambia, Guinea Bissau and Cape Verde
The Gambia	Small scale fishery development New fish legislation
Cape Verde	Cold store improvements
Guinea Bissau	Start of processing facilities
Guinea	Intensive motorization of canoes
Sierra Leone	New plan for small scale fisheries
Ivory Coast	Purchase of tuna seiners Construction of tuna cannery Aquaculture research and development
Ghana	Purchase of tuna seiners Construction of tuna cannery Distant water trawlers purchase
Benin	Aquaculture development
Nigeria	Construction of cold stores Aquaculture research and development
Cameroon	Extension to port

From: Everett, P[illegible] Emmim, and Mizuishi (1980)

IV. Economic Analysis of Fishery Development Prospects

The prospects for fisheries development in West Africa generally are favorable. The region as a whole has a resource base not fully exploited by coastal African states, and fish is used as a staple food by most people in the region.

The fishery resource base in the Eastern Central Atlantic yielded 3.50 - 3.75 million tons during the mid-1970s, and 50 - 70 percent were caught by non-African fleets. The estimated potential yield from the resource base is about 4.0 million tons. Therefore, it is possible (though not necessarily probable) for African fleets to increase their production by three times their late-1970s level of about 1.3 million tons.[1] Most of this increase in production would have to occur in the northern zone where the most abundant resource bases exists, and result from elimination of foreign fishing in the zone. The likelihood of this three-fold increase is discussed below.

Fish consumption per capita is high and would likely grow by 1-4 percent per year in most coastal states if relative prices did not change appreciably. Fish prices are expected to rise, however, as supply increases are not likely to keep peace with demand increases, and actual consumption will grow more slowly than predicted. The important result, for present purposes, is that there is ample room for increased supplies to be absorbed by consumers in the region.

A principal feature of consumption is that most consumers

[1]Note that these figures include the rich resources in Moroccan waters.

of fish in the region are in the populous coastal states of the southern zone. Therefore, while major producing states in the northern zone (eg. Mauritania and Senegal) may remain net exporters of fish, major consuming states in the southern zone (eg. Nigeria, Ivory Coast and Ghana) will remain net importers of fish and fish products.

A. Cephalopod and Crustacean Stocks

Most of the potential for increasing West African production lies in supplanting foreign with local fishing operations. Let us assume for the moment that West African fleets completely supplant foreign fleets operating in the region and trace out the implications of this development. Using 1977 data, West African catches could increase by 200 percent in weight and by 250 percent in value.[1] If the stocks were fully exploited and properly managed, these increases could be somewhat larger. The species groups having the greatest potential for increased West African production are the cephalopods, crustacea and coastal pelagics (principally mackerels, sardinellas and sardines).[2] Cephalopods and crustacea, of course, command high prices in the international market and even with full West African exploitation would likely continue to be consumed in

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[1] We Choose 1977 because suitable data (Everett, 1980) are available. Unfortunately, it overstates the case since foreign catches dropped dramatically in 1978.

[2] Tuna also has high potential for expanded African production, but because it is an oceanic pelagic full African exploitation is more problematic than with coastal species in the EEZs.

Europe, Asia and North America. Therefore, we cannot expect development of these fisheries to directly contribute to food supplies in the region. The principal advantage of developing these two fisheries would be to generate added income and foreign exchange; and there would be some modest gains in employment. Significant added income and foreign exchange also could be earned without developing a West African production capacity, however. Christy (1979) has estimated that with proper management of the cephalopod fishery, licensing foreign vessels could generate fees of $160-214 million per year. But the coastal states appear determined to develop their own harvesting capacity for these fisheries. Mauritania, for example, is encouraging joint ventures to exploit its rich fishery resources rather than licensing foreign vessels (Everett, 1980).

B. Coastal Pelagic Stocks

Expanding West African exploitation of coastal pelagic stocks appears to have significantly different implications than those for cephalopod and crustacea development. The sardine fishery off the coast of Morocco is the principal coastal pelagic fishery in the region. Morocco continues to develop its domestic production, processing and marketing capacity as well as manage the exploitation of foreign fleets. The other, cheaper coastal pelagics (mackerel, horse mackerel and sardinella) have been heavily exploited by foreign fleets in the northern zone, but also have been exploited by West African industrial and artisanal

fleets throughout the region. There appears to be high potential for readily expanding West African production of coastal pelagics, particularly in the northern zone where foreign fleets have harvested the majority of the catch. Local fishermen, having lengthy experience harvesting these species, are likely to be more capable of expanding their production of coastal pelagics than, say, cephalopods. The expanded exploitation of coastal pelagics could involve both artisanal and industrial fishing operations.

Expansion of West African production of coastal pelagic species could significantly contribute to food supplies and nutrition in the region. Coastal pelagics are widely consumed and are a relatively inexpensive source of protein. Everett (1980) prices small pelagics at $50 per ton in 1977, compared with $200 per ton for mackerel and $400 for demersal fish. If West African fleets completely supplanted foreign exploitation, West African production and consumption of coastal pelagics could more than triple (even if Morocco's sardine fishery is excluded). This result has significant implications. Total fish supply in the West African states (Morocco to Zaire) in 1975 is estimated to be about 2 million tons (Everett, 1980). Of that, coastal pelagics likely contributed 0.4-0.5 million tons. A tripling of coastal pelagic catch and consumption alone would increase total fish supplies by about 50 percent. Clearly, development of coastal pelagic fisheries can significantly contribute to food supplies and nutrition in the region.

Whether employment and incomes would increase significantly with coastal pelagic development is not clear. Since the species are of low value, incomes to coastal pelagic fishermen also are low. For stocks farther offshore, larger more efficient vessels may be needed which likely would have only a minimal impact on local incomes and employment.

Since the opportunities for expanded production are greater in the northern zone and most of the consuming population is in the southern zone, development of the coastal pelagic fisheries will increase the flow of fish and fish products from the northern to the southern zone. This will generate added foreign exchange for northern producing states and draw down foreign exchange reserves of southern consuming states. Again, however, since the value of these fish is low the amounts should be relatively small. The flow of foreign exchange between countries in the region may be minimized if arrangements are made to allow southern fleets to operate in northern waters (eg., the agreement between Senegal and Ivory Coast).

The potential contribution to economic growth of coastal pelagic development appears modest, given the species low value. However, if artisanal exploitation is greatly expanded, the contribution to equity could be significant. Concern with equity is likely a principal reason for assisting artisanal fishermen, obviously among the poorest of the poor in these countries. Otherwise, small-scale industrial operations would be the most attractive development option (see Jarrold and Everett, 1978).

But the extent to which inshore coastal pelagic stocks can support expanded artisanal fishing is not clear. At this point in time, too little is known about their state of exploitation. Until more is known, development of offshore industrial fleets is the safest course of action. Hence, any contribution to equity from coastal pelagic development may be long in coming, if ever. The issue clearly requires more study.

C. Demersal Stocks

Expanding West African exploitation of demersal stocks would have implications similar in kind to both cephalopods and coastal pelagic development, but at a more modest scale. That is, there are some demersal species (eg. hake and seabream) which likely would be exported out of the region, even with full West African exploitation. Therefore, West African harvest of the demersal species of high value would not directly contribute to regional food supplies, but they would earn a modest amount of foreign exchange.

The significant potential for development of the demersal fisheries appears to be in the southern zone. Moderate size offshore stocks of demersal fish currently are lightly exploited. While these stocks would require the more capital intensive industrial fleets for exploitation, they are near the large population concentrations. Therefore, a significant contribution to food supplies and nutrition appears likely, and without placing a drain on foreign exchange reserves.

Apparently, most inshore demersal stocks are fully or over exploited. Therefore, there is no opportunity to expand artisanal production of this fishery.

D. Processing, Distribution and Marketing

Besides directly expanding production, development of the intermediate processing, distribution and marketing operations likely would yield significant benefits. The more extensive and efficient these operations, the greater consumption becomes. Information is so sketchy, however, that it is difficult to assess where the best development potential lies.

The cold store network through which the industrial catch is distributed is fairly well developed in the populous southern zone. Without more information, it is not possible to discern whether and how development might best occur in this network.

The processing, distribution and marketing of artisanal catches, however, appears to process substantial opportunity for development. Artisanal catches, which dominate local fish supplies in many countries, are typically processed using traditional methods and receive limited distribution, being consumed near the landing site. The principal traditional processing method, smoking, seriously reduces the protein content of the resulting product. Introduction of improved small-scale smoking technology like that developed by Caurie (1975) could possibly substantially increase protein intake in the region.

Distributing and marketing more of the artisanal catch

in the interior may or may not be feasible and desirable. This question has received no study as far as can be determined. Improving the economic efficiency of the marketing system could raise incomes of fishermen and lower prices to consumers. Again, the extent to which efficiency gains are possible is not known and requires further study.

Employment gains from fisheries development may be significant in the marketing and distribution subsector. To arrive at this conclusion we assume there are from 3 to 5 people employed on-shore in the fisheries sector (primarily involved in processing, distributing and marketing fish). This assumption implies there are some 1.8 to 3.0 million persons with secondary employment in the fishing industry (the primary employment being the some 0.6 million fishermen), handling somewhere between 1.5 to 2.0 million tons of fish flowing through the system each year. That is, there is one secondary job for every 0.5 to 1.0 tons of fish that passes through the system. Now suppose local supplies of fish increase by 1.0 million tons per year (a conservative estimate since this could be realized with development of the coastal pelagic fishery alone). If the existing secondary labor force is fully employed, then another one to two million jobs would be created. We believe, however, that labor is not normally fully employed in most marketing and distribution activities. Therefore, an estimate of one to two million additional jobs is too high. Our conservative conjecture is that between 250,000 to 500,000 additional secondary jobs could be created by a million ton increase in local fish supplies.

E. Institutions

Development and management of West African fisheries will require a strengthened set of institutions at both national and regional levels. An important set of documents on institutional aspects (Carroz and Moore, 197 , and Fidel, 197 , and 197 were not available for this study so it is difficult to prescribe these requirements in any detail. General experience suggests that national institutions are poorly equipped to conduct sophisticated fisheries development and management programs. It is not clear whether the institutional design has been found for such programs. One of the most pervasive problems of development administration is described by Hennessy (1980) as the "paradox of comprehensive planning". The paradox is that while comprehensive development programs require high degrees of interagency coordination, this in itself creates a high potential for strategic behavior whereby each agency attempts to take advantage of the situation by minimizing its contribution by free-riding at the expense of the others involved. This results in a suboptimal level of overall contribution and a failure to meet project goals. Hennessey's study of a Costa Rican artisanal fisheries development project found a propensity for free-riding among the participating agencies which contributed significantly to project failure. There is some indication this problem exists in West Africa as well. During a discussion of development projects, the Ad Hoc Working Group on Fishery Planning (CECAF, 1970) noted that fishery projects were not completed on schedule because of the delay in releasing funds,

and there was no sense of commitment to project implementation. Everett (1976) also notes that involvement of government agencies other than the fisheries department "... can often lead to a complete lack of interest by politicians and civil servants ..." in fishing projects. These troublesome phenomena are consistent with the paradox. For a more complete discussion of these and related problems see Ostrum and Hennessey (1975) and Caiden and Wildavsky (1978).

The need for an effective regional fisheries institutional structure is particularly significant. To fully exploit - without over exploiting - the regions fishery resources, means will have to be found to successfully manage stocks that migrate across the EEZs of two or more states. Whether much management problems are best solved by several bilateral and multilateral arrangements or by a single institutional structure is not clear. This is another issue for further study.

Intraregional trade in fish products will likely increase as the fisheries develop. Removing significant barriers to fish trade should significantly enhance the benefits to both fish producing and consuming nations. Again, it is not clear which regional institution is best equipped to deal with fisheries trade problems.

V. Sociocultural Assessment

Various aspects of the society and culture of the artisanal fishermen of West Africa are discussed in previous sections and Appendix C. The purpose of this section is to highlight socio-cultural factors which may either facilitate or impede development efforts.

Fundamental to any sociocultural assessment of fishery development strategy in West Africa is the ethnic diversity of the peoples living and fishing along the coast. In Appendix C an attempt is made to identify fishing groups; but the key fishing groups, although relatively numerous do not exhaust the ethnic diversity of the West African coastline. An examination of Murdock's map of ethnic groups of Africa (1959) indicates that there are some 47 distinct ethnic groups living along the West African coastline from Mauritania to Cameroon (Appendix C). If we take into consideration all groups living within a fifty-mile wide bank along the coast, we could easily double this number. This diversity has many implications for development. Project design is often influenced by intergroup differences, and the identification of these differences during the early stages of planning can help reduce potential problems and make it possible to arrive at more realistic cost estimates (cf. Cochrane 1979).

The most important implication of this ethnic diversity is that no single, unitary approach to fishery development can be applied with a reasonable chance for success along this coastline--it will not be possible to develop a package that can be applied

to all regions. This restriction is valid not only for the region, but also for specific countries. As outlined in Appendix C, there is also intracountry ethnic diversity.

A. Communication

Turning to potential project impacts, it is important to consider the operationally relevant aspects of ethnic diversity. Of primary concern in a development project is the establishment of communication with the target group as a means of obtaining grass-roots input to project design--a critical factor in project success (Morss, et al 1976; Mickelwait et al 1979). Most ethnic groups along the coast speak mutually incomprehensible languages; thus, establishment of communication will be a difficul process. Use of acceptable lingua francas is possible in some areas, but care must be taken due to regional variations in lingua francas and differential attitudes towards available languages. Many studies have indicated that the most effective communications are conducted in the native tongue (cf. Pollnac and Sutinen 1980).

B. Social organization

Property Rights The ethnic diversity of the West African coast is also reflected in its variability in social organization. Of primary concern to development project planners are aspects of social organization influencing rights to property or group membership. In general, rights to property or group membership descend through females (matrilineal), males (patrilineal), or both (bilateral). Along the West African coast there are groups which manifest all three of these patterns in addition to one other: duolineal, where different rights are held by the patrilin-

eage and matrilineage. Several studies (e.g., Poewe 1978; Douglas 1971) have demonstrated the differential receptivity to economic development manifested by societies which vary in terms of inheritance patterns. For example, matrilineal societies are ill-adapted to some conditions of economic development, and the shift to a patrilineal or bilateral system is often accompanied by resistance on the part of the group loosing power (the matrilineage). Many West African social groups are matrilineal, but these strains may not develop due to the predominant form of division of labor--another social variable related to ethnic diversity.

Division of Labor As discussed above in the section on the artisanal fishery, in West African fishing communities males generally fish and females process and distribute the product. Some authors (e.g. Christensen 1978) suggest that the female role of fish trader results in their being the primary element of economic stability in some fishing societies. The males fish intermittently while females work year-round. Programs which maintain this division of labor will probably encounter less resistance in matrilineal societies than programs which reduce the economic role of females. In many countries female processors and distributors have adapted to the industrialized fishery by purchasing frozen fish, smoking and distributing them through the traditional network. In part, this was made possible by the fact that cold stores are not as wide spread as the traditional trade networks. Perhaps a larger contribution to this adaptation, however, was made by the fact that smoked fish plays a large

role in traditional diets. Changes in traditional diets and/or increasing efficiency in the distribution of industrial catches may displace these women in the future. One very real threat to their future, however, is the fishermen's cooperative.

The fishermen's cooperative is given an important role in artisanal fishery development by most West African governments (Lamming & Hotta 1980). The fishermen's cooperative is often viewed as a technique for eliminating exploitation by middlemen. If this becomes the goal of the cooperative movement in West Africa, female fish processors and vendors would be displaced. In areas where fishermen are related to the middlemen, the movement would probably be resisted; but in other areas, the effects on a relatively large, economically productive sector of the population would be disasterous.

Distribution of Wealth and Power The distribution of wealth and power also differs within the various ethnic groups along the coast. Some societies are relatively egalitarian with little differences between individuals with respect to wealth and power. Other societies, with a tradition of hierarchical organization and social stratification manifest marked variance with respect to access to wealth and power among individuals. Development programs targeted at helping the poorest of the poor must be differently structured in these different societies. In communities where there is differential access due to tradition, procedures should be developed which will equalize access without arousing resistance on the part of the traditional elite. This is not necessary in the more egalitarian societies.

Social Organization of Work The traditional social organization of work varies from society to society and has great potential influence on the success of fishery development programs (cf. Pollnac 1978). For example, crew size, which is traditionally large in some West African societies (e.g. Ghana, see Appendix C), can be influenced by technological changes. If technological improvements are made which can eliminate some crew members, there will be social forces which will keep the crew at its traditional level; thus, reducing the efficiency of the new technology. This is especially true in areas where crew are usually kinsmen as in much of West Africa. Further, elimination of crewmen in an area of scarce alternative employment would increase unemployment, a phenomena which has other negative implications such as increasing tendencies to move to urban areas.

Another aspect of the social organization of work which can be influenced by technological change in West Africa is the owner-worker relationship. In most of West Africa's artisanal fishing communities the owner is also a fisherman, and he usually uses kinsmen as crew members. As technology becomes more sophisticated and expensive, artisanal owner-operators are usually not in a position to be able to finance the new tehcnology, and the number of non-fisherman owners increases. These new ownership patterns result in greater social stratification which can result in social unrest. Sometimes the new technology is rejected when fishermen forsee its potentially negative effects. These problems, where present, can be overcome through the use of financing techniques

which will allow the industry to stay in the hands of traditional fishermen (e.g., producer cooperatives, subsidized loans from development banks, etc.).

C. Belief Systems

Ideological systems often determine specific aspects of the types of development opportunities that will be acceptable to the target population (cf. Cochrane 1979). The belief systems vary considerably among the ethnic groups fishing the coast of West Africa, and prior to project development, a preliminary assessment should be made of attitudes, beliefs, and values relevant to project parameters (cf. Pollnac 1976, 1980). Failure to account for these cultural differences can result in the failure of technologically well conceived projects.

Attitudes Towards Fish as Food The relatively high per capita consumption of fish in most of the countries considered suggests that attitudes towards fish as food are positive. In Simoons' article on rejection of fish as human food in Africa (1974), he cites only two ethnic groups in the area of interest which avoid fish as food: the Moors and the Ibo. The source of information on the Moors was dated 1909, and personal communication with individuals with recent experience in Mauritania suggest that the taboo has less impact today. With respect to the Ibo, only one unspecified subgroup was reported as having a taboo against fish consumption. The report was dated 1950, and changes may have occurred since then. The countries with the lowest per

capita consumption of fish are Mauritania and Guinea. Lack of a tradition of eating fish probably accounts for the low consumption rate in Mauritania, but in Guinea it is suggested that inadequate infrastructure may be contributing to the low consumption rate. This suggestion is supported by the relatively low density of roads in Guinea (see Table 18).

D. Distribution of Fishermen in Relation to Infrastructure

The present distribution of fishing communities along the West African coastline is adapted to existing technology and infrastructure (e.g. landing facilities, processing and distribution networks). Technological improvements, such as increased vessel size, may be restricted to areas with adequate facilities (as with the semi-industrial trawlers in Ghana). If the new technologies are so effective that they can respond more efficiently to demand, they may replace the older, less efficient technologies. Although this is desirable in most situations, these changes may result in under-employment in rural areas which lack adequate infrastructure (this includes most of the coastline) and stimulate increased rural to urban migration. Rural to urban migration is a factor recognized as having a negative impact on food production in Africa, and development programs should reverse not exacerbate this phenomena. Table 18 indicates that the level of rural to urban migration is already excessive in West Africa.

E. Mobility Patterns

Some ethnic groups in West Africa are already well known for the geographic mobility of their fishermen (e.g., the Fanti and the Anglo (Ewe)). Other fishermen are not as extensively

mobile, but many do migrate from area to area in response to availability of resources. Some migrate from fishing to farming areas depending on the season. These mobility patterns affect access to fishermen as well as development of adequate data gathering systems (e.g., as basic as determining the number of fishermen); thus, knowledge of the specific mobility patterns of different ethnic groups must be taken into account in designing fishery development programs.

F. Competing Demands Of Farming and Fishing

Available data suggest that fishing is a seasonal occupation for about one-third of the fishermen in most West African countries. Depending on the region and traditional practices, they either prepare the land and/or plant during the planting season, and fish when the agricultural work is completed. As would be expected, it appears that fishermen from the more rural areas spend more time farming than those near or in more urban areas. Nevertheless, fishermen residing in towns are reported to practice some subsistence agriculture (e.g., in Guinea Bissau, Hochet 1979).

Changes in fishing patterns (e.g., fishing further out at sea) which will alter the seasonality of fishing may have a negative impact on time devoted to agriculture. It is therefore suggested that prior to project implementation distributions of fisherman/farmer combinations be determined and cost/benefit analyses conducted to determine effects of proposed changes.

G. Artisanal Versus Industrial Fishery Development

A question that frequently arises in most fishery development programs involves the advisability of developing the artisanal fishery at the expense of the industrial. Everett (1979) presents

a comparison of costs and benefits of artisanal and industrial fishing development which was prepared by CIDA. His table is reproduced here.

Everett (1979) indicates that the overall benefits of the artisanal fishery in Table 17 are to a certain extent exaggerated, but admits that artisanal fisheries do deserve a high priority in fishery development. In some cases, e.g., fishing great depths or rough waters or supplying large urban areas or processing facilities, the industrial fishery is clearly more efficient. In setting development priorities, however, factors such as those discussed above should be weighed in a cost benefit analysis, to arrive at the best mixture for the country involved.

Table 17 SUBJECTIVE ASSESSMENT OF BENEFITS TO ANNATION OF ARTISANAL RATHER THAN INDUSTRIAL FISHERIES

Artisanal	Industrial
creates : employment	unemployment
uses : modest local investment	substantial foreign investment
are : decentralized, in villages	centralized in towns
uses : simple technology	complicated technology
exploits : abundant coastal resources	poor offshore resources
produces : high quality fresh fish	poorer quality stored fish
provides : products for local markets	for export
consumes : little energy	much energy
causes : little pollution	substantial pollution
affects : beneficially social habits	detrimentally social habits

Source: Everett (1979) adapted from an unpublished CIDA document.

Jarrold and Everett (1978) conducted an economic and socio-political analysis of the returns of unmotorized canoes (hand-liners), and semi-industrial handliners, purse seiners, and trawlers in Senegal. The analysis indicated that the semi-industrial trawler and purse seiner gave the most favorable returns in terms of overall benefits to the nation. Nevertheless, as Everett (1979) points out, canoe motorization does provide benefits to both the fishermen and the nation. It maintains employment in rural areas with a modest investment and increases both the income of the small fishermen and the supply of fresh fish. Further, semi-industrial vessels often need landing facilities found only in urban areas; thus, resulting either in under-employment in the rural area or the migration of fishermen to urban centers. As noted elsewhere in this report, employment in rural areas is a positive factor due to the problems associated with increasing urbanization in Africa. Further, rural fishermen often grow at least subsistence crops, thus contributing to the availability of plant food as well as animal protein in an area of the world suffering from food deficits.

H. Key Social Indicators

Table 18 was prepared to provide a general summary of important social indicators for West African coastal countries. The table clearly indicates the extreme poverty of the region. A recent calculation of the Physical Quality of Life Index for 150 countries placed all countries in Table 18, except for Ghana and Cape Verde, in the lower 20 percent. Ghana was ranked 39th

Table 18. Key Social Indicators in Coastal West Africa.

Country	Per Capita GNP 1977 US $[1]	Percent Literate (age 15 and over)[2]	Life Expectancy At Age One (years)[2]	Infant Mortality Rate Per 1000 Live Births[2]	Km of Roads Per Km^2 of Total Land (Percent)[1]	Percent of Total Population Urban[1]	Percent Avg. Annual Growth Rate of Urban Areas[1]
Mauritania	270	11	45.7	187	.6	26	14.4
Senegal	430	8	51.1	159	7.1	24	8.0
The Gambia	-	10	51.7	165	-	-	-
Cape Verde	180	37	53.3	79	-	-	-
Guinea Bissau	280	5	46.9	208	8.9	-	-
Guinea	220	9	48.7	175	3.1	17	6.2
Sierra Leone	190	10	49.9	136	10.3	23	5.6
Liberia	420	10	52.5	159	7.2	32	5.6
Ivory Coast	690	20	51.6	164	14.2	35	9.3
Ghana	380	25	55.8	156	13.5	33	5.1
Togo	300	16	45.9	127	12.5	16	5.4
Benin	200	20	49.3	185	2.4	-	-
Nigeria	420	25	49.0	180	11.6	18	4.6
Cameroon	340	19	46.5	137	6.1	28	8.0

[1]Source: Food Problems and Prospects in Sub-Saharan Africa: The Decade of the 1980's, U.S.D.A. (1980).

[2]Source: M.D. Morris, Measuring The Condition of The World's Poor, Permagon Press (1979).

and Cape Verde 62nd (Morris 1979). This index, which captures the essentials of "basic needs", is based on infant mortality, life expectancy, and basic literacy--three variables related to a host of factors associated with economic development.

Returning to Table 18, although it was determined on the basis of country-wide statistics, it is possible to make some inferences concerning relationships between items in the table and and fishery development. First, it is clear that the low literacy rate impacts on fishery development programs. There is some evidence to suggest that fishermen may actually be below the national average with respect to literacy. Gladwin (1970) notes that Ghanaian fishermen tend to be less Westernized than other Ghanaians. Noting that while over 50 percent of the individuals over 15 years of age in Cape Coast can speak English, only one of the 200 fishermen he interviewed could. He suggests that this may be due to the fact that fishing is not considered a suitable occupation for the educated, thus the occupation selects against English speakers. This low literacy rate indicates that communications aimed at fishermen will have to be oral, not written. Further, it will be necessary to locate credible, literate fishermen to act as record keepers where necessary (e.g. in fishermen's associations).

Road density is another social indicator that will impact development programs. Low road density suggests that there will be relatively isolated fishing villages which will be hard to reach with development programs. Further, road density is an aspect of infrastructure that impacts the distribution of fish.

Regions with low densities can probably absorb less product than those with high densities. Projects planned for countries with low densities should therefore make sure that transportation links to major markets are adequate.

Finally, with respect to Table 18, it is clear that the rate of urbanization is relatively high in most of the countries. This trend has been noted as part of the problem negatively affecting food production in Africa. As noted above, fishery developments which introduce technologies that are restricted to areas with well developed infrastructures (usually urban areas) tend to exacerbate the urbanization problem. Nevertheless, since many of the larger urban areas in West Africa are located in coastal regions, development of the marine fishery could help provide animal protein to the urban dwellers with a minimum of infrastructure for distribution. More careful analyses need to be conducted, however, to determine the relative balance between these conflicting needs.

APPENDIX A

APPROXIMATE COASTLINE AND CONTINENTAL SHELF

COUNTRY	COASTLINE km	SHELF AREA '000 km^2
Morocco (to 21°N)	2,300	75.0
Mauritania	780	32.3
Senegal	500	30.0
Gambia, The	80	5.2
Cape Verde	-	-
Guinea Bissau	350	52.5
Guinea	320	39.5
Sierra Leone	300	26.9
Liberia	560	17.4
Ivory Coast	600	11.6
Ghana	550	21.7
Togo	70	1.7
Benin	100	2.6
Nigeria	860	37.0
Cameroon	480	25.0
Equatorial Guinea	200	-
Gabon	800	39.0
Congo	180	16.0
Sao Tome and Principe	-	-
Zaire	40	-

Source: Everett, et al (1980).

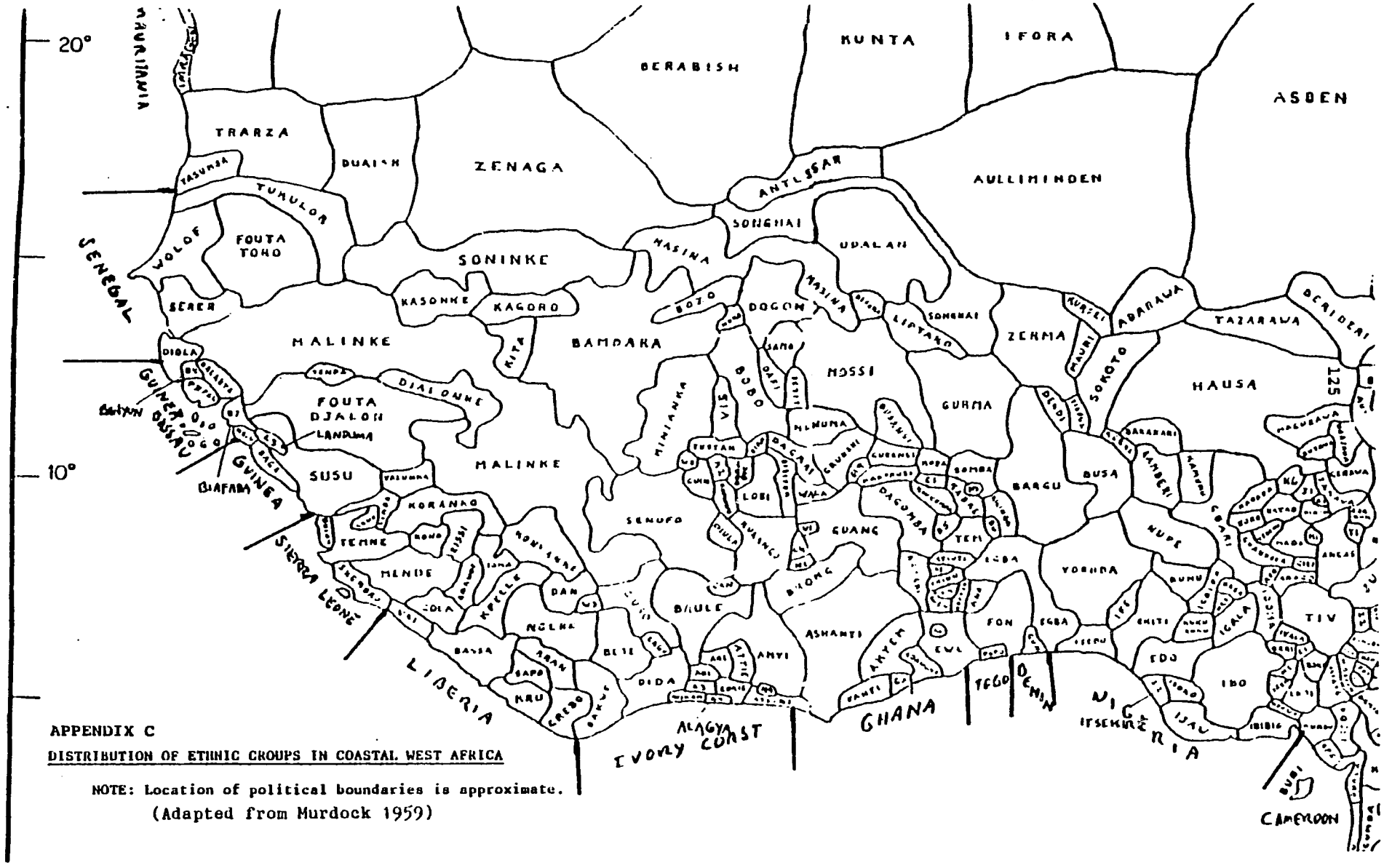
Appendix B

Nominal Catches by Country

CECAF Region

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978
West African									
Benin	8,500	5,600	10,400	8,700	7,502	5,673	4,956	4,378	4,852
Cameroon	20,800	24,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
Cape Verde	5,100	4,500	4,100	6,200	2,426	3,902	2,024	8,331	8,331
Congo	9,900	11,000	15,800	15,200	15,717	15,103	17,869	15,364	16,297
Eq. Guinea	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Gabon	2,500	3,500	4,500	4,500	4,500	5,656	6,656	6,656	6,656
Gambia	4,800	5,000	6,200	9,600	9,995	9,995	9,995	9,995	9,995
Ghana	141,500	177,100	222,000	110,500	164,634	176,873	157,721	203,611	219,654
Guinea	6,000	9,000	7,300	8,500	111,000	12,370	8,920	8,120	9,000
Guinea Bissau	1,600	1,400	1,700	1,700	1,700	866	1,615	1,911	1,911
Ivory Coast	66,500	70,600	76,400	59,500	69,251	62,470	72,895	79,307	74,908
Liberia	10,700	11,800	12,500	12,500	12,600	12,600	12,600	12,537	14,626
Mauritania	50,200	62,900	32,400	28,400	21,170	21,170	21,170	21,170	21,170
Morocco	239,700	213,700	229,900	379,900	267,426	213,362	262,536	226,805	259,796
Nigeria	217,000	231,700	222,900	233,900	233,843	226,106	256,124	263,860	272,681
Sao Tome Prn	800	700	800	800	1,000	1,200	1,300	1,400	1,500
Senegal	169,200	221,000	278,600	303,800	347,030	352,912	350,861	282,332	340,280
Sierra Leone	29,600	29,600	60,100	65,700	66,739	67,497	62,692	61,452	47,580
Togo	6,400	7,600	7,600	7,600	8,150	11,420	9,470	7,623	4,000
West Sahara	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Zaire	1,000	700	700	700	700	700	395	2,400	1,392
Sub Total	998,700	1,096,100	1,211,500	1,290,600	1,255,983	1,229,497	1,278,397	1,235,852	1,346,852
Non-West African									
Major									
Bulgaria	35,000	14,100	26,600	19,900	255,000	45,614	28,405	48,454	31,153
Cuba	22,100	9,000	6,800	10,600	10,700	6,600	6,400	20,700	7,200
Egypt	9,000	11,000	16,100	13,800	12,913	15,000	15,000	15,000	-
France	64,100	47,700	59,300	49,300	64,215	56,030	64,131	67,242	65,270
Germany DM RP	39,100	43,000	6,000	-	1,561	1,913	7,461	18,020	8,524
Greece	32,400	40,500	33,300	33,400	28,800	23,800	25,378	26,956	26,956
Iceland	-	-	-	-	-	10,897	-	-	-
Italy	62,900	65,400	59,700	44,300	32,870	19,004	26,014	26,234	20,241
Japan	142,900	114,600	120,200	113,200	126,790	86,675	65,374	67,796	60,938
Korea Rep	-	39,900	40,100	64,200	75,482	97,220	104,952	99,043	94,338
Norway	97,100	202,800	197,000	129,900	79,379	12,631	-	-	-
Poland	31,200	32,200	39,900	34,300	36,613	92,290	129,412	203,429	49,302
Portugal	70,400	46,700	35,100	27,700	30,738	26,869	26,775	20,301	15,294
Puerto Rico	16,000	20,000	30,000	29,600	27,900	28,433	30,671	22,360	29,975
Romania	4,800	16,900	33,400	43,900	72,004	78,084	35,804	78,431	41 02
South Africa	126,000	-	-	-	-	-	-	-	-
Spain	219,700	228,900	246,500	367,200	423,137	387,287	415,184	442,064	267,488
U.S.S.R.	612,500	789,800	848,800	942,700	1,145,000	1,165,744	1,315,439	1,134,433	769,500
Total Major	1,665,200	1,721,500	1,787,700	1,924,000	2,183,603	2,162,951	2,292,695	2,291,263	1,495,381
Minor	2,200	1,700	700	2,100	1,700	400	400	400	400
Total Non-W. African	1,667,400	1,723,200	1,788,400	1,926,100	2,185,303	2,164,391	2,292,995	2,291,663	1,495,781
Total West African	998,700	1,096,100	1,211,500	1,290,600	1,255,983	1,229,497	1,278,397	1,235,852	1,346,852
Other NEI	202,100	149,700	168,000	171,500	107,237	171,877	84,762	221,540	203,050
Total Catches	2,768,200	2,969,000	3,177,900	3,388,200	3,548,523	3,555,765	3,656,154	3,749,055	3,045,683

Source: FAO (1979), Yearbook of Fishery Statistics, Vol. 46. Catches and Landings, 1978, p.221:



APPENDIX C

DISTRIBUTION OF ETHNIC GROUPS IN COASTAL WEST AFRICA

NOTE: Location of political boundaries is approximate.

(Adapted from Murdock 1959)

APPENDIX D

COUNTRY SUMMARIES OF ARTISANAL FISHING: ETHNIC GROUPS, FISHERMEN'S ASSOCIATIONS, AND FISH CONSUMPTION.

MAURITANIA Despite the richness of the coastal waters off Mauritania, most of the fishing has traditionally been done by outsiders, especially Canary Islanders and fleets from some European countries. Doubtless, this is due to the fact that the Maures[1], who comprise about 80 percent of the population, traditionally do not eat fish. According to some sources, they practice fish avoidance--there is actually a taboo against consuming fish. The only Maures that both fish and consume fish are of the Imraguen caste, a group of relatively low social status whose physical appearance distinguishes them from other groups in the country[2]. According to the FAO Fishery Country Profile (1979) approximately 400 Imraguens operate 85 artisan vessels in the coastal zone. The only other artisanal fishing group identified consists of approximately 250 Senegalese who operate 60 canoes along the coast.

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[1]Maure (Moor) is a general term used to refer to some pastoral peoples in Mauritania. The ethnic groups of Mauritania, some of which are variously classified as Maures, include the Delim, Tasuma, Tukulor, Trarza, Regeibat, Zenaga, Duaish, and Berabish.

[2]According to Grayzel (personal communication) this physical difference is not evident today.

SENEGAL The artisanal fishery of Senegal produces over three-fourths of the annual landings. The 1977-81 Plan indicates that there are some 46,600 artisanal fishermen operating 6,442 small vessels of which approximately two-thirds are motorized. Although today's fishermen are drawn from most of the ethnic groups in the country, traditionally the Niominka and the Lebon were identified as fishermen. The Niominka are a coastal group related to the Serer, and the Lebon are a relatively small ethnic group wherein both men and women practice fishing. Although the Toucouleur practice only inland fishing, it is interesting to note that fishermen comprise the lowest strata of the upper class in their caste system. This is the opposite of the traditionally low status of fishermen in many parts of the world. The national consumption of fish is rather high, and no ethnic groups were identified as rejecting fish as food. Fish is consumed all over the country in various forms (e.g., fresh, dried, smoked, fermented, salted, etc.), and is used principally in sauces on rice, millet, or sorghum.

The government of Senegal has promoted the fishermen's co-operative as a principal means of increasing primary productivity in the sector. At present, there are 76 primary societies with some 7,000 members. These cooperatives distribute occupational supplies (gear, engines, gasoline, etc.) with subsidized prices and interest free loans. Reports thus far indicate that the co-operatives have been successful. For example, it is reported that loan repayments are usually made on time in marked contrast to the defaults that plague cooperatives in many developing countries.

Fish landed are usually purchased by middlemen who drive to the landing places. Each fisherman has his own buyer, and considerable price variations are reported. The government is now expanding the supply function of the cooperatives to include marketing the distribution, an act that they hope will level price fluctuations. One potential problem noted, however, is the fact that the fishermen, including the secretaries and managers of their cooperatives, may not have sufficient skills to run these more complex cooperatives. Further, Senegal has no special training program to train individuals for positions of cooperative leaders. Government cooperative officers, however, can enroll in a cooperative training course run by the National School of Applied Economics in Dakar.

GAMBIA It is reported that the Gambia has some 3,000 artisanal fishermen. From 50 to 80 percent of these fishermen are foreigners, mostly Senegalese and some Ghanaians. The catch of the foreign fishermen is landed and sold primarily in Gambia, and many of them apparently live there for the greater part of the year.

Fish are landed and sold directly to middlemen who distribute the catch further inland with their own vehicles. The Government Fish Marketing Corporation also buys fish from these middlemen, but it is mainly for export and some large local users.

Attempts to organize fishermen's cooperatives have not been very successful thus far. There are only two active cooperatives with a total of about 240 members. The firm establishment of the

middlemen has been identified as a constraint in the development of cooperatives as well as the relatively low level of formal education of most Gambian artisanal fishermen. The existence of a well organized cooperative training scheme which has worked quite successfully among groundnut producers, however, suggests that fishermen's cooperatives can be developed and used as a vehicle to promote the development of the artisanal fishermen.

GUINEA The FAO Fishery Country Profile for 1978 indicates that there are about 4,000 artisanal fishermen operating in Guinea. Many of these fishermen are found among the Soussou and the Baga, the two largest of the four ethnic groups that live along the coast. The Soussou are the largest ethnic group on the coast. Those who fish along the coastline also depend on coconut and oil palms for a portion of their income. The important role played by the Soussou in terms of their dominance of the trade between the coast and the interior is reflected in the fact that their language, Soussou, is the lingua franca of lower Guinea. The other major fishing group, the Baga, is the second largest ethnic group living on the coast. Many Baga cultivate the land as well as fish. Although there is no mention of fish avoidance among the people of Guinea, the per capita consumption is not as high as in many other West African Countries. Fish is important in the diet only along the coast and in river basins, which suggests that the problem may be distributional.

GUINEA BISSAU The little information available concerning the coastal people of Guinea Bissau suggests that the majority of the

fishermen are also farmers, and the planting and harvesting seasons affect the timing of fishing. The principal fishing groups along the coast include the Bayote, Diola, Pepel, and Niominka. The Niominka are accomplished fishermen who originally came from Serer (Serrer) country in Senegal. It is reported that both males and females fish among the Manjak and Pepel (Hochet 1979). Where both sexes fish, men tend to fish from boats or distant from home while women fish along the shore and inland streams and collect shellfish (Murdock 1959).

SIERRA LEONE The coastal regions of Sierra Leone are populated by five major ethnic groups. The Mende and Sherbro from the largest part of the population in the south, the Temne and Susu in the north, and the Krio (formerly Creole) in the west. The Temne constitute the majority of the fishermen in each region. In the recent past numerous Ghanian artisanal fishermen worked in Sierra Leone, but their numbers have decreased substantially in the past few years.

The fishermen manifest several features which can be significant in terms of designing development programs. First, the fishermen migrate a great deal. This has resulted in problems determining the exact number of active artisanal fishermen. Some fishermen establish a home with a wife in each fishing area, but the majority maintain only one home and live with friends while fishing away from home.

Another significant aspect of artisanal fishing in Sierra Leone is the distinction between the part-time and full-time fishermen. In the major fishing areas, most fishermen are full-time.

In other areas, men fish during the peak period and engage in other activities such as farming and petty trading during the off-season.

Traditionally, boat owners formed part of the crew. Often a man would fish with relatives and provide for their upkeep as well as giving them a little spending money. Today, especially in the more urban area close to Freetown, a new system of ownership is developing which is referred to as the "sleeping fisherman". "Sleeping fishermen" are owners who do not fish--they hire crews. As fishing grows more profitable, it is expected that these non-fishermen owners will increase in number resulting in a "new class" of person in the fishing industry as well as increasing social stratification in the fishing communities.

The artisanal fishermen of Sierra Leone traditionally sell their catch to middlemen, who until recently were exclusively female. It is reported that more men are going into this profitable business today, but women still outnumber men. Sometimes the middleman is the fisherman's wife. In any case, strong social ties of reciprocity exist between the fisherman and his buyer. This middleman smokes the fish and then sells them for a profit. Attempts to organize the fishermen into cooperatives failed on such a grand scale that they will have nothing to do with co-operatives today. Fisheries personnel are now trying to organize them into "fishermen's groups" which in the first stages provide the supply function of a cooperative.

Most of the people of Sierra Leone eat fish. In fact, it is reported that they prefer salt water fish because of its taste.

Local markets which sell the smoked fish can be found in all areas. In addition, 12 to 14 of the provincial towns have fish shops which sell frozen fish from the industrial fishery. The people are said to prefer smoked fish, however, because of its flavor and its inclusion in traditional recipes. Fish is not only the cheapest source of animal protein, it is also preferred by all classes of people; thus increases in supply should find a ready market.

LIBERIA Moving from the northwest to the southeast along the Liberian coastline one finds four major ethnic groups: The Vai, Dei, Bassa, and Kru. The coastal Kru are fishermen and seamen, and the Bassa rely heavily on hunting, fishing, and the gathering of forest products. According to the FAO Fishery Country Profile for 1979, the coastal artisanal fleet consists of about 700 canoes with 2,800 small-scale fishermen. Fanti fishermen from Ghana are reported to own 80 percent of the canoes fishing along the coast.

IVORY COAST Estimates of the number of artisanal marine fishermen in Ivory Coast vary from 17-22,000. The ethnic diversity of the coastal peoples and the small amount of applicable data available concerning their lifestyles and economy probably contributes to this variance in the estimate. In the west, Kru (Krou) peoples are found along the coast. They are part of the same ethnic group that produces the marine fishermen in Liberia. In Ivory Coast as in Liberia, it is the coastal Kru who fish. A cluster of ethnic groups

known as the Lagoon Cluster also includes several groups that fish. For example, the Mekyibo and the Ebrie are predominantly fishing people. It is reported that many of the Lagoon Cluster fishermen actively fish the waters of other countries farther east. This migratory pattern is similar to that practiced by the Fanti of Ghana and the Ews of Togo who fish the waters of other countries, including Ivory Coast. Early efforts to establish cooperatives among these fishermen failed, and today there are no officially recognized cooperatives. It is reported, however, that there are a number of mutual aid groups among the artisanal fishermen which could provide the basis for developing cooperative-like institutions in the future to facilitate aid programs.

GHANA Ghana has a relatively large artisanal marine fishing fleet composed of some 8,200 canoes crewed by an estimated 60-100,000 fishermen who live in some 200 villages and towns scattered along the coastline. The exact number of Ghanaian fishermen is hard to determine because of the traditionally high number of fishermen who migrate to the shores of other countries to fish, save money, and return to Ghana. Further, several reports have indicated that a majority of fishermen fish only two to three months of the year, thus increasing the difficulty of including all fishermen in a survey. According to several reports, this relatively short period of fishing activity has led to a perception of the fisherman as being lazy.

Among the several ethnic groups along the coast, the Fanti comprise most of the canoe fishermen as well as most of the Ghanaian migratory fishermen. It is important to note, however, that fisher-

men as a group do not enjoy high status among the Fanti. The coastal Ewe (specifically the Anglo) Adangbe, and Ga in the East are also principally fishermen, but they number far less than the Fanti. The Fanti operate both large and small canoes. The former are crewed by one to five fishermen and the latter by nine to fourteen. Crew members are often linked to the owner by kinship.

The artisanal fishery in Ghana seems to merge with the industrial fishery in a way not seen in other West African countries. This is due to the existence of small (10 meter and under) trawlers. Although it is reported that the majority of these trawlers are not owned by Fanti, Fanti often make up the average twelve man crew, and the catch is distributed in the traditional manner described below. This small trawler fishery contrasts with the traditional artisanal fishery in that the trawlers are too large to land their catches at most of the coastal fishing villages and towns, a fact that is of considerable importance with respect to any plans to increase the size of this fleet.

Fishermen's cooperatives have had mixed success in Ghana. The Ghanaian Cooperative Department maintains a network of field officers for organizing and advising primary cooperatives, but few of them are specialists in fishermen's cooperatives. There are now about 147 fishermen's cooperatives which function primarily to obtain credit and supplies for members. Some sell fish jointly on behalf of members.

Marketing and distribution of fish in Ghana is dominated by women. The primary buyer is usually the wife, wife's mother, or mother of the fisherman. Today there is an increase in the number of fishermen selling to unrelated female buyers who are often quite successful entrepreneurs. The importance of these unrelated middlemen has increased along with the motorization of the artisanal fleet in Ghana due to the fact that they often are the ones who provide loans necessary to purchase and maintain the more expensive and complex equipment. The primary buyers either sell the fish to other middlemen, processors, or retailers, or smoke the fish and then sell it. The high per capita consumption of fish in Ghana suggests that it is a widely appreciated food.

BENIN The artisanal inshore fishery of Benin is composed of approximately 3,500 fishermen operating an estimated 500 dugout canoes crewed by five to nine men each. Accroding to the FAO 1978 Fishery Country Profile, approximately 20 percent of the vessels are motorized.

About two-thirds of the landings are smoked or salted as a means of preservation for selling in inland markets. Another 10 percent is fried in palm oil. A little less than one-fourth of the catch is consumed fresh. Consumer attitudes towards fish are positive as evidenced by increasing imports to satisfy demand.

TOGO The artisanal coastal fishery provides approximately two-thirds of Togo's catch. Some 600 boats carrying from nine to tweleve fishermen each make up the artisanal fleet of Togo. Approximately 150 of these boats are manned by immigrant fishermen from neighboring countries. It is reported that fishing activities are concentrated between September and February.

The Ga and Gon are the ethnic groups which concentrate primarily on fishing. The Anglo, a coastal Ewe speaking people who live in western Togo and eastern Ghana, traditionally operated beach seines along the coast of Africa from Sierra Leone to Angola. In the past ten to fifteen years, however, most countries ceased giving them permission to fish their waters in attempts to help their own artisanal fishermen. These Anglo beach seine fishermen are now concentrated in Togo and Ghana.

The catch is sold directly on the beach to individual family enterprises which process the fish by smoking, a process which produces a product preferred by the consumer. Other forms of preservation (e.g. salting, drying) are also practiced. Most

of the fish are consumed in the coastal belt because of transportation difficulties and higher prices inland.

NIGERIA Major ethnic groups along the Nigerian coastline are the Yoruba, Ijaw, and Ibibio. There are about one million Ijaw in and along the coastline of the Niger delta. The principal activity of the Ijaw is fishing. Other economic activities prevalent among the Ijaw such as fish processing (e.g. drying), salt making, and trading are also derived from their coastal location. Although no information is available at present, the concentration of oil reserves off the Niger delta has probably had an influence on this traditional occupation structure.

The Yoruba were traditionally farmers, but in the 19th centruy some moved toward the coastline and became lagoon and coastal dwellers. Today there are numerous Yoruba fishing villages in the western coastal zone. Smoked fish from this region reaches far into the interior of the area populated by the Yoruba.

One subgroup of the Ibibio, the delta or Andoni-Ibeno Ibibio, who live on the islands and mudflats east of Port Harcourt, exist primarily by fishing, smoking the fish, and selling the product.

Most of the artisanal catch is consumed within a relatively short distance of the coastline. Over eighty percent of the fish are smoked, some of which finds its way into inland markets. Only one ethnic group in Nigeria, an unspecified subgroup of the Ibo, are reported to manifest a taboo against eating fish. The report containing information on the taboo was dated 1950, and changes may have occurred since then.

CAMEROON About 12,000 artisanal fishermen operate 5,950 small-scale fishing vessels along the coast of Cameroon. The important coastal ethnic groups include the Douala, Wouri, Kpe, Pongo, Bodiman, and Bamboko. The most important single activity of the coastal people is fishing although some cultivate commercial crops and others are traders. The Douala and Kpe are numerically the most significant of the coastal people. Although all are reported to speak Bantu languages, one report notes that Wes Cos, a form of pidgin English, is widely used along the coast as a lingua franca.

Little information is available concerning the processing and distribution of marine fish. The FAO Fishery Country Profile notes that much of the artisanal catch is smoked prior to distribution. A fleet of refrigerated trucks deliver fish caught by the industrial fleet to a chain of cold storage depots located in the interior of the country.

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They need to do a strategy in collaboration with a group from AID- because of [illegible] coop. with Near East Bureau-